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Identifying structural similarities between stricto sensu post-graduation programs in management regarding the strategy tripod

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Abstract

Purpose – The purpose of this paper is to identify the structural similarities between stricto sensu post-graduation programs in management through the formation of clusters, with the strategy tripod as a backdrop (Peng, 2002; Peng *et al.*, 2009).
Design/methodology/approach – The co-plot method was used as a tool. It was chosen because it simultaneously enables joint and individual observations of comments and variables.
Findings – The results showed the formation of clusters among the programs, identifying a series of similarities between their components. The age and number of lines of research of the programs were the determining variables to identify isomorphism among the clusters.
Research limitations/implications – The main limitation of the study lies in the updating of information at the source of the data collection. All the data were collected from the Sucupira Platform for CAPES Triennial Evaluation of 2013. However, when the authors accessed the portals of the programs, the authors found that some data were outdated. Nevertheless, the authors limited themselves to using official data. Therefore, even if the authors found divergences or inconsistencies regarding the published information, the authors decided to use the official data made available by CAPES on the Sucupira Platform for the period in question.
Originality/value – Understanding that the results through the approaches of the industry-based view, resource-based view and institution-based view were insufficient for a thorough analysis, it is demonstrated in isolation that none of these succeeds in explaining the organizational context that permeates Brazilian stricto sensu post-graduation institutions. In this organizational field, the three views are not at the same theoretical level. The institutional view overlaps with the strategic competitive views. Therefore, the study contributes to reorganizing the strategy tripod and the proposed articulation between the arrangement of theory, method and field research.

Keywords Management, Co-plot method

Paper type Research paper

1. Introduction

Universities, due to their public nature, whether considered public or private property, are traditionally funded (Bloom *et al.,* 2007) or regulated by governments (Geiger, 1985). Although their primary function is to provide teaching services (Chakrabarti and Rice, 2003),

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another recognized role of theirs is to promote knowledge and scientific progress (Atkinson, and Blanpied, 2008). The transforming role of institutions means that university environments are under pressure, meaning that university managers have to consider the government and academic community as important forces (Alperstedt *et al.,* 2005).

Government influence on learning institutions with post-graduate programs in management (PGPMs), known as stricto sensu programs in Brazil, can be seen in the role of the Coordination for the Improvement of Higher Education Personnel (CAPES) in the funding, evaluation and regulation of management programs. Langrafe *et al.* (2009) argue that these pressures lead programs to assume a similar strategic stance, since in the institutional perspective, organizations that behave so have greater legitimacy in the eyes of regulators and society (DiMaggio and Powell, 1983).

The literature that examines strategic similarity predominantly focuses on the competing theoretical institutional approaches (Miller *et al.,* 2013) and competitive strategy theories at the industrial level (Porter, 1980) or company level (Barney, 1991). However, in this study, we begin from the viewpoint that the combination of these approaches can lead to a better understanding of complex phenomena (Yamakawa *et al.,* 2008) based on the proposal of the strategy tripod (Peng, 2002; Peng *et al.*, 2009).

Therefore, we believe that the influence of the institutional pressures from CAPES on stricto sensu PGPMs leads to the formation of clusters with similar structural characteristics because they need to adapt to the institutional context. However, we do not lose sight of the fact that, even in regulated environments, educational organizations act strategically in order to stand out, given that those in the most favorable positions can be guaranteed better opportunities to access resources (Dias Sobrinho, 2003). Thus, we believe that an integrated view through the strategy tripod can provide a better understanding of the similarities and dissimilarities of the sector than a single view.

Consequently, this study seeks to identify the structural similarities between stricto sensu PGPMs through the formation of clusters, analyzing them through the lens of the strategy tripod. We will use the co-plot method, which was employed in the study by Segev *et al.* (1999), who evaluated the adaptation of American business schools through changes in the curriculum, seeking to identify the differences between them. In this work, by applying a similar technique to identify clusters, we seek to understand the isomorphic or competitive behavior of each program.

In the following sections, we discuss the principal approaches on which the study is based, beginning with the environmental context, followed by the strategy tripod, methodological procedures and details of the method used, presenting and discussing the results and closing with the conclusions.

2. Environmental context

In Brazil, stricto sensu PGPM are supervised and evaluated by CAPES. CAPES (2008) aims to aid the expansion and consolidation of stricto sensu post-graduation in Brazil and seeks to maintain a continuously improved evaluation system to achieve a national standard of academic excellence. Its functions involve evaluating post-graduation programs, divulging scientific production, international scientific cooperation, funding the qualification of high-level professionals in Brazil and overseas and investing in the qualification of basic education teachers (CAPES, 2012).

CAPES evaluation criteria are the same as those used for planning post-graduation programs in Management used in the presentation of proposals for new courses (Maccari, Lima and Riccio, 2009), differing in only two aspects. For new courses, the following points are evaluated: proposed program; teaching staff; research activity; intellectual production; and teaching and research infrastructure (CAPES, 2016a).

For courses in progress, the criteria are: proposed program; teaching staff; student body; intellectual production; and social inclusion (CAPES, 2016b).

CAPES evaluation system is predominantly based on quantitative, impartial and even standards (Maccari *et al.*, 2014). CAPES system is predominantly quantitative (Sguissardi, 2006), as 80 percent of its evaluation is based on quantitative criteria, with the remaining 20 percent being qualitative, which can be evaluated with metrics (Maccari *et al.*, 2014).

