The research productivity of new Brazilian PhDs in management

A few "star" performers outshine a mass of low performers

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Abstract

Purpose – Doctoral programs are primarily intended to train new professors and researchers to take positions requiring research competency. This paper aims to observe the scientific production of 734 Brazilian new PhDs in management and the possible link between the scientific output of the graduates and doctoral program rank.

Design/methodology/approach – Methodologically, the authors built a database collecting the journal publications of the first six years after doctoral degree of all PhDs in management graduated by Brazilian doctoral programs during the period of 1998-2008. The authors use cluster and descriptive analysis to explore PhD publication.

Findings – Results show a great disparity of productivity, where 10 per cent of all new PhDs account for most of the Brazilian research productivity, while most of the PhDs have a very low performance – and that the CAPES (the Brazilian institutional system) qualification of doctoral programs is not a good predictor of the performance of the future graduates. Results are discussed to understand this productivity gap among researchers in a context of a developing country where support institutions are working to improve quantity and quality of publication.

Practical implications – The results are useful for recruiters that need to decide between hiring new PhDs with low productivity graduated from high-ranked programs or new PhDs with high productivity from programs with more modest ranking. At least in part, the authors' results question the real impact that the doctoral program's prestige has on the performance of its graduates.

Social implications – There are implications for the future candidates to a management PhD program, for the Directors of these programs and for the institutional agencies that regulate and promote science and that establish the prevailing rules and norms that researchers and institutions follow.

Originality/value – The results are adamant in pointing out that there is a small group of highly productive new PhDs – that the authors called "stars". Generally speaking, they may find these "star" new PhDs in several doctoral programs. They have also found that some of the new PhDs have a relatively higher level of international papers published, but not necessarily a larger volume of publications. Meanwhile, most PhDs present a very low level of performance. This has important contributions to the way they perceive the doctoral education in management, especially in Ibero-America, revealing insights about the quality of PhDs and PhD courses.

Keywords Skills, Brazil, Learning, Academic staff

Paper type Research paper

Resumen

Propósito: – Los programas de Doctorado están destinados principalmente a la formación de nuevos profesores e investigadores que puedan acceder a puestos que requieren habilidades de investigación. En este artículo nos fijamos en la producción científica de 734 nuevos doctorados de Brasil en Gestión, y la posible relación entre la producción científica de los egresados y la clasificación del programa de doctorado en el ranking.

Metodología: – En cuanto a la metodología, se construyó una base datos usando la información de publicaciones en revistas los primeros seis años después de finalizado el programa de doctorado de todos los doctores en Administración formados por los programas de doctorado de Brasil entre 1998 y 2008. Se realizaron análisis descriptivos y de cluster para explorar los datos.

Resultados – Los resultados muestran una gran brecha de productividad, pues el 10 per cent de todos los nuevos doctores son responsables de la mayor parte de la productividad de la investigación académica de Brasil, mientras que la mayoría de los doctores tienen un rendimiento muy pobre en términos de publicaciones – así como que la clasificación de CAPES (el sistema institucional de Brasil) de los programas de doctorado no es un buen predictor del desempeño de los futuros graduados.

Valor – Los resultados son útiles para las personas que deben decidir entre contratar a nuevos doctorados con baja productividad pero graduados en programas de alta calificación, o nuevos doctores con alta productividad provenientes de programas con una clasificación más modesta. Por lo menos en parte, nuestros resultados cuestionan el impacto real que el prestigio del programa de doctorado tiene en el desempeño de sus egresados. Hay implicaciones para los futuros candidatos de los programas de doctorado en Administración, para los directores de estos programas y agencias institucionales que regulan y promueven la ciencia y que establecen las normas y reglas que los investigadores y las instituciones siguen.

Tipo de artigo Artigo de investigação

Resumo

Finalidade – Os programas de Doutorado são destinados principalmente para treinar novos professores e pesquisadores para tomar posições que requerem competências de pesquisa. Neste artigo, observamos a produção científica de 734 novos doutorados brasileiros em Administração, e a possível ligação entre a produção científica dos graduados e a classificação do programa.

Metodologia – Metodologicamente, foi construído um banco de dados com as publicações de revistas dos primeiros seis anos após graduação de todos os doutores em Administração formados por programas doutorais brasileiros no período de 1998 a 2008. Utilizamos estatísticas descritivas e clusters para analisar os dados.

Resultados – Os resultados mostram uma grande disparidade de produtividade, onde 10 per cent de todos os novos doutores são responsáveis pela maior parte da produtividade de pesquisa do Brasil, enquanto a maioria têm um desempenho muito baixo - e que os rankings CAPES (o sistema institucional brasileiro) de qualificação dos programas de doutoramento não é um bom preditor do desempenho futuro.

Valor – Os resultados são úteis para os recrutadores que precisam decidir entre a contratação de novos doutorados com baixa produtividade que se formaram a partir de programas de alto ranking, ou novos doutores com alta produtividade provindo dos programas com classificação mais modesta. Pelo menos em parte, os nossos resultados questionam o impacto real que o prestígio do programa de doutorado tem sobre o desempenho dos seus graduados. Existem implicações para os futuros candidatos a um programa de doutoramento em Administração, para os diretores desses programas, e para as agências institucionais que regulam e promovem a ciência, e que estabelecem as normas vigentes e as normas que os pesquisadores e instituições seguem.

Tipo de artículo Artículo de investigación

1. Introduction

Doctoral programs are conceived to train new researchers for research and teaching positions at universities. Therefore, doctoral programs attract students that intend to pursue an academic career. Universities invest in building the reputation of their doctoral programs and qualifying new doctors (Stephan, 1996), and students select the programs they apply to with the expectation that the learning and the reputation provided by the program will contribute for a prolific career (Conley and Önder, 2014). Hence, the best doctoral programs will tend to attract more and better doctoral candidates and, consequently, these programs should graduate the future PhDs with better academic publishing performance.

Scholarly publications play a crucial role in the career of the professors of doctoral programs (Stephan, 1996; Maccari *et al.*, 2014). In Brazil, the institutional rules imposed by Coordination for improvement of higher education personnel (CAPES) demands professors to publish a certain number of papers (that following a pre-defined listing are converted into points) for the program to be well-classified (Maccari *et al.*, 2009; Nascimento, 2010). Hence, doctoral programs tend to value the more prolific researchers, making publications an important component of the researchers' career (Bedeian, 2003).

