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ADAPTIVE CAPACITY: PROPOSITION AND VALIDATION OF A MEASUREMENT SCALE

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ABSTRACT

Purpose - The paper aims to propose and validate a scale for measuring adaptive capacity in organizations.
Design / methodology / approach - To propose the scale dimensions, the model by Stabler and Sydow (2002) was taken into account and to propose the indicators for each dimension, previous studies related to the theme were analyzed based on a systematic review on academic bases. For quantitative validation of the scale, an e-survey was adopted in 122 organizations in the Northwest Colonial region of the State of Rio Grande do Sul, Brazil, using structural equation modeling (MEE) with the SmartPLS 3.2.8 software as support.
Findings - The results of the study demonstrate the articulation of the indicators of Flexible Organizational Structure and Innovative Management, Plurality and Multifunctionality of Teams and Information Systems and Market Analysis result in a scale in which several aspects related to the existence of the development of adaptive capacities in organizations can be analyzed.
Research limitations / implications - It is noteworthy that the sample considered for the analysis is based on a specific region, therefore, its results should be interpreted with caution.
Practical implications - The scale contributes to instrumenting the managers allowing the identification of weaknesses, relevant to the dimensions and indicators, so that the managers can guide their efforts.
Originality / value - This study shows itself to be prominent, since its measurement and validation of a scale based on the development of adaptive capacity will allow, in such a way, other studies and also new comparisons for the advancement of the subject.

Keywords: Adaptive Capacity; Scale; Dynamic Capabilities.

RESUMO

Objetivo - O estudo tem como objetivo a proposição e validação de uma escala de mensuração da capacidade adaptativa em organizações.
Design / metodologia / abordagem - Para proposição das dimensões da escala levou-se em consideração o modelo de Stabler e Sydow (2002) e para proposição dos indicadores de cada dimensão analisou-se estudos anteriores relacionados à temática com base em uma revisão sistemática em bases acadêmicas. Para validação quantitativa da escala adotou-se o e-survey em 122 organizações da região Noroeste Colonial do Estado do Rio Grande do Sul, utilizando a modelagem de equações estruturais (MEE) com o software SmartPLS 3.2.8.
Resultados - Os resultados do estudo demonstram a articulação dos indicadores de Estrutura Organizacional Flexível e Gestão Inovadora, Pluralidade e Multifuncionalidades das Equipes e Sistemas de Informações e Análise de Mercado resultam em escala em que vários aspectos relacionados à existência do desenvolvimento de capacidades adaptativas em organizações podem ser analisados.
Limitações / implicações da pesquisa - Destaca-se que a amostra considerada para as análises se baseia em uma região específica, portanto, seus resultados devem ser interpretados com cautela.
Implicações práticas - A escala contribui para instrumentar os gestores permitindo a identificação de pontos fracos, pertinentes às dimensões e aos indicadores, de maneira que os gestores possam nortear seus esforços.
Originalidade / valor - Este estudo se mostra proeminente, uma vez que, a sua mensuração e validação de uma escala fundamentada no desenvolvimento da capacidade adaptativa permitirá de tal maneira novos estudos e também novas comparações para o avanço da temática.

Palavras-Chave: Capacidade Adaptativa; Escala; Capacidades Dinâmicas.

1 INTRODUCTION

Adaptive capacity is considered as one of the components of dynamic capabilities that seeks to understand how organizations connect their internal advantages and resources with the existing advantages in the market (Wang & Ahmed, 2007). In this context, an organization has adaptive capacity when it adapts, responds and reacts to internal or external changes (Grewal & Tansuhaj, 2001; Krohmer, Homburg & Workman, 2002).

Rindova and Kotha (2001) highlight those dynamic capabilities are reflected through an organization's ability to adapt, essentially considering the strategic flexibility of existing resources, the internal alignment of resources, its form of organization and the permanent needs for strategic change. The difference between adaptive capacity and adaptive capacity is that adaptation describes an ideal final state of survival for an organization, while adaptive capacity emphasizes the search for balance in prospecting and exploration strategies (Staber & Sydow, 2002).

Adaptive capacity helps organizations to: a) seek new markets and technologies; b) process new information continuously; c) adjust and reconfigure the organizational structure and management quickly and; d) to study and explore new knowledge simultaneously (Staber & Sydow, 2002; Teece, Pisano & Schuen, 1997). Thus, companies must develop the adaptive capacity to reconfigure their resources and coordinate processes immediately, in order to develop more successful products than those of competitors.

