RAE Journal of Business Management

RESEARCH AND KNOWLEDGE
V. 59, N. 1,
January–February 2019

fgv.br/rae

FGV | SAO PAULO SCHOOL OF BUSINESS ADMINISTRATION

ARTICLES

Spirituality, moral conviction, and prosocial rule-breaking in healthcare
Muhammad Ali Asadullah | Ifrah Fayyaz | Rizwana Amin

The social representation of cloud computing according to Brazilian information technology professionals
Gustavo Guimarães Marchisotti | Luiz Antonio Joia | Rodrigo Baroni de Carvalho

Factors related to the maturity of Environmental Management Systems among Brazilian industrial companies
Blênio Cezar Severo Peixe | Andréa Cristina Trierweiller | Antonio Cezar Bornia | Rafael Tezza | Lucila Maria de Souza Campos

Redemption constraints of Brazilian equity funds, liquidity of assets and performance
Dermeval Martins Borges Junior | Rodrigo Fernandes Malaquias

PERSPECTIVES

Challenges of teaching strategy in professional masters and doctorate programs
Jorge Renato de Souza Verschoore

Teaching strategy in executive MBAs and professional master's programs: The overlooked role of execution
Jorge Carneiro

BOOK REVIEWS

The history of theranos and the lessons learned from a drop of blood
Daniel Chu

CONTENTS

EDITORIAL

1 NEW YEAR, OLD QUESTIONS
Ano novo, velhas questões...
Nuevo año, viejas preguntas
Maria José Tonelli | Felipe Zambaldi

ARTICLES / *ARTIGOS / ARTÍCULOS*

3 SPIRITUALITY, MORAL CONVICTION, AND PROSOCIAL RULE-BREAKING IN HEALTHCARE
Espiritualidade, convicção moral e quebra de regras pró-sociais na área da saúde
Espiritualidad, convicción moral y ruptura de reglas prosociales en la asistencia sanitaria
Muhammad Ali Asadullah | Ifrah Fayyaz | Rizwana Amin

16 THE SOCIAL REPRESENTATION OF CLOUD COMPUTING ACCORDING TO BRAZILIAN INFORMATION TECHNOLOGY PROFESSIONALS
A representação social de cloud computing pela percepção dos profissionais brasileiros de tecnologia da informação
La representación social del cloud computing desde la percepción de los profesionales brasileños de tecnología de la información
Gustavo Guimarães Marchisotti | Luiz Antonio Joia | Rodrigo Baroni de Carvalho

29 FACTORS RELATED TO THE MATURITY OF ENVIRONMENTAL MANAGEMENT SYSTEMS AMONG BRAZILIAN INDUSTRIAL COMPANIES
Fatores relacionados com a maturidade do Sistema de Gestão Ambiental de empresas industriais brasileiras
Factores relacionados con la madurez del Sistema de Gestión ambiental de empresas industriales brasileñas
Blênio Cezar Severo Peixe | Andréa Cristina Trierweiller | Antonio Cezar Bornia | Rafael Tezza | Lucila Maria de Souza Campos

43 REDEMPTION CONSTRAINTS OF BRAZILIAN EQUITY FUNDS, LIQUIDITY OF ASSETS AND PERFORMANCE
Restrições de resgate em fundos de ações, liquidez dos ativos e desempenho
Restricciones de rescate en fondos de acciones, liquidez de los activos y desempeño
Dermeval Martins Borges Junior | Rodrigo Fernandes Malaquias

PERSPECTIVAS / *PERSPECTIVES*

57 CHALLENGES OF TEACHING STRATEGY IN PROFESSIONAL MASTERS AND DOCTORATE PROGRAMS
Desafios do ensino de estratégia em mestrados e doutorados profissionais
Retos de la estrategia docente en los programas de máster profesional y doctorado
Jorge Renato de Souza Verschoore

62 TEACHING STRATEGY IN EXECUTIVE MBAS AND PROFESSIONAL MASTER'S PROGRAMS: THE OVERLOOKED ROLE OF EXECUTION
Ensino de estratégia em MBAs executivos e Mestrados profissionais: O papel negligenciado da execução
Enseñanza de estrategia en MBA executive y Mestrados profesionales: El papel negligenciado de la ejecución
Jorge Carneiro

BOOK REVIEW / *RESENHA / RESEÑA*

68 THE HISTORY OF THERANOS AND THE LESSONS LEARNED FROM A DROP OF BLOOD
A história da Theranos e as lições extraídas de uma gota de sangue
La historia de lo Theranos y las lecciones extraidas de una gota de sangre
Daniel Chu

EDITORIAL INFORMATION / *INFORMAÇÕES EDITORIAIS / INFORMACIÓNES EDITORIALES*

70 INFORMAÇÕES EDITORIAIS 2018 | COLABORADORES
Editorial information 2018 / Contributors
Informaciónes editorales 2018 / Colaboradores

CC BY

ISSN 0034-7590

EDITORIAL

Translated version
DOI: http://dx.doi.org/10.1590/S0034-759020190101



Maria José Tonelli
Editora-chefe



Felipe Zambaldi
Editor-adjunto

NEW YEAR, OLD QUESTIONS ...

Pink tells a joke: "What are you going to do in the New Year?", to which *Brain* replies: "The same thing I did last year, try to lose weight and get rich." Jokes aside, what do we expect from this New Year? To continue receiving the excellent contributions of our researchers and count on the invaluable cooperation of our scientific editors and reviewers, who are essential for the continuity of *RAE*, with almost 60 years of uninterrupted publication has been fundamental to the construction of the academic field of Business Administration in Brazil (Tonelli, 2018).

However, one question worries us: what is the future of Business Administration journals in Brazil? To what extent does the publication of English-language journals impact this future? This is not a new issue. The topic has received the attention of Brazilian researchers for some time, either in debates at Brazilian congresses or in publications. If, on the one hand, publishing in English can provide great international visibility to the production of local knowledge, on the other hand, some researchers argue that this model leads to neo-colonization: in other words, new forms of control over and the submission of Southern people by and to the Northern models that restrict other ways of thinking (Alves & Pozzebon, 2013; Rosa & Alves, 2011).

Another phenomenon accompanies this process: when encouraged to publish in English, Brazilian authors may prefer to submit their articles to international journals, disregarding national journals (even those published in English). This ends up reinforcing a model of internationalization of national research, which does not necessarily contribute to the raising of the quality of national journals or the development of local knowledge (Alcadipani, 2017; Diniz, 2017; Farias, 2017).

Furthermore, Diniz (2017) points out that Brazilian articles in English, whether in national or international journals, may or may not be cited. With the aggravating factor that they cannot be read in our own country since only 5% of the Brazilian population has reasonably mastered the language. The quality of the articles, their presentation in English, and the co-authorship with foreign researchers are crucial for Brazilian researchers to become international references (Farias, 2017). Being an English-language journal does not ensure that a journal will be read or that its articles will be cited.

Another aspect pointed out by Farias (2017) is that most Brazilian journals do not favor the quality and visibility of the articles that they publish, either in English or in Portuguese. Although SciELO imposes criteria for the internationalization of Brazilian journals, they are not enough to ensure increased visibility. Besides that, other countries are competing globally; China, specifically, is being singled out as the model for science in the future (The Economist, 2019). Moreover, Fradkin (2017) shows that, at least in the area of Psychology, the publication of articles in English does not correlate with internationalization. We are facing a phenomenon that may have the opposite effect, further restricting the development of Business Administration science in Brazil, that could be disconnected to the social and practical issues that the country still needs to resolve.

Furthermore, most graduate programs in Brazil require a mastery of English reading skills but are far from working with the same scientific logic as the Northern countries (Alcadipani, 2017; Farias, 2017; Rosa & Alves, 2011). In addition to that, the Brazilian academia suffers from productivism and low scientific and/or practical contributions (Alcadipani, 2017; Bertero, 2011; Machado & Bianchetti, 2011).

In summary, several factors come together when it comes to predicting the future of Brazilian journals: the language issue, which does not necessarily lead to the greater visibility of journals; the academic productivism, and the structure of knowledge production in the country.

CC BY

ISSN 0034-7590

We are in a moment of transition—both in our journals and in the national and international geopolitical and economic scene—which does not yet allow us to be clear on the form that journals will take in the future. We hope that as we slowly go through the fog, as Paulinho da Viola says, we will see a promising future.

We invite our professors, researchers, and graduate students to read the articles in this issue: "Spirituality, moral conviction, and prosocial rule-breaking in healthcare" by Muhammad Ali Asadullah, Ifrah Fayyaz, and Rizwana Amin; "The social representation of cloud computing according to Brazilian information technology professionals," by Gustavo Guimarães Marchisotti, Luiz Antonio Joia, and Rodrigo Baroni de Carvalho; "Factors related to the maturity of Environmental Management Systems among Brazilian industrial companies," by Blênio Cezar Severo Peixe, Andréa Cristina Trierweiller, Antonio Cezar Bornia, Rafael Tezza, and Lucila Maria de Souza Campos; "Redemption constraints of Brazilian equity funds, liquidity of assets, and performance," by Dermeval Martins Borges Junior and Rodrigo Fernandes Malaquias; the articles presented in the Perspectives Section: "Challenges of teaching strategy in professional masters and doctorate programs," by Jorge Renato de Souza Verschoore; and "Teaching strategy in executive MBAs and professional master's programs: The overlooked role of execution," by Jorge Carneiro and finally, Daniel Chu in the Book Review Section brings a review of the book "Bad Blood: Secrets and lies in a Silicon Valley startup" by John Carreyrou. At the end of this edition, we present the editorial information of 2018.

Enjoy reading!

Maria José Tonelli[1] | ORCID: 0000-0002-6585-1493
Felipe Zambaldi[1] | ORCID: 0000-0002-5378-6444

[1] Fundação Getulio Vargas
Escola de Administração de Empresas de São Paulo,
São Paulo, SP, Brazil

REFERENCES

Alcadipani, R. (2017). Periódicos brasileiros em inglês: A mímica do *publish or perish* "global". *RAE-Revista de Administração de Empresas*, *57*(4), 405-411. doi:10.1590/s0034-759020170410

Alves, M., & Pozzebon, M. (2013). How to resist linguistic domination and promote knowledge diversity? *RAE-Revista de Administração de Empresas*, *53*(5), 629-633. doi:10.1590/S0034-759020130610

Bertero, C. O. (2011). Meio século de *RAE*. *RAE-Revista de Administração de Empresas*, *51*(3), 224-226. doi:10.1590/S0034-75902011000300002

Diniz, E. H. (2017). Periódicos brasileiros da área de administração no contexto de internacionalização da produção científica. *RAE-Revista de Administração de Empresas*, *57*(4), 357-364. doi:10.1590/s0034-759020170406

Farias, S. (2017). Internacionalização dos periódicos brasileiros. *RAE-Revista de Administração de Empresas*, *57*(4), 401-404. doi:10.1590/s0034-759020170409

Fradkin, C. (2017). The internationalization of psychology journals in Brazil: A bibliometric examination based on four índices. *Paidea*, 27(66), 7-15. doi:10.1590/1982-43272766201702

Machado, A. M. N., & Bianchetti, L. (2011). (Des)fetichização do produtivismo acadêmico: Desafios para o trabalhador-pesquisador. *RAE-Revista de Administração de Empresas*, *51*(3), 244-254. doi:10.1590/S0034-75902011000300005

Rosa, A. R., & Alves, M. A. (2011). Pode o conhecimento em gestão e organização falar português? *RAE-Revista de Administração de Empresas*, *51*(3), 255-264. doi:10.1590/S0034-75902011000300006

The Economist. (2019, January 12-18). *Red moon rising: If China dominates Science, should the world worry?* p. 9.

Tonelli, M. J. (2018). Revistas científicas em Administração: O papel histórico da Revista de Administração de Empresas (RAE) na construção do campo acadêmico em administração no Brasil. *Cadernos EBAPE.BR*, *16*(4), 509-515. doi:10.1590/1679-395173941.

 CC BY

ARTICLES

Submitted 08.11.2017. Approved 07.18.2018
Evaluated through a double-blind review process. Scientific Editor: Maurício Serafim
Original version
DOI: http://dx.doi.org/10.1590/S0034-759020190102

SPIRITUALITY, MORAL CONVICTION, AND PROSOCIAL RULE-BREAKING IN HEALTHCARE

Espiritualidade, convicção moral e quebra de regras pró-sociais na área da saúde

Espiritualidad, convicción moral y ruptura de reglas prosociales en la asistencia sanitaria

ABSTRACT

This study investigated the effect of healthcare professionals' workplace spirituality (WPS) on moral conviction and prosocial rule-breaking (PSRB). The data were collected from 315 healthcare professionals from three main districts of South Punjab, Pakistan. We determined the measures' validity using confirmatory factor analysis. We investigated the hypothesized relationships using structural regression modeling. The results demonstrated a significant effect of WPS on PSRB and moral conviction. However, the mediating effect of moral conviction between WPS and PSRB was insignificant. Healthcare professionals may regulate PSRB by screening and promoting individuals with high WPS to positions requiring a high level of PSRB rather than considering health service providers' personal moral beliefs.

KEYWORDS | Workplace spirituality, moral conviction, prosocial rule-breaking, healthcare professionals, ethical dilemma.

RESUMO

Este estudo investigou o efeito da espiritualidade no local de trabalho dos profissionais de saúde sobre a convicção moral e quebra de regras pró-sociais. Os dados foram coletados de 315 profissionais de saúde dos três distritos principais de South Punjab, Paquistão. A validade das medidas foi determinada por meio de análise fatorial confirmatória. As relações hipotéticas foram investigadas usando modelagem de regressão estrutural (SEM). Os resultados demonstraram que o efeito da espiritualidade no local de trabalho na quebra de regras pró-sociais e na convicção moral foi significativo. No entanto, o efeito mediador da convicção moral entre espiritualidade no local de trabalho e quebra de regras pró-sociais não foi significativo. Os profissionais de saúde podem regulamentar a quebra de regras pró-sociais, classificando e promovendo os indivíduos com uma elevada espiritualidade no local de trabalho para as posições que exigem alto nível de quebra de regras pró-sociais, em vez de considerar as crenças morais pessoais dos provedores de serviços de saúde.

PALAVRAS-CHAVE */ Espiritualidade, convicção moral, quebra de regras pró-sociais, profissionais de saúde, dilema ético.*

RESUMEN

Este estudio investigó el efecto de la espiritualidad del lugar de trabajo de profesionales de salud sobre la convicción moral y la ruptura de reglas prosociales. Se recolectaron datos de 315 profesionales de salud de tres distritos de Pakistán. La validez de las medidas se determinó mediante el análisis factorial confirmatorio. Las relaciones hipotéticas se investigaron usando modelos de regresión estructural. Los resultados demostraron que el efecto de la espiritualidad en el lugar de trabajo sobre la ruptura de reglas prosociales y la convicción moral fue significativo, aunque el efecto mediador de la convicción moral entre la espiritualidad del lugar de trabajo y la ruptura de reglas prosociales no fue significativo. Los profesionales de salud pueden regular infracciones prosociales mediante el examen y promoción de personas con alta espiritualidad en el lugar de trabajo a puestos que requieran un alto nivel de ruptura prosocial en lugar de considerar creencias morales personales de los proveedores de servicios de salud.

PALABRAS CLAVE */ Espiritualidad, convicción moral, prosocial, destrucción de normas, profesionales de salud, dilema ético.*

MUHAMMAD ALI ASADULLAH[1 2]
iae.hec@gmail.com
ORCID: 0000-0002-5977-1809

IFRAH FAYYAZ[3]
ifrahfayyaz@yahoo.com
ORCID: 0000-0002-5977-1809

RIZWANA AMIN[4]
rizwana_aries@hotmail.com
ORCID: 0000-0002-3262-6329

[1]Emirates College of Technology, Abu Dhabi, United Arab Emirates

[2]The University of Lahore, Lahore Business School, Lahore, Punjab, Pakistan

[3]Air University, Department of Management Sciences, Islamabad, Pakistan

[4]Bahauddin Zakariya University, Multan, Punjab, Pakistan

CC BY

ISSN 0034-7590

INTRODUCTION

In organizational literature, rule-breaking has been studied under the umbrella of deviant behavior and refers to employees' intentional, self-serving violations of formal organizational rules (Morrison, 2006). Most prior studies focused on the destructive aspects of deviant behaviors, such as workplace deviance (Bennett & Robinson, 2000); misbehavior (Vardi & Weitz, 2005); and counterproductive work behavior (Cohen-Charash & Mueller, 2007), which resulted in enormous costs for organizations.

However, employee deviant behavior is not always destructive; it can be constructive, too. To define this kind of constructive deviant behavior, Morrison (2006) coined the term "prosocial rule-breaking" (PSRB) to refer to employees' intentional violation of organizational rules and policies they perceived as hurdles in doing their job in an "effective, responsible, and responsive manner" (p. 9). She argued that unlike other deviant behaviors, which have destructive, negative implications, PSRB is a form of constructive deviant behavior having positive implications for organizations (e.g., efficiency, cooperation, and customer/client retention) (Morrison, 2006).

Despite Morrison's early insight on the usefulness of PSRB for organizations, few researchers (Ambrose, Taylor, & Hess, 2015; Dahling, Chau, Mayer, & Gregory, 2012; Mayer, Caldwell, Ford, Uhl-Bien, & Gresock, 2007; Youli, Xixi, & Xi, 2014) have attempted to uncover its antecedents. Since 64% of participants surveyed by Morrison (2006) recalled engaging in PSRB, more research is needed to understand why some employees engage in PSRB, some do not, and what is/are the underlying mediating mechanism(s) through which different individual and organizational factors lead to PSRB (Dahling et al., 2012; Youli et al., 2014). Addressing this gap, our study aims to make the following contributions:

First, we investigate workplace spirituality (WPS)'s effect on PSRB to address what motivates employees to engage in PSRB. We believe this is the first study investigating employees' WPS as an antecedent of PSRB. Examining this relationship seems plausible because the two important constituents of Ashmos and Duchon (2000)'s definition of WPS (meaningful work and a sense of community) resemble the two antecedents of PSRB, i.e., job meaning and empathy (Morrison, 2006). Second, we investigate moral conviction as an underlying mediating mechanism through which WPS leads to PSRB to examine how this relationship operates. In the workplace, moral conviction means an employee's strong and absolute belief about something being right or wrong, moral or immoral (Skitka & Mullen, 2002). We argue that employees' WPS first develops their moral conviction(s) about aspects of their work life, which then motivates and justifies their engaging in PSRB for the greater good. We address the research calls of Dahling et al. (2012) and Youli et al. (2014) for investigating the mediating factors influencing employees' PSRB by collecting quantitative data gathered through a survey of healthcare professionals.