A number of works, in addition to those already cited, have evaluated the role of CAPES in terms of its contribution to organizing the educational field. These works include Maccari, de Almeida, Nishimura and Rodrigues (2009), Kirshbaum *et al.* (2004), Shigaki and Patrus (2013), Mello *et al.* (2010), Correa *et al.* (2009), and Gatti *et al.* (2003). Some studies highlight the importance of CAPES in the development of Brazilian post-graduation programs. Others question the standardization of the system for the evaluation of any field of knowledge (Spagnolo and Calhau, 2002), while others discuss the consideration that every program that is evaluated has similar conditions in terms of resources (Spagnolo and Calhau, 2002; Thayer and Whelan, 1987; Sguissardi, 2006).

Evaluation means a great deal of pressure because in addition to the accreditation and authorization required for programs to function, CAPES ranks the programs (Maccari *et al.*, 2014; Dias Sobrinho, 2003; Maccari, Lima and Riccio, 2009), directly affecting their ability to gain resources (Dias Sobrinho, 2003). Therefore, the pressures from CAPES promote behavior that strives to earn legitimacy (Rossoni and Guarido Filho, 2009) and the pressures for legitimacy also influence the actions taken by managers to adapt to the institutional environment (Rossetto and Rossetto, 2005). Furthermore, these pressures influence decisions with regard to allocating resources and the structure of courses.

2.1 The strategy tripod perspective

Works that focus on strategic conformity, with companies behaving in a strategically similar way, have employed contrasting theoretical approaches (Miller *et al.,* 2013). The theoretical approaches on competitive strategy argue that companies seek different strategies to ensure a unique position in the sector in which they operate, using the industry-based view (IBV) (Porter, 1980) or the resource-based view (RBV) (Barney, 1991).

In the IBV, competitiveness and observing the competition defines a successful organization that manages to monitor its competitors better and apply strategies that differentiate it and allow it to stand out from the rest (Porter, 1980). The analysis of the IBV is "outside in" (Fleury and Fleury, 2003). Despite criticisms (Mintzberg, 1973; Carneiro *et al.,* 1997; Vasconcelos and Cyrino, 2000; Leite and Porsse, 2003), it continues to play an important role in the corporate world. Despite its heavy emphasis on diagnosing the environment, it seeks to map the actors with whom the company maintains a relationship (Foss, 1996) and provides tools for practical application (António, 2002), and efficiently prepares the right strategies for organizations.

On the other hand, the vision of the RBV can be described as "inside out" (Prahalad and Hamel, 1990), concentrating on the internal elements of the organization, without observing the external environment in which it is embedded. This negligence and other elements have been subject to criticism (Heene and Sanchez, 1997; Mascitelli, 1999; António, 2002; Serra *et al.,* 2008; Burlamaqui and Proença, 2009; Carneiro *et al.*, 1997). However, since the 1990s, the RBV has dominated studies on strategy and its postulates claim that organizational performance is a function of the types of resources and capabilities that the organization controls, and the greater its competitive differential, the more able it is to control and combine its resources and capabilities (Barney, 1991; Barney and Hesterly, 2011). The theory also idiosyncratically analyzes an organization's rare, valuable, inimitable and organizable resources (Barney and Hesterly, 2011).

Both approaches attempt to understand how to raise the organization's level of competitive performance. However, they do not heed or subjugate the resulting inter-institutional relationships and legal, political, social and normative apparatus. Thus emerges the institution-based view. In the institutional approach, social institutions, armed with laws, regulations, norms and culture, have an influence on organizations (Scott, 1995). Government agencies are among the most influential environmental actors (Frumkin and Galaskiewicz, 2004), to the extent that some formal organizational structures emerge as reflections of institutional norms (Meyer and Rowan, 1977), which end up shaping the behavior of organizations in search of legitimacy (Deephouse, 1996). The drive for legitimacy leads PGPMs to adapt to the social system of norms, values and beliefs in which it is embedded (Suchman, 1995).

Pressures for legitimacy can influence decisions on the allocation of resources and structure of programs, leading to isomorphism. Isomorphism derives from formal and informal pressures on an organization, together with other important forces such as social pressures that stem from the cultural expectations of society (DiMaggio and Powell, 1983). The proposal of the strategy tripod (Peng, 2002; Peng *et al.*, 2009) argues that there is a need to integrate these perspectives, especially due to the importance of considering the institutional context. Thus, the institution-based view should be considered as the third perspective in strategy because the IBV and RBV do not consider the context.

The strategy tripod has been used to study a variety of contexts, ranging from small family businesses (Duran *et al.,* 2016), private companies (Lu *et al.,* 2010) and state-owned enterprises (Bruton *et al.,* 2015) to emerging markets (Meyer and Peng, 2016). It has been applied in diverse fields, such as entrepreneurship (Lim *et al.,* 2010), competitiveness (Lazzarini, 2015), international businesses (Gao *et al.,* 2010), research and development (Koo and Kim, 2009), politics (Lux *et al.*, 2011), sustainable development (Kolk and Van Tulder, 2010) and transnational education (Wilkins and Huisman, 2012). Recently, the approach has won the hearts of many researchers, especially those of Asian origin.