However, according to Wang and Ahmed (2007), empirical theoretical studies on dynamic capabilities - which encompass adaptive capacity - have been conducted on a fragmented basis and research results remain disconnected in order to integrate factors and resources. However, Meirelles and Camargo (2014) justify that, despite the efforts already spent on the theme, the concept is still the subject of controversy, as several definitions are presented, some similar, others not, and, in par-

ticular, it stands out the disparities in proposals for understanding the mechanisms and conditioning factors for the development of dynamic capabilities, thus requiring research that understands their development process. Thus, Barreto (2010) and Eriksson (2014) point out the need for multidimensional constructs to assess dynamic capabilities.

In this perspective, some studies have already been developed to propose and validate scales, constructs or tools for measuring and/or assessing dynamic organizational capabilities. The study by Silveira-Martins and Zonatto (2015) that evidenced the development of tourist capacities, D'avila and Silveira-Martins (2017) analyzed dynamic productive capacities, Schilke et al. (2018) is also concerned with offering a research agenda for the theme of dynamic capabilities, in particular the need to formulate scales to validate the propositions of this theory in the organizational context. Kump, Engelmann, Kessler and Schweiger (2019) identified the perception capacities, apprehension and transformation, Zaluski, Sausen and Ferreira (2020) evaluated the component elements and the organizational mechanisms for developing dynamic capabilities in organizations. Garrido et al (2020) are also dedicated to structuring a relationship of the components of dynamic capabilities, involving shaping opportunities, collecting opportunities and managing risks and reconfiguration, as elements that impact organizational performance.

Otherwise, despite the efforts to increase new scales on organizational capacities, this study differs from others, as it does not yet have a theoretical framework for creating an adaptive scale. Thus, this work shows itself to be relevant, since its measurement and validation of a scale based on the development of adaptive capacity will in such a way allow further studies and new comparisons or even future meta-analyzes of the subject (Kump et al., 2018).

In this sense, this study aims to propose and validate a scale for measuring adaptive capacity in organizations. For proposing the dimensions of the scale, the model by Stabler and Sydow (2002) was taken into account. To propose the indicators for each dimension, previous studies related to the theme were analyzed (Oktemgil & Greenley, 1997; Stabler & Sydow, 2002; Wei & Lau, 2010; Akgun, Keskin & Byrke, 2012; Biedenbach & Müller, 2012; Kaehler, Busatto, Becker, Hansen, & Santos, 2014; Chryssochoidis, Dousios & Tzokas, 2016; Minucci, 2016; Sussman, 2016; Ma, Yao & Xi, 2009; Ali, Sun & Ali, 2017; Eshima & Anderson, 2017; Zhu, Su & Shou, 2017).

Thus, to achieve the research objective, a quantitative and descriptive methodology was used, where data collection was performed through an e-survey. The sample included 122 organizations in the Northwest region of the State of Rio Grande do Sul. According to Büttenbender et al (2020) this specific region of the state of Rio Grande do Sul plays an important role in the state's economic dynamics. The agricultural inspiration of the region is evident, according to data from the Economic Atlas of Rio Grande do Sul (2021), but it presents the region with a strong potential for development, given its productive base and training of new professionals, with a focus on innovation industry linked to rural development, likewise the use of technology incubators as an strategy to development new business and create more innovation. Also, according to that same study, in 2017 the state contributed 6.4%, being in 4th place in relation to the participation of states in Brazil's GDP.

The developed study had as a principle the proposition of the dimensions and indicators of the scale and later the validation of the proposed measurement model was carried out, being finalized, with the validation structural scale model and theoretical discussions of the results. Such findings conclude that the final scale proposed for disclosing organizational indicators for the development of adaptive capacity has three dimensions and twenty-one indicators.

This study is structured in five sections. The first and second present the theoretical framework and propose the dimensions and indicators of the measurement scale. The third section presents the methodology adopted for data collection, analysis and interpretation. The fourth presents

the results of the study, starting with the validation of the measurement and structural model of the scale and discussions. In the fifth section, the conclusions, limitations of the study and suggestions for future research are presented.

2 DYNAMIC CAPABILITIES

The theoretical assumptions of dynamic capabilities are presented as a relatively new topic in academia, being established as a field of studies of increasing interest for researchers in the field of administration (Meirelles & Camargo, 2014). Its concept is relevant because the company carries out the transformation through stimulus oriented towards changes, in a balanced way with the challenges and routines of day-to-day operations. In this way, the dynamic capacities reflected in to sense, to take advantage and to transform, would act in the reconfiguration of operational capacities, such as, marketing, R&D, operations, and, here we suggest, in the ability to adapt (Lima, Borini & Santos, 2020).