This study used utilitarianism to support the hypothesized relationship. Considerations of "utility" matter generally in ethics and particularly in health (Emanuel, Schmidt, & Steinmetz, 2018, p. 318). Authors (Holland, 2015; Horner, 2001; Nixon & Forman, 2008; Rothstein, 2004; Royo-Bordonada & Román-Maestre, 2015) agree that healthcare is in essence utilitarian. Utilitarianism provides the healthcare profession an intuitive capacity to preserve the health status and wellbeing of the most individuals. Hence, utilitarianism seems better for determining the actions required for evaluating and justifying morality issues in healthcare. Utilitarianism, as a science of morality for bettering human life, tends to approve or disapprove of actions and regulate the party's happiness whose interest is in question (Bentham, 1789, pp. 6-7). Thus, utilitarianism may also help us explain the spiritual and moral reasons of PSRB behavior/actions of healthcare professionals to examine their effect on patients as interested parties in healthcare.

THEORETICAL FRAMEWORK AND HYPOTHESES

Prosocial rule-breaking

Contrary to rule-breaking, a harmful deviant behavior, PSRB represents the positive side of employee deviant behavior (Morrison, 2006). According to Morrison (2006), "employees do not always break organizational rules/policy for their self-interest, rather sometimes they do it to perform their job in an 'effective, responsible, and responsive manner'" (p. 9). PSRB refers to "any instance where an employee intentionally violates a formal organizational policy, regulation, or prohibition with the primary intention of promoting the welfare of the organization or one of its stakeholders" (Morrison, 2006, p. 6). According to Morrison, employees are generally engaged in PSRB to enhance their efficiency, help their colleagues in job duties, and provide better service to customers. None of these forms of PSRB is a destructive deviant behavior in organizations. In a qualitative investigation, Morrison (2006) found that 64% of respondents had experienced PSRB in their organizations. In an experimental study, she found that support for job autonomy, coworker rule-breaking behavior, and risk-taking propensity showed significant association with

 CC BY ISSN 0034-7590

PSRB. Thus, Morrison called for researchers to explore these and other factors that might lead employees to PSRB.

However, only three notable studies attempted to address Morrison's call and empirically investigated new antecedents of PSRB. The first was an experimental study (Mayer et al., 2007) finding statistical support for the mediating role of a supervisor's perceived support and moderation of perceived policy fairness between supervisor–subordinate relationship quality and PSRB. The second study was conducted by Dahling et al. (2012), who developed the PSRB scale and found support for the significant correlation of conscientiousness, job demands, and coworker behavior with PSRB. The third study was conducted by Vogel et al. (2014), who found support for the direct and indirect effects of transformational leadership on PSRB through mediation of autonomy.

Thus, in extending the literature on PSRB's antecedents, this study investigates the effect of employees' WPS on their PSRB.

Workplace spirituality

WPS has been conceptualized in many ways with more than 70 definitions (Geigle, 2012). The most common definitions of WPS contain three similar themes (Karakas, 2010; Pawar, 2009): inner life, meaning in work, and a sense of community (Chawla & Guda, 2013; Milliman, Czaplewski, & Ferguson, 2003). We used Ashmos and Duchon (2000)'s definition of WPS, which contains all three themes and refers to WPS as "the recognition that employees have an inner life that nourishes and is nourished by meaningful work that takes place in the context of community" (p. 137). Inner life refers to employees' "spiritual needs [...] just as they have physical, emotional, and cognitive needs. These needs [do not] get left at home when they come to work" (Duchon & Plowman, 2005, p. 811). The second theme, meaning in work, refers to employees' better understanding of their work's purpose and importance in their lives (Ashmos & Duchon, 2000; Duchon & Plowman, 2005). The third theme, a sense of community, refers to employees' shared values, mutual obligations, and commitment to work with the organization's other members as a community (Duchon & Plowman, 2005).

Workplace spirituality and prosocial rule-breaking

During the last few years, WPS has become an emerging area of investigation in organizational research (Ashmos & Duchon, 2000; Chawla & Guda, 2013; Daniel, 2015). Many organizational studies have reported significant effect of employees' WPS on many positive work attitudes and behaviors such as job commitment (Chawla & Guda, 2010), individual well-being (Mackenzie, Rajagopal, Meilbohm, & Lavizzo-Mourey, 2000), work unit performance (Duchon & Plowman, 2005), and organizational performance (Fry & Matherly, 2006). In extending this line of research, we investigate the effect of employees' WPS on their PSRB.

We used utilitarian moral theory to test this relationship in the health sector, as it can be helpful in decisions related to the quality of patients' experiences (Scott, 2007). Utilitarianism is one of the "big three" traditional moral theories developed by Jeremy Bentham (1748–1832), focusing on the overall balance of the positive and negative effects of a healthcare professional's actions (Scott, 2017). Classical utilitarian moral theory explains that human acts or practices are evaluated based on their consequences or utility for others. Although PSRB is a constructive behavior, it involves deviance and risk. However, a recent meta-analytic study (Yonker, Schnabelrauch & DeHaan, 2012) reported risk-taking behavior as a significant psychological outcome of WPS. Moreover, WPS enhances individuals' prosocial motivation. Einolf (2013) found that daily spiritual experiences promote helping behaviors and a sense of others' needs. Godwin, Neck, and D'Intino (2016) propose that spiritual entrepreneurs perceive external business stressors as challenges rather than obstacles. Utilitarian theory suggests socially motivated persons are risk takers who intend to help others by breaking rules in specific conditions (Athanassoulis & Ross, 2010). Based on utilitarian theory, we argued that employees' WPS increased their likelihood of engaging in PSRB. For instance, WPS's inner life dimension makes employees' personal life congruent with their work, which motivates them to fulfill their work efficiently even if it requires breaking organizational rules creating dissonance in their inner life. Their work's higher purpose strengthens their desire to make a difference by taking necessary actions (Spreitzer & Sonenshein, 2003), and a sense of community motivates them toward interpersonal helping behavior by reducing the focus on personal instrumentality (Dahling et al., 2012; Morrison, 2006). Utilitarian theory suggests socially motivated persons are risk takers who intend to help others by breaking rules under specific conditions (Athanassoulis & Ross, 2010). Employees with high WPS are socially motivated people who are generally unafraid of risk-taking to deviate from organizational rules to increase organizational productivity and efficiency (Duchon & Plowman, 2005; Morrison, 2006).

Based on previous arguments and developed through utilitarian moral theory, we hypothesized the following relationship.

> H1: Employees' workplace spirituality has a positive association with their prosocial rule-breaking.

CC BY

ISSN 0034-7590

To improve understanding of how employees' WPS transmutes to PSRB, it is important to uncover the underlying psychological mechanism creating this relationship. This study incorporated moral conviction as the underlying mediating mechanism through which employees' WPS transmuted to PSRB.

Workplace spirituality and moral conviction

Morality research has gained attention since the last quarter of the 20th century (Skitka, Bauman, & Lytle, 2009). Morality is the notion of correct versus incorrect, and a conviction is a solid belief without the need for evidence (Skitka & Mullen, 2002).

Since development of one's beliefs is a "meaning-making process" (Fowler, 1981), moral conviction can also be regarded as a meaning-making process, particularly to justify actions (Skitka, 2010). The "sense-making" process develops individuals' understanding about their lives, values, and commitments (Fowler, 1981; Cartwright, 2001). According to cognitive development theory, individuals' sense-making processes develop through different stages of incorporating more sophisticated ways of understanding (Cartwright, 2001). WPS should also incorporate more sophisticated ways of understanding toward one's cognitive development or sense-making process. Indication regarding WPS's role in the faith-development process can be obtained from Fowler (1981), who proposed that one's understanding of oneself in relation to others and the centers of shared values and commitment are critical in the sense-making or faith development process (Fowler, 1981). We argue that moral conviction is also a sense-making or faith-development process defined as "a meta-cognitive belief of an individual that a given position is based on one's core moral beliefs and convictions" (Skitka, Washburn & Carsel, 2015, p. 1). Thus, we believe spirituality contributes to one's faith development or sense-making process to justify his moral actions by incorporating a more sophisticated way of understanding as described by cognitive development theory.

One way WPS may incorporate sophisticated ways of understanding in the one's moral attitudes and behaviors is by expanding and deepening his moral conviction (Jackson, 1999). WPS helps stimulate the moral imaginations, e.g., moral convictions, of employees who must deal with ethical issues and leads them to make moral decisions on them (Gull & Doh, 2004). Duchon and Plowman (2005) found that a greater percentage of employees are on a spiritual journey exploring meaning and purpose in their lives during routine job duties (Duchon & Plowman, 2005). We argue that employees' WPS shapes their moral conviction, i.e., their primary values and perceived worldview, about activities, e.g., ethics, morality, helping attitudes, honesty, etc., they experience in the organization's daily life (Godwin et al., 2016).

The relationship between WPS and moral conviction can also be justified using utilitarian moral theory. We have described how WPS influences one's moral imagination/convictions (Gull & Doh, 2004), whereas moral conviction is the belief that one's stance is based on core moral beliefs (Skitka et al. 2015). However, research has shown the reaction of people toward individuals selecting wrong options is a case of ethical dilemma. Utilitarian moral theory indicates that an action's consequences determine if it is right or wrong and moral or immoral. WPS can also be considered a moral act if it develops moral beliefs in individuals. Based on moral theory, we can argue that WPS develops one's moral conviction, or moral conviction is the cognitive belief that is a consequence of WPS. Based on the previous arguments and utilitarian moral theory, we argue that employees with a high level of WPS are very likely to have a high level of moral conviction.

Research has shown the extent that people perceive an ethical dilemma from a moral perspective determines their reactions toward people making wrong choices in situations of ethical dilemmas (Skitka et al., 2015). The reactions of people with high moral convictions are likely to be more moral than in those with low moral convictions. However, WPS influences individuals' moral imaginations/convictions (Gull & Doh, 2004) because moral conviction is a moral belief influenced by WPS. Moral conviction may be seen as a moral consequence of WPS inducing moral reactions. This perspective accords with the utilitarian moral theory indicating an action's consequences determine if it is right or wrong and moral or immoral. Based on these arguments, we hypothesized the following relationship.

> H2: Employees' workplace spirituality has a positive association with their moral convictions.

Moral conviction and prosocial rule-breaking

Employees' PSRB is a risk-taking behavior where they must decide whether to follow a particular rule or break it for the sake of better job functioning. This is often not a simple choice; for instance, employees may feel a rule must be violated to optimize their work performance, but may also fear they will be punished (Morrison, 2006). Employees need strong motivation and justification for intended violation(s) of specific rule(s) before engaging in actual PSRB.

When individuals' moral convictions are at stake, they are likely to believe that greater moral purposes dictate rules, procedures, and authority rather than the rules, procedures, or authorities themselves (Skitka, Bauman, & Mullen, 2008; Skitka & Mullen, 2008; see also Kohlberg, 1976; Rest, Narvaez, Thoma,

CC BY

ISSN 0034-7590

& Bebeau, 2000). Utilitarian theory of moral actions explains actions can be defined as moral if they bring the greatest total well-being (Bartels & Pizzaro, 2011).

We have described that PSRB is a positive form of deviance aiming at benefiting both customer and organization. PSRB can also be described as moral action for the greater well-being. Moral conviction is likely to give employees the courage and motivation they need to help create a better workplace environment (Skitka, 2010). Thus, we argue that employees' moral convictions, shaped by their WPS, not only motivate them to engage in PSRB, but also provide justification for it (Prinz, 2007). Moral conviction research also suggests when people have strong moral convictions and clarity of their work's purpose, they feel released from a tendency to follow standard procedures (Skitka, 2010); consequently, they reject authorities and rules when outcomes violate their moral convictions (Mullen & Nadler, 2008). We have also described that moral convictions provide justification for actions (Skitka, 2010). Since PSRB can be defined as a moral action, individuals with high moral convictions are likely to engage in PSRB. The "side-taking hypothesis" also explains that individuals use their judgment of an action as moral to choose a side in conflicts by focusing on disputants' actions rather than their identities (DeScioli, 2016). Since PSRB is normally required in the same kind of situations representing ethical dilemmas where organizational rules collide with customers' needs, employees are likely to take customers' sides while deviating from organizational rules to enhance their performance (Morrison, 2006).

Based on this argument and research findings, we hypothesized the following relationship.

> H3: Employees' high moral convictions have a positive association with prosocial rule-breaking.

Based on the hypothesized direct positive relationships between WPS and moral conviction (i.e., H2) and between moral conviction and PSRB (i.e., H3), we can argue that employees' moral convictions mediate the direct positive relationship between their WPS and the PSRB (i.e., H1). Research suggests that moral conviction, combined with anger, mediates the relationship between unethical business practices and boycotting of consumer goods, e.g., boycotting Walmart products in response to the company not treating its employees well (Skitka, 2010). We argue that employees' WPS first develops their moral conviction, which then leads them to PSRB. Specifically, employees' high moral conviction mediates the direct relationship between their WPS and PSRB.

> H4: Employees' high moral convictions mediate the direct positive association between their workplace spirituality and prosocial rule-breaking.

METHODOLOGY

Sample

This study's participants were doctors, pharmacists, drug directors/pharmacists, and clinical psychologists working in 33 districts hospitals. The hospitals were public sector hospitals operating under the Punjab Government Health Department and were located in major districts and tehsils of South Punjab, Pakistan's three divisions. The cities included Multan, Bahawalpur, Deraghazi Khan, Khanewal, Lodhuran, Muzaffargarh, Layyah, Taunsa, and Vehari. Health professionals working in them were monitored and evaluated through a similar set of administrative and human resource policies (like selection, training, compensation appraisal, etc.).

We combined a purposive sampling method with representative sampling to obtain responses from key respondents working in diverse departments and positions in these hospitals. We sought the respondents' consent to participate in the study. The data were obtained from respondents who showed willingness to participate. We obtained three hundred and forty (340) dyadic responses. After removing incomplete responses, three hundred and fifteen (315) valid responses remained.

Design and procedure

This study was quantitative. We collected data through a field survey using paper-and-pencil questionnaires. We began by approaching potential participants working in the hospitals (in cafeterias, wards, and offices during tea breaks). Respondents were also presented a research recommendation letter from the research supervisors on university letterhead and were required to complete a brief questionnaire for a chocolate. Respondents completed the questionnaires during a short face-to-face meeting. The cover letter stated the study's objectives, contained questionnaire guidelines, and ensured confidentiality. Due to the sensitivity of the doctors' job, data collection was difficult in hospital wards. Therefore, data were gathered from respondents in different places (like canteens, wards, and during tea breaks) within the vicinity.

Measures

Moral conviction

We followed Skitka et al. (2005) to measure moral conviction. Skitka et al. (2005) used a single-item scale. However, this

CC BY

ISSN 0034-7590

measure consisted of a single indicator. It also measured moral conviction in social or political contexts. We did not find a measure of moral conviction in the business context at the time of data collection, so we conducted a pilot study following the procedure of Skitka et al.

In study, we asked respondents to highlight ethical issues they faced while interacting with patients. This informal pilot study revealed many problem areas related to organizational values, bullying, work environment, and work practices (like pay, promotion, etc.), power (abusive supervision), and rule-breaking (nondiscipline/irregularity). Next, we took these issues and developed a multiple-indicator scale based on the scale of Skitka et al. (2005). The item used by Skitka et al. was: "How much are your feelings about _____ connected to your core moral beliefs or convictions?" We completed blank spaces with each of the problems respondents reported during the pilot study and constructed a scale using eight different items.

The moral conviction scale's sample items included: "How much are your feelings about power (abusive supervision) connected to your core moral beliefs or convictions?"; "How much are your feelings about organizational values connected to your core moral beliefs or convictions?"; and "How much are your feelings about rule-breaking (nondiscipline/irregularity) connected to your core moral beliefs or convictions?" We asked participants to respond on a 5-point radio-button scale with "1 = not at all" and "5 = very much." The scale's overall reliability was 0.80.

Respondents reported against each statement. After collecting data, we performed reliability and validity tests. Four different items of moral conviction remained in the final CFA model.

Workplace spirituality

We assessed WPS using the work scale developed by Ashmos & Duchon (2000), containing three subscales and 21 items. The subscales' reliability was 0.82 for community, 0.78 for meaning at work, and 0.77 for inner life. The overall Cronbach's alpha was 0.89. We gathered all responses on a 5-point Likert-style scale ranging from "strongly disagree = 5" to "strongly agree = 1." Sample items included: "I feel part of a community in my immediate workplace (hospital, ward, etc.);" "I experience joy in my work;" and "I feel hopeful about life."

Prosocial rule-breaking

We measured PSRB using 13 items developed by Dahling et al. (2012). We obtained responses to this variable from respondents' colleagues for accurate results. The scale's overall reliability was 0.90. We used a frequency-type anchor ranging from "never = 1" to "always = 5" to collect responses. The scale's sample item was: "This employee has broken rules that stand in the way of good patient care service."

Control variables

Since the tendency toward risk-taking is lower in women (Morrison, 2006), there could be significant difference in PSRB in male and female respondents. Harrison (2015) reported gender as a significant predictor of PSRB. Curtis (2010), and Curtis, Upchurch, and Dickson (2013) found significant difference in a restaurant's frontline employees' PSRB behavior regarding age, experience, and job designation. Youli et al. (2014) found job position significantly affected the PSRB behavior of employees working in different Chinese organizations. Similarly, Skitka et al. (2005) emphasized knowing participants' age, gender, experience, and job nature were important for internal validity of PSRB because respondents' demographic characteristics could possibly significantly affect PSRB. We controlled for the possible effect of respondents' characteristics, including gender, age, experience, and job description as dependent variables. We provide the respondents' demographic details in Table 1.