Due to CAPES' operations with regard to PGPMs, the similarities found in the programs reflect a determined configuration of resources. The isomorphic pressure exerted by CAPES really exists and not just in one set of institutions. This leads to the idea of isomorphic clustering, with these clusters reflecting certain choices in relation to the use of resources (Segev *et al.,* 1999). Following the concept of these authors, the study intends to identify clusters resulting from the structural similarity of institutions that offer PGPMs.

3. Methodological procedures

To identify structural similarities between stricto sensu PGPMs with the most frequently identified concepts through the formation of clusters, the selected population was made up of all the stricto sensu PGPMs with scores of 4, 5, 6 and 7 in the Triennial Evaluation by CAPES in 2013 in the field of management, accounting sciences and tourism, totaling 37 programs. CAPES ranks the best post-graduation programs using a rigid evaluation system that includes the criteria of "proposed course, teaching staff, student body, theses and dissertations, intellectual production and social inclusion" (CAPES, 2016b). The purpose of the evaluation is to certify the quality of the courses and identify regional asymmetries and distribution of fields of knowledge to guide the expansion and approval of new courses. The score achieved in the evaluation determines which programs will be selected for the distribution of scholarships and funding for research (CAPES, 2014).

3.1 Data collection

The registration data of the programs and respective scores were collected between July 21 and August 15, 2016 from CAPES Sucupira Platform portal (CAPES, 2016c). To measure the elements that can demonstrate similar strategies and characteristics between programs, the

following variables were used: CAPES score; age of the program; number of professors in the teaching staff; legal status of the institution that hosts the program; and number of lines of research. The association of the variables with the adopted theoretical framework is shown in Figure 1.

Research objective: to identify the structural similarities between *stricto sensu* PGPMs through the formation of clusters, analyzed from the perspective of the strategy tripod	
Analysis variable	Theoretical construct
PGPM's CAPES score	Capes ranks the programs (Maccari *et al.*, 2014; Dias Sobrinho, 2003), and the ranking will be directly reflected in the ability to attract resources (Dias Sobrinho, 2003). Capes score is a parameter for generating social recognition and legitimacy, which, according to Carvalho *et al.* (2005), are requirements for obtaining other resources Capes score reflects the performance of the PGPM. Performance is a function of the types of resources and capabilities controlled by the organization. The greater the competitive differential, the better its ability to control and combine its resources and capabilities (Barney, 1991; Barney and Hesterly, 2011). Performance is also the result of the articulation between the conduct of organizations and the market structure (Cyert and March, 1963), so that the organization that creates the most value achieves a competitive advantage over its competitors (Porter, 1989)
Age of the PGPM	PGPMs founded at the same time may have similar structural characteristics because, according to Dacin (1997), institutional pressures tend to vary over time and organizations seek to adapt to the norms in force at the time of their foundation. In PGPMs, this can occur because Capes evaluation system has changed how it operates over the years. In 1976, it was created quietly and improved over time, undergoing a major transformation in 1990, with computerization and the implementation of rigid criteria for evaluating programs (Maccari *et al.*, 2014). Thus, unlike the oldest programs, the newest ones were born in a regulated institutional environment. Thus, evaluations can have different effects and developments on programs. According to Thayer and Whelan (1987), these can lead to expectations for new programs and greater comfort and ease for older and consolidated programs. From a strategic viewpoint, historical differences between organizations can lead to different performance (Cool and Schendel, 1988) and their trajectory of dependence (Karim and Mitchell, 2001) can be a determining factor in the achievement of results
Number of professors in the teaching staff	The size of the teaching staff indicates the scope of the program and the amount of financial resources invested in the PGPM by the host. This is an important factor in the sector, as institutions with high financial capacity can be strategically more aggressive and alter the configuration of the market (Lopes, 2016). Likewise, the size of the teaching staff reflects the institution's strategic planning and how important the PGPM is to it since, according to Porter (1999), strategies are sustained as the organization chooses to offer certain types of values in detriment of others. Therefore, if the PGPM has preference in the host organization, it will be more heavily funded. Furthermore, in a PGPM, the most important resource is the teaching staff and the results achieved by the program depend on them. After all, the most valuable resources of an organization are people and their capabilities (Barney and Hesterly, 2011)
Legal nature of the institution that hosts the PGPM: public and private (profit and non-profit)	The legal nature represents the final goal of the institution that hosts the PGPM, making competitiveness more or less relevant to obtaining resources, social approval and legitimacy. Every organization acts according to its end goals, so that companies seek to create greater economic value and become competitive (Porter, 1989), public organizations seek to meet the needs of citizens (Da Silva, 2001) and non-profit institutions work privately to achieve goals that are in the public interest (Thompson, 1997) Although institutions that host PGPM can have different goals, the quantitative CAPES evaluation is indifferent to the particular nature of these institutions, as all the evaluated programs have similar conditions with regard to resources (Spagnolo and Calhau, 2002; Thayer and Whelan, 1987; Sguissardi, 2006). This leads us to believe that institutional pressures do not affect organizations with the same intensity (Dacin, 1997)
Number of lines of research	The number of lines of research can indicate the level of concentration of the program. In this respect, Moreira and Planellas (2003) claim that it is important for organizations to concentrate their functions on their essential competencies, as unrelated diversification has a negative impact on performance, i.e., lines of research not aligned to the proposal of the program negatively affects the final score of the evaluation The number of lines of research is also related to the diversification of specialties of the teaching staff and the dimension of the program. Lean programs tend to have fewer lines of research and vice versa. This is because Capes (2016a) regulates the number of teaching staff, which corresponds to a minimum of four for each line of research, and PGPMs tend to adapt because social institutions that draft or enforce laws, regulations and norms influence the actions of organizations (Scott, 1995) Finally, lines of research reflect the expertise of the teaching staff. This expertise jointly reflects a certain configuration of resources (Segev *et al.*, 1999)