Since the first debates on organizational capabilities in Winter (1964), several authors have sought to develop the concept of this theme, above all else, from the point of view of its micro-foundations and operationalization (Zollo & Winter, 2002; Wang & Ahmed, 2007; Teece, 2009). In the second half of the 1990s, Teece, Pisano & Shuen (1990) constituted the theoretical search to present a definition on this theme. The aforementioned study was highlighted by the authors not only for the set of resources that maintain the competitive advantage, as promulgated by RBV, but, at the same time, the articulating instruments by which organizations learn to embrace new skills and capacities.

However, the dynamic capabilities construct is surrounded by a framework of varieties of interpretations and conceptualizations, and these concepts and elements change and transform from research to research. In contrast, the different definitions of dynamic capabilities focus in terms of identifying them as organizational procedures that allow companies to change their resource bases (Garrido, Kretschmer, Vasconcellos & Gonçalo, 2020).

Teece & Pisano (1994) define the concept of the term “dynamic capacity”, where the term “dynamic” is intended for the ability to renew skills to converge with the competitive environment of rapid changes, new technologies and high market influx, whose nature is complex. Therefore, the term “capabilities” emphasizes the basic role of strategic management in seeking to adapt, integrate and reconfigure its competencies, functional resources and organizational agilities at internal and external levels in the face of changes in the considered environment.

In this sense, Lima, Borini and Santos (2020) declare that an organization has dynamic capacity when it manages to highlight the context of the environment in such a way as to identify opportunities and threats; seize and capture opportunities and; transform and reconfigure resources and other operational capabilities. Operational details include clarifying the nature of dynamic capabilities.

Following this same thought, several definitions are found in the literature for the term dynamic capabilities, in addition, there are also different and distinct designations regarding their constructs or thematic elements that make up the capabilities in an organization. Meirelles & Camargo (2014) clarify that part of the authors highlight dynamic capabilities as constituting a set of organizational processes and routines, such as Teece, Pisano and Shuen (1997), Eisenhardt and Martin (2000) and Zollo and Winter (2002), for on the other hand, there are authors who understand organizational skills, behaviors and capacities, such as Collis (1994), Andreeva and Chaika (2006), Helfat, Finkelstein, Mitchell, Peteraf, Singh, Teece and Winter (2007) and Wang and Ahmed (2007). In this context, Schilke et al (2018) proposes, from a content analysis reviewing the state of the art, a research agenda for the theme, including, here, the need to translate dynamic capabilities into effective organizational practices, in a world in accelerated transformation.

In this sense, Teece (2019) is concerned with updating his theory proposed in the 1990s, in order to offer an explanation for emerging organizational phenomena in a world in constant change. With this objective, the author structures an initial view of a theory of the firm based on its capabilities, organizing them into ordinary capabilities and dynamic capabilities. These are responsible for the formation of differential value in a dynamic competitive market, involving three central elements: technology, business model and market.

Wang and Ahmed (2007), identified that dynamic capacities are composed of three component elements: adaptive capacity, absorptive capacity and innovative capacity. Thus, adaptive capacity seeks to explain how organizations use their internal advantages and resources combined with the advantages that exist in the market. The absorptive capacity highlights the organization's ability to acquire, assimilate and take advantage of external knowledge and, in turn, the innovative capacity comprises the organization's ability to develop new products and markets through the alignment and strategic orientation of innovation behaviors and processes. This study focuses on adaptive capacity, as presented in the next section.

2.1 ADAPTIVE CAPACITY

Teece, Pisano and Schuen (1997) and Zhou and Li (2010) agree to point out that a more dynamic view of organizational adaptation is important, which consists of the habituation capacity to deal with changes in environmental conditions. In the same way, Stabler and Sydow (2002) observe that organizations with an adaptive capacity might learn faster in changing conditions that require reconfiguring old routines, experimenting with new projects, identifying and capitalizing on market and technology opportunities emerging countries to develop and implement innovative ideas.

In this sense, adaptive capacity is perceived as a dynamic process of continuous learning that allows an increase in the capacity for innovation. The concept of adaptive capacity is used as a basis for understanding the different forms of capital (social, physical, human and natural) of an organization, as well as understanding the processes that allow it to live with changes, reducing negative impacts, and taking advantage of opportunities that appear. It constitutes a collective and multidimensional effort, so that the diversity of human capital represents a differential for the adaptive quality of systems (Harrison, 2013).

Burns and Stalker (1961) highlight that adaptive capacity addresses the interface between the environment and the organization, understanding the fit between an organization's external environment and its internal organizational structure. It is defined by the conventional approach to organizational adaptation, where organizations seek signals from the environment through customers, competitors and general conditions, with this information being filtered and, subsequently, decisions are made to respond to these environmental changes (Weick, 1979).