RESULTS

Analytical procedure

The data analysis procedure commenced with preliminary screening and testing of basic assumptions, including normality, outliers, multicollinearity, etc. We provide statistical estimates for mean, standard deviation, and correlations among independent, dependent, mediating, and control variables in Table 2.

Confirmatory factor analysis (CFA) (Tabachnick and Fidell, 1996; Tabachnick and Fidell, 2007) was one of the methods used to determine convergent and discriminant validity of measures (Harrington, 2009). We performed CFA to examine model fit and determine convergent and discriminant validity of variables. We performed CFA using the maximum likelihood estimation and variance–covariance methods. We used Brown's (2015) criteria to determine model fit (Harrington, 2009). The model indices included absolute fit indices (x2/df and RMR), parsimony correction indices, i.e., root mean square error of approximation (RMSEA), and comparative fit indices (CFI, GFI, and IFI). A reasonable model fit required that the ratio of the chi-square to the degree of freedom (x2/df) be less than three, the CFI values greater than or equal to 0.95, and the values of RMR and RMSEA close to or less than 0.05 (Hu & Bentler, 1999; Kline, 2011; Harrington, 2009).

CC BY

ISSN 0034-7590

Table 1. **Demographics of research participants**

Variables	Categories	Percent
Gender	Male	57.8
	Female	42.2
Age	25–34	60.3
	35–44	24.1
	45–54	9.5
	55–64	6.0
Education	MBBS	49.8
	MBBS, FCPS	30.5
	MBBS, MCPS	15.2
	MD	1.6
	BDS	1.3
	B PHARMACY	1.6
Nature of job	Permanent	80.3
	Contract	18.1
	Part time	1.6
Experience (in years)	1–5 years	54.0
	6–10	20.6
	11–15	14.0
	16–20	5.1
	21–25	1.6
	26–30	1.0
	31–35	3.8
Designations	MO/WMO/Demonstrator	31.1
	PGR/PGMO/FCPS Trainee	19.7
	Pharmacists/Drug Directors	1.6
	Senior Registrars/HODs/ Superintendents	14.0
	Assistant Professors	7.0
	House Officers/Psychologists	21.0
	Surgeons/Dental Surgeons	5.7
Total		100

Since WPS and PSRB were multidimensional construct, we introduced them as second order latent factors in the CFA model. However, we introduced moral conviction as a first order construct. The initial model fit was inadequate (chi-square/DF = 2377.864/851; CMIN/DF = 2.794; RMR = 0.091; CFI = 0.754; TLI = .739; IFI = 0.756; GFI = 0.751; RMSEA = 0.073). We drew one covariance between items 4 and 5 of the moral conviction and two covariances between items 6 and 7 and between items 6 and 9 of employee PSRB dimension. The final CFA model demonstrated reasonable model fit (chi-square/DF = 543.796/218; CMIN/DF = 2.494; RMR = 0.079; CFI = 0.90; GFI = 0.876; IFI = 0.90; RMSEA = 0.069).

We followed Fornell and Larcker (1981)'s recommendations and used CFA results to determine the constructs' convergent and discriminant validity. A measure's convergent validity is established if the average variance extracted (AVE) is less than the composite reliability but equal to or greater than 0.50. Discriminant validity is established if the AVE is greater than the maximum shared squared variance (MSV) or average shared squared variance (ASV). We used a statistical tools package developed by James Gaskin (http://statwiki.kolobkreations.com/index.php?title=Main_Page) and correlations and standardized regression coefficients from the full CFA model to determine convergent and discriminant validity. This package automatically calculated the values of CR, AVE, ASV, and MSV along with the measures' correlations. The results in Table 3, which follow, showed that the conditions of convergent and discriminant validity of the measures used in this study's model were satisfied. The ratio of chi-square to degrees of freedom was less than 3, representing discriminant validity (Carmines & McIver, 1981).

We also assessed common method variance through different procedural and statistical manipulations based on Podsakoff, MacKenzie and Podsakoff (2012)'s recommendation. First, the scale anchors measuring each construct were different. Second, multisource data used to rate PSRB were obtained from the respondents' colleagues. Third, we conducted Herman single-factor analysis (Podsakoff & Organ, 1986) using exploratory factor analysis in SPSS, where we restricted all items to load on a single factor. This single factor explained the 18% variance only, which was below the threshold level (40%) described by Podsakoff et al. (2012). We performed CFA by adding a common latent factor connecting all the instrument's items. We restricted all paths between the common latent factor and all observed variables to be equal to 1. This CFA model explained the 4% variance in all latent factors. Both tests demonstrated that common method variance was not an issue in our study.

CC BY

ISSN 0034-7590

Table 2. **Means, standard deviations (SD), and correlations**

	Mean	SD	1	2	3	4	5	6	7
1. Gender	-	-	1						
2. Education	-	-	−0.045	1					
3. Job nature	-	-	0.008	−0.272**	1				
4. Position	-	-	0.06	0.081	0.583**	1			
5. Experience	-	-	−0.082	0.364**	−0.310**	0.084	1		
6. WS	4.25	0.467	−0.135**	0.108**	0.133	0.225	0.141**	1	
7. MC	3.52	0.806	−0.167*	0.090	0.053	0.120	0.199**	0.370**	1
8. PSRB	2.86	0.818	−0.077*	−0.055*	0.030	−0.071	−0.075	0.095*	-0.004

*Correlation is significant at the 0.05 level (2-tailed).
**Correlation is significant at the 0.01 level (2-tailed).
WS = Workplace Spirituality
MC = Moral Conviction
PSRB = Prosocial Rule-breaking

Table 3. **Estimates of convergent and discriminant validity and composite reliability**

	CR	AVE	MSV	Reliability
Moral Conviction	0.800	0.512	0.164	0.878
Workplace Spirituality	0.894	0.738	0.164	0.945
Prosocial Rule-Breaking	0.853	0.666	0.023	0.967

CR = Composite Reliability
AVE = Average Variance Extracted
MSV = Maximum Shared Variance

Table 4. **Statistical results of mediation analysis using 2000 bootstrapping samples with 95% confidence interval**

Variables	Model 1 DV = PSRB	Model 2 DV = MC	DV = PSRB
Gender	−0.071(0.119)	---	−0.072(0.119)
Education	-0.042(0.093)	---	−0.041(0.055)
Experience	-0.032(0.043)	---	-0.032(0.043)
Designation	-0.030(0.012)		0.030(0.012)
Direct Effects			
Workplace Spirituality	0.143(0.169)*	.421(.152)***	0.147(0.192)
Moral Conviction (MC)	---	---	-0.021(0.089)
Indirect Effect: WPS→MC→ PSRB	---	---	β= -0.009 95% confidence interval with 2000 bootstrapping samples = [upper bound = 0.060, lower bound = -0.115]

*Relationship is significant at the 0.05 level (2-tailed).
**Relationship is significant at the 0.01 level (2-tailed).
PSRB = Prosoial Rule Breaking

Note: Beta coefficients, standard error (in brackets) and p-values (as asterisks) are reported.

CC BY

ISSN 0034-7590

Hypotheses testing and mediation analysis

We examined the hypothesized relationships using structural equation modeling (SEM) in AMOS. We performed mediation analysis with the bootstrapping method recommended by Cheung and Lau (2017) and MacKinnon, Coxe & Baraldi (2012). We preferred SEM because testing structural regression models of indirect effect with bootstrap was better than testing hierarchical multiple regression and then performing a Sobel test to analyze the mediation. First, we tested a structural regression model to examine moral conviction's effect on PSRB (chi-square/DF = 499.875/246; CMIN/DF = 2.032; RMR = 0.03; CFI = 0.922; IFI = 0.924; RMSEA = 0.057 PClose = .048). Statistical results demonstrated the direct effect of WPS on PSRB was positive and significant ($\beta = 0.143$, $p < 0.05$). These results supported the study's H1. We tested another structural regression model, examining the indirect effect of moral conviction on PSRB through WPS using 2,000 bootstrap samples and 95% bias-corrected and accelerated confidence intervals. The structural model demonstrated adequate fit (chi-square/DF = 650.073/323; CMIN/DF = 2.013; RMR = 0.091; CFI = 0.91; IFI =.91; RMSEA = 0.057). This study's statistical result demonstrated that WPS was positively associated with moral conviction ($\beta = 0.421$, $p < 0.001$), supporting H2. Further, moral conviction's effect on PSRB was negative and insignificant ($\beta = -0.021$, $p > 0.05$). Hypothesis 3 was not supported. We found moral conviction's direct effect on PSRB in the mediation model was positive and insignificant ($\beta = 0.147$, $p > 0.05$). Moral conviction's standardized indirect effect on PSRB through WPS was negative but insignificant ($\beta = -0.009$, $p > .05$), and the upper and lower bounds of a 95% confidence interval included zero [0.060, -0.110]. These statistical results did not support hypothesis 4, which stated that moral conviction mediated the relationship between WPS and PSRB.

DISCUSSION

Healthcare relies on high contact between service providers and receivers, where service experience depends upon service quality (Groth & Grandey, 2012) and employees are vital to the service experience of a customer, i.e., a patient (Bowen & Ford, 2004; Hartline & Ferrell, 1996; Kelly, 1992). The service quality provided by healthcare professionals is critical. Berry, Carbone, and Haeckel (2002) divided service experience into three categories: functional clues, mechanic clues, and humanic clues. Employee behavior falls into the humanic clues category (Wall & Berry, 2007). We can categorize PSRB behavior of healthcare professionals into the human clues category. Understanding PSRB's role in customer (patient) experience is important for developing high service quality in the healthcare profession.

Research shows moral conviction has been reported as a significant predictor of attitudes and behavioral forms of interpersonal intolerance toward others (Cole Wright, Cullum, & Schwab, 2008). As a form of constructive deviance, PSRB also includes some kind of interpersonal intolerance. Investigating the role of the healthcare professional's moral conviction in PSRB was critical in enhancing customer experience and service quality. Although we found the relationship between moral conviction and PSRB insignificant in this study, it was vital to test it.

We used the utilitarian theory of moral action to predict this study's hypotheses. Utilitarian theory explains that socially motivated persons are risk takers who intend to help others by breaking rules in specific conditions (Athanassoulis & Ross, 2010). The significant and positive relationship we found between WPS and healthcare professionals' PSRB supported this perspective. This implied that HR professionals should consider WPS an important factor when hiring healthcare professionals for positions requiring high PSRB. Researchers (Shepherd et al., 2017) have stressed emphasizing spiritual growth to caregiving professionals because it might affect their care. WPS becomes critical for healthcare professionals and they can use screening mechanisms to identify individuals with high levels. Similarly, the relationship between WPS and moral conviction also emphasizes the need for healthcare professionals to train employees to enhance their WPS because it strengthens their moral convictions. WPS can be an important tool for developing moral convictions, depending on organizational requirements.

We used the utilitarian theory of moral action to predict the relationship between moral conviction and PSRB. People with strong moral convictions tend to defy authorities, rules, or laws more (Skitka, 2012) because they provide motivation (Skitka, 2010) and inherent justification (Prinz, 2007) for PSRB. We expected that moral conviction would be associated with PSRB. However, we found that moral conviction was not a significant predictor of PSRB. Although PSRB was a constructive behavior, it involved certain risk. PSRB required a significant motivational source, and mere moral conviction did not lead to PSRB. In healthcare organizations where doctors face ethical dilemmas, patients might be highly likely to drive PSRB.

Skitka (2012) indicated that people's moral conviction must enhance their moral courage to defy the pressures of formal authorities or group norms on an issue. The authority independence hypothesis explains that people become less concerned with the

 CC BY
ISSN 0034-7590

cost of defying authorities or the law when they have a personal moral stake in a situation. One can argue that moral conviction may not predict PSRB in healthcare professionals, as it is risky, if it does not induce moral courage. Moral conviction may have an indirect effect on PSRB through moral courage rather than a direct one. Future researchers can test the relationship between moral conviction and PSRB using moral courage as a possible mediator.

Similar to our third hypothesis, we also expected that employees' WPS first developed their moral conviction, which then led them to PSRB. We did not find statistical support for the hypothesis stating that employees' high moral conviction mediated the direct positive association between their WPS and PSRB.

Such findings demonstrated that employees' WPS positively affected their moral conviction. However, moral conviction did not lead employees toward PSRB. Employees' WPS would enhance their moral conviction, but they would not engage in PSRB based on this. Based on the arguments previously described by Skitka (2012), one can argue that, instead of moral conviction, moral courage can mediate the relationship between WPS and PSRB.

CONCLUSION

Spirituality plays a more significant role in determining healthcare professionals' PSRB behavior than their personal moral convictions. Based on utilitarianism, we examined how moral conviction might mediate the relationship between WPS and PSRB in healthcare professionals. We did not find statistical support for the hypothesized mediating role of moral conviction between WPS and PSRB, yet we believe our study will stimulate research to identify the mechanisms through which spirituality may strengthen PSRB in healthcare professionals.

Limitations and Future Research

This study had limitations that can be addressed in future research. We found the effect of moral conviction on PSRB was significant. However, based on Skitka (2012)'s arguments, we stated that moral conviction might affect PSRB through moral courage. Future research can be conducted by investigating moral courage's mediating role between moral conviction and PSRB. Future research can also be conducted to examine the effect of WPS on PSRB through moral conviction and moral courage using either serial or parallel mediation mechanisms. These models may be extended further to investigate PSRB's effect on service quality provided by healthcare professionals to patients. This study introduced PSRB as a dependent variable and multidimensional construct consisting of three different dimensions. Moral conviction's effect on PSRB might differ with respect to the dimensions of PSRB. Future research can be conducted by investigating the direct and indirect effect of WPS on each dimension of PSRB separately.

Practical Implications

Our findings have managerial implications. Healthcare managers enjoy discretion of hiring healthcare professionals who enhance customer experience and service quality. However, healthcare professionals also face ethical dilemmas and may require violating existing organizational policies to enhance customer experience. PSRB emerges as a positive form of deviance to do so. Healthcare managers may be interested in recruiting professionals based on certain factors indicating a high tendency for PSRB. We showed that spirituality was positively associated with constructive deviance behaviors within employees, like PSRB. The positive association between WPS and moral conviction means that a spiritually rich workplace can shape employees' moral convictions. This offers one of the study's most important implications for healthcare managers. Since an organization's required level of PSRB may differ by position (Curtis, 2010), organizational managers can encourage recruitment and promotion of employees with high levels of WPS to positions requiring high levels of PSRB. They can use screening tests to identify people with high WPS during recruitment.

The insignificant relationship between moral conviction and PSRB implies that one's belief system is not what encourages deviant behaviors, even if PSRB is a form of constructive deviance. Perhaps customer requirements, ethical dilemmas, or individuals' moral courage encourage PSRB. An employee's deviant behavior may not be predicted based on moral convictions. The insignificant mediating role of moral conviction between WPS and PSRB offers interesting implications for healthcare professionals. Specifically, they can emphasize training people in WPS and focus less on individual specific moral beliefs' role in regulating employee PSRB.

REFERENCES

Ambrose, M. L., Taylor, R., & Hess Jr, R. L. (2015). Can I help you? Employee prosocial rule breaking as a response to organizational mistreatment of customers. In P. L. Perrewé, J. R. B. Halbesleben, & C. C. Rosen (Eds.), *Mistreatment in organizations* (pp. 1-31). Emerald Group Publishing Limited.

Ashmos, D. P., & Duchon, D. (2000). Spirituality at work: A conceptualization and measure. *Journal of Management Inquiry*, *9*(2), 134-145. doi:10.1177/105649260092008

 CC BY

Athanassoulis, N., & Ross, A. (2010). A virtue ethical account of making decisions about risk. *Journal of Risk Research*, *13*(2), 217-230. doi:10.1080/13669870903126309

Bartels, D. M., & Pizarro, D. A. (2011). The mismeasure of morals: Antisocial personality traits predict utilitarian responses to moral dilemmas. *Cognition*, *121*(1), 154-161. doi:10.1016/j.cognition.2011.05.010

Bennett, R. J., & Robinson, S. L. (2000). Development of a measure of workplace deviance. *Journal of Applied Psychology*, *85*(3), 349-360. doi:10.1037/0021-9010.85.3.349

Bentham, J. (1789). Principles of morals and legislation. London, UK: Clarendom Press.

Berry, L. L., Carbone, L. P., & Haeckel, S. H. (2002). Managing the total customer experience. *MIT Sloan Management Review*, *43*(3), 85-89.

Bowen, J., & Ford, R. C. (2004). What experts say about managing hospitality service delivery systems. *International Journal of Contemporary Hospitality Management*, *16*(7), 394-401. doi:10.1108/09596110410559078

Brown, T. A. (2015). Confirmatory factor analysis for applied research. New York, NY: Guilford Publications.

Carmines, E. G., & McIver, J. P. (1981). Social measurement: Current issues. In G. Bohrnstedt & E. Borgatta (Eds.), *Analyzing models with unobserved variables: Analysis of covariance structures* (pp. 65-115): Beverly Hills, CA: Sage.