Notes: Industry-based view; Resource-based view; Institution-based view
Source: Prepared by the authors based on the literature

Figure 1.
Variables used in the study and their association with the theoretical constructs

To select each analysis variable used in the study, a series of criteria was adopted as follows:

(1) The courses that were selected were all those evaluated by CAPES with a score of 4 or higher in the last triennial (on a scale of 1–7). Therefore, these are considered the best Brazilian stricto sensu programs in management.

(2) The age considered is calculated from the beginning of the program, i.e., when the master's course was implemented, irrespective of the time required for the approval of the doctorate course.

(3) The number of professors in the teaching staff includes permanent professors, collaborators and visiting professors, although the number of visiting professors is low.

(4) To enable the nominal variable "legal nature" to be manipulated arithmetically, a value of "1" was assigned to a public institution and "2" to a private one, with the latter being profit or non-profit by nature.

(5) The number of lines of research is an important variable for demonstrating to what extent the course concentrates on one or more fields. This variable makes it possible to infer the diversity of the teaching staff and configuration of supporting resources.

Table I shows the set of data formed from the collection of variables for each program listed on the horizontal lines.

3.2 Method

The method used is a two-dimensional representation of a set of data called a co-plot. It was adapted from the study by Segev *et al.* (1999), who compared the curricular structure of the 25 best American MBA courses in management. The method has been applied in other studies on diverse themes, such as socio-economic differences between cities (Mindali *et al.,* 2004), culture in mergers and acquisitions (Weber *et al.,* 1996), information technology (Giladi *et al.,* 1996), MBA programs in the UK (Páucar-Caceres and Thorpe, 2005), performance of the Greek banking system (Raveh, 2000) and strategic groups in the America Economia ranking (Scafuto *et al.,* 2017).

The co-plot enables the identification of similarities between the structural characteristics of the main Brazilian stricto sensu PGPMs. It is capable of locating each program within a two-dimensional space. The method allows the graphic representation of cases and variables in the same graph (Segev *et al.,* 1999). Graphic presentations are derived from a matrix $Y = n \times p$, in which $n = 37$, corresponding to the number of programs and $p = 5$, corresponding to the variables selected for analysis, all centered on the same axis and in the same origin. The co-plot method is based on the integration of mapping as a variation of the regression analysis. It is executed in four stages:

(1) The first step is to normalize the variables through $Zn \times p$, in order to obtain a mean equal to 0 and variance equal to 1.

(2) The measurement used to differentiate each pair of observations (programs) is the Minkowski metric:

$$S_{ik} = \left[\sum_{j=1}^{p} |Z_{ij} - Z_{ij}|^{r}\right]^{1/r} \geqslant 0, (1 \leqslant i,\ k \leqslant n;\ r \geqslant 1)$$

This matrix allows the distance between each pair of observations to be calculated.

Program/university	CAPES score	Number of professors	Age of program	Number of lines of research	Nature Public 1 Private 2
(1) FUNDAÇÃO GETÚLIO VARGAS/SP (FGV/SP)	7	40	42	9	2
(2) UNIVERSIDADE DE SÃO PAULO (USP)	7	56	41	12	1
(3) FUNDAÇÃO GETÚLIO VARGAS/RJ (FGV/RJ)	6	25	49	2	2
(4) UNIVERSIDADE FEDERAL DE MINAS GERAIS (UFMG)	6	29	43	12	1
(5) UNIVERSIDADE DO VALE DO ITAJAÍ (UNIVALI)	5	16	13	7	2
(6) UNIVERSIDADE DO VALE DO RIO DOS SINOS (UNISINOS)	5	15	16	3	2
(7) UNIVERSIDADE FEDERAL DE LAVRAS (UFLA)	5	22	41	7	1
(8) UNIVERS. FEDERAL DO RIO GRANDE DO NORTE (UFRN)	5	15	38	6	1
(9) UNIVERS. FEDERAL DO RIO GRANDE DO SUL (UFRGS)	5	51	44	12	1
(10) UNIVERS. MUNICIPAL DE SÃO CAETANO DO SUL (USCS)	5	16	13	5	2
(11) UNIVERSIDADE NOVE DE JULHO (UNINOVE)	5	27	10	5	2
(12) UNIVERSIDADE PRESBITERIANA MACKENZIE (UPM)	5	19	17	4	2
(13) PONT. UNIVERS. CATÓL. RIO GRANDE DO SUL (PUC/RS)	5	18	10	3	2
(14) PONTIFÍCIA UNIVERS. CATÓLICA DO PARANÁ (PUC/PR)	5	19	16	2	2
(15) PONT. UNIVERS. CATÓL. DO RIO DE JANEIRO (PUC/RIO)	5	30	44	5	2
(16) UNIVERSIDADE FEDERAL DA BAHIA (UFBA)	5	18	33	7	1
(17) UNIVERS. FED. DA PARAÍBA/JOÃO PESSOA (UFPB/JP)	5	21	40	6	1
(18) UNIVERSIDADE DE BRASÍLIA (UNB)	5	27	40	2	1
(19) CENTRO UNIVERSITARIO DA FEI (FEI)	4	15	9	4	2
(20) FUND. UNIVERS. FED. DE MATO GROSSO DO SUL (UFMS)	4	17	8	4	1
(21) PONTIFÍCIA UNIV. CATÓLICA DE SÃO PAULO (PUC/SP)	4	18	38	4	2
(22) UNIVERSIDADE DA AMAZÔNIA (UNAMA)	4	14	7	3	2
(23) UNIVERSIDADE DO GRANDE RIO (UNIGRANRIO)	4	18	9	4	2
(24) UNIVERSIDADE ESTADUAL DE MARINGÁ (UEM)	4	13	6	4	1
(25) UNIVERSIDADE ESTADUAL DO CEARÁ (UECE)	4	14	11	1	2
(26) UNIVERSIDADE FEDERAL DE PERNAMBUCO (UFPE)	4	26	21	8	1
(27) UNIVERSIDADE FEDERAL DE SANTA CATARINA (UFSC)	4	31	38	7	1
(28) UNIVERSIDADE FEDERAL DE SANTA MARIA (UFSM)	4	26	13	5	1
(29) UNIVERSIDADE FEDERAL DO ESPÍRITO SANTO (UFES)	4	15	16	2	1
(30) UNIVERSIDADE FEDERAL DO PARANÁ (UFPR)	4	26	24	6	1