Rindova Kotha (2001) explains that dynamic capabilities are reflected through a company's ability to adapt in terms of strategic flexibility of resources, internal alignment of company resources, its form of organization and the constant needs for strategic changes. There is a distinction between adaptive capacity and adaptation, insofar as adaptation describes a final state, ideal for survival for a company, and adaptive capacity focuses on the effective search to balance prospecting and exploration strategies (Staber & Sydow, 2002).

The development of adaptive capacity is sometimes followed by the evolution of organizational forms, such as conventional structures that involve formalization, integration, centralization and complexity (Hage, 1999). However, in addition to formal structures, there are informal structural dimensions, such as low coupling, multiplexing and redundancy (Stabler & Sydow, 2002), this to

create and manage the capacity for organizational adaptation (Wang & Ahmed, 2003; 2007). In this context, for the proposition of the scale variables, it used studies available in the Scopus and Web of Science databases. The search for the studies adopted the criterion for selecting keywords that had the term “dynamic capacity” or “dynamic capabilities” and “adaptive capacity”, between the years of 1945-2019, with thirteen studies that presented in their structure the dimensions or indicators used to measure adaptive capacity. Table 1 presents the proposed scale for measuring adaptive capacity.

Table 1 - Proposal of the adaptive capacity measurement scale

(ADAPT.C) ADAPTIVE CAPACITY				
Dimension		**Indicator**	**Question**	**Evidence**
(FOSIM) Flexible Organizational Structure and Innovative Management	AC1	Flexibility in the Organizational Structure	The Organization has a flexible organizational structure	Zhu, Su and Shou (2017)
	AC2	Innovation in Organizational Management	The organization has an innovative organizational management	Sussman (2016)
	AC3	Management Style Flexible to changes	The organization has a flexible management style to change	Ali, Sun and Ali (2017)
	AC4	Adaptability to market changes	The organization is able to adapt to market changes	Minucci (2016)
	AC5	Use of New Technologies	The organization seeks and uses new technologies	Chryssochoidis, Dousios and Tzokas (2016)
	AC6	Shared and Participative Management Decisions	Management decisions are shared and participatory	Ali, Sun and Ali (2017)
	AC7	Fast and Assertive Decision Making	The organization is able to make quick and assertive decisions	Kaehler et al. (2014)
(PMT) Plurality and Multifunctionality of the Teams	AC8	Decision autonomy in teams	Decision autonomy exists in the organization's teams	Ma, Yao and Xi (2009)
	AC9	Trust in teams and management	There is confidence in the organization's teams and management	Kaehler et al. (2014)
	AC10	Efficient organizational communication	There is an efficient organizational communication	Wei and Lau (2010)
	AC11	Access to organizational information	Teams have access to organizational information	Minucci (2016)
	AC12	Team resilience in the face of organizational change and adaptation	There is resilience in the teams in the face of organizational change and adaptation	Akgun, Keskin and Birke (2012)
	AC13	Proactivity in teams	There is proactivity in the organization's teams	Minucci (2016)
	AC14	Configuration and Troubleshooting Organizational Problems	Teams are able to analyze and propose solutions to organizational problems	Ali, Sou e Ali (2017)
(ISMA) Information Systems and Market Analysis	AC15	Troubleshooting	The organization can quickly find problems that need adaptation and solution	Ali, Sou e Ali (2017)
	AC16	Monitoring Customers' Needs and Demands	The organization monitors customers' needs and demands	Minucci (2016)
	AC17	Identification of Opportunities and Threats from Information Collected	The organization is able to identify opportunities and threats from the information collected	Wei and Lau (2010)
	AC18	Interdepartmental Information Flow	There is an information flow between the sectors and departments of the organization	Ali, Sou e Ali (2017)
	AC19	Information Redundancy	The organization has excess and idle information that increases the choice in the face of market changes	Minucci (2016)
	AC20	Management Information Systems	The organization has a management information system for storing, accessing and analyzing information	Ali, Sou e Ali (2017)
	AC21	Competition Monitoring	The organization monitors competition	Kaehler et al. (2014)

Source: Authors.

The elaboration of the scale's dimensions was based on the structural dimensions of the adaptive capacity: multiplexity, redundancy and flexible coupling proposed by Staber and Sydow (2002). The indicators were proposed based on the selected studies (Oktemgil & Greenley, 1997; Stabler & Sydow, 2002; Wei & Lau, 2010; Akgun, Keskin & Byrke, 2012; Biedenbach & Müller, 2012; Kaehler, Busatto, Becker, Hansen, & Santos 2014; Chryssochoidis, Dousios & Tzokas, 2016; Minucci, 2016; Sussman, 2016; Ma, Yao & Xi, 2009; Ali, Sun & Ali, 2017; Eshima & Anderson, 2017; Zhu, Su & Shou, 2017) and categorized according to the alignment with the proposal of each dimension.