Cartwright, K. B. (2001). Cognitive developmental theory and spiritual development. *Journal of Adult Development*, *8*(4), 213-220. doi:10.1023/A:1011386427919

Cole Wright, J., Cullum, J., & Schwab, N. (2008). The cognitive and affective dimensions of moral conviction: Implications for attitudinal and behavioral measures of interpersonal tolerance. *Personality and Social Psychology Bulletin*, *34*(11), 1461-1476. doi:10.1177/0146167208322557

Curtis, C. R. (2010). *An investigation of prosocial rule breaking within the casual restaurant industry* (Doctoral Thesis). University of Central Florida. Retrieved from https://stars.library.ucf.edu/etd/4191/

Curtis, C. R. (2013). Restaurant industry perspectives on pro-social rule breaking: Intent versus action. *FIU Hospitality Review*, *31*(1). Retrieved from https://digitalcommons.fiu.edu/hospitalityreview

Chawla, V., & Guda, S. (2010). Individual spirituality at work and its relationship with job satisfaction, propensity to leave and job commitment: An exploratory study among sales professionals. *Journal of Human Values*, *16*(2), 157-167. doi:10.1177/097168581001600203

Chawla, V., & Guda, S. (2013). Workplace spirituality as a precursor to relationship-oriented selling characteristics. *Journal of Business Ethics*, *115*(1), 63-73. doi:10.1007/s10551-012-1370-y

Cheung, G. W., & Lau, R. S. (2017). Accuracy of parameter estimates and confidence intervals in moderated mediation models: A comparison of regression and latent moderated structural equations. *Organizational Research Methods*, *20*(4), 746-769. doi:10.1177/1094428115595869

Cohen-Charash, Y., & Mueller, J. S. (2007). Does perceived unfairness exacerbate or mitigate interpersonal counterproductive work behaviors related to envy? *Journal of Applied Psychology*, *92*(3), 666-680. doi:10.1037/0021-9010.92.3.666

Cole Wright, J., Cullum, J., & Schwab, N. (2008). The cognitive and affective dimensions of moral conviction: Implications for attitudinal and behavioral measures of interpersonal tolerance. *Personality and Social Psychology Bulletin*, *34*(11), 1461-1476. doi:10.1177/0146167208322557

Curtis, C. R. (2010). An investigation of prosocial rule breaking within the casual restaurant industry (Doctoral Thesis). University of Central Florida. Retrieved from https://stars.library.ucf.edu/etd/4191/

Curtis, C. R., Upchurch, R. S., & Dickson, D. (2013). Restaurant industry perspectives on pro-social rule breaking: Intent versus action. *FIU Hospitality Review*, *31*(1). Retrieved from https://digitalcommons.fiu.edu/hospitalityreview/

Dahling, J. J., Chau, S. L., Mayer, D. M., & Gregory, J. B. (2012). Breaking rules for the right reasons? An investigation of pro-social rule breaking. *Journal of Organizational Behavior*, *33*(1), 21-42. doi:10.1002/job.730

Daniel, J. L. (2015). Workplace spirituality and stress: Evidence from Mexico and US. *Management Research Review*, *38*(1), 29-43. doi:10.1108/MRR-07-2013-0169

DeScioli, P. (2016). The side-taking hypothesis for moral judgment. *Current Opinion in Psychology*, *7*, 23-27. doi:10.1016/j.copsyc.2015.07.002

Duchon, D., & Plowman, D. A. (2005). Nurturing the spirit at work: Impact on work unit performance. *The Leadership Quarterly*, *16*(5), 807-833. doi:10.1016/j.leaqua.2005.07.008

Einolf, C. J. (2013). Daily spiritual experiences and prosocial behavior. *Social Indicators Research*, *110*(1), 71-87. doi:10.1007/s11205-011-9917-3

Emanuel, E., Schmidt, H., & Steinmetz, A. (Eds.). (2018). Rationing and resource allocation in healthcare: Essential readings. Oxford, UK: Oxford University Press.

Fornell, C., & Larcker, D. F. (1981). Evaluating structural equation models with unobservable variables and measurement error. *Journal of Marketing Research*, *18*(1), 39-50. doi:10.2307/3151312

Fowler, J. W. (1981). Stages of faith the psychology of human development and the quest for meaning. Ney York, NY: Harper & Row.

Fry, L. W., & Matherly, L. L. (2006, August). Spiritual leadership and organizational performance: An exploratory study. In *Annual Meeting of the Academy of Management*, (11-16 Ağustos) Atlanta-Georgia. Retrieved from http://www.tarleton.edu/~fry/sltorgperf.pdf.

Geigle, D. (2012). Workplace spirituality empirical research: A literature review. *Business and Management Review*, *2*(10), 14-27.

Godwin, J. L., Neck, C. P., & D'Intino, R. S. (2016). Self-leadership, spirituality, and entrepreneur performance: A conceptual model. *Journal of Management, Spirituality & Religion*, *13*(1), 64-78. doi:10.1080/14766086.2015.1122546

Groth, M., & Grandey, A. (2012). From bad to worse: Negative exchange spirals in employee–customer service interactions. *Organizational Psychology Review*, *2*(3), 208-233. doi:10.1177/2041386612441735

Gull, G. A., & Doh, J. (2004). The "transmutation" of the organization: Toward a more spiritual workplace. *Journal of Management Inquiry*, 13(2), 128-139. doi:10.1177/1056492604265218.

Harrington, D. (2009). *Confirmatory factor analysis*. Oxford, UK: Oxford University Press.

 CC BY
ISSN 0034-7590

Harrison, J. A. (2015). The things I will do for you: Investigating gratitude's effects on prosocial rule breaking willingness in supervisor-subordinate relationships (Doctoral Thesis). Retrieved from https://yorkspace.library.yorku.ca/xmlui

Hartline, M. D., & Ferrell, O. C. (1996). The management of customer-contact service employees: An empirical investigation. *The Journal of Marketing*, *60*(4), 52-70.

Hu, L. T., & Bentler, P. M. (1999). Cutoff criteria for fit indexes in covariance structure analysis: Conventional criteria versus new alternatives. *Structural Equation Modeling: A Multidisciplinary Journal*, *6*(1), 1-55. doi:10.1080/10705519909540118

Holland, S. (2015). Public health ethics. Cambridge, UK: Polity Press.

Horner, J. S. (2001). The virtuous public health physician. *Journal of Public Health Medicine*, *23*(1), 48-53.

Jackson, K. T. (1999). Spirituality as a foundation for freedom and creative imagination in international business ethics. *Journal of Business Ethics*, *19*(1), 61-70. doi:10.1023/A:1006149905996

Karakas, F. (2010). Spirituality and performance in organizations: A literature review. *Journal of Business Ethics*, *94*(1), 89-106. doi:10.1007/s10551-009-0251-5

Kelley, S. W. (1992). Developing customer orientation among service employees. *Journal of the Academy of Marketing Science*, *20*(1), 27-36. doi:10.1007/BF02723473

Kline, R. B. (2011). Principles and practice of structural equation modeling, (3rd ed.). New York, NY: Guilford Press.

Kohlberg, L. (1976). Moral stages and moralization: The cognitive-development approach. In T. Lickona (Ed.), *Moral Development and Behavior: Theory Research and Social Issues* (pp. 31-53). New York, NY: Holt, Rinehart and Winston.

Mackenzie, E. R., Rajagopal, D. E., Meilbohm, M., & Lavizzo-Mourey, R. (2000). Spiritual support and psychological well-being: Older adults' perceptions of the religion and health connection. *Alternative Therapies in Health and Medicine*, *6*(6), 37-45.

MacKinnon, D. P., Coxe, S., & Baraldi, A. N. (2012). Guidelines for the investigation of mediating variables in business research. *Journal of Business and Psychology, 27*(1), 1-14. doi:10.1007/s10869-011-9248-z

Mayer, D. M., Caldwell, J., Ford, R. C., Uhl-Bien, M., & Gresock, A. R. (2007). Should I serve my customer or my supervisor? A relational perspective on pro-social rule breaking. In *67th Annual Meeting of the Academy of Management,* Philadelphia, PA.

MacKinnon, D. P., Coxe, S., & Baraldi, A. N. (2012). Guidelines for the investigation of mediating variables in business research. *Journal of Business and Psychology*, *27*(1), 1-14. doi:10.1007/s10869-011-9248-z

Milliman, J., Czaplewski, A. J., & Ferguson, J. (2003). Workplace spirituality and employee work attitudes: An exploratory empirical assessment. *Journal of Organizational Change Management*, *16*(4), 426-447. doi:10.1108/09534810310484172

Morrison, E. W. (2006). Doing the job well: An investigation of pro-social rule breaking. *Journal of Management*, *32*(1), 5-28. doi:10.1177/0149206305277790

Mullen, E., & Nadler, J. (2008). Moral spillovers: The effect of moral violations on deviant behavior. *Journal of Experimental Social Psychology*, *44*(5), 1239-1245. doi:10.1016/j.jesp.2008.04.001

Nixon, S., & Forman, L. (2008). Exploring synergies between human rights and public health ethics: A whole greater than the sum of its parts. *BMC International Health and Human Rights*, *8*(1), 2. doi:10.1186/1472-698X-8-2

Pawar, B. S. (2009). Some of the recent organizational behavior concepts as precursors to workplace spirituality. *Journal of Business Ethics*, *88*, 245261. doi:10.1007/s10551-008-9961-3

Podsakoff, P. M., MacKenzie, S. B., & Podsakoff, N. P. (2012). Sources of method bias in social science research and recommendations on how to control it. *Annual Review of Psychology*, *63*, 539-569. doi:10.1146/annurev-psych-120710-100452

Podsakoff, P. M., & Organ, D. W. (1986). Self-reports in organizational research: Problems and prospects. *Journal of Management*, *12*(4), 531-544. doi:10.1177/014920638601200408

Prinz, J. (2007). The emotional construction of morals. Oxford, UK: Oxford University Press.

Rest, J. R., Narvaez, D., Thoma, S. J., & Bebeau, M. J. (2000). A neo-Kohlbergian approach to morality research. *Journal of Moral Education*, *29*(4), 381-395. doi:10.1080/713679390

Rothstein, M. A. (2004). Are traditional public health strategies consistent with contemporary American values. *Temple Law Review*, *77*, 175.

Royo-Bordonada, M. Á., & Román-Maestre, B. (2015). Towards public health ethics. *Public Health Reviews*, *36*(3). doi:10.1186/s40985-015-0005-0

Scott, P. A. (2007). Understanding ethical failures in leadership. *Nursing Philosophy*, *8*(2), 144-146. doi:10.1111/j.1466-769X.2007.00273.x

Scott, P. A. (2017). Nursing and the ethical dimension of practice. In *Key Concepts and Issues in Nursing Ethics* (pp. 1-13). Cham, Switzerland: Springer.

Scott, P. A. (2007). Understanding ethical failures in leadership. *Nursing Philosophy*, *8*(2), 144-146. doi:10.1111/j.1466-769X.2007.00273.x

Shepherd, A. M., Schnitker, S. S., Leffel, G. M., Oakes Mueller, R. A., Curlin, F. A., Yoon, J. D., & Greenway, T. (2018). Developing the good physician: Spirituality affects the development of virtues and moral intuitions in medical students. *The Journal of Positive Psychology*, *13*(2), 143-154. doi:10.1080/17439760.2016.1269185

Skitka, L. J. (2010). The psychology of moral conviction. *Social and Personality Psychology Compass*, *4*(4), 267-281. doi:10.1111/j.1751-9004.2010.00254.x

Skitka, L. J. (2012). Moral convictions and moral courage: Common denominators of good and evil. In M. Mikulincer & P. R. Shaver (Eds.), *Herzliya series on personality and social psychology*. *The social psychology of morality: Exploring the causes of good and evil* (pp. 349-365). Washington, DC: American Psychological Association.

Skitka, L. J., Bauman, C. W., & Lytle, B. L. (2009). Limits on legitimacy: Moral and religious convictions as constraints on deference to authority. *Journal of Personality and Social Psychology*, *97*(4), 567-578. doi:10.1037/a0015998

Skitka, L. J., Bauman, C. W., & Mullen, E. (2008). Morality and justice: An expanded theoretical perspective and empirical review. In *Justice* (pp. 1-27). Bingley, UK: Emerald Group Publishing Limited.

Skitka, L. J., Bauman, C. W., & Sargis, E. G. (2005). Moral conviction: Another contributor to attitude strength or something more? *Journal of Personality and Social Psychology*, *88*(6), 895-917.

Skitka, L. J., & Mullen, E. (2002). The dark side of moral conviction. *Analyses of Social Issues and Public Policy*, *2*(1), 35-41. doi:10.1111/j.1530-2415.2002.00024.x

Skitka, L. J., & Mullen, E. (2008). Moral convictions often override concerns about procedural fairness: A reply to Napier and Tyler. *Social Justice Research*, *21*(4), 529-546. doi:10.1007/s11211-008-0085-9

Skitka, L. J., Washburn, A. N., & Carsel, T. S. (2015). The psychological foundations and consequences of moral conviction. *Current Opinion in Psychology*, 6, 41-44. doi:10.1016/j.copsyc.2015.03.025

Spreitzer, G., & Sonenshein, S. (2003). Positive deviance and extraordinary organizing. In K. S. Cameron, J. E Dutton, & R. E. Quinn (Eds.), *Positive organizational scholarship* (pp. 207-224). San Francisco, CA: Berrett-Kohler.

Tabachnick, B. G., & Fidell, L. S. (1996). *Using multivariate statistics* (3rd ed.). New York, NY: Harper Collins.

Tabachnick, B. G., & Fidell, L. S. (2007). *Using multivariate statistics*. Boston, MA: Allyn & Bacon/Pearson Education.

Vardi, Y, & Weitz, E. (2005). *Misbehavior in organizations: Theory, research, and management*. Mahwah, NJ: Lawrence Erlbaum Associates.

Vogel, R. M., Mitchell, M. S., Tepper, B. J., Restubog, S. L., Hu, C., Hua, W., & Huang, J. C. (20145). A cross-cultural examination of subordinates' perceptions of and reactions to abusive supervision. *Journal of Organizational Behavior*, *36*(5), 720-745. doi:10.1002/job.1984

Wall, E. A., & Berry, L. L. (2007). The combined effects of the physical environment and employee behavior on customer perception of restaurant service quality. *Cornell Hospitality Quarterly*, *48*(1), 59-69. doi:10.1177/0010880406297246

Yonker, J. E., Schnabelrauch, C. A., & DeHaan, L. G. (2012). The relationship between spirituality and religiosity on psychological outcomes in adolescents and emerging adults: A meta-analytic review. *Journal of Adolescence*, *35*(2), 299-314. doi:10.1016/j.adolescence.2011.08.010

Youli, H., Xixi, L. U., & Xi, W. A. N. G. (2014). The effects of transformational leadership on employee's pro-social rule breaking. *Canadian Social Science*, *10*(1), 128-134. doi:10.3968/j.css.1923669720141001.4286

 CC BY
ISSN 0034-7590

ARTICLES

Submitted 10.27.2016. Approved 10.26.2017
Evaluated by the double-blind review system. Scientific Editor: Maria Alexandra Cunha
Translated version
DOI: http://dx.doi.org/10.1590/S0034-759020190103

THE SOCIAL REPRESENTATION OF CLOUD COMPUTING ACCORDING TO BRAZILIAN INFORMATION TECHNOLOGY PROFESSIONALS

A representação social de cloud computing pela percepção dos profissionais brasileiros de Tecnologia da Informação

La representación social del cloud computing desde la percepción de los profesionales brasileños de tecnología de la información

GUSTAVO GUIMARÃES MARCHISOTTI[1]
marchisotti@terra.com.br
ORCID: 0000-0002-7028-0015

LUIZ ANTONIO JOIA[2]
luiz.joia@fgv.br
ORCID: 0000-0002-5903-5190

RODRIGO BARONI DE CARVALHO[3]
baroni@pucminas.br
ORCID: 0000-0003-3716-0879

[1]Universidade Federal Fluminense, Escola de Engenharia, Niterói, RJ, Brazil

[2]Fundação Getúlio Vargas, Escola Brasileira de Administração Pública e de Empresas, Rio de Janeiro, RJ, Brazil

[3]Pontifícia Universidade Católica de Minas Gerais, Programa de Pós-Graduação em Administração, Belo Horizonte, MG, Brazil

ABSTRACT

This study seeks to identify the social representation of Cloud Computing as perceived by Brazilian Information Technology (IT) professionals. Using accessibility criteria, 221 IT professionals were chosen as respondents to an online questionnaire. Using Social Representation Theory (SRT), the techniques of free evocation of words, the Vergès' framework, and implicative, lexical, and content analysis were performed. Analyzing the social representation of cloud computing yielded associated words such as cloud, storage, availability, Internet, virtualization, and security, implying that Brazilian IT professionals have a primarily operational, rather than strategic, approach to cloud computing. This paradigm is based on issues related to the safety and availability of cloud data, and the results match other scientific literature on this subject. The theoretical contribution of this research lies in the use of SRT. The integrated use of implicative, lexical, and content analyses may be used for a better examination of constructs in the future.

KEYWORDS | Cloud computing, social representation theory, word evocation technique, Information Technology infrastructure management, information security.

RESUMO

Este estudo busca identificar a representação social sobre Cloud Computing, pela percepção dos profissionais brasileiros de Tecnologia da Informação (TI). Os dados empíricos foram coletados por meio de questionários on-line respondidos por uma amostra por acessibilidade de 221 profissionais de TI e analisados por meio da Teoria da Representação Social (SRT), operacionalizada pelas técnicas de evocação livres de palavras e do quadro de quatro casas de Vergès, bem como pelas análises implicativa, léxica e de conteúdo. Como resultado, identificou-se que o núcleo central da representação social associada ao Cloud Computing é composto pelas palavras: nuvem, armazenamento, disponibilidade, internet, virtualização e segurança. Assim, conclui-se que os profissionais de TI no Brasil têm uma visão mais operacional do que estratégica do Cloud Computing. Essa visão funcional, congruente com parte da literatura científica sobre o tema, fundamenta-se basicamente em aspectos relacionados à segurança, armazenamento e disponibilidade dos dados armazenados no Cloud Computing, faltando uma percepção do valor estratégico do cloud computing, baseada na viabilização de novos modelos de negócio. Finalmente, este artigo traz uma contribuição metodológica original ao usar a SRT – por meio da aplicação conjunta das análises implicativa, léxica e de conteúdo – na definição de um constructo específico.

PALAVRAS-CHAVE */ Cloud Computing, Teoria da Representação Social, evocação de palavras, gestão da infraestrutura de Tecnologia da Informação, segurança da informação.*

RESUMEN

Este estudio busca identificar la representación social sobre Cloud Computing, por la percepción de los profesionales brasileños de Tecnología de la Información (TI). Se recolectaron datos mediante cuestionarios online con una muestra por accesibilidad de 221 profesionales de TI y se analizaron usando la Teoría de las Representaciones Sociales (SRT), con la técnica de recuperación libres de palabras y análisis implicados, léxicos y de contenido. Se identificó que el núcleo de la representación social asociada al Cloud Computing está compuesto por las expresiones: Nube de almacenamiento, Disponibilidad, Internet, Virtualización y Seguridad. Se concluyó que la percepción sobre Cloud Computing es más operacional que estratégica, y se alinea con parte de la literatura científica, basándose en la seguridad y la disponibilidad de los datos almacenados en el Cloud Computing. La contribución teórica original del estudio está asociada con el uso de la SRT mediante la aplicación conjunta de los análisis implicados, léxicos y de contenido para definición de constructos.