(*continued*)

Table I.
Set of data for the stricto sensu post-graduation programs in management

Program/university	CAPES score	Number of professors	Age of program	Number of lines of research	Nature Public 1 Private 2
(31) UNIVERSIDADE FEDERAL DO RIO DE JANEIRO (UFRJ)	4	31	43	8	1
(32) ESCOLA SUPERIOR DE PROPAG. E MARKETING (ESPM)	4	13	6	1	2
(33) UNIVERS. DO ESTADO DE SANTA CATARINA (UDESC)	4	15	16	4	2
(34) UNIVERSIDADE REGIONAL DE BLUMENAU (FURB)	4	11	19	3	2
(35) UNIVERSIDADE DE CAXIAS DO SUL (UCS)	4	19	10	2	2
(36) UNIVERSIDADE FEDERAL DE VIÇOSA (UFV)	4	16	11	2	1
(37) UNIVERSIDADE FEDERAL DE RONDÔNIA (UNIR)	4	12	10	2	1

Source: Coordination for the Improvement of Higher Education Personnel, Sucupira Platform (CAPES (2016c), available at: https://sucupira.capes.gov.br/sucupira/public/index.jsf (accessed July 5, 2016)

Table I.

(3) The matrix S_{ik} is mapped using multidimensional scaling, proposed by Guttman (1968). The objective is to transform similar values into distances, represented in two-dimensional Euclidean space. In a two-dimensional space, this stage produces coordinates 2_n (X_{1i}, X_{2i}) $i = 1, \ldots, n$, in which each line $Z_i = (Z_{i1}, \ldots, Z_{ip})$ is mapped through a point in two-dimensional space (X_{1i}, X_{2i}).

(4) In this stage, the arrows corresponding to the variables are projected into the Euclidean space obtained in the previous phase. Each variable j is represented by an arrow that emerges from the center of gravity of the points, so that the correlation between the real values of each variable and their projections onto the arrow are maximum. The individual p measures are calculated for each of the p variables separately and the arrows associated with the correlated variables point in approximate directions.

In previous studies, like that of Segev *et al.* (1999), the researchers used binary variables to identify the spatial distribution of observations and variables, which became the target of criticisms, mainly due to the first step, which is intended to normalize the data. Researchers such as Mar-Molinero and Mingers (2007) warned that binary variables are nominal and, in this case, indicate the presence or absence of a certain element in the location under study. Therefore, they do not support arithmetical calculations, and to avoid this sort of problem, in the present study four variables were used as a basis with different values and weights. Only one binary variable was used, the legal nature of the institutions, assigning a value of "1" to public institutions and "2" to private ones. Thus, the setoff data are shown to be more appropriate for obtaining reliable results and achieve the aims of the study.

In short, the method adopted for the study, the co-plot, is based on two graphs that are sequentially overlapped. The first graph maps the observations by n and the second is conditioned to the first and consists of arrows p, which represent the variables and are portrayed individually (Talby *et al.,* 2007).

4. Results

The coefficient of alienation obtained in this study using the co-plot method was 0.10, and the average correlation of variables was 0.89. These values are considered an excellent fit (Borg and Groenen, 1997; Talby *et al.,* 2007). Therefore, the variables

chosen to measure the similarity of the programs and possible formation of clusters proved to be adequate.

According to the characteristics analyzed through the chosen variables, the formation of clusters can be seen among the Brazilian programs through the proximity of some institutions to others. At the same time, it is possible to observe the direction indicated by the arrows (in red), which represent each variable individually. The projection of a point in the arrow of a variable should be proportional to its average distance from the variable. If it is above average, it is in the direction of the arrow and vice versa. The distribution of the programs in two-dimensional space and their location in accordance with the average proximity of each variable are shown in Figure 2.