In this article, we examine the scientific production (publication of peer-reviewed articles in academic journals) of the new PhDs in management by Brazilian universities and analyze its relation with the relative standing (or ranking) of the doctoral program. The objective of this study is to analyze the scientific publications of the new PhDs (in volume and quality) and to relate it with the ranking of the program (used as a quality metric). This article adapts to Brazil the study of Conley and Önder (2014) on the scientific productivity of the new PhDs in economics in the USA and Canada, that concluded that there was not a significant effect of program rank on the future productivity of the graduated PhDs. Given the current debates in Brazil pertaining to the institutional milieu that is feeding critics on the emphasis on productivism (Nascimento, 2010; Alcadipani, 2011; Bertero *et al.*, 2013), the value of publishing in low-quality journals, pay for publication journals (Bartholomew, 2014) and the guidelines used by CAPES in assessing the Brazilian system, among other, it is relevant to examine the Brazilian reality. Specifically, we expect a positive relation between the rank of the doctoral program and the scientific production of its PhD graduates, with the highest reputed programs graduating the most prolific researchers.

As the recent Financial Times rankings point out, management programs from the USA are losing some ground to the ones from other countries (mainly European countries and developing countries in Asia) (Collet and Vives, 2013). In this shifting environment, the choice of the Brazilian context is a valid case to study, although not

being an European or Asian country, it is relevant due to the abundant amount of data that are available and due to the current stage of academic development, being a benchmark to other developing countries. First, Brazil is a developing country where graduate programs are relatively recent, most of management programs initiated during the 1970s and are now undergoing major changes to reach international levels of relevance. Second, Brazil has one of the most innovative and organized systems of scientific production in the world, the Lattes platform, which contains detailed data on every researcher, such as all their published papers, their educational background, patents, research grants and many other indicators. Third, Brazil has one of the most advanced methods of governmental assessment of the quality of graduate programs, ranking its universities' programs according to specific, quantitative criteria (Maccari *et al.*, 2009).

This study required constructing a dedicated database comprising data of all graduates of the Brazilian doctoral programs between 1998 and 2008, based on data collected from CAPES. We examined 11 doctoral programs for a final sample of 734 new PhDs. We also collected all data on the scientific publications of every new PhD during the six years following their graduation (for instance, for a graduate in 2000, we counted the publications between 2001 and 2006). The track record of publications was extracted from the Lattes of each individual, and the publications were further classified using the Qualis listing. The Qualis is the Brazilian official listing of the journals that comprises an assessment of quality and relevance. Data were analyzed using mostly descriptive statistics involving time series to observe the evolution of scientific publications, percentile cuts to reveal the scientific production differences between doctoral programs and a cluster analysis to identify the different publication profiles of new PhD graduates.

Results show that a small number of "star" researchers published a large number of articles and also the articles in the best journals (quality assessed using the Qualis list). In contrast, the majority of the new PhDs published very little or no article at all, during the first six years after receiving their PhDs. The ranking (or concept) CAPES of the doctoral program did not prove to be a good predictor for the future productivity of the graduates. In fact, the majority of the new PhDs, even those from the highest ranked doctoral programs, published very little, while some graduates from other lower ranked programs attained a better publication record. Nonetheless, Faculdade de Economia e Administração (FEA)/Universidade de São Paulo (USP) (ranked 7, the highest of CAPES) emerged as the "cellar" of the new PhDs with larger and better track record of scientific publications.

Studying the scientific productivity of the new PhDs in management has possible practical implications. There are implications for the future candidates to a PhD program in management by providing the profile of PhD programs and past record of the graduates, therefore facilitating the candidates' decision of where to apply. For the Directors of the doctoral programs, we contribute providing a comparison of the new graduates' performance that may lead to deploy actions to improve research and publication ability. This study further contributes to the institutional agencies that regulate and promote science by establishing the prevailing norms that researchers and institutions follow, by providing a discussion of the relative ranking of doctoral programs and the performance of their new PhD graduates. Specifically, there are implications for the Brazilian CAPES that sets the criteria to evaluate the "quality" of the

doctoral programs. Finally, the results are useful for recruiters that need to decide between hiring new PhDs with low productivity graduated from high-ranked programs, or new PhDs with high productivity from programs with more modest ranking (Conley and Önder, 2014). At least in part, our results question the real impact of the doctoral programs' prestige on the performance of their graduates.

This article is organized in five parts. First, we review the literature on scientific production highlighting some specific traits of the Brazilian institutional system. In the second part, we present the method, including data collection procedures and sample. The third part includes the results, that instigate, in the fourth part, a broader discussion on the new PhDs scientific productivity, the doctoral programs and, more generically, academic publishing in management.

2. Literature review
Throughout the past decades, countries worldwide have instituted public policies to promote economic development and scientific productivity (Lin *et al.*, 2014). The large investments in the creation and promotion of universities and research institutes to leverage the production of knowledge has also led governs to implement evaluation systems of both the quantity and quality of scientific publications. To a large extent, this has implied implementing objective metrics to evaluate the publications, or productivity, of researchers (Galbraith *et al.*, 2014) and institutions to which they are affiliated (Maccari *et al.*, 2009). Remarkably, countries that have institutionalized evaluation systems and procedures have had substantial increases in productivity (Bouabid, 2014; Ingwersen and Larsen, 2014; Hilton, 2014).

2.1 Scientific production
Although there are no internationally agreed upon criteria, the metrics used to measure researchers' scientific production (we refer to production as the articles published in peer-reviewed journals) are often based on qualitative and quantitative data. Quantitative data are based on counting the number of articles published in journals. Qualitative data comprise an assessment of quality (Carpenter *et al.*, 2014) that may be based on aspects such as the number of citations (Bouabid, 2014; Galbraith *et al.*, 2014) or, more often, the quality of the journals in which the papers were published (Carpenter *et al.*, 2014). Despite the most accepted criteria for productivity are based on the journal articles published, some authors defend that being a productive scholar is about making scholarly contributions, which as Northcraft and Tenbrunsel (2012) point out, acting as journal editor should be just as valid as publishing in top-tier journals.

The qualitative assessments have been gaining greater acceptance in measuring researchers' publications. To a large extent, the prevailing qualitative criteria are based on the impact factors of the journals (Garfield, 1955, 2006). In fact, in Brazil, the debate on the scientific productivism (that is, the focus on the volume of published articles in disregard of the quality of the publications) has been notorious and raising concerns over the evolution of the institutional system (Alcadipani, 2011; Bertero *et al.*, 2013) that seems to promote quantity of articles over the quality of the scientific work. At least in part, the underlying concerns are also fuelled by the large number of journals that publish subpar articles. An additional concern pertains to the emergence of new journals – including the pay per publication journals – that do not prove to follow the

best academic criteria (Bartholomew, 2014) and are easier to publish (Carpenter *et al.*, 2014).

Although the intervention of regulatory institutions is relevant, it is not the only source of motivation for researchers. The researchers' scientific production is one of the core aspects building their reputation and peer recognition (Bedeian, 2003). A track record of high-quality publications, highly cited by the peers, is strongly valued in every researcher's career, even if more remarkably in the USA (Thoenig and Paradeise, 2014) and some European countries (Ingwersen and Larsen, 2014). In US universities, for instance, scientific publications have a direct impact on the employability (Galbraith *et al.*, 2014) and are a main driver of promotions and salary raises (Stephan, 1996). Hence, in addition to possible aspects concerning individual satisfaction of discovery and contribution to society, or other personal motives, there are significant institutional incentives to publish (Stephan, 1996). These incentives are, mainly, due to the need of the management programs to be well-ranked (by securing the best researchers), and just as pointed by Bill Starbuck in his interview with Barnett (2007), management programs generally seem to have no higher mission for themselves than to achieve higher rankings.