PALABRAS CLAVE */ Computación en nube, Teoría de la Representación Social, evocación de palabras, gestión de la infraestructura de Tecnología de la Información, seguridad de la información.*

INTRODUCTION

Information Technology (IT) is considered a basic utility service like any other such as water, electricity, gas, and telephone (Buyya, Yeo, Venugopal, Broberg, & Brandic, 2009). One of the computational paradigms that meets this vision, Cloud Computing, transforms IT into a basic utility service with an adequate infrastructure for users to access applications and data from anywhere (Buyya et al., 2009). Cloud computing spending is expected to reach $500 billion by 2020, which indicates the relevance of cloud computing to the IT industry in the coming years (International Data Corporation - IDC, 2016).

The technical issues associated with the use of Cloud Computing have been widely addressed in the literature, mostly in the studies of Armbrust et al. (2010), Brian et al. (2012), Buyya et al. (2009), Mell and Grance (2011), Marston, Li, Bandyopadhyay, Zhang, and Ghalsasi (2011) and Verdi, Rothenberg, Pasquini, and Magalhães (2010). Some studies have also revealed how Cloud Computing has been strategically adopted by companies to build business models (Wirtz, Mory & Piehler, 2014). However, no studies were found to investigate, through the Social Representation Theory (SRT) (Bayramusta & Nasir, 2016; Wang, Liang, Jia, Ge, Xue, & Wang, 2016), the perception of IT professionals toward the concept of Cloud Computing.

Thus, in line with Joia (2017), who considered SRT an efficient approach for understanding constructs in the area of Information Management, this article seeks to identify the perception of Brazilian IT professionals toward the concept of Cloud Computing and compare the results with those found in the current literature.

With this introduction, the rest of the article is structured as follows. In the next section, the theoretical framework addressing the concepts of SRT and Cloud Computing are presented. Subsequently, the methodological procedures used are described, followed by the results, which are discussed based on the theoretical framework used. Finally, the conclusions are presented, covering the academic and management contributions, followed by the limitations of the study.

THEORETICAL FRAMEWORK

Cloud computing

One of the most wide-ranging studies on Cloud Computing has been conducted by the National Institute for Standards in Technology (NIST) in the United States, which addresses the subject in a highly technical manner. They state that this computational paradigm is composed of (a) five essential characteristics: self-service on demand, broad network access, resource pool, rapid elasticity, and measurable services; (b) three service models: software as a service, platform as a service, and infrastructure as a service; and (c) four implementation models: private cloud, community cloud, public cloud, and hybrid cloud (Mell & Grance, 2011).

According to Brian et al. (2012), one of the essential characteristics of the Cloud Computing model, or the "resource pool," as coined by Mell and Grance (2011), is that it can be obtained only through technologies such as virtualization and multitenancy. These technologies allow providers to deliver computing resources, simultaneously or otherwise, based on the demand and needs of multiple consumers.

Since Cloud Computing makes data available remotely, and thus is out of the owner's control, it is inevitable that it causes issues related to information security. According to Dikaiakos, Katsaros, Mehra, Pallis, & Vakali (2009), all responsibility for the protection of the user, his privacy, and the integrity of the information stored by him on the cloud belongs to the contracted service provider. Wei et al. (2014) agree with this statement and believe that security and privacy management are the main challenges associated with the implementation of Cloud Computing in organizations. Younis and Kifayat (2013), in turn, identify data integrity, availability and confidentiality, security threats, and attacks as the most important factors considered by IT users when it comes to Cloud Computing.

Although most concepts regarding Cloud Computing are focused on its technological aspects (Armbrust et al., 2010; Mell & Grance, 2011), there are other concepts such as Marston et al. (2011), considered by Madhavaiah and Bashir (2012) offer the most comprehensive explanation of Cloud Computing:

Cloud Computing is an information technology service model where computing services (both hardware and software) are delivered on-demand to customers over a network in a self-service fashion, independent of device and location. The resources required to provide the requisite quality-of-service levels are shared, dynamically scalable, rapidly provisioned, virtualized and released with minimal service provider interaction. Users pay for the service as an operating expense without incurring any significant initial capital expenditure, with the cloud services employing a metering system that divides the computing resource in appropriate blocks (Marston et al., 2011, p. 2).

Thus, for Marston et al. (2011), by using Cloud Computing, IT expenses in organizations would get converted from a capital expense (Capex) to an operating expense (OPEX). Armbrust et al. (2010) and Brian et al. (2012) believe that it would be more

CC BY

ISSN 0034-7590

appropriate to consider Cloud Computing within the pay as you go (PAYG) or pay-per-use models.

Social representation theory (SRT)

The SRT was developed in the 1960s in France by Serge Moscovici to explain how common sense is formed, organized, grounded, and propagated in different human groups. According to Moscovici (1979, 1988), social representations are constructed with the aim of understanding, locating, and adjusting in the world. Jodelet (2001) corroborates this understanding, believing that social representations are important in everyday life, because there is always a need to know how a person or object is related to the world around them. Thus, "social representations are a form of knowledge socially constructed and shared with a practical objective, and that contributes to the construction of a common reality to a social set" (Jodelet, 2001, p. 22).

It should be noted that the literature on social representations is focused on the human being and his or her relations with society. It cannot be otherwise since SRT comes from psychoanalysis. However, in the context of this study, social representation is applied to a service model, a computational paradigm called Cloud Computing, and not to an individual. Jodelet (1993) confirms the possibility of applying the concept of social representation to this paradigm, since social representation corresponds to an act of thinking by which a subject relates to an object. This can be a person, a thing, a material, a psychic or social event, a natural phenomenon, an idea, or a theory.

It is interesting to note that the use of the concept of social representation in the field of Information Systems (IS) is not something new (Gal & Berente, 2008; Jung, Pawlowski & Wiley-Patton, 2009; Kaganer & Vaast, 2010; Vaast & Walsham, 2005), especially for understanding certain attitudes of users as well as for defining constructs in IS (Joia, 2017). On these lines, the studies of Cunha, Coelho, and Pozzebon (2014) are noteworthy in that investigate the reason for the change in users' behavior over the years in relation to digital public participation in the definition of the budget of Belo Horizonte (Minas Gerais) and that of Teodoro, Przeybilovicz, and Cunha (2014), which investigate how IT governance was perceived by the technicians involved in its implementation. Vaast (2007) goes further by investigating, using SRT, how professionals of a hospital recognize and represent the aspects associated with IS safety.

According to Vergara and Ferreira (2005), in SRT, it is necessary to identify the most important part of the social representation, the core. The core defines specific consensual aspects within a group regarding the social representation of an object (Menin, 2007). Thus, the core of a social representation is formed by values about which, in general, the subject is not aware, or by values that are not made explicit, but that guide the subject's action and behavior. It represents the immutable essence of social representation, is stable and resistant to change, and thereby ensures the maintenance of social representation. Therefore, in a specific historical and cultural context, the core is decisive in defining the sense that a given object assumes for a group (Vergara & Ferreira, 2005).

According to Abric (1998, 2003), there is a more flexible peripheral system around the core. This system accommodates the direct contextual contradictions, supports the heterogeneity of the group, and gets the different perceptions of its members to allow for the adaptation of social representation to the immediate, without affecting the core (Mazzotti, 2001; Vergara & Ferreira, 2005). Thus, the peripheral system is less stable than the core, playing the role of individual modulation, without putting at risk the role of the core (Menin, 2007).

According to Mazzotti (2001), a transformation in the core generates a new social representation. Correia and Joia (2014), in turn, state that, as the core is composed of highly important elements for social representation, its change or absence would disrupt this representation or give it a new meaning.

METHODOLOGICAL PROCEDURES

The methodology proposed in this study is based on the principles of qualitative and quantitative research. Thus, data were collected using the word evocation technique, treated using the four quadrants technique proposed by Jean-Claude Abric, and analyzed using implicit and content analysis (Abric, 1998; Vergara & Ferreira, 2005; Vergès, 2003).

The field research used a non-probability sample, that is, it was based on accessibility (Vergara, 2005). An online questionnaire was sent by email during April 2014 to professionals who were effectively working, or had previously worked, in the IT field. This was done to reduce the possibility of an erroneous representation of Cloud Computing.

Different techniques were used to identify social representation, such as the word association technique. Free word association, used in this article, refers to respondents evoking and expressing words when a given word or an inductive expression is presented to them, either verbally or in writing (Vergara, 2005). Thus, in this study, the participants were asked

 CC BY ISSN 0034-7590

to express five words or expressions that they evoked instantly when they came heard or saw the term "Cloud Computing."

Following word association, complementary closed and open questions were presented in a complementary questionnaire. This questionnaire was used for content analysis, which in turn, served to support the understanding of the core and the statistical data of the sample.

To analyze the evoked words, the data treatment model of Pierre Vergès and the four quadrants technique were used. This technique consists of four quadrants that carry essential information for the analysis of social representation, through which the evoked words are separated (Abric, 1998; Vergès, 2003). To this end, the EVOC 2005 software was used. According to Abric (2003) and Pereira (2006), as summarized in Exhibit 1, using the four quadrants technique of Vergès shows that the recall frequency or quantitative information surpasses that of recall order or qualitative information.

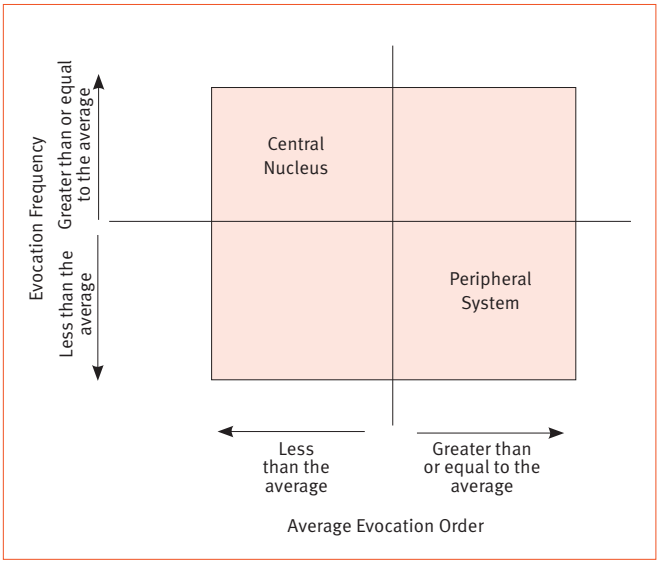
Exhibit 1. Descriptive summary of the four Vergès quadrants

Core Has a evoke frequency higher than the AEF and a evokes order lower than AEO	**First periphery** Has a evoke frequency higher than the AEF and a evokes order higher than the AEO Close connection to the core
Contrast zone Has a evoke frequency lower than the AEF and evokes order lower than the AEO Close connection to the core	**Second periphery** Has a evoke frequency lower than the AEF and evokes order higher than the AEO Distant connection to the central core

According to Joia (2017), the average evokes frequency (AEF) measures the average evokes frequency of a given word and is calculated by the total evokes of a given word over the total number of distinct words. The average evokes order (AEO) is obtained by the mean evokes of words, considering the order in which they were evoked – first, second, third, fourth, and fifth places. The AEO mean is obtained by dividing the sum of all AEOs by the total number of distinct words. Figure 1 summarizes the distribution of the AEF and AEO values in the framework of the four quadrants of Vergès

Thus, to find the core of social representation, according to the framework of the four houses of Vergès, these steps must be followed i) organization of the evoked words; ii) calculation of word frequency through EVOC; iii) calculation of the mean order of evocation of words through EVOC; iv) creation of reference points (average), so that evoked words are properly disposed within the frame of four quadrants of Vergès, that is, calculate AEF and AEO using EVOC, and v) make an individual comparison between the values associated with the words and the values of AEO and AEF, using EVOC, thereby creating the Vergès framework for Cloud Computing (Abric, 2003; Correia & Joia, 2014).

Figure 1. The Vergès quadrants



Source: Joia (2017).

In this study, we sought words that would enable the completion of Exhibit 1, with special attention to the words in the upper left quadrant, known as the core, and to those in the lower right quadrant or second periphery (Abric, 2003; Pereira, 2006), also known as the peripheral system (Vergara, 2005). In Tura (1997), the lower left quadrant (contrast zone) and the upper right quadrant (first periphery) allow a less direct interpretation of social representation, since they represent cognitions that are distant from that of the core (Abric, 2003; Pereira, 2006), and, therefore, they were not used in the study.

An implicative analysis was then performed to identify the relationship among words that are part of the social representation of Cloud Computing (Gras & Almouloud, 2002). According to Pereira (1997) and Gras and Almouloud (2002), the implicative analysis enables the confirmatory analysis of the core and the peripheral systems of social representation under study, defining the structural model of the components of social representation that were found. Thus, we obtained the groups formed by the evoked words with the highest implication indices

CC BY

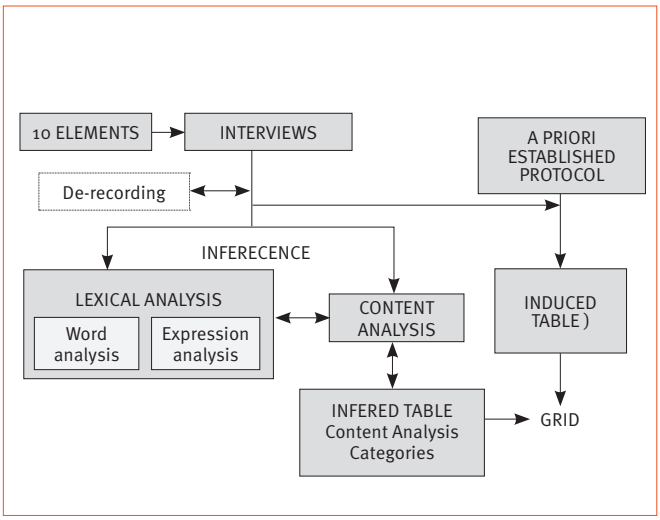
ISSN 0034-7590

with other evoked words to understand how these groupings and the words, individually, are formed and related to each other (Pereira, 1997).

To perform the implicative analysis, we used the CHIC software, which, according to Sarubbi et al. (2013), aims to provide a quality index of the associations among the elements of the core, representing them graphically.

Finally, the data were analyzed using the lexical and content analysis techniques, as proposed by Freitas and Janissek (2000). Lexicon analysis enabled content analysis, which sought to identify what was written about Cloud Computing based on the responses to complementary questionnaires, seeking indicators that would allow inferring knowledge on the conditions of production/reception of these messages (Vergara, 2005). Thus, the elements of the Vergès quadrant, obtained via lexical analysis, will serve as the basis for the categorization of the content analyzed in the open questions to generate a list with the final categories, as proposed by Freitas and Janissek (2000) and summarized in Figure 2.

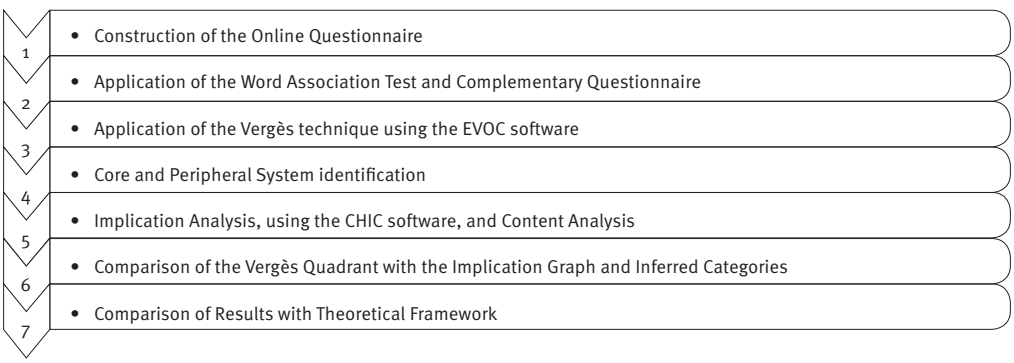
Figure 2. **Data analysis plan**



Source: Freitas and Janissek (2000).

Finally, the flow from the empirical research to data analysis is summarized in Figure 3.

Figure 3. **Research Flow**



RESULTS

Sample analysis

Using an online questionnaire, 291 responses were obtained, of which 221 (76%) were used, which is a sufficient sample size for obtaining a satisfactory result (Moscarola, 1990). Seventy questionnaires (24%) were excluded for containing blank answers because they were completed by professionals who did not work in the IT area or they contained incomprehensible words and/or those out of the context of the research. Exhibit 2 summarizes the general characteristics of the respondents.

Identification of the central nucleus and peripheral system

Before the core and peripheral system are generated, three parameters must be set. The first of is the minimum frequency that each evoked word must have to be considered by the software when calculating MRO. To this end, we used the frequency value that represents the mean of the evoked words, that is, 17.

CC BY

ISSN 0034-7590

Of the 1,091 evoked words, the EVOC software identified 213 different words, of which 15 words (7%) met the criterion of having a evokes frequency equal to or higher than 17, with an MRO of 2.99. Thus, the second parameter used by the software to generate the core and peripheral system was obtained – the mean order of evoked words, which was 2.90 – rounded off from 2.99 to 2.90, aiming at a greater rigidity in the analysis (Vèrges, 2003).

Exhibit 2. **Summary of sample characteristics**

Item	Summary of sample characteristics
1	Adequate sample size, with 221 valid questionnaires for the word association test
2	Data on gender and location of respondents according to the characteristics of the IT industry: most respondents were men (87.4%) and operated in the Southeast Region (84.1%)
3	Mean time of experience in the IT area was 15 years and mean age was 40 years, showing that the respondents have maturity and experience in the IT area
4	Respondents have, on average, 6.7 years of experience in their current position, showing stability in their profession.
5	Most of the interviewees have graduate/MBA education level (50.8%), aligned with the profile required by the market of IT professionals.
6	Most respondents are graduated (79.1%) and work (73.9%) in IT and Engineering areas.
7	Most respondents work in private companies (79%).
8	Respondents are equally divided between managers (52.8%) and non-managers (47.2%).
9	Most respondents (80%) believe that Cloud Computing is a technological paradigm, which is the same perception that market and academia have.
10	Most of the companies in which respondents work use Cloud Computing (54.5%), believing that their company is at least reasonably involved in Cloud Computing.