3 METHOD

The study adopted a quantitative, exploratory, and descriptive approach to the data collected. The methodological procedures used were bibliographic research and survey (Lakatos, 2017). The selection of the sample of organizations for data collection took into account the delimitation of the Regional Development Council (COREDE) Northwest Colonial of the State of Rio Grande do Sul (Foundation of Economics and Statistics [FEE], 2019). For the selection of the interviewees, it was taken into account what Helfat et al. (2007) and Helfat and Martin (2015) where they explain that dynamic capabilities are noticeable at the managerial and top management level.

A sample of organizations from different sectors and sizes was chosen, as they present different forms of development and achievement of organizational capacity results. According to Kump et al. (2018) and Zaluski, Sausen & Ferreira (2020), in the construction of a DC scale, it should: i) capture the broad and general DC so as not to measure specific DC examples in a sector or organizational context; ii) be effective and generic for measuring high speed environments and markets, remaining useful even with market changes; and iii) enable the development and analysis of competitive advantage. Thus, considering that different sectors have different ways of developing and achieving DC results, a sample was chosen in this study that guaranteed maximum variation in the data, in relation to both its size and the sector in which it operates. The sample size calculation considered the statistical power of the sample size, being of the "a priori" type, using the G* Power 3.1.9.2 software (Faul, Erdfelder, Lang & Buchner, 2009). The evaluation of the sample size used the parameters of statistical power of 80% (0.80), with a significance level of 5% (0.05), mean effect (f2) of 0.15 for 1 predictor. In this context, the minimum sample calculated for the study must be 55 cases.

To validate the content of the proposed scale, two specialists (doctors and experienced in the theme of this study) were selected to assess the dimensions, indicators and questions of the scale. Afterwards, a pre-test was carried out with four random companies from the sample adopted in the study, which sought to analyze the filling, reading and understanding of the questions and the structure and presentation of the scale. The considerations of content validation with specialists and pretesting with organizations were based on textual adjustments and improvements in statements to align with the adopted theory. These adjustments are already included in the scale proposal (Table 1).

Data collection used the e-survey method applied online to organizations registered in the available databases, and the invitation and explanation of the research objectives were sent to them via email. The meaning questionnaire sought to analyze the agreement on the existence of the questions/statements of the proposed scale in the organizations, adopting an assumed ordinal scale with an interval of 7 points (1 = totally disagree to 7 = totally agree). In all, 867 e-mails were sent to organizations in the delimited region (4.9% of the total population). The data collection period was between the dates of 02/02/2019 to 02/08/2020, resulting in 122 (14.07%) valid questionnaires answered. Table 2 shows the characterization of the respondent sample and the industries.

Table 2 - Descriptive analysis of the sample of respondents and industries

Profile			Number	Percent
Respondents Profile	Function	Director	65	79,3%
		Administrative Manager	32	39,0%
		Administrator	15	18,3%
		Employee in leadership position	10	12,2%
	Organization Time	Up to 3 years	8	9,8%
		From 3 years to 5 years	13	15,9%
		From 5 years to 8 years	23	28,1%
		From 8 years to 10 years	49	59,8%
		More than 10 years	29	35,4%
Organizations Profile	Sector	Trade	59	72,0%
		services	42	51,2%
		Industry	21	25,6%
	Size	Large	36	43,9%
		Midsize	51	62,2%
		Small Size	35	42,7%

Source: Authors based on the research data.

Data analysis, interpretation and validation were performed using Microsoft Excel 2019 software for data tabulation and SmartPLS 3.3.2 (Ringle, Wende & Will, 2005) for the analysis of the measurement model and the structural model with the technique of Structural Equation Modeling. As for the approach chosen for this study, the key characteristics of PLS-SEM such as the ability to deal with small samples, the possibility of testing complex models and also for not assuming the normality of the data are situations commonly found in the investigations of Social Sciences (Hair et al., 2014).

4 DISCUSSION AND RESULTS

The presentation of the results begins with the validation of the measurement and structural model. Afterwards, the theoretical discussions of the scale validation are presented.

4.1 VALIDATION OF THE MEASUREMENT AND STRUCTURAL MODEL

The validation of the measurement model was based on the analysis of convergent validity and reliability, which was assessed by Average Variance Extracted (AVE), Composite Reliability (CR) and Cronbach's Alpha for each dimension of the scale, as highlighted by Hair et al. (2014). Thus, Table 3 presents the values of the loadings for each indicator and the values of the AVE, Composite Reliability and Cronbach's Alpha of each dimension of the scale.