The expression "Public or Perish" (Harzing, 2010) has been broadly used in countries where the institutional systems require researchers to publish high-quality articles (specifically, in high-impact journals) to secure their positions at the universities (Carpenter *et al.*, 2014). Although the "Publish or Perish" represents for the new PhDs initiating their careers the need to publish in impact journals to obtain tenure – the academic stability at the university (Baccini *et al.*, 2014) – it is also relevant for future progressions in their careers.

2.2 The Brazilian institutional framework

In Brazil, the institutional system that oversees research in doctoral programs is established by the agency CAPES (Castro and Soares, 1983; Shigaki and Patrus, 2013; Maccari and Nishimura, 2014). In 1951, the Brazilian government created CAPES this agency to provide training of specialized personnel, in quantity and quality, needed for the development of the country (Shigaki and Patrus, 2013). In 1977, CAPES started evaluating the graduate programs (Castro and Soares, 1983); currently it assesses a number of indicators on the performance of masters and doctoral programs and ranks them in a seven-point scale (Maccari and Nishimura, 2014). This evaluation is important for the doctoral programs, not only because it signals quality, but also because a better evaluation can facilitate access to public resources and funding (Maccari *et al.*, 2008).

CAPES institutes criteria and measures to evaluate researchers and doctoral programs (Maccari *et al.*, 2009). Among the criteria assessed there is strong valorization of scientific publications (Nascimento, 2010) in peer-reviewed journals (Shigaki and Patrus, 2013). Other criteria include the program's proposition, profile, experience and stability of the teaching faculty, the quality of the theses and dissertations, students' productivity and social embeddedness (Maccari *et al.*, 2014). These metrics are not static, instead they are continuously revised and updated. For instance, a recent change of criteria entailed not providing points for paper presentations in scientific events (Nascimento, 2010). In fact, scientific events were losing relevance in the criteria since the 2007 evaluation, being replaced by peer-reviewed publications ranked by Qualis

(Maccari and Nishimura, 2014) and generating higher pressure for journal publications (Maccari *et al.*, 2009).

One element of the Brazilian system is the Qualis list of journals. In essence, the Qualis is the Brazilian classification of the journals along a system that goes from C, in the lower bound, to A1 in the upper bound. The criteria for classifying the journals are publicly announced (see http://qualis.capes.gov.br/webqualis/principal.seam) but comprise, at least in part, a number of organizational aspects of the journals and some indicators of quality – based on the impact factor and the publishing organization.

3. Method

3.1 Procedures for data collection

Data collection followed three procedures. First, we identified the PhDs graduated by each Brazilian doctoral program. We used the CAPES database (publicly available in www.capes.gov.br/cursos-recomendados) to identify the doctoral dissertations defended and the graduates' names. CAPES database only covers data after 1998, thus defining the lower bound of the timeframe of this study.

The second procedure involved collecting data on the scientific publications of each of the new PhDs. We used the Lattes database – Lattes is the Brazilian database of the academic curriculums – to identify the articles published. The third procedure involved classifying the publications in the following four groups:

(1) the number of published articles;
(2) number of articles published on Brazilian Qualis A2 journals;
(3) the number of articles published in international journals (published geographically outside of Brazil); and
(4) the number of articles published in Qualis A1 international journals.

In defining the period of the study, we followed Conley and Önder (2014) and considered only the new PhDs publications during the six years after receiving the PhD degree. Therefore, the timeframe for this study was between 1998 and 2014. However, as the purpose was to examine the publication record six years after graduation, we only analyzed PhD graduated between 1998 and 2008. By defining a time window, it is possible to establish comparisons between the track record of publications of the new PhDs without possible bias of comparing newer and older graduates that had more time to publish and could be taken as more prolific. A six-year period is somewhat arbitrary, but it follows Conley and Önder (2014), and it is often the period given by US universities to evaluate whether a newcomer will obtain tenure.

3.2 Coding of the data

To classify the publications of newly graduated PhDs, we have used the current Qualis 2015 journal ranking. As noted previously, the publications were classified in the following four categories:

(1) absolute number of articles published during the six years after graduation;
(2) number of articles published in Qualis A2 national journals (in the "Management, accounting and tourism" area) – these include: Brazilian Administration Review, Brazilian Business Review, Gestão & Produção, Organizações & Sociedade, Revista de Administração Contemporânea, Revista

de Administração de Empresas, Revista Brasileira de Economia, Revista Contabilidade & Finanças, Revista de Administração da FEA/USP (RAUSP) and Revista de Administração Pública e Dados;

(3) number of articles published in international outlets (foreign but classified by Qualis CAPES); and

(4) the number of articles published in Qualis international Qualis A1 journals in management.

These categories are justified because the absolute number of articles published indicates productivity of the new PhDs, while the remaining categories comprise different assessments of quality. For example, publications in Qualis A2 journals are those in the best reputed Brazilian journals. International articles reveal the degree of internationalization of the publications, and international A1 articles denote publications in the highest quality journals.

3.3 Sample
The search in the CAPES database identified 829 new PhDs graduated during the period 1998-2008. We excluded 24 observations because they were foreign graduates and for whom there was no indication they pursued an academic career in Brazil and did not maintain an updated version of their curriculum Lattes. We further excluded 71 other observations for not having an updated Lattes or for not having a CV Lattes at all. Finally, we excluded two graduates by two universities – UNB and UFPR – because these were the only representatives of these universities.

The final sample consisted of 734 new PhDs, graduated between 1998 and 2008, by all doctoral programs in management in Brazil that graduated any PhD during this period, totalizing 11 programs. Although there were more management programs operating during the analyzed period, they had not yet graduated any student during the years of the study. Currently, there are several additional doctoral programs in Brazil, but they did not exist or did not have any doctoral graduates during the period of our study, such as the PPGA/Uninove and the PMDI/ESPM, among others.

Tables I and II characterize the sample. Table I shows the number of PhDs graduated by each doctoral program, per year, during the period. There was an increase in the number of PhDs graduated over the years, from 33 graduates in 1998 to 102 in 2008. The older programs have more participants in our sample, mostly FEA/USP (234 new PhDs), FGV/SP (184) and UFRGS (105).

Table II presents data on the track record of publications by the new PhDs per doctoral program. The eldest programs have the higher number of graduates and also the higher number of articles published. FEA/USP and FGV/SP have the highest number of published articles, with 1,678 and 846 articles, respectively. However, a larger volume of publications does not necessarily means higher quality publications (e.g. A2, international or international A1). Moreover, a large number of articles published by a program's graduates does not mean a high mean number of articles per PhD graduate.