Finally, the central evokes value of the 15 words that comprise the social representation of Cloud Computing was found to be 35.2 (mean) or 26 (median). The median (third variable) was used as it is the best measure of the mean number of evokes, considering that the evokes frequency is not evenly distributed (Sarubbi, Reis, Bertolino & Rolim, 2013). Thus, the third and last parameter was obtained, generating the Vergès' framework of four quadrants presented in Exhibit 3.

Exhibit 3. **Distribution of words according to the framework of four houses of Vergès**

Frequency	MRO less than 2.9 (mean)	MRO greater than or equal to 2.9 (mean)
Frequency greater than or equal to 26 (median)	Storage (54; 2.444) Availability (47; 2.851) Internet (27; 2.481) Cloud (90; 1.500) Virtualization (26; 2.269) **Central Nucleus**	Accessibility (40; 3.150) Cost (36; 3.444) Security (67; 3.015) **First Periphery**
Frequency greater than or equal to 17 (minimum) and less than 26 (median)	Data (20; 2.650) Flexibility (18; 2.500) Mobility (22; 2.545) **Contrast Zone**	Sharing (24; 2.917) Scalability (25; 3.520) Easiness (22; 3.545) Network (20; 3.150) **Second Periphery/Peripheral System**

CC BY

ISSN 0034-7590

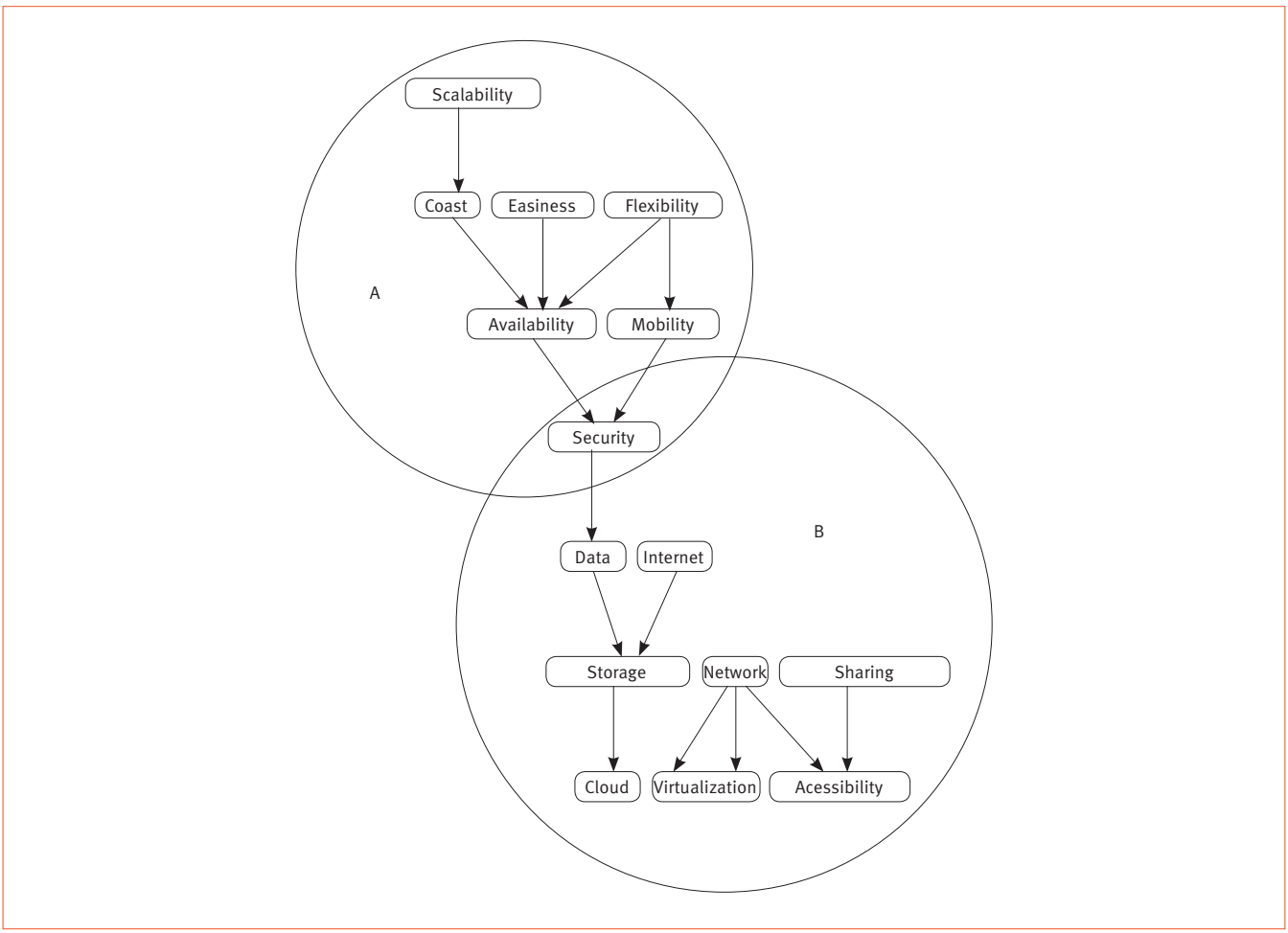
Implication analysis

To understand how the association occurs among the words that are part of the social representation of Cloud Computing, an implicative analysis was performed (Gras & Almouloud, 2002; Pereira, 1997).

According to Pereira (1997), through the implicative analysis, the possible weaknesses of the investigative technique used in this study are eliminated, since, in the evocation of words, it is often not clear what distinguishes representation from what is exclusive to language. Thus, by analyzing the association between the words that make up the social representation of Cloud Computing, we sought to strengthen the investigative method used by associating the words unconsciously evoked by respondents. This enabled the construction of implication graphs that can be analyzed and compared with the elements of the social representation generated by the EVOC software. The relational analysis of the words may even suggest changes in the core identified by the EVOC software. Thus, by using the CHIC software version 4.1, we constructed the implication graph presented in Figure 2.

Thus, two large associations were identified – circulated in Figure 4 – and named associations A and B for having words with the highest confidence indexes individually. Association A is formed by a core group comprising the words scalability => cost => availability => safety <= mobility. The core group categories are surrounded by the words flexibility and ease. Association B is formed by a core group comprising the words data => storage => cloud <= network. The core group is surrounded by the words security, internet, virtualization, sharing, and accessibility.

Figure 4. **Implication graph**



It is observed that association A is related to the characteristics of Cloud Computing, that is, those that mainly express the features considered important as well as the aspects related to the economic benefits provided by this type of system. Conversely, association

CC BY

ISSN 0034-7590

B mainly expresses aspects related to the application and use of Cloud Computing, including those related to connectivity between user and system, as well as the conceptual aspects of the computational paradigm under study.

From the analysis of the associations, it can be observed that the word security, from a relational point of view, is fundamental for the social representation of Cloud Computing, since, once deleted, it completely disarticulates this representation. Thus, the word "security" is the common link between the two associations, that is, it is the link between various elements that comprise the core of the social representation of Cloud Computing. Thus, based on this analysis, it is concluded that the word "security," although not included before, should be included in the core of the social representation of Cloud Computing.

Lexical and content analysis

The lexical and content analysis techniques are used in a sequential, recurrent, and complementary manner for categorizing research data (Freitas & Janissek, 2000). According to Freitas and Janissek (2000), lexical analysis "consists of moving from text analysis to lexical analysis (the set of all the words found in the statements or answers)" (p. 29). Conversely, according to these authors, content analysis "consists of an in-depth reading of each of the answers, and by codifying each one, one gets an idea about the whole" (Freitas & Janissek, 2000, p. 29).

Thus, the elements of the Vergès quadrant, obtained using lexical analysis, were used as the basis for categorizing open questions contents, generating a list of categories. This categorization identifies the dimensions to be tested, in this case, the core of the social representation of Cloud Computing.

One hundred eight-nine complementary questionnaires (85.5%) were considered in all from 221 respondents who answered two questions that sought to identify the definition and characteristics of Cloud Computing. Exhibit 4 summarizes the categories associated with the elements that comprise the social representation associated with Cloud Computing.

DISCUSSION

By using the four quadrants technique of Vergès (Exhibit 3), it is observed that the social representation of Cloud Computing from the perspective of Brazilian IT professionals comprises the following elements at its core: cloud, storage, availability, internet, and virtualization.

However, according to Figure 2 and by using implication analysis, other words in addition to those identified in the core were considered relevant from a relational point of view: scalability, cost, mobility, network, and security. The word "security" was fundamental for the stability of the social representation of Cloud Computing, with characteristics that suggest its positioning as part of the core, because its removal would disrupt the social representation identified. Its inclusion in the core could, therefore, be explained not from the perspective of the evokes order, but from the perspective of relationality and frequency.

Ryan (2013) and Younis and Kifayat (2013) state that security is, today, the dimension that most applies to the concept of Cloud Computing, since, if not achieved, it impairs its full use, even considering the various benefits that this computational paradigm brings to the user and the organization. In line with this, we observed how respondents' placed importance on this dimension, through the content analysis performed.

Some considerations can be made regarding the words included in the core. The word "cloud" was the most evoked, totaling almost a third of the evoked words considering the elements of the core. However, it is only a translation of the word "cloud." According to Correia and Joia (2014), it is common for respondents to evokes the inductive word itself or similar expressions when using the word association technique. It is worth mentioning that, in the implication analysis, the term "cloud" was also indicated as part of the core, from a relational point of view.

Two other words, "availability" and "storage," also stand out for their large number of evokes, totaling together more than a third of all the evoked words, considering the elements of the core. Thus, IT professionals understand Cloud Computing as a large storage center for data, programs, solutions, systems, or applications that have high availability, that is, they cannot fail. The implication analysis, despite placing these words in distinct association groups A and B, also suggests that both words are part of the core because they are strongly implicated with other words comprising social representation, with a value above 85.

The interpretation of the word "storage" follows from Mell and Grance (2011) and Marston et al. (2011), who consider information a commodity with remote storage within a shared structure of computational resources. Similarly, Mell and Grance (2011) and Ryan (2013) state that Cloud Computing is based on the idea of storing data and programs remotely within a central shared structure of computing resources accessed from anywhere and from any device.

CC BY

ISSN 0034-7590

Exhibit 4. Inferred categories - central nucleus

Inferred category	Description	Words composing social representation
Ability to store data and applications	Cloud Computing's ability to store or host data, documents, files, information, applications, or any content remotely. It is associated with space. E.g. "Possibility of **storing data** and content of any kind in a cloud environment."	Storage
Availability of computational resources and data/ information	Cloud Computing's ability to deliver remote computing resources seamlessly and ubiquitously to all users. It is related to Service Level Agreement (SLAs) and continuity of service. It also includes equipment and access systems, such as links and broadband. E.g. "24 X 7 **Availability**".	Availability
Network connectivity and access to computing resources	All the necessary resources related to the connection or interconnection of the user with the remote computing resources, the physical medium, i.e., data network, links, broadband, the Internet, and the Intranet, whether public or private. It is also associated with the dependence of Cloud Computing on access connectivity because if it does not exist or is of poor quality, effective use of Cloud Computing is not possible. E.g. "Use of several applications via **the Internet** anywhere regardless of the technological platform."	Internet and network
Remote computing resource pool	This is Cloud Computing on its own, understood as cloud, computing, cloud computing, online, i.e., all the availability of integrated remote infrastructure and its physical components, equipment, etc. that are part of the system: machines, memory, servers, processors, and data centers, recognized as remote computing resources. Example: "**Use of memory** and storage capacities of computers and servers shared and interconnected through the Internet."	Cloud
Data/Information Virtualization and Systems	Cloud Computing's ability to locally simulate the entire environment necessary for the execution of the service, which is effectively provided remotely. Virtualization is critical for Cloud Computing. Otherwise, there would be no possibility of using remote computing resources. Example: "**Access to applications virtually,** not needing to install an application on the machine."	Virtualization
Data/information security	All aspects related to data security, information, software, applications, in short, everything that is remotely maintained in the Cloud Computing environment, to try to ensure the privacy, secrecy, and confidentiality of user information. It also corresponds to the tools used by users to keep their data safe, such as backup and redundancy. Examples: "Availability of data on any Internet access. **Data security**."	Security
Sharing of computational resources and data/ information	Capacity of simultaneous or parallel use of remote computing resources interconnected by several users independently. It also includes the possibility of remote file sharing and collaboration between users. E.g., "**Sharing processing power** for the common purpose of streamlining tasks."	Sharing
Scalability of computational resources	Meaning is close to elasticity; however, it is differentiated by the fact that it relates to the ability of Cloud Computing to grow as the user's need increases, not allowing to decrease. It aims at increasing the work to be processed, ignoring the use or non-use of available resources. E.g. "Cloud Computing is a technology that is mainly associated with the easy and fast **scalability** of a given environment. With this, it is possible to resize it according to the need of use, generating savings, because one needs to pay for only what one consumes, different from a physical server within a company, dedicated exclusively to a particular system and/or service.	Scalability
Ease of use of computational resources	Cloud Computing users' ability to use, implement, hire, or manage remote computing resources, in a simple, practical way, and with minimal effort. E.g. "Dynamic provisioning of resources on demand, with **minimal effort**."	Ease of use

CC BY

ISSN 0034-7590

Although the word "data" does not appear as an element of the core, its presence, both in the implicit and in the content analysis, indicates its function within the social representation. After content analysis, we understand that the word "data" is more frequently associated with the word "storage" and then, in a lesser frequency, with the word "processing." Thus, Cloud Computing continues to be recognized by IT professionals as just a data storage system or a data repository, dating back to an early stage of its use.

The word "availability" refers to service availability, uninterrupted, online, 24 hours a day, and 7 days a week. According to the content analysis, this expression includes not only system availability and remote computing resources per se, but also data network (Internet) availability, which links the user and the elements of Cloud Computing (servers, storages). Thus, it is similar to what was presented as one of the main features of Cloud Computing according to Younis and Kifayat (2013), Brian et al. (2012), and Mell and Grance (2011): service provision through a high-performance connection, always available.

The presence of the words "internet" and "virtualization" reveals that the understanding of IT users is that Cloud Computing is a service available remotely through the internet, using virtualization as a tool for emulation of these services, without the need for proprietary infrastructure. Through content analysis, we observed that the word "Internet" is always mentioned as the means by which the user connects remotely to the cloud computing resources. Therefore, the Internet is seen as the enabler of connectivity between the user and the Cloud Computing resources. It is even possible to combine the word Internet with the word "network," which appears as an element of the peripheral systems. Marston et al. (2011) had already stated that virtualization is the key technological aspect that enables the full use of Cloud Computing, because it enables the use of computing resources by individual or multiple consumers, which simulates infinite and automatic provisioning of computing capacity on demand (Armbrust et al., 2010; Brian et al., 2012; Mell & Grance, 2011).

The peripheral system of the social representation of Cloud Computing, from the analysis of Exhibit 3, consists of the following words: sharing, scalability, ease of use, and network. The presence of the word "sharing", as an element of the core, has two interpretations derived from the content analysis. The first, more evident, refers to the ability to share configurable computational resources through modern cloud computing platforms (Marston et al., 2011; Mell & Grance, 2011). The second refers to the perception that Cloud Computing is not only a remote, Internet-accessible, and individual-use data storage service, but also a means of promoting data and information sharing among individuals.

The word "scalability," in turn, refers to the ability of Cloud Computing to resize virtualized computing resources on demand, increasing the number of processing nodes (Verdi et al., 2010). Scalability should be transparent to the user, without the need to know data location and how data can be accessed, ensuring the level of service quality contracted by the user (Marston et al., 2011).

Finally, the word "ease of use", according to the content analysis, represents the ability of Cloud Computing users to use, implement, hire, or manage remote computing resources simply and practically and with minimal effort. Mell and Grance (2011) state that Cloud Computing is a model in which computing resources can be quickly provisioned and released, with minimal management effort or interaction with the service provider.

Thus, after using the word association technique, implication analysis, and content analysis, we suggest a reorganization of the core and the peripheral system of the social representation of Cloud Computing as shown in Exhibit 5.

Exhibit 5. **Final Social Representation of Cloud Computing**

Frequency	MRO less than 2.8 (mean)	MRO greater than or equal to 2.8 (mean)
Frequency greater than or equal to 26 (median)	Storage Availability Internet Cloud Virtualization Security **Core**	None **First Periphery**
Frequency greater than or equal to 17 (minimum) and less than 26 (median)	None **Contrast Zone**	Sharing Scalability Easiness **Second Periphery/Peripheral System**

CC BY

ISSN 0034-7590

CONCLUSIONS

Based on the results obtained, especially considering the central nucleus, it may be concluded that the perception of Brazilian IT professionals toward Cloud Computing – in agreement with a part of the scientific literature on this concept - is focused on its operational and functional aspects, especially on the availability, storage, and security dimensions. Thus, Brazilian IT professionals lack understanding about the strategic value of Cloud Computing, as proposed by Wirtz et al. (2014), and of the new business models provided by this new paradigm, as suggested by Marston et al. (2011).

Thus, from the elements of the core of the social representation of Cloud Computing, it was possible to generate a new definition of this computational paradigm. Thus, Cloud Computing is a business model based on its consideration in IT as a data storage service, comprising a pool of remote computing resources, which are accessible to users via the Internet and which use virtualization. Computational resources need to be fully available, that is, uninterrupted, secure, and risk-free regarding user data.

Management contributions

The first management contribution of this study – from the identification of the social representation of Cloud Computing according to IT professionals – is that it allows IT executives to share the best practices to be adopted for the correct use of this computational paradigm, with their internal and external customers, besides allowing them realize the stage in which their organization is situated in relation to this paradigm.

The second contribution of this study is that it reinforces the need for executives to focus on the development of Cloud Computing solutions based on security, availability, and storage. Since this study shows that the social representation of cloud computing by the respondents is highly focused on the risks associated with data security, as well as on data storage and availability, there is a need to invest hugely in effective and secure solutions with high availability.

The last contribution of this study is that it suggests how future Brazilian IT executives will have to align Cloud Computing to new business models and business strategies.