Table 3 - Factor loads, convergent validity and reliability

	LOADINGS			AVE	CR	*Alpha*
	FOSIM	PMT	ISMA			
AC1	0,8091					
AC2	0,7696					
AC3	0,7184					
AC4	0,7122			0,598	0,9121	0,8879
AC5	0,7552					
AC6	0,8033					
AC7	0,8366					
AC8		0,8416				
AC9		0,7625				
AC10		0,7276				
AC11		0,7434		0,5864	0,9083	0,8826
AC12		0,7841				
AC13		0,7519				
AC14		0,7434				
AC15			0,7240			
AC16			0,7593			
AC17			0,7675			
AC18			0,8547	0,6073	0,9152	0,8917
AC19			0,7961			
AC20			0,8064			
AC21			0,7394			

Source: Authors based on the research data.

It is noteworthy that all values of AVE, CC and Cronbach's Alpha are above >0.50, >0.70 and >0.70 respectively, which allows us to state that the scale measurement model has convergent validity and reliability (Hair et al., 2014). Once the criteria for convergent validation and reliability are met, the scale's discriminant validation follows.

For the discriminant validation, it was evaluated how much the indicators obtain a higher load in their own dimensions than in others (Hair et al., 2014). Table 4 presents the cross loadings, in which it is possible to verify that all the dimension indicators have higher values relative to the corresponding Cross Loadings, which ensures the discriminant validity of the proposed scale.

Table 4 - Discriminant validity - Cross Loadings

	FOSIM	PMT	ISMA
AC1	**0,8091**	0,6383	0,6338
AC2	**0,7696**	0,5004	0,4478
AC3	**0,7184**	0,3580	0,3527
AC4	**0,7122**	0,4415	0,5489
AC5	**0,7552**	0,3189	0,3420
AC6	**0,8033**	0,5882	0,6285
AC7	**0,8366**	0,5098	0,5755
AC8	0,5325	**0,8416**	0,6183
AC9	0,7336	**0,7625**	0,7134
AC10	0,4647	**0,7276**	0,5519
AC11	0,3249	**0,7434**	0,5226
AC12	0,4119	**0,7841**	0,5833
AC13	0,5247	**0,7519**	0,5049
AC14	0,3249	**0,7434**	0,5226
AC15	0,4363	0,5821	**0,7240**
AC16	0,6124	0,4933	**0,7593**
AC17	0,3709	0,5695	**0,7675**
AC18	0,4952	0,6812	**0,8547**
AC19	0,6613	0,5859	**0,7961**
AC20	0,6953	0,5323	**0,8064**
AC21	0,3347	0,6951	**0,7394**

Note 1: Cross loads of each dimension are marked in bold.
Source: Authors based on the research data.

In the next stage of the evaluated discriminant validation, the Fornell-Larcker criterion was evaluated, which compares the square roots of the AVE values of each dimension with the correlations of the dimensions (Henseler, Ringle & Sinkovics, 2009). Table 5 shows the correlations between dimensions, in which it is possible to verify that the square root of the stroke of each dimension was superior to the correlations in all dimensions, showing the discriminant validity between them.

Table 5 - Correlation Matrix and Discriminant Validity (Fornell-Larcker Criterion)

	FOSIM	PMT	ISMA
FOSIM	**0,7733**		
PMT	0,6363	**0,7658**	
ISMA	0,6695	0,7575	**0,7793**

Note 1: The square root of the AVE is distributed along the main diagonal, in bold.
Note 2: Correlations equal to or greater than 0.126 are significant at 5%, and correlations equal to or greater than 0.126 are significant at 1%.
Source: Authors based on the research data.

In order to evaluate the structural model, the values of the R determination coefficients were first followed (Hair et al., 2014). With the R^2 values found it is possible to verify that the R^2 of the CHMI dimension is 0.737, that is, 73.7% of its variation can be explained by the model studied.

The R^2 of the PRBI dimension is 0.804, thus, 80.4% of its variation can be explained by the model studied. The R^2 of the MAGC dimension is 0.835, so 83.5% of its variation can be explained by the model studied. All dimensions analyzed show R^2 values with a large effect (Cohen, 1977).

Next, the models' quality of fit indicators are analyzed, both obtained by using the Blindfolding module: Relevance or Predictive Validity (Q^2) or Stone-Geisser Indicator, and Effect Size (f^2) or Cohen Indicator. Table 6 shows the values of Q^2 and f^2 for the scale dimensions.