3.4 Procedures of analyses
The analyses were mostly descriptive, based on counts and averages. The mean scores were calculated and divided by each class of graduates – the class refers to the graduates by each program in each year. We also use percentiles. We classified the 99th, 95th, 90th,

Start of program	CAPES concept	Program	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Total PhDs on Sample
1975	7	FEA/USP	13	13	23	14	14	12	30	23	23	31	38	234
1976	7	FGV/SP	17	14	9	16	15	29	23	15	18	9	19	184
1994	5	UFRGS	3	3	8	12	4	3	12	20	20	9	11	105
1995	6	UFMG		2	5	7	1	5	10	5	4	7	6	52
1993	5	UFBA			5	4	1	5	4	8	2	12	5	42
1976	4	UFRJ			2		2	4	1	8	8	3	4	32
1997	5	PUC/RIO				1	2	2	6	3	3	4	1	22
1997	6	FGV/RIO						4	2	4	2	1	6	19
2000	5	UFLA					1			2	5	6	4	18
2000	4	UFPE								3	5	3	2	13
2003	5	UPM									1	6	6	13
Total			33	32	50	54	40	64	88	87	91	91	102	734

Note: The values expressed indicate the number of new PhDs graduated in each year
Source: Authors' calculations using the data described in the paper

Doctoral program	No. of published articles	No. of national A2 articles	No. of international articles	No. of A1 articles	Mean no. of articles per PhD	Mean no. of A2 articles per PhD	Mean no. of international articles per PhD
FEA/USP	1,678	196	188	13	7.2	0.8	0.8
FGV/SP	846	186	84	9	4.6	1.0	0.4
UFRGS	776	139	98	12	7.4	1.3	0.9
UFMG	516	82	35	0	9.9	1.6	0.7
UFRJ	208	25	55	10	6.5	0.8	1.8
UFPE	201	18	17	1	15.5	1.4	1.3
UFBA	196	31	5	2	4.7	0.7	0.1
UFLA	189	19	19	3	10.5	1.1	1.1
PUC/RIO	106	23	23	1	4.8	1.0	1.0
FGV/RIO	93	14	14	1	4.9	0.7	0.7
UPM	54	7	13	0	4.2	0.5	1.0

Note: Ordered by the total number of articles per institution
Source: Authors' computations using the data described in the paper

Table II.
Characterization of
the sample:
publications by
institution

80th, 60th and 50th percentiles. The percentiles can be read as the point that divides the sample where the percentage of the sample is over a certain score (1 per cent at the 99th percentile, for instance), while the rest of the sample is under the given score (99 per cent of the sample on the 90th percentile, for instance).

4. Results

Table III contains the means, standard deviations and correlations. To code the variable "year", we used 1 for 1998 up to 11 for 2008. Overall, the new PhDs in the sample published a mean of 6.6 articles over the six years after graduation, including about one article in A2 national journals, only 0.75 international articles and a mean of a mere 0.066 A1 articles published per graduate.

It is worth noting the negative correlations between program ranking (or concept CAPES) and the number of publications and publications in A2 national journals. It is further noteworthy the positive correlations between all publication measures, showing that the PhDs that publish more are also those that publish in better journals. That is, performance measures are correlated denoting that the best performers do better on all indicators. Finally, correlations seem to show that PhDs graduated more recently tend to have more international articles than their precursors.

4.1 Productivity over the years

Table IV shows the publication averages of the new PhDs by year of graduation and doctoral program, in the four categories examined. The number of articles published by the new PhDs [Table IV(a)] have increased just slightly over the years. A mean of about two articles published over a six-year period by the new PhDs separates the graduates in 1998 from those graduated in 2008. The doctoral programs of UFPE and UFBA had the highest mean number of articles per new PhD but are among the programs with the lowest number of PhDs awarded (13 and 16, respectively). The classes of graduates that stand apart were those of FGV/Rio of 2007, with 20 articles per new PhD, UFMG also of 2007 with a mean of 23.3 articles and UFPE 2008 with a mean of 22 articles per new PhD.

The publications of the new PhDs in A2 national journals [Table IV(b)] increased little during the period. The doctoral programs of UFMG and UFRGS had the highest number of A2 national articles published, and the older programs actually decreased the number of these publications over the more recent years. Analyzing the number of articles published in international journals [Table IV(c)], again a small increase over the

Variable	Mean	SD	1	2	3	4	5	6
1. Program concept	6.18	1.02	1.00					
2. Year	6.35	2.63	$-0.20**$	1.00				
3. No. of articles	6.64	8.66	$-0.16**$	0.03	1.00			
4. No. of national A2 articles	1.01	1.82	$-0.08*$	-0.03	$0.61**$	1.00		
5. No. of international articles	0.75	2.05	-0.06	$0.11**$	$0.49**$	$0.33**$	1.00	
6. No. of international A1 articles	0.07	0.34	-0.06	0.05	$0.16**$	$0.12**$	$0.39**$	1.00

Notes: Spearman correlations; $*p < 0.050$; $**p < 0.001$
Source: Authors' computations using the data described in the paper

Table III.
Mean, standard deviation and correlations

(a) Mean of articles per new PhD, year of graduation and program

Institution	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean per PhD program
UFPE					12.0	5.0	9.7	11.0	13.8	18.3	22.0	15.5
UFLA					17.0	11.0	7.7	8.50	15.2	11.3	4.0	10.5
UFMG		12.0	5.4	9.1	14.8	7.9	6.0	5.8	10.5	23.3	4.7	9.9
UFRGS	4.7	7.3	7.3	6.9	8.5	5.3	5.0	7.0	7.8	7.8	4.5	7.4
FEA/USP	2.6	6.6	5.5	5.5	10.0	3.3	7.5	6.6	6.2	10.5	9.0	7.2
UFRJ			3.0					5.6	5.4	10.3	9.3	6.7
FGV/RIO				9.0	5.0	7.0	1.5	7.3	1.0	20.0	2.3	4.9
PUC/RIO								4.7	3.7	9.8	0.0	4.8
UFBA			4.4	7.8	8.0	2.8	5.0	3.0	10.0	4.6	2.8	4.7
FGV/SP	5.6	3.0	5.6	2.1	3.8	3.7	6.0	3.7	5.9	8.0	4.6	4.6
UPM									6.0	3.2	4.8	4.2
Mean per year	4.4	5.4	5.7	5.5	7.6	5.0	6.3	6.1	7.4	10.1	6.5	6.6