Academic contributions

This study opens room for an academic discussion on the use of implication analysis to confirm the core of social representation. We believe that this study makes an important methodological contribution since it uses implication analysis to show how the words that are part of the central and peripheral system are in dialogue with each other, strengthening social representation. Using implication analysis, this study attempts to change the position of one element – security – from the peripheral system to the core.

Furthermore, this study explains how the core and the peripheral system of a social representation can be identified using the EVOC and CHIC software.

Finally, the concomitant use of the four quadrants technique of Vergès, implication analysis, and content/lexical analysis leads to greater consistency in the results obtained, which is a methodological contribution of this study.

STUDY LIMITATIONS

An important limitation of this study refers to the organization of words – one of the steps used by the EVOC software to build the framework of four quadrants technique. No matter how many rules have been previously established by the referenced studies, mistakes can occur. Likewise, inference errors may have occurred when categorizing words, which was mitigated by including implication, content, and lexical analysis. A second limitation refers to the non-probability sample, which makes the conclusion of the study statistically less generalizable for Brazil. Despite these limitations, we hope to have contributed to a better conceptual definition of the Cloud Computing paradigm with this study.

REFERENCES

Abric, J. C. (1998). A abordagem estrutural das representações sociais. In O. D. Moreira (Org.), *Estudos interdisciplinares de representação social* (pp. 27–38). Goiânia, GO: AB.

Abric, J. C. (2003). La recherche du noyau central et de la zone muette des représentations sociales. In J. C. Abric (Org.), *Méthodes d'étude des représentations sociales* (pp. 60–80). Erès.

Armbrust, M., Fox, A., Griffith, R., Joseph, A. D., Katz, R., Konwinski, A. ... Zaharia, M. (2010). A view of cloud computing. *Communications of the ACM*, *53*(4), 50–58. doi:10.1145/1721654.1721672

Bayramusta, M., & Nasir, V. A. (2016). A fad or future of IT? A comprehensive literature review on the cloud computing research. *International Journal of Information Management*, *36*(4), 635–644. doi:10.1016/j.ijinfomgt.2016.04.006

Brian, O., Brunschwiler, T., Christ, H., Dill, H., Falsafi, B., Fischer, M., & Zollinger, M. (2012). *White Paper Cloud Computing*. SATW, Swiss Academy of Engineering Sciences. Retrieved from http://www.satw.ch/organisation/organe/tpf/tpf_ict/box_feeder/2013-02-06_SATW_White_Paper_Cloud_Computing_EN.pdf

Buyya, R., Yeo, C. S., Venugopal, S., Broberg, J., & Brandic, I. (2009). Cloud computing and emerging IT platforms: Vision, hype, and reality for delivering computing as the 5th utility. *Future Generation Computer Systems*, *25*(6), 599–616. doi:10.1016/j.future.2008.12.001

Correia, J. C. P., & Joia, L. A. (2014). CIO competencies: A social representation analysis. *Proceedings of the Twentieth Americas Conference on Information Systems*. Savannah, USA.

Cunha, M. A. V. C., Coelho, T. R., & Pozzebon, M. (2014). Internet e participação: O caso do orçamento participativo digital de Belo Horizonte. *RAE-Revista de Administração de Empresas*, *54*(3), 296–308. doi:10.1590/S0034-759020140305

Dikaiakos, M. D., Katsaros, D., Mehra, P., Pallis, G., & Vakali, A. (2009). Cloud computing: Distributed internet computing for IT and scientific research. *IEEE Internet Computing*, *13*(5).

Freitas, H., & Janissek, R. (2000). *Análise léxica e análise de conteúdo: Técnicas complementares, sequências e recorrentes para análise de dados qualitativos*. Porto Alegre, RS: Sphinx-Sagra (Distrib.).

Gal, U., & Berente, N. (2008). A social representations perspective on information systems implementation: Rethinking the concept of "frames." *Information Technology & People*, *21*(2), 133-154. doi:10.1108/09593840810881051

Gras, R., & Almouloud, S. A. (2002). A implicação estatística usada como ferramenta em um exemplo de análise de dados multidimensionais. Retrieved from http://math.unipa.it/~grim/asi/asi_03_saddo_gras.pdf

International Data Corporation. (2016). Cloud's impact is far reaching. Retrieved from http://www.idc.com/promo/thirdplatform/fourpillars/cloud

Jodelet, D. (1993). Representações sociais: Um domínio em expansão. Retrieved from http://portaladm.estacio.br/media/3432753/jodelet-drs-um-dominio-em-expansao.pdf

Jodelet, D. (2001). Representações sociais: Um domínio em expansão. In D. Jodelet (Org.), *As representações sociais* (pp. 17–44). Rio de Janeiro, RJ: EdUERJ.

Joia, L. A. (2017). A teoria da representação social e a definição de constructos na área de administração da informação. *VI EnADI*. Curitiba, PR.

Jung, Y., Pawlowski, S. D., & Wiley-Patton, S. (2009). Conducting social cognition research in IS: A methodology for eliciting and analyzing social representations. *Communications of the Association for Information Systems*, *24*, 598–614. doi:10.17705/1cais.02435

Kaganer, E. A., & Vaast, E. (2010, September). Responding to the (almost) unknown: Social representations and corporate policies of social media. *31st ICIS*. Saint Louis, USA.

Madhavaiah, C., & Bashir, I. (2012). Defining cloud computing in business perspective: A review of research. *Metamorphosis*, *11*(2), 50–65.

Marston, S., Li, Z., Bandyopadhyay, S., Zhang, J., & Ghalsasi, A. (2011). Cloud computing: The business perspective. *Decision Support Systems*, *51*(1), 176–189. doi:10.1016/j.dss.2010.12.006

Mazzotti, T. B. (2001). Representações sociais de problemas ambientais: Uma contribuição à educação brasileira. In A. P. Moreira (Org.), *Representações sociais: Teoria e prática* (pp. 86–123). João Pessoa, PB: UFPB.

Mell, P., & Grance, T. (2011). *The NIST definition of cloud computing*. National Institute of Standards and Technology, *53*(6), 50.

Menin, M. D. S. (2007). O aspecto normativo das representações sociais: Comparando concepções. Revista de Educação Pública, *16*(30), 121–135.

Moscarola, J. (1990). Enquêtes et analyse de données avec le sphinx. Vuibert.

Moscovici, S. (1979). Psychologie des minorités actives, Paris, Presses Universitaires de France. Version espaflola (1981): Psicología de las misnorias activas. Ediciones Morata. Google Scholar.

Moscovici, S. (1988). Notes towards a description of social representations. *European Journal of Social Psychology*, *18*(3), 211–250. doi:10.1002/ejsp.2420180303

Pereira, C. (1997). A análise de dados nas representações sociais. *Análise Psicológica*, *1*(15), 49–62.

Pereira, M. A. (2006). *O medo no contexto organizacional* (Masters Dissertation, Fundação Getulio Vargas, Rio de Janeiro, RJ).

Ryan, M. D. (2013). Cloud computing security: The scientific challenge, and a survey of solutions. *Journal of Systems and Software*, *86*(9), 2263–2268. doi:10.1016/j.jss.2012.12.025

Sarubbi, V. J., Reis, A. O. A., Bertolino, M. M., Neto, & Rolim, M. L., Neto. (2013). *Tecnologias computacionais para o auxílio em pesquisa qualitativa: Software EVOC*. São Paulo, SP: Schoba.

Teodoro, A. N., Przeybilovicz, É., & Cunha, M. A. (2014). Governança de tecnologia da informação: Uma investigação sobre a representação do conceito. *Revista de Administração*, *49*(2), 237–321. doi:10.5700/rausp1148

Tura, L. F. R. (1997). *Os jovens e a prevenção da AIDS no Rio de Janeiro*. Rio de Janeiro, RJ: Universidade Federal do Rio de Janeiro.

Vaast, E. (2007). Danger is in the eye of the beholders: Social representations of information systems security in healthcare. *The Journal of Strategic Information Systems*, *16*(2), 130–152. doi:10.1016/j.jsis.2007.05.003

Vaast, E., & Walsham, G. (2005). Representations and actions: The transformation of work practices with IT use. *Information and Organization*, *15*(1), 65–89. doi:10.1016/j.infoandorg.2004.10.001

Verdi, F. L., Rothenberg, C. E., Pasquini, R., & Magalhães, M. (2010). Novas arquiteturas de data center para cloud computing. *XXVIII Simpósio Brasileiro de Redes de Computadores e Sistemas Distribuídos*. Gramado, RS.

Vergara, S. C. (2005). *Métodos de pesquisa em administração*. São Paulo, SP: Atlas.

Vergara, S. C., & Ferreira, V. C. P. (2005). A representação social de ONGs segundo formadores de opinião do município do Rio de Janeiro. *Revista de Administração Pública*, *39*(5), 1137–1159.

Vergès, P. (2003). *EVOC – Ensemble de programmes permettant l`analyse des évocations: Manuel Version 15 octobre 2003*. Aix-en-Provence, France: Laboratoire Méditerranéen de Sociologie (LAMES).

Wang, N., Liang, H., Jia, Y., Ge, S., Xue, Y., & Wang, Z. (2016). Cloud computing research in the IS discipline: A citation/co-citation analysis. *Decision Support Systems*, *86*, 35–47. doi:10.1016/j.dss.2016.03.006

Wei, L., Zhu, H., Cao, Z., Dong, X., Jia, W., Chen, Y., & Vasilakos, A. V. (2014). Security and privacy for storage and computation in cloud computing. *Information Sciences*, *258*, 371–386. doi:10.1016/j.ins.2013.04.028

Wirtz, B. W., Mory, L., & Piehler, R. (2014). Web 2.0 and digital business models. In *Handbook of strategic e-business management* (pp. 751–766). Berlin Heidelberg: Springer-Verlag.

Younis, Y. A., & Kifayat, K. (2013). Secure cloud computing for critical infrastructure: A survey. Liverpool John Moores University, United Kingdom, Tech. Rep, 599–610.

ARTICLES

Submitted 09.29.2017. Approved 06.21.2018
Evaluated by the double-blind review system. Scientific Editor: Mônica Abreu
Translated version
DOI: http://dx.doi.org/10.1590/S0034-759020190104

FACTORS RELATED TO THE MATURITY OF ENVIRONMENTAL MANAGEMENT SYSTEMS AMONG BRAZILIAN INDUSTRIAL COMPANIES

Fatores relacionados com a maturidade dos Sistemas de Gestão Ambiental de empresas industriais brasileiras

Factores relacionados con la madurez del sistemas de Gestión Ambiental de Empresas industriales brasileñas

BLÊNIO CEZAR SEVERO PEIXE[1]
bleniocsp@gmail.com
ORCID: 0000-0001-8271-0628

ANDRÉA CRISTINA TRIERWEILLER[2]
andrea.ct@ufsc.br
ORCID: 0000-0002-9435-8083

ANTONIO CEZAR BORNIA[3]
cezar.bornia@gmail.com
ORCID: 0000-0003-3468-7536

RAFAEL TEZZA[4]
rafaeltezza@yahoo.com.br
ORCID: 0000-0002-6539-4608

LUCILA MARIA DE SOUZA CAMPOS[3]
lucila.campos@ufsc.br
ORCID: 0000-0002-1610-7617

[1]Universidade Federal do Paraná, Departamento de Ciências Contábeis, Curitiba, PR, Brazil

[2]Universidade Federal de Santa Catarina, Araranguá, SC, Brazil

[3]Universidade Federal de Santa Catarina, Departamento de Engenharia de Produção, Florianópolis, SC, Brazil

[4]Universidade do Estado de Santa Catarina, Escola Superior de Administração e Gerência, Florianópolis, SC, Brazil

ABSTRACT

This study evaluates the factors that have a significant relationship to the level of maturity of the Environmental Management Systems (EMS) among Brazilian industrial companies, using a multiple linear regression model. The variables consider the respondents' characteristics, their categories, and other dummy variables. The results, in ascending order of their influence on the EMS maturity level, were possessing ISO 14001 certification, participation in the carbon market, disclosing information in reports (environmental disclosure), having a project to reduce water consumption, having a professional management model, having insurance against environmental accidents, company age, operating in the textile sector, and the legal constitution of the company Ltda.

KEYWORDS | Environmental Management System, environmental disclosure, environmental maturity, ISO 14001 certification, Brazilian industrial companies.

RESUMO

O objetivo do artigo foi avaliar os fatores que apresentaram relação significante com o nível de maturidade dos Sistemas de Gestão Ambiental (SGA) de empresas industriais brasileiras, por meio de um modelo de regressão linear múltipla. Considerando as características dos respondentes, chegou-se às variáveis, suas categorias e variáveis dummy decorrentes do estudo. Os resultados, pela ordem dos fatores relacionados que influenciam o nível de maturidade dos SGA, foram: a empresa possuir certificação ISO 14001; possuir participação no mercado de carbono; divulgar suas informações em relatórios (disclosure ambiental); possuir projeto para redução do consumo de água; possuir modelo de gestão profissional; possuir seguro relacionado a acidentes ambientais; idade da empresa; atuar no setor têxtil; e a constituição jurídica da empresa ltda.

PALAVRAS-CHAVE */ Sistemas de Gestão Ambiental, disclosure ambiental, maturidade ambiental, certificação ISO 14001, empresas industrias brasileiras.*

RESUMEN

El objetivo del artículo fue evaluar los factores que presentaron relación significante con el "nivel de madurez del Sistemas de Gestión Ambiental (SGA)" de empresas industriales de Brasil, por medio de un modelo de regresión lineal múltiple. Considerando las características de los encuestados, se llegó a las variables, sus categorías y variables resultantes del estudio. Los resultados, por el orden de los factores relacionados que influencian el "nivel de madurez del SGA" fueron: poseer certificación ISO 14001; participación en el mercado de carbono; divulgar informes (divulgación ambiental); poseer un proyecto para reducir el consumo de agua; tener un modelo de gestión profesional; tener seguro relacionado con accidentes ambientales; edad de la empresa; en el sector textil y la constitución jurídica de la empresa Ltda.

PALABRAS-CLAVE */ Sistemas de Gestión Ambiental, divulgación ambiental, madurez ambiental, certificación ISO 1400, empresas industriales de Brasil.*

CC BY

ISSN 0034-7590

INTRODUCTION

Climate change and environmental degradation, evidenced by the constant loss of biodiversity, are pressuring companies to adopt environmental management practices (Boiral, 2006; Jabbour, Jabbour, Teixeira, & Freitas, 2012). Perez, Ribeiro, Cunha, and Rezende (2008) noted that the search for strategies to revert or mitigate the consequences of global warming, which arises from climate change, led to discussions and actions aimed at reducing gas emissions, *e.g.*, the Kyoto Protocol and the carbon market.

Environmental Management Systems (EMS) cover a wide range of aspects and principles, with implications on strategic environmental policies and quality control systems of modern companies; they act as a competitive strategy in the information integration plan (Alperstedt, Quintella, & Souza, 2010; Boiral & Henri, 2012; Rodríguez, Alegre, & Martínez, 2011). Business management identifies, controls, evaluates, monitors, and seeks to reduce environmental impact to acceptable levels (Balzarova & Castka, 2008). In addition, significant advances in EMS are among the factors that result in investigations to determine the requirements of different organizations and their desire to achieve results and EMS compliance (Stevens, Batty, Longhurst, & Drew, 2012).

In this line of research, the environmental maturity of companies is associated with the EMS level or evolution stage (Jabbour, 2015). Assessing the maturity level in relation to each associated factor enables identifying possible improvements in different areas of the company (Fischer, Jan-Hendrik, Pfeiffer, Hellingrath, Scavarda, & Roberto, 2014).

The factors listed in this article will be analyzed in terms of their relationship with the EMS maturity level. Peixe (2014) developed a scale to measure the EMS maturity level of industrial companies using the Graded Response Model (GRM) of the Item Response Theory (IRT). Thus, the following factors may be associated with EMS maturity level: company age, sector of activity, management model, legal constitution, disclosure of information via reports (environmental disclosure), ISO 14001 certification, project to reduce water consumption, project to reduce energy consumption, project to reduce the consumption of raw material, insurance against environmental accidents and participation in the carbon market.

However, the research gap in this context leads to a problem. Which factors are associated with the EMS maturity level of industrial companies in Brazil? Therefore, the objective of this study was to evaluate significant factors in the EMS maturity level of industrial companies in Brazil. The variables, their categories, and resulting dummy variables were obtained using a multiple linear regression model to assess these factors, considering the characteristics of the respondents.

This study investigates these factors to bridge a research gap, considering corporate sustainability, and compensation to companies in environmental disclosure shared with stakeholders (Castka & Prajogo, 2013; Fonseca, 2015; Marimon, Casadesús, & Heras, 2010). Moreover, the EMS adds important benefits to several sectors, validating the environmental quality policy for products and services offered to consumers and society (Castka & Prajogo, 2013; Marimon, Llach, & Bernardo, 2011).

We now present the theoretical framework, methods, analysis, discussion of the results, and lastly, the final considerations.

THEORETICAL FRAMEWORK

Environmental management system

Studies on EMS are important because they comprise requirements and aspects of corporate sustainability of organizations in recent years (Zobel, 2013). A company that adopts an EMS demonstrates proactivity and considers environmental issues in its decision-making process (Boiral, 2006; González-Benito & González-Benito, 2006; Halila & Tell, 2013).

The strategic approach to environmental issues by implementing the requirements of ISO 14001 defines a company's environmental policy, plans, and actions (Corazza, 2016; To & Lee, 2014). Another strategic approach is a comparative analysis of the intensity of major nations in diffusing ISO 14001, per sector of activity (Marimon et al., 2010; Marimon et al., 2011). Thus, this certification has proven to be fundamental, because of its direct relationship with image, compliance, and prevention of environmental incidents, considering its strategic scope or worldwide dissemination (Singh, Jain, & Sharma, 2015).

The EMS is a complex process, often with a great impact on business activity. Its adoption suggests that the company recognizes the importance of environmental excellence in business, which may lead to new opportunities, rather than as a limiting factor for performance and profitability (Halila & Tell, 2013). After all, the demands of stakeholders and market globalization, among other factors, led to the consideration of quality control systems and EMS as a part of competitive strategy (Alperstedt et al., 2010; Rodríguez et al., 2011).