The projection of the variables used in the study is done by using arrows, and the closer the observation point of the arrow, the stronger its correlation. Thus, the number of professors and the age of the program are the variables that best explain the position of the universities USP, UFRGS, UFMG and UNB. The programs of the first three institutions are isolated and do not form clusters with any other institution. The common characteristics of these programs are that they are over 40 years old, and USP and UFRGS have over 50 professors registered in their teaching staff. The UFMG has a teaching staff of 29 and UNB has 27 professors registered in its program.

On the other hand, the variable that best explains the position of the programs of ESPM, UECE, UNAMA, FURB, UCS, FEI, UDESC and UNIGRANRIO are the lines of research. All of these institutions, which are close to the indicator arrow, have four or more lines of research, although ESPM and UECE have only one. These courses are in the opposite direction of the arrows that indicate the age of the program and number of professors, for two reasons, one there is that they have been operational for under 11 years, with the exception of UDESC and FURB, and other reason is which they have a small teaching staff on their programs, all of them with 15 teachers or fewer, except Unigranrio and UCS.

The arrow representing the variable nature of the program/institution clearly divided in the direction of programs of a private nature and, in the opposite direction were the public universities. On the other hand, CAPES score variable pointed to the two programs of the Getúlio Vargas Foundations, which had two of the best grades, 6 and 7, and in the opposite direction of the arrow were all the programs with a score of 4.

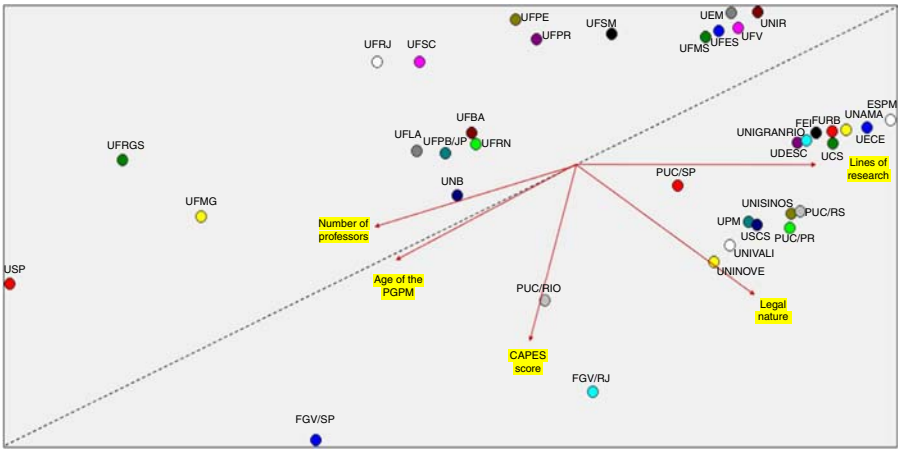

Figure 2.
Two-dimensional map with variables and observations of the PGPMs

Regarding the variables that formed the "cones," none of them had a negative correlation with any of the others. If that were the case, they would maintain a direct connection from one side to the other of the gravitational center of the points. Among these variables, only one strong correlation can be observed, between the age of the program and size of the teaching staff. The other variables have a less intense correlation with one another, and the formation of cones is more discreet.

One of the advantages of the co-plot method is that in addition to allowing an analysis of the individual variables, it enables a visualization of the correlations between all the variables at the same time, also allowing sets of correlations and their inter-relations to be defined. Therefore, we can view the formation of clusters of programs in Figure 3.

On the two-dimensional plane, the formation of six clusters and seven scattered programs can be observed. These can be classified as outliers, as shown in Figure 3. Four of the outliers have the best classifications according to CAPES Triennial Classification of 2013. The UFRGS program is currently not among the PGPMs that serve as international benchmarks, but was the first program, along with USP, to achieve a score of 7 in Management in Brazil. There are two other outliers closer to the centroid of the variables, PUC/SP and PUC/RIO. The former is an old course (38 years), with four lines of research and a teaching staff of 18 and a score of 4. The latter is one of the oldest Management programs in the country. It began 44 years ago and has a CAPES score of 5, 30 teaching staff members and five lines of research. These programs have exclusive structural characteristics that differentiate them from all the other PGPMs.

Regarding the clusters that formed, the analysis will be conducted by order of number of components. Thus, the cluster formed by the programs of the following institutions will be referred to as "Cluster 1": ESPM, UECE, UNAMA, FURB, UCS, FEI, UNIGRANRIO and UDESC. This is the largest cluster, composed of eight elements and one of the most cohesive, as shown in Figure 3. In Cluster 1, six institutions are private and two are state run (UECE and UDESC). The principal common characteristics of these programs are that they are young and lean. They all began under 20 years ago and have fewer than 20 professors in their teaching staff. They also have four lines of research or less.