(b) Mean of A2 national articles per new PhD, year of graduation and program

Institution	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean per PhD program
UFMG		1.5	1.8	2.9	4.0	0.8	0.6	0.6	2.3	2.1	1.5	1.6
UFPE								1.3	1.2	2.7	0.0	1.4
UFRGS	1.0	1.0	2.1	1.4	4.8	1.0	1.3	1.3	0.8	1.2	0.7	1.3
UFLA					0.0			0.0	1.8	1.2	0.8	1.1
PUC/RIO				5.0	1.0	2.0	0.7	0.7	1.0	0.8	0.0	1.1
FGV/SP	1.4	0.4	0.8	0.7	1.1	0.5	1.1	1.7	1.8	0.8	0.7	1.0
FEA/USP	0.6	0.5	0.7	0.9	1.6	0.5	1.0	1.0	1.0	0.7	0.7	0.8
UFRJ			1.0		1.5	0.0	0.0	0.3	0.5	1.7	2.3	0.8
FGV/RIO						0.5		1.3	0.0	3.0	0.2	0.7
UFBA			1.6	0.5	0.0	0.4	1.5	0.0	4.5	0.3	1.0	0.7
UPM							0.3		2.0	0.5	0.3	0.5
Mean per year	1.1	0.6	1.2	1.2	1.7	0.6	1.0	1.0	1.3	1.0	0.8	1.0

(continued)

Table IV.
Articles published
per new PhD, year of
degree and program

Table IV.

Institution	1998	1999	2000	2001	2002	2003	2004	2005	2006	2007	2008	Mean per PhD program
(c) Mean of international articles per new PhD, year of graduation and program												
UFRJ		1.0			6.5	0.0	5.0	0.3	0.8	3.0	4.5	1.8
UFPE								1.7	1.4	0.7	1.5	1.3
UFLA					1.0			1.0	1.2	1.5	0.3	1.1
PUC/RIO				0.0	0.0	0.0	0.0	0.0	0.0	5.8	0.0	1.1
UPM									1.0	0.0	2.0	1.0
UFRGS	0.3	0.3	0.	0.8	0.8	0.0	0.3	0.7	1.2	2.9	1.3	0.9
FEA/USP	0.7	1.2	0.2	0.4	1.1	0.3	0.9	0.8	0.7	1.1	1.1	0.8
FGV/RIO						0.3	2.0	2.0	0.0	1.0	0.0	0.7
UFMG		0.0	0.0	0.0	0.0	0.2	1.1	0.2	0.0	2.9	0.3	0.7
FGV/SP	0.8	0.1	0.6	0.1	0.1	0.5	0.5	0.2	0.8	1.0	0.4	0.5
UFBA			0.0	0.0	0.0	0.2	0.8	0.0	0.5	0.0	0.0	0.1
Mean per year	0.7	0.6	0.3	0.3	0.9	0.3	0.7	0.6	0.9	1.5	1.0	0.8
(d) Mean of A1 international articles per new PhD, year of graduation and program												
UFRJ		0.0			0.5	0.0	0.0	0.0	0.0	1.0	1.5	0.3
UFLA					0.0				0.0	0.5	0.0	0.2
UFRGS	0.0	0.3	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.6	0.1	0.1
FEA/USP	0.1	0.1	0.0	0.1	0.1	0.0	0.0	0.0	0.1	0.0	0.1	0.1
FGV/SP	0.1	0.1	0.0	0.0	0.0	0.0	0.0	0.1	0.1	0.2	0.1	0.1
UFBA						0.0	0.3	0.0	0.5	0.0	0.0	0.1
FGV/RIO						0.0	0.0	0.2	0.0	0.0	0.0	0.0
PUC/RIO				0.0	0.0	0.0	0.0	0.0	0.0	0.2	0.0	0.0
UFMG			0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UFPE											0.5	0.0
UPM		0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
Mean per year	0.1	0.1	0.0	0.0	0.1	0.0	0.0	0.0	0.1	0.2	0.2	0.1

Source: Authors' computations using the data described in the paper

years, but the graduates in 2006, 2007 and 2008 had more publications than their
predecessors. The observable peaks in international publications – for instance, by the
graduates from PUC/RIO in 2007 (5.75) and UFRJ 2002 (6.50) – we further explored and
was traced to some high-performing new PhDs, such as Valdir Lameira, with 22
published international articles. When taking into account the A1 international
publications [Table IV(d)], there is little variation, and the majority of the graduates did
not publish a single paper in A1 international journals.

4.2 Analyses per doctoral program
In the following tables, we expand the description to show percentiles referring to
each type of publication and institution. The productivity differences between
institutions are significant, according to the test of means U of Kruskal–Wallis ($p <$
0.05). For a better understanding, in reading of the percentiles follow the example: as
the 90th percentile of FEA/USP program intercepts 28 published articles, 90 per cent
of the FEA/USP graduates published less than 28 articles, while 10 per cent
published more than 28 articles.

Table V contains the percentile distribution, percentage of graduates that published
an article of the observed category and the mean number of published articles per new
PhD. Notably, only 66.8 and 69.2 per cent of the graduates from FGV/SP and UPM,
respectively, ever published an article during the observed period – in other words, 33.2
per cent of the PhDs graduated at FGV/SP and 31.8 per cent of the new PhDs by UPM
have not published a single article during the period. In contrast, some of the smaller
programs had up to 100 per cent of their new PhDs publishing, such as UFPE (100 per
cent published) and UFLA (94.4 per cent).

A small number of researchers may have done most of the publishing and, on the
other hand, there is a large number of PhDs that did not publish an article.
Observing the percentiles, we conclude that in the doctoral programs by UFPE and
UFLA, the 50th percentile intercepts 11 and 8 articles, respectively. In other words,

Doctoral program	Percentiles							Per cent of publishing PhDs	Mean of articles per PhD
	99	95	90	80	70	60	50		
UFPE	44.3	41.4	36.6	23.8	16.0	13.2	11.0	100.0	15.5
UFLA	34.6	29.2	21.7	15.0	11.9	9.4	8.0	94.4	10.5
UFMG	47.2	28.5	19.9	17.0	10.7	9.0	6.5	90.4	9.9
UFRGS	27.8	21.6	16.6	12.0	10.0	7.4	6.0	87.6	7.4
FEA/USP	54.7	28.0	16.0	11.0	8.0	5.8	4.0	76.9	7.2
UFRJ	20.0	19.1	16.2	9.2	8.3	7.4	6.0	86.7	6.7
FGV/RIO	19.8	19.1	15.0	7.4	6.0	2.8	2.0	73.7	4.9
PUC/RIO	28.6	11.9	9.0	7.8	4.0	3.6	2.0	81.8	4.8
UFBA	17.0	13.0	10.0	8.0	6.0	4.0	4.0	85.7	4.7
FGV/SP	29.3	15.9	12.0	8.4	6.0	3.0	2.0	66.8	4.6
UPM	12.6	11.2	9.2	6.0	6.0	5.2	5.0	69.2	4.2

Source: Authors' calculations using the data described in the paper

Table V.
Percentile analysis:
articles published by
new PhDs, per
institution
(1998-2008)

half of the new PhDs graduated by these programs published at least 11 and 8 articles, respectively. Moreover, the 5 per cent percentile of UFPE graduates has published over 41 articles, which is a very high number of publications. On the other hand, some programs have a smaller production – for instance, about half of the PhD graduates by FGV/Rio, PUC/Rio and FGV/SP published less than two articles. FEA/USP program outstands at the number of articles published by their most prolific graduates, having the 1 per cent more prolific alumni publishing more than 547 articles at the 99th percentile.