Table 6 - Predictive relevance and effect size

	Q^2	f^2
FOSIM	0,4244	0,5982
PMT	0,4652	0,5323
ISMA	0,4949	0,6174

Source: Authors based on the research data.

In the results achieved, with an omission distance of 7, it appears that in the structural model all values of Q2 are >0, thus verifying that the scale has predictive validity. The same situation was verified in the fit quality indicator f^2, where all dimensions have a value >0.35, which indicates that the dimensions are important for the general adjustment of the scale proposed in this study. Finally, the significance of the relationships is shown in Table 7.

Table 7 - Significance of structural relationships

Structural Relationship	Structural Coefficient	Standard Error	*t-Student*
ADAPT.C -> FOSIM	0,8585	0,0262	32,7329*
ADAPT.C -> PMT	0,8968	0,0163	55,0112*
ADAPT.C -> ISMA	0,9140	0,0161	56,7906*

* = 1% significance level (=> 2.58).

Source: Authors based on the research data.

The values of the t-Student test demonstrate that the level of significance of the scale dimensions is greater than 1.96, highlighting that the model is adequate and with a level of significance of 1%. The following is the theoretical discussions about the relationships between the dimensions and variables of the validated scale.

4.3 DISCUSSION

The development of scales for measuring abstract constructs is a topic of wide debate within the field of administration. Hair, Black, Babin, Anderson and Tatham (2009) in addition to pointing out the importance of statistical rigor in the construction of instruments, data collection and analysis, indicate the need for the proposed scales to find support in the literature developed by the field. With regard to the scales of studies in relation to dynamic capacities, Verreynne, Hine, Coote and Parker (2016) defend the need to develop instruments and definitions of constructs around the dynamic capacities that collaborate so that it leaves a perspective of vision for a theory. Authors such as Kump et al. (2016) indicate that part of this work has already been done, but that further development of scales is still necessary so that, in addition to theory, effective ballast can be found in the empirical field to deepen these discoveries.

The results achieved in the statistical analyzes, put to the test of the respondents, sought to

articulate different concepts and dimensions already worked and consecrated by different authors, in the scope of the studies of the dynamic capacities. Thus, the three central constructs: a) Flexible Organizational Structure and innovative Management; b) Plurality and Multifunctionality of the Teams; and; c) Information Systems and Market Analysis, were divided into different items mapped by the specialized literature of the area (Zhu, Su & Shou, 2017; Sussman, 2016; Kaehler et al., 2014; Wei & Lau, 2010; Akgun, Keskin & Birke, 2012, Ali, Sou & Ali, 2017).

The model, in the way it was built, offers an interesting power of theoretical-empirical explanation of the phenomenon of the adaptive capacity of organizations, taking into account the defined constructs. Wilden, Devinney and Dowling (2016) discuss the need for structuring scales to address dynamic capabilities based on the use of other studies in the field of administration. Practice, to a certain extent, explored by this study, even though studies that addressed specific issues of dynamic capabilities were used primarily. Kump et al. (2016) also recalls that few studies have so far managed to build surveys or measurement instruments that were genuinely linked exclusively to Teece (2007) proposition on the fundamentals of dynamic capabilities. Helfat et al. (2009) also explores the need to broaden the view of this theory and seek support for its explanation in other areas of study of management, in addition to strategy.

The proposition of a construct that refers to the Flexible Organizational Structure and Innovative Management is related to the discussions about adaptive capacity and organizational arrangements, and also to the aspect of organizational innovation. Teece, Pisano and Shuen (1997) discuss this issue in their seminal article on the issue of dynamic capabilities and point to the theme of path dependence, that is, the organization's intrinsic adaptability to reinvent itself in the face of adversity, without abandoning its essence. Thus, the dyad structure and strategy are playing an important role in the adaptive construction of the organization. This construct, with its seven measurement items, reveals the need to understand, flexibility, innovation, management style, adaptability, use of technology, shared decision and speed in decisions to better understand how the ability to adapt is implemented in each organization. The study by Kump et al. (2019) reveals central elements in this debate, as it discusses the relationship between the size of the organization, that is, its structure, and the construction of common sense, that is, strategy.

From a human point of view, it is important to remember that organizations are structures of human meaning, that is, human institutions (Weick, 1979). To measure the impact and the role of people in Adaptive Capacity, the construct involving Plurality and Multifunctionality of Teams, was structured around issues related to autonomy, trust, communication, access to information, resilience, proactivity and problem solving. The seven items of this construct are related to topics widely discussed in other areas of management. Mainly, with regard to people management.