The second largest cluster is "Cluster 2," made up of the following institutions: UNINOVE, UNIVALI, UPM, USCS, PUC/PR, UNISINOS and PUC/RS. In this group, the main characteristic is that all the institutions achieved a score of 5. All are young and privately run. The programs have operated for under 18 years. Uninove and PUC/RS especially stand out because they have existed for only ten years and together

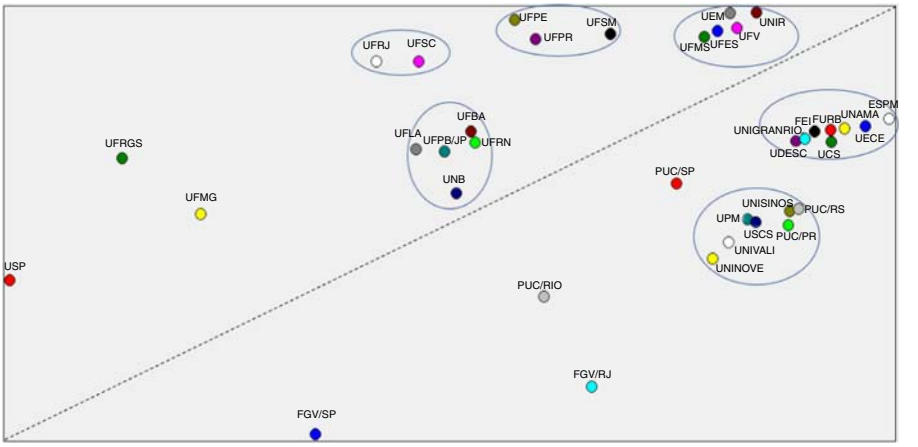

Figure 3.
Two-dimensional map with the formation of clusters of PGPMs

with the other components in the group have achieved the status of national recognition. Within the cluster, Uninove's program is the only one with more than 20 professors in its teaching staff (27).

There are two clusters with five members each. However, they will be denominated according to the cohesion of their elements. Thus, Cluster 3 is made up of the following members: UNIR, UEM, UFV, UFES and UFMS. This is one of the most homogeneous clusters, with younger study programs. All have been operational for under 12 years, except for UFES, with 16 years. All the programs belong to public universities and they have lean teaching staffs, ranging from 12 to 17 professors. All these PGPMs achieved a CAPES score of 4.

Cluster 4 consists of the programs of five federal universities (UFBA, UFRN, UFPB/JP, UFLA and UNB). Every program in this cluster is public. They are old programs with a CAPES score of 5. Three of them are located in the northeast of Brazil (UFBA, UFRN and UFPB/JP). The youngest program has been operating for 33 years (UFBA). The others have been operational for 38–41 years, with six or seven lines of research, with the exception of UNB, which has only two.

As for the smaller clusters, Clusters 5 and 6, the former is made up of three federal universities (UFPR, UFPE and UFSM). They are similar in terms of their CAPES score (4) and the number of teaching staff, with 26 in all three programs. Likewise, the universities in Cluster 6 (UFRJ and UFSC) are similar in number of teaching staff, with 31 professors. Both are old (43 and 38 years) and have several lines of research, eight and seven, respectively.

4.1 Discussion of the results

Although there are strategic studies on higher learning institutions and the role of Capes in ordering the regulation of the organizational field, these studies use their strategic theoretical framework in isolation, sometimes with the institutional view and sometimes with competitive strategic views, especially the RBV. However, the proposal of this study was to adopt the premise of Peng (2002) and Peng *et al.* (2009), arguing for the need to integrate the three approaches to understand complex fields, as is the case of Brazilian stricto sensu post-graduation courses.

The main findings showed that the post-graduation programs in management formed six clusters in accordance with their structural characteristics, while seven programs behaved like outliers, with particular and well-defined characteristics in relation to the other programs. The clusters indicated coherence with regard to structural similarities and, supposedly, in terms of resource management. An individual analysis of the variables showed that the time factor is highly correlated with the teaching staff through a positive relationship, while two variables are determiners of the higher scores achieved in CAPES evaluation.

The variables used in the model are proxies, with age as a way of gauging experience. The teaching staff indicates the ability to capture and retain highly specialized, rare valuable and irreplaceable human resources in accordance with the RBV. The lines of research indicate the strength of the group and whether it is being steered to a concentration area or the option of diversification. It should be highlighted that the lines of research reflect the individual competencies of the teaching staff and are closely related to the number of professors. The size of the teaching staff can indicate greater or less scientific productivity for the program. On the other hand, the legal nature helps to identify the end goals of the program. In the case of profit or non-profit private institutions, the former suffer greater market pressure and their success depends on the strategies they adopt. Therefore, the programs run by private institutions suffer different types of pressure from market regulators and the host institution.

The results demonstrate the isomorphic behavior of the PGPMs in terms of the number of lines of research and the size of their teaching staff. Regarding the lines of research, regulatory force was fundamental. Ever since CAPES determined the minimum number of staff for each line, the trend has been to reduce the number of lines of research in the programs. As shown in Table I, this effect is perceived in the younger courses, which were founded in a more strictly regulated environment. As for the number of teaching staff, the most important factor is financial resources, so that to maintain a high number of professors, it is necessary to have robust funding. As this resource is scarce in most institutions, it is understandable that the public universities or those with greater government funding have the highest numbers of teaching staff. On the other hand, CAPES (2016a) determines the minimum number of permanent teaching staff for each program, which is eight.

From a strategic viewpoint, the age of the program also influences its strength, as programs that were born in the days of the military government, when Brazil was seeking to consolidate a respected scientific community, were given specific incentives. This was because the orientation was for the government to take over post-graduation, as the universities were unable to maintain the courses. At the time, the National Council for Scientific and Technological Development (CNPq) was assigned the task of establishing research centers and disseminating the post-graduation policy (Alves and de Oliveira, 2014). This means that the PGPMs created at that time had the opportunity to receive more public investments and financial support than younger programs.