Table VI shows the analysis of the percentiles for publications in A2 national journals. In most of the programs, 50 per cent of the PhDs did not publish in A2 national journals, as pointed by the 50th percentile of all institutions, with two exceptions: PUC/Rio and UFMG. On the 70th percentile, UFRGS stands out with 70 per cent of its graduates publishing up to two articles during the research period. UFMG and FEA/USP have the 1 per cent more prolific PhD graduates publishing more than 896 and 867 A2 national articles, respectively.

Analyzing international publications (Table VII), some programs stand out. The doctoral program of UFPE had 50 per cent of its graduates publishing at least one international article. In contrast, we may find, for instance, UFBA, where 90 per cent of its graduates did not publish a single article in international journals.

Finally, we examined the publications in A1 international journals (Table VIII). It is well-known that Brazilian researchers have a hard time publishing at this strata. In most of programs, there was close to none A1 article published by their graduates during the observed period. Nonetheless, some doctoral programs stand out. The most successful program at this strata was UFRJ where at the 90th percentile, we observe that 10 per cent of the new PhDs had at least one A1 article. Other programs also stand out, as UFLA and UFRGS, although having a high number of graduates, present a rather high per cent of graduates that published on A1.

Doctoral program	Percentiles							Per cent of publishing PhDs	Mean of national A2 articles per new PhD
	99	95	90	80	70	60	50		
UFMG	8.9	5.4	4.0	2.8	2.0	1.0	1.0	59.6	1.6
UFPE	6.6	5.2	3.8	2.6	1.4	1.0	0.0	46.2	1.4
UFRGS	7.9	4.8	4.0	2.2	2.0	1.0	0.0	49.5	1.3
UFLA	5.4	3.4	3.0	2.6	1.0	0.2	0.0	38.9	1.1
PUC/RIO	4.7	3.9	2.0	2.0	1.0	1.0	1.0	54.5	1.1
FGV/SP	8	6.0	3.0	2.0	1.0	0.0	0.0	35.9	1.0
FEA/USP	8.6	4.0	2.0	1.0	1.0	0.0	0.0	36.8	0.8
UFRJ	6.8	3.5	2.1	1.0	1.0	0.0	0.0	33.3	0.8
FGV/RIO	4.6	3.2	3.0	1.4	0.0	0.0	0.0	26.3	0.7
UFBA	6.9	3.0	1.9	1.0	1.0	0.0	0.0	35.7	0.7
UPM	1.88	1.4	1.0	1.0	1.0	1.0	0.0	46.2	0.5

Table VI.
Percentile analysis:
A2 national articles
published by new
PhDs per institution
(1998-2008)

Source: Authors' calculations using the data described in the paper

Doctoral program	Percentiles							Per cent of publishing PhDs	Mean of international articles per new PhD
	99	95	90	80	70	60	50		
UFRJ	12.7	10.2	5.3	2.0	1.0	1.0	0.0	43.3	1.8
UFPE	3.9	3.4	3.0	3.0	2.4	1.2	1.0	53.8	1.3
UFLA	4.8	4.2	3.3	1.6	1.0	1.0	0.5	50.0	1.1
PUC/RIO	17.6	1.0	0.0	0.0	0.0	0.0	0.0	9.1	1.1
UPM	9.8	5.0	1.0	0.6	0.0	0.0	0.0	23.1	1.0
UFRGS	7.0	4.8	2.6	1.0	1.0	0.0	0.0	34.3	0.9
FEA/USP	11.3	4.0	2.0	1.0	0.0	0.0	0.0	27.8	0.8
FGV/RIO	5.6	4.2	2.4	1.0	0.0	0.0	0.0	26.3	0.7
UFMG	9.5	4.9	1.0	0.0	0.0	0.0	0.0	19.2	0.7
FGV/SP	6.0	2.0	2.0	1.0	0.0	0.0	0.0	22.8	0.5
UFBA	2.2	1.0	0.0	0.0	0.0	0.0	0.0	7.1	0.1

Source: Authors' calculations using the data described in the paper

Table VII.
Percentile analysis: articles published in international journals, by institution (1998-2008)

Doctoral program	Percentiles							Per cent of publishing PhDs	Mean of A1 articles per new PhD
	99	95	90	80	70	60	50		
UFRJ	3.0	2.6	1.1	0.0	0.0	0.0	0.0	16.7	0.3
UFLA	2.5	0.5	0.0	0.0	0.0	0.0	0.0	5.6	0.2
UFRGS	2.0	1.0	0.0	0.0	0.0	0.0	0.0	8.6	0.1
FEA/USP	1.0	0.0	0.0	0.0	0.0	0.0	0.0	4.3	0.1
FGV/SP	1.2	0.0	0.0	0.0	0.0	0.0	0.0	3.8	0.1
UFBA	1.0	0.0	0.0	0.0	0.0	0.0	0.0	4.8	0.1
FGV/RIO	0.8	0.1	0.0	0.0	0.0	0.0	0.0	5.2	0.1
UFPE	1.0	0.8	0.0	0.0	0.0	0.0	0.0	7.6	0.1
PUC/RIO	1.0	0.5	0.0	0.0	0.0	0.0	0.0	4.5	0.0
UFMG	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0
UPM	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0	0.0

Source: Authors' calculations using the data described in the paper

Table VIII.
Percentile analysis: articles published on A1 international journals by new PhDs, by institution (1998-2008)

4.3 Researcher profiles

Previous analyses showed that a small number of researchers seem to be publishing most of the articles. Based on that partial evidence, we conducted a K-means cluster analysis (Table IX).

The cluster analysis identified three distinct groups of researchers. Cluster 1 comprises 21 new PhDs that are the higher performers. This group can be identified as the Brazilian "stars" new PhDs, with an average of 41.4 articles, 3.7 A2 national articles, 6.5 international articles and 0.2 international A1 articles. Cluster 2 includes 166 new PhDs that have intermediate publication performance. The members of this group have published an average of 14.7 articles, 3.7 A2 national articles, 1.6 international articles and 0.1 international A1. Cluster 3 has the larger number of members ($n = 547$). The members of this cluster have a mean of 2.9 published

articles, 0.5 national A2 articles, 0.3 international articles and 0.0 international A1 articles. This group publishes very little nationally and internationally. Table X identifies the members of Cluster 1.