Salvato and Valosso (2018) indicate, as pointed out by the scale, the central role that people play in the environment of organizations, as they are the ones who configure and reconfigure organizational capacities, from generation to generation. Barrales-Molina, Montes and Gutierrez-Gutierrez (2015) also deepen this debate, indicating that communication and more flexible and adaptable relationships generate better performance from an organizational point of view. Still, according to the same authors, repetitive routines and rigid structures tend to generate organizations with less dynamic capabilities and, therefore, less competitive advantages. Similar findings were found in the application of the scale of the study proposed here, corroborating these discussions with regard to people management and Adaptive Capacity.

Regarding the organizational contingency, it is also important to highlight the role that the Information Systems and Market Analysis construct plays on the organization's Adaptive Capacity, as revealed by the analyzes of the scale instrument applied (Eshima & Anderson, 2017). The items that

make up this construct are related to both the notion of exploration and exploitation, widely debated with regard to the absorptive capacity of organizations, as revealed by Zahra and George (2002). In fact, these are intrinsically related issues: problem localization, monitoring customer needs and demands, identifying opportunities and threats, information flow and redundancy, management information systems and monitoring the competition. The items cover, to a large extent, the different aspects of information capture in the organization's business environment and its processing by decision-making structures.

5 CONCLUSIONS

Regarding the search for understanding and the development of adaptive capacities in the organizational environment, this study aimed to propose and validate a scale for measuring adaptive capacity. The theoretical model adopted in this study, elucidates the development of the adaptive capacity of organizations through a set of twenty-one indicators categorized in three dimensions. Thus, the development of the dimensions of the proposed scale was based on the structural dimensions of adaptive capacity: multiplexity, redundancy and flexible coupling proposed by Staber and Sydow (2002) and the dimension indicators were proposed based on the empirical studies selected.

The results of the study demonstrate the articulation of the indicators of Flexible Organizational Structure and Innovative Management, Plurality and Multifunctionality of Teams and Information Systems and Market Analysis result in a theoretical model in which several aspects related to the existence of the development of adaptive capacities in organizations. In this way, the proposed scale presented the validity of its measurement and structural model for the verification of adaptive capacity in organizations.

It is important to note that, in addition to scale validation, future studies exploring the relationships of these constructs, with other dimensions of the theory of dynamic capabilities, may contribute to their improvement and better understanding of the phenomenon. The continuous use of scale and the growth in the volume of empirical data can greatly boost its explanatory power and generate, both from a theoretical and managerial point of view, more knowledge for the management of the adaptive capacity of organizations.

It is also worth noting the possibility of a theoretical addition to the theme of dynamic capabilities, mainly in research aimed at relating their development to other constructs, as well as quantitative studies, based on the scale. In this bias, through the use of scale, new grounded insights can be developed.

From a practitioner point of view, the scale contributes to instrumenting managers, allowing the identification of weaknesses relevant to dimensions and indicators, so that managers can guide their efforts. In addition, it can be used to enable organizations to invest in organizational mechanisms that will give them competitive advantage through the development of adaptive capacity.

This study contributes to science while allowing the understanding of factors that favor adaptive capacity in the organizational environment, considering the characteristics and indicators of the dynamic environment in which the company is inserted. Contributing mainly with empirical data, which strengthen the idea that this instrument allows an assessment of adaptive effectiveness. It reinforces the possibility of measuring different but complementary dimensions of the construct through adaptive effectiveness, in accordance with the adaptive capacity theory and the assumptions elucidated by the Stabler and Sydow (2002) model, constituting a more versatile instrument for surveys using an assessment scale.

As limitations of this study, it is highlighted that the sample considered for the analyzes is based on a specific region, therefore, its results must be interpreted with caution, future studies must adapt or adopt other variables specific to the context to be studied. It is also suggested, the replication and revalidation of the scale in other contexts, mainly in sectors with more dynamic and competitive environments. The suggestion for future research is highlighted, analyzing the effects of adaptive capacity on some organizational variables such as organizational performance, innovation, competitive advantage, etc., while also applying moderating variables in this measurement such as dynamism of the market and sector.

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1. Definition of research problem	√	√	√	√
2. Development of hypotheses or research questions (empirical studies)	√	√	√	√
3. Development of theoretical propositions (theoretical work)	√	√	√	√
4. Theoretical foundation / Literature review	√	√		
5. Definition of methodological procedures	√			√
6. Data collection	√	√		
7. Statistical analysis	√			
8. Analysis and interpretation of data	√	√	√	√
9. Critical revision of the manuscript			√	√
10. Manuscript writing	√	√	√	√
11. Other (please specify)				

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