Therefore, the explanation for the scores for excellence and higher performance among the older programs has historic roots. However, this fact is not an absolute determiner of success and other issues are involved, such as physical, financial, human, technological and organizational structure (Barney, 1991; Grant, 1991) to sustain the number of lines of research. The lines of research reflect the diversity of the teaching staff, who in turn reflects a series of complementary resources that are necessary to support the research groups. The lines of research also guide the set of courses offered by the PGPMs, as it is necessary to maintain coherence between the concentration area, lines of research and curricular structure (CAPES, 2016a).

In this field, it can be seen that regulation overlaps strategic issues. For instance, the youngest programs have few professors and few lines of research. This may be the result of institutional pressure and/or strategic decisions to achieve better performance in the evaluation. These PGPMs may only continue to accredit professors with the scientific production level established by CAPES. The presence of professors whose production is not in keeping with the indicators, which range from student orientation to minimum classroom time, managing funded projects, teaching and research with undergraduate students or students in scientific initiation can lower the program's evaluation score. Therefore, what we find is the strategic organization of resources focusing on performance and driven by institutional regulation.

From our findings, we argue that the combination of the three approaches is one of the best ways to analyze the field, as the structural similarities observed between the clusters are the result of the institutional environment. Nevertheless, the outliers call attention to the competitive issue in the field. In this sense, these PGPMs make a great effort to achieve scores of excellence as this "certificate" of higher performance provides the best opportunities to access resources and sources of funding. For example, there are announcements for resources stating that programs with scores lower than 5 are not allowed to apply. Furthermore, there is the PROEX, a funding program only for programs with scores of 6 and 7, offering sums far higher than other government programs that support post-graduation, such as the PROAP and PROSUP. In this case, as sources of funding are scarce, there is no doubt that there is competition between the post-graduation programs.

Therefore, all the resources of the program are mobilized to comply with CAPES evaluation requirements, especially with regard to human resources, as the five evaluation criteria are based on the scientific production of the teaching staff and student body, together with the organizational articulation represented by the proposal of the program. This needs to be coherent in terms of goals, concentration area, lines of research, curricular structure, projects and regional, national and international impact (CAPES, 2016a). The programs that succeed in achieving all the evaluation metrics obtain satisfactory scores. However, those that achieve higher scores become national and international benchmarks in the field. Like a vicious circle, higher scores mean access to more resources, which will strengthen the PGPMs even further, making them more competitive.

Therefore, it is a well-known fact that the programs prepare their strategies to improve their performance. However, they do not fail to comply with regulatory norms, as this would compromise their performance in CAPES evaluation. Thus, in a field with a high level of regulations, the freedom to define strategy may be reduced and the main focus would be on complying with the norms. Therefore, in this organizational field, the institution-based view overlaps with the two purely competitive views. The latter two appear to be articulated so that one complements the other, but the institutional theory prevails over the others, with a special highlight for isomorphism. Finally, to achieve the aims of the study, the co-plot method proved to be an adequate structure for identifying the strategic structural similarities among the PGPMs, especially through the differentiated graphic presentation.

5. Conclusions

This study was intended to identify the structural similarities between stricto sensu post-graduation programs in management through the formation of clusters, with the strategy tripod as a backdrop (Peng, 2002; Peng *et al.*, 2009). As a tool, we used the co-plot method, chosen because it enables a joint and individual observation of comments and variables simultaneously, demonstrating the behavior of the programs among themselves, measuring the correlation between the variables and gauging the inter-relations between the structural variables and cluster formation.

The results show the formation of cohesive clusters among the programs, identifying a series of similarities between the components of each cluster. The age and number of lines of research of the programs were the determining variables in the identification of isomorphism among the groups. The consequence of isomorphism is the uniformity of the behavior of managers when it comes to accepting and assimilating institutional norms. In the field of post-graduation, regulation is driver and directly reflects the performance of the programs through scores given by CAPES in triennial evaluations.

The relationships among the programs were interpreted from the perspective of the IBV, RBV and institution-based view. In isolation, none of these was sufficient to explain the complex organizational context that permeates Brazilian stricto sensu post-graduation programs. These programs are under even greater pressure because their function is to deliver teaching and research to society, and they are also responsible for contributing to the evolution of science and technology. However, in this organizational field, the three views are not at the same theoretical level, so that the institutional view overlaps with the competitive strategic views. Thus, the contribution of the study lies in reorganizing the strategy tripod and the proposed articulation between the theory-method-field research arrangement.

The main limitation of the study lies in the updating of information at the source of the data collection. All the data were collected from the Sucupira Platform for CAPES Triennial Evaluation of 2013. However, when we accessed the portals of the programs, we found that

some data were outdated. Nevertheless, we limited ourselves to using official data. Therefore, even if we found divergences or inconsistencies regarding the published information, we decided to use the official data made available by CAPES on the Sucupira Platform for the period in question.

For future studies, we recommend using the data of the 2016 Quadrennial Evaluation following their publication. We also suggest using other quantitative variables, such as production of the teaching staff, the student body's compliance with deadlines and goals, technological, technical and scientific production and strategies for attracting and allocating resources. This will enable an in-depth understanding of the characteristics of each cluster of programs and identify the effects of each strategy adopted in relation to the results achieved by the programs.

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