The predominance of higher concept programs appearing in the high-performers cluster is visible. In particular, FEA/USP is not only the program that graduated more PhDs, but it also emerges as the "cellar" of the most productive PhDs. It is also remarkable that even among the "stars" there were huge disparities in production. For instance, while Emerson Maccari (68 articles), Flavia Sherer (62) and Felipe Borini (57) topped the list, Francisco Costa, in the 21st position, published nearly half (29 articles). Common to most is the low number of international A1 articles, which highlights Felipe Borini, with three A1 publications in the period.

Nonetheless, the first cluster is highly driven by the volume of publications and does not distinguish the quality of the journals. Therefore, we conducted an additional analysis – see Table XI – to analyze the production assessing relative quality. It is worth noting at this point that the category "international journals" is very broad and may actually include journals in the several strata of Qualis – that is, publishing in an "international journal" does not immediately signal quality.

Table XI includes only the new PhDs with two or more articles published in international A1 journals. This is the group that excels in the quality of the articles published. For example, Valter Vieira, graduated in UNB in 2008, had five A1 articles published and 15 articles in national A2 journals. Jorge Carneiro, graduated by UFRJ published 18 published articles, four of which are in national A2 journals, eight international and three international A1 articles. Both Tables X and XI figure Felipe Borini, with 57 published articles, including three international A1 during the period.

5. Discussion

In this article, we analyzed scientific production – or rather, the publication of articles in peer-reviewed journals – by the new PhDs in management by the Brazilian doctoral programs. The analyses focused on the production of the new PhDs and the graduation institution. We compiled a database with the researchers that received their doctoral degrees by Brazilian programs of management between 1998 and 2008, and examined their track record of publication over the six years after receiving their doctoral degree. The data used were collected from two secondary sources: the CAPES "recommended courses" database and the Lattes curriculum database.

Variable	Cluster		
	1	2	3
Total articles	41.4	14.7	2.9
A2 national	3.7	2.5	0.5
International	6.5	1.6	0.3
A1 international	0.2	0.1	0.0
N	21	166	547

Table IX.
Cluster formation

Source: Authors' calculations using the data described in the paper

Name	CAPES concept (2013)	PhD program (year of degree)	No. of articles	No. of A2 national articles	No. of international articles	No. of international A1 articles	Current employment
Emerson Maccari	7	FEA/USP (2008)	68	3	6	0	UNINOVE
Flávia Scherer	6	UFMG (2007)	62	1	12	0	UFSM
Felipe Borini	7	FEA/USP (2008)	57	10	14	3	ESPM/FEA-USP
Clandia Gomes	7	FEA/USP (2007)	56	3	9	0	UFSM
Eduardo Spers	7	FEA/USP (2003)	50	2	0	0	ESPM
Marcos Neves	7	FEA/USP (1999)	53	1	12	1	FEA/USP
André Leão	4	UFPE (2007)	46	7	1	0	UFPE
Gilnei Moura	7	FEA/USP (2008)	48	2	6	1	UFSM
Fátima Matos	4	UFPE (2008)	39	0	3	0	UNIFOR
Kelmara Vieira	5	UFRGS (2006)	39	3	7	0	UFSM
Luciano Toledo	7	FEA/USP (2007)	37	1	1	0	UPM
Juliana Giraldi	7	FEA/USP (2006)	37	9	10	0	FEA/USP
Luiz Abrantes	5	UFLA (2006)	36	3	0	0	UFV
Luiz Fávero	7	FEA/USP(2005)	35	4	13	0	FEA/USP
Kely Paiva	6	UFMG (2007)	34	5	7	0	UFMG
Wilson Amorim	7	FEA/USP (2007)	33	1	2	0	FEA/USP
Valdir Lameira	5	PUC/RIO (2007)	32	0	22	0	IBMEC/INESCC
Herbert Kimura	7	USP & FGV/SP (2002)[a]	30	8	9	0	UnB
Armindo Teodósio	7	FGV/SP (2008)	31	3	0	0	PUC-Minas – FEA/USP
Alexandre Carrieri	6	UFMG (2001)	30	11	0	0	UFMG
Francisco Costa	7	FGV/SP (2007)	29	1	2	0	UFPB

Notes: Organized by the number of articles published; [a] graduate with two PhD degrees, one by each institution
Source: Authors' computations using the data described in the paper

Table X.
"Stars" of scientific
publication

Table XI.
New PhDs with
highest impact
publications (A1
international
journals)

Name	CAPES concept (2013)	PhD program (Year)	No. of articles	No. of A2 national articles	No. of international articles	No. of international A1 articles	Current program
Valter Vieira	5	UNB (2008)	28	14	8	4	UEM
Felipe Borini	7	FEA/USP (2998)	57	10	14	3	ESPM/FEA- FEA/USP
Luciano Barin-Cruz	5	UFRGS (2007)	23	3	16	3	HEC Montréal
Claudio Barbedo	4	UFRJ (2008)	20	8	5	3	IBMEC
Jorge Carneiro	4	UFRJ (2007)	18	3	8	3	PUC-RJ
Priscila Claro	5	UFLA (2007)	8	3	4	3	INSPER
Rosalvo Streit	5	UFRGS (2006)	3	0	3	2	UCB
Leila Humes	7	USP (2006)	3	0	3	2	FEA/USP
Felipe Zambaldi	7	FGV/SP (2007)	14	2	4	2	FGV/SP
Thomaz Wood Jr	7	FGV/SP (1998)	16	8	4	2	FGV/SP

Source: Authors' computations using the data described in the paper

In this study, we endeavored to analyze the track record of scientific publications of the new PhD graduates, relating with the ranking of the doctoral program. We present two main empirical contributions. First, we reveal the volume and quality of scientific publications of the Brazilian new PhDs in management. We conclude that a small number of new doctoral graduates account for the majority of the articles published. This is of major interest to doctoral students, as their record of publications can determine employment opportunities, salaries and tenure. Moreover, the relative prestige of the doctoral programs does not seem strictly related to the performance of the graduates. This is also of interest to the doctoral programs. This understanding may influence doctoral programs to change policies and perhaps the curriculum to improve the ability of their graduates to publish more and in "better" journals. A third contribution pertains to the evaluation and ranking of PhD programs. Albeit Brazil seems to have one of the most advanced institutional systems to regulate and rank programs; our results failed to find evidence that those programs that are higher ranked by CAPES are also those that graduate the most prolific scholars. Hence, the empirical evidence ought to contribute to institutional agencies in Brazil and perhaps in other Latin American countries in designing the evaluation systems. Perhaps these agencies could use some of the metrics used in this study in setting evaluation criteria when the purpose is to promote research and publication.

The results of this study have implications relevant for all audiences involved. They are useful to candidates to doctoral programs when choosing the program that best suits their needs for learning and developing a research capability. Also, to the Directors of doctoral programs and the institutional agencies that regulate the generation of science, because we discuss the research productivity of Brazilian doctoral programs. Moreover, this study is likely relevant for recruiters when deciding between candidates with low productivity records but graduated by higher ranked doctoral programs or candidates with high productivity but coming from lower ranked programs.

As we intended to analyze the scientific publications of new PhDs, this study highlighted that a large number of new PhDs in management had poor publication performance. However, this result needs to take into account a broader contextual and institutional analysis. The criteria and metrics for evaluating researchers and doctoral programs have evolved markedly (Maccari *et al.*, 2014). Specifically, the change in criteria that started emphasizing publications in peer-reviewed articles over conference papers after 2007 is likely to require careful and more in-depth longitudinal analyses. For example, the PhD graduated in 2006, 2007 and 2008 were already trained towards favoring publications in peer-reviewed journals. Other institutional changes include the journal classifications and continuous updating of Qualis, as well as the criteria by which the journals are classified in Qualis. The variations in the Qualis listing may also change the relative status of journals over time, thus possibly impacting some of our computations.

The results are adamant in pointing out that there is a small group of highly productive new PhDs – that we called "stars". Generally speaking, we may find these "star" new PhDs in several doctoral programs. We have also found that some of the new PhDs have a relatively higher level of international A1 papers published, but not necessarily a larger volume of publications. That is, a small group of the new PhDs

seems to value quality (or journal reputation) over quantity of publications; following more of an US or European standard, as they value more the quality than the quantity published.

A great part of the objective of this study was to analyze the relation between ranking of doctoral program and the productivity of new PhDs. Our results on the possible impact of the doctoral program showed that there is a negative correlation between the programs' rank and the productivity of their graduates on the six years following graduation. The CAPES concept of a doctoral program does not seem to be a good predictor of the future scientific production of its graduates. Hence, some doctoral programs with high-ranking graduate low-performing PhDs, while smaller programs, with lower ranks, are able to graduate high performing PhDs. However, these results also need to be analyzed with caution. For instance, FEA/USP has graduated the larger number of PhDs as well as the largest number of "stars". In fact, the Qualis rakings, or doctoral program rankings, seem to make more sense when examining the highly productive new PhDs, revealing that the doctoral programs with higher ranks also tend those that have a larger number of very productive graduates. These results seem to agree that ranking systems can be generally volatile and unfair, as pointed by Adler and Harzing (2009), since the most prominent new PhDs seem to be weighting more than the general productivity level of the graduates.

There are many issues to consider when assessing the new PhDs scientific productivity. For instance, productivity may be related to the embeddedness in research groups (Lee and Bozeman, 2005; Antonio-García et al., 2014) and English proficiency (Man et al., 2004; Bauwens et al., 2012). It is therefore crucial to understand whether the doctoral programs comprise these structures that promote research collaborations. Moreover, it seems reasonable to suggest that higher ranked doctoral programs have a larger pool of doctoral candidates from which to select better students (Conley and Önder, 2014).

To explain the high number of new PhDs with very low publication record, we might examine what are the underlying motivations (Levin and Stephan 1991) and the incentive systems. That is, what drives new PhDs to publish? Brazilian researchers are mainly motivated by individual and intrinsic satisfaction, but also by the value of publications on the researchers' reputation that is valued, for instance, by the agencies such as CNPq (Maccari et al., 2014). Other motivational forces may be found on the institutional requirements of publication imposed by CAPES. In Brazil, only a handful of institutions provide financial incentives to publish (some exceptions found in PUC-Rio, FGV/Rio, FGV/SP and in 2015 implemented in FEA/USP). It is further worth noting that it is not clear that in Brazil the track record of publications is a major criteria in deciding hiring and promotion new faculty (Maccari et al., 2014). We may thus find that the Brazilian institutional reality is in sharp contrast to that found in countries such as the UK and USA, where maintaining the current employment and getting tenure deeply depends on the publications record (Lopez et al., 2014; Baccini et al., 2014).

Albeit the institutional changes that have been implemented in Brazil, and specifically those targeted at regulating the graduate programs, there has been little change in both the volume and quality of the publications. The data presented in Tables III and IV reveal that when comparing the production of the graduates in 1998 with those graduated in 2008, there was an increase of about two papers

published over the six-year period after doctoral graduation. The evolution is also short when examining publications in the top national and international journals. Therefore, it is not evident that the strengthening of the institutional requirements has had a significant effect on scientific publishing. Perhaps adopting a system that values more other metrics, such as journals' impact factors (Ingwersen and Larsen, 2014; Bouabid, 2014), may fuel the publications, as occurred in countries that instituted these metrics (Hilton, 2014). It is possible that having direct benefits to the more prolific scholars, such as financial rewards, might increase the productivity of the Brazilian academy (Stephan, 1996; Galbraith *et al.*, 2014). It is thus important to examine the best practices around the world and their actual outcomes and implement a system in Brazil that is adjusted to the academic goals of the country as a whole and the specific universities individually. Hence, a national policy towards promoting research and publication is likely to complement individual incentives by the institutions.

This study presents interesting evidence on the publication record of the PhDs in management by Brazilian doctoral programs. We have found that a small number of "stars" new PhDs are high performers but rather overshadowed by a large number of new PhDs that publish very little. In building our dedicated database, we have excluded 71 graduates because they did not have their Lattes curriculum up-to-date, a basic requirement for an academic career. This may signal the possibility that many graduates did not pursue research positions or an academic career. We have also questioned the relevance of the CAPES concept in estimating the future publication performance of the graduates. This study thus entails important practical implications for candidates to pursue doctoral education, for the doctoral programs and for public policy.

5.1 Limitations and future research

This study has some limitation worth noting. First, it is evident that the institutional scenario of doctoral education in Brazil, as well as the requirements for doctoral programs, has changed over the past few years. Our study only analyzed new PhDs graduated in management between 1998 and 2008, and their track record of publications. However, over this period and then more recently, there were multiple changes that we could not take into account in our study. To some extent, it is not a simple matter if we had sought to compare the production of new PhDs in different moments in time. Our data revealed very little differences in the production of the new PhDs over the years. Future research could extend this study and further analyze the impact of the institutional changes over time. For instance, the focus on peer-reviewed journals publications is relatively recent in Brazil, as the previous rules favored conference papers and books.

We identified three profiles for the new PhDs: high performers, medium performers and low performers. It would seem reasonable to suggest that the quality of training received by each doctoral program could have an effect on the new researchers' productivity. However, we were not able to accurately conclude that the quality of the doctoral program is a good predictor of the new PhD future production. Further research could inquire what factors determine the productivity of the new PhDs; moreover, this analysis could compare across programs but also across individuals by examining

individual performance factors. That is, why do some new PhDs publish more than their peers?

It could be especially interesting to fully understand the decision-making process in hiring new PhDs. What are the recruiters looking for? What are the substantial differences across institutions? It is worth noting that when hiring recent PhD graduates, recruiters do not have our data on the six-year track record. Thus, how do the recruiting committees form their expectations on the future publication record of the new hire and what role does the doctoral program of graduation play on hiring decision are relevant questions.

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Further reading

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