The maturity of EMS, based on ISO 14001 and other factors, can lead to effective control of environmental aspects, principles, and impacts, improving the environmental maturity levels of the company, and acting as an improved tool for sustainability (Fonseca, 2015; Marimon et al., 2011).

CC BY

ISSN 0034-7590

Maturity of environmental management systems

"Maturity" primarily refers to mastering managerial processes over time (effectiveness), performance, and efficient resource management (Trierweiller et al., 2012). Maturity models predict structures for systematic and continuous evaluation, allowing companies to compare their processes with the best practices, including those of its competitors, *i.e.*, the greater the maturity of its management systems, the better a company's performance.

The use of environmental (e.g. energy and water consumption), human and organizational resources (workforce qualification, training, and organizational culture) may influence a company's environmental performance, and consequently, its environmental maturity (Jabbour, 2015; Melnyk, Sroufe, & Calantone, 2003). This is evidenced by the awareness of employees and organizations to reduce the consumption of natural resources by modernizing equipment and processes, among other factors (Oliveira, & Serra, 2010; Oliveira, Serra, & Salgado, 2010).

Maturity models applied to the environmental sector are developed in stages, levels, or evolutionary phases, from the initial moment of mere existence to the most advanced levels, when there is dominance and leadership in management activity. EMS maturity is presented under different names through a *continuum*, from reactive to passive models, and from preventive to active and proactive models (Haddock-Freser & Tourelle, 2010; Jabbour., Teixeira., Oliveira, & Soubihia 2010; Jabbour 2015; Jabbour & Jabbour, 2009; Ormazabal & Sarriegi, 2014). Thus, EMS models are evolutionary, from early incipience to achieving a high level of maturity (Okongwu, Morimoto, & Lauras, 2013; Ormazabal & Sarriegi, 2014). Costa and Rosa (2017) ranked business competence in evolutionary stages, from inexperience to full mastery.

Peixe (2014) defined six maturity levels: (1) Reactive Initiative (Real), (2) Reactive (Rea), (3) Preventive Initiative (Prevl), (4) Preventive (Prev), (5) Proactive Initiative (Proal) and (6) Proactive (Proa), developing a scale to measure the EMS maturity level of industrial companies using IRT. To do so, Peixe (2014) used an instrument composed of 55 items (Exhibitions 1 to 5). The instrument was sent to medium and large companies (with more than 100 employees) affiliated to the Industry Federation. The information was collected using an online survey. The companies were contacted by email and telephone. In addition, a workshop was held in companies affiliated to the Industry Federation.

The companies tasked their employees in the environmental division to take the survey using the link or send their responses in a Word file via email. The instrument was sent to 2,994 companies and yielded 354 responses from the following complexes of economic activity: agro-industrial; metallurgical, mechanical and electro-electronic, textile, mineral, forestry, technological, chemical, civil construction, and energy (Peixe, 2014).

The parameters were estimated using the Maximum Marginal Likelihood (MML) available in the Multilog software (Thissen, Chen, & Bock, 2003), and a *z* scale (zero mean and standard deviation) was created, to measure the EMS maturity level. The maturity level was estimated using the Bayesian expected a posteriori (EAP) procedure, and the Gradual Response Model of the IRT, creating a *z* scale, considering the items in Exhibits 1 to 5.

Exhibit 1. **Environmental policy (EP)**

1	The company considers EP in its strategic planning
2	The company considers the environmental risks related to its operation in the process of designing its EP
3	The company considers whether the competitors are certified or have an EMS when analyzing the EP scenario in its strategic planning
4	There is a person responsible for developing and implementing the EP in the company
5	The company has an adequate structure (location, computerized system, and equipment) to conduct the process of EP implementation
6	The company defines financial resources to implement EP
7	The company periodically identifies the environmental legislation applicable to its activities, products, and services
8	The company considers competition in the process and design of its EP
9	The company considers the funding bodies in the process and design of its EP
10	The company considers the certifying bodies in the process and design of its EP

Source: Peixe (2014).

 CC BY ISSN 0034-7590

Exhibit 2. Planning (plan)

11	When defining objectives and targets, the company takes into account the opinion of the stakeholders
12	In defining objectives and goals, the company includes technological changes
13	In defining objectives and goals, the company includes changes and revisions of the environmental legislation
14	In defining objectives and goals, the company includes information on its public image regarding the environment
15	The programs foresee the reduction in the consumption of water, energy, raw material, and volume of waste
16	The company defines resources (human, financial, technological, and material) compatible with the goals and objectives for implementing EMS programs
17	The company defines who is responsible for implementing the programs aligned to achieve the goals and objectives
18	In planning, the company considers investment forecasts for research and development in the EP area
19	The company defines the indicators to monitor and evaluate the fulfillment of environmental objectives and goals

Source: Peixe (2014).

Exhibit 3. Implementation and operation (Do)

20	The company considers whether resources (material, financial, human, and technological) are used efficiently to implement EMS programs
21	The company has a plan to make employees aware of the importance of the EMS
22	The company's employees receive training to operate according to the EMS
23	The company has a structured communication plan to disclose its environmental actions to internal and external opinion makers
24	The company documents the actions carried out annually on the EP
25	The company adopts procedures to control its operational activities that may cause changes to the environment
26	The company performs procedures to identify, prevent, and respond to environmental risks, and posts the procedures in areas of the company
27	The company works to adjust its products for clean production
28	The company adopts cleaner production in its operations
29	The company adopts the concept of the Brazilian solid waste policy of Law no. 12.305/2010 (return, recycling, reuse, and reprocessing)
30	The company adopts recycling programs
31	The company maintains procedures to monitor the results of its operations that may cause changes in the environment

Source: Peixe (2014).

CC BY

ISSN 0034-7590

Exhibit 4. Verification and corrective action (Check)

32	The company periodically checks the non-compliance reports to implement preventive and corrective actions
33	The company conducts diagnosis for preventive and corrective actions by accredited bodies
34	The company carries out compensatory actions to recover degraded areas
35	There are procedures for verifying the effectiveness of preventive actions in the company
36	There are procedures for verifying the effectiveness of corrective actions in the company
37	The impacts, costs, and risks associated with non-compliance with the EMS are assessed
38	The company has an environmental audit structure to check for EMS compliance
39	The company can measure financial gains from environmental practices
40	The company uses indicators to assess compliance and non-compliance of preventive and corrective actions
41	The company uses indicators to monitor EMS implementation

Source: Peixe (2014).

Exhibit 5. Exhibit 5 Continuous improvement (Act)

42	The company holds periodic meetings to map the strengths and weaknesses identified in the EMS
43	The company analyzes threats and opportunities related to the environmental policy
44	The company analyzes threats and opportunities related to the stakeholders of the organization
45	The company analyzes threats and opportunities in response to changing technologies
46	The company analyzes threats and opportunities that arise in the development of new products and services
47	The company checks the EM for significant aspects beneficial to understanding and creating competitive advantage
48	There are persons responsible for verifying and periodically reviewing environmental aspects and impacts
49	Periodic analysis is conducted to define continuous improvement in the EM
50	Periodic analysis is conducted to identify the most critical areas related to the EM
51	The company develops activities for raising the awareness of employees in the designing and adoption of cleaner processes
52	The company conducts a general EP analysis and indicates paths for future steps
53	Within the approach of continuous improvement, the company prioritizes areas with environmental risk
54	The company uses the consolidation of indicators to issue a general diagnosis of the EM aligned with its EP
55	The company's suppliers are selected following the criteria of good environmental practices

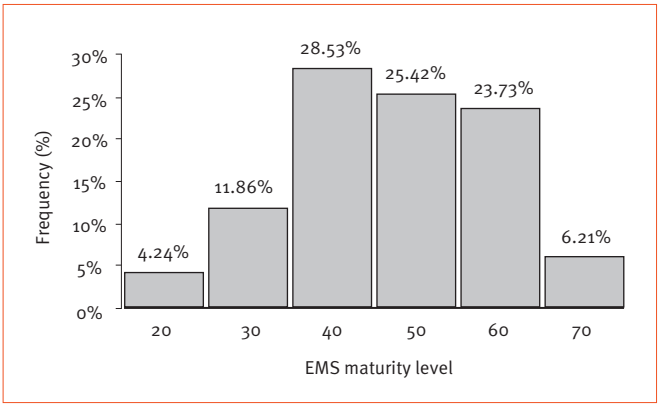
Source: Peixe (2014).

CC BY

ISSN 0034-7590

For ease of understanding, Figure 1 shows the EMS maturity level of the respondent companies as a latent trait, considering the conversion of the *z*-transformed scale to one with mean and standard deviation of 50 and 10, respectively.

Figure 1. **Maturity level of the environmental management systems (EMS)**



Source: Peixe (2014).

The histogram (Figure 1) shows the EMS maturity level in the converted scale, considering the levels 20 (4.24% of the companies), 30 (11.86%), 40 (28.53%), 50 (25.42%), 60 (23.73%), and 70 (6.21%), of companies that took the survey.

Factors associated with the maturity of environmental management systems

Several factors are associated with EMS maturity. The most obvious seems to be an ISO 14001 certification. However, Zobel (2013) states that ISO 14001 demands compliance with regulations but does not establish minimum levels of environmental performance to be achieved and evaluated periodically to maintain the certification. Thus, the criteria and requirements indicated in the actions to implement EMS are defined and used to monitor and evaluate the continuous improvement in environmental performance (Stevens et al., 2012). Thus, it is natural to associate an ISO 14001 certification with the EMS maturity level and the benefits from environmental prevention activities undertaken by a company's internal management (Peixe, 2014).

Measurement and communication of environmental performance are key factors that help decision makers and the public (Calixto, 2007; Ramos & Melo, 2006). Xu, Zeng, and Tam (2012) analyzed the stock market reaction to the disclosure of environmental violations by Chinese companies (57 companies) and found that negative environmental events have a weak effect on the stock market. Trierweiller, Peixe, Tezza, Bornia, and Campos (2013) conducted a study on environmental management disclosure, evaluating the websites of 638 Brazilian companies in 10 activity sectors, and concluded that environmental fines had the lowest disclosure.

According to Oliveira et al. (2010), the cost reduction in hiring insurance was investigated upon the disclosure of benefits obtained by implementing an EMS based on the ISO 14001 standard (Gupta & Innes, 2014; Marimon et al., 2011; To & Lee, 2014). Cost reduction, fines, energy savings, waste and environmental impacts are factors that can contribute to the implementation of an EMS (Trierweiller et al., 2013).

The demands of stakeholders and market globalization are primary factors that led to the inclusion of quality control systems and EMS in the competitive strategies of companies (Alperstedt et al., 2010; Rodríguez et al., 2011). Another factor is the demand for qualified professionals in environmental issues (green teams) in organizations with greater EMS maturity (Jabbour, Santos, Fonseca, & Nagano, 2013). Therefore, professional management is associated with a higher EMS maturity level, *i.e.*, demonstrating a company's progression through its rating system, reflecting its effectiveness and efficiency (Gupta & Innes, 2014; Singh et al., 2015).

METHOD

This work was based on the scale created by Peixe (2014), which comprises 55 items used to measure the EMS maturity of industrial companies using IRT. The sample included industrial companies that have over 100 employees. The list of companies registered in the Industry Federation was used, with a total of 2,994 companies, of which 354 responded to the survey. Moreover, the agro-industrial (16%); metallurgical, mechanical, and electronic (22%); textile (19%); forestry (16%); technological (7%); chemical (11%); civil construction (5%); energy (1%); and other (3%) company complexes responded. Exhibits 1 to 5 show the items formulated by Peixe (2014) that constitute his proposed scale. In addition, descriptive questions were used for this study. A multiple regression analysis was used to assess the influence of the variables presented in Exhibit 6 regarding the EMS maturity level proposed by Peixe (2014). In this analysis, EMS maturity level was the dependent variable, and the variables listed in Exhibit 6 were independent variables.

Exhibit 6 presents the variables, their categories, and the dummy variables.

(continua)

 CC BY
ISSN 0034-7590

Exhibit 6. Variables, their categories, and resulting dummy variables

Variable	Category	Dummy variable	Source
Company age	Number in years	-	Andersen and Jessen (2003); Cooke-Davies and Arzymanow (2003); Grant and Pennypacker (2006); Spenassato et al. (2015).
Sector (ST) where the company operates	Agroindustry	ST_Agroind	Marimon et al. (2010); Marimon et al. (2011); Castka e Prajogo (2013); To and Lee (2014); Fischer et al. (2014); Jabbour and Jabbour (2009); Jabbour (2010, 2015); Haddock-Freser e Tourelle (2010); Ormazabal and Sarriegi (2014); Trierweiller et al. (2013).
	Metallurgical, mechanical, and electro-electronic	ST_Metalmec	
	Forestry, mineral, ceramic, and construction	ST_Fo_Mi Ce_Co	
	Textile	ST_Textile	
Management model of the company	Professional	Profesional_ management	Gupta and Ines (2014); Singh et al. (2015).
	Family	-	
Legal constitution (CJ) of the company	Publicly traded	LC_PT	Carvalho (2001); Silva (2002); Barbieri (2008); Miranda (2010).
	Privately held	LC_PH	
	Private limited company	LC_LL	
Variable	**Category**	**Dummy variable**	**Source**
The company discloses its information through environmental disclosures	Yes/No	Disclosure	Cormier and Magnan (2003); Ramos and Melo (2006); Calixto (2007); Xu et al. (2012); Trierweiller et al. (2013).
ISO 14001 certified	Yes/No	ST_Agroind	González-Benito e González-Benito (2006); Boiral (2006); Halila and Tell (2013); To and Lee (2014); Corazza, (2016).
Has a project to reduce water consumption	Yes/No	Water	Melnyk et al. (2003).
Has a project to reduce energy consumption	Yes/No	Energy	Melnyk et al. (2003); Trierweiller et al. (2013); Jabbour (2015).
Has a project to reduce raw material (RM) consumption	Yes/No	RM	Melnyk et al. (2003).
Has insurance against environmental accidents	Yes/No	Insurance	Trierweiller et al. (2013); Gupta and Innes (2014); Singh et al. (2015).
Company participates in the carbon market	Yes/No	Carbon market	Perez et al. (2008); Jabbour et al. (2010); Sundarakani et al. (2010); Hua et al. (2011).

CC BY

ISSN 0034-7590

EMS maturity level is the dependent, quantitative variable measured using the TIR from the results presented by Peixe (2014), as previously explained. Age is a quantitative independent variable, measured in years of existence of the company, while the other independent variables are represented by dummy variables (categorical). Thus, the research hypotheses are as follows:

H1: Having ISO 14000 certification influences the maturity of the company's EMS.

H2: Participation in the carbon market influences the maturity of the company's EMS.

H3: Environmental disclosure influences the maturity of the company's EMS.

H4: Having a project to reduce water consumption influences the maturity of the company's EMS.

H5: The management model influences the maturity of the company's EMS.

H6: Having insurance against environmental accidents influences the maturity of the company's EMS.

H7: Age influences the maturity of the company's EMS.

H8: The sector of activity influences the maturity of the company's EMS.

H9: The legal constitution influences the maturity of the company's EMS.

H10: Having a project to reduce energy consumption influences the maturity of the company's EMS.

H11: Having a project to reduce raw material consumption influences the maturity of the company's EMS.

The theoretical basis of each hypothesis is presented in Exhibit 6.

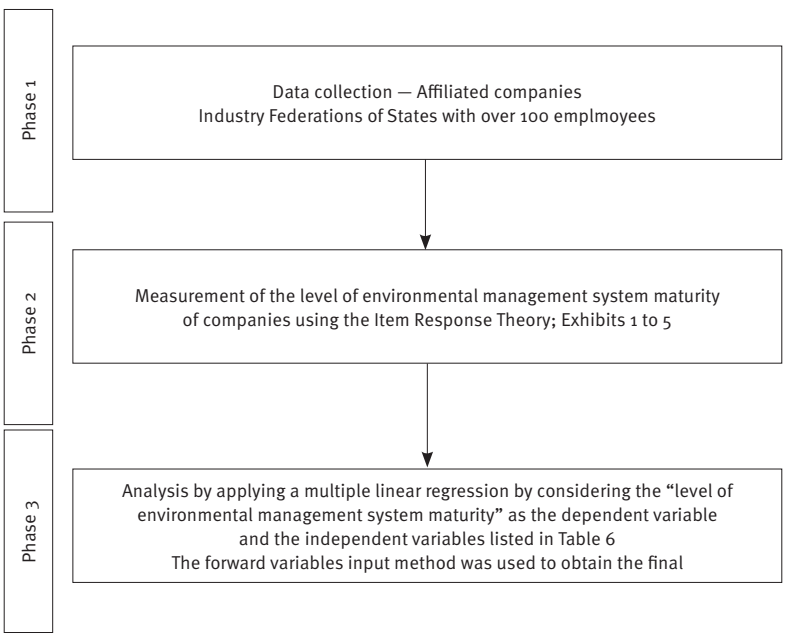
Figure 2 shows the research design, considering phases 1, 2, and 3, to evaluate factors associated with the EMS maturity level (dependent variable of the sample studied).

The analysis was performed by applying multiple linear regression using the Statistical Package for Social Sciences software, while considering the dependent variable, and beginning with the age and other variables listed in Exhibit 6. The forward variables input method was used to obtain the final model.

Factor analysis

The model was created (Table 1) by applying a regression analysis using the forward method of variable selection.

Figure 2. **Research design**



 CC BY
ISSN 0034-7590

Table 1. **Coefficients of the model**

Variable	Non-standard coefficient		Standardized coefficient	t	p-value	Collinearity	
	B	Std. error	Beta			Tolerance	Variance inflation factor
(Constant)	-0.513	0.176		-2.925	0.004		
ISO 14001	1.064	0.133	0.344	7.998	0.000	0.919	1.089
Carbon market	0.724	0.204	0.158	3.540	0.000	0.854	1.171
Environmental disclosure	0.419	0.131	0.155	3.189	0.002	0.724	1.381
Water	0.413	0.119	0.159	3.459	0.001	0.809	1.236
Professional management	0.367	0.126	0.131	2.910	0.004	0.838	1.193
Insurance	0.325	0.123	0.117	2.641	0.009	0.875	1.143
Age	0.022	0.006	0.181	3.905	0.000	0.794	1.259
ST_Textile	-0.287	0.134	-0.092	-2.138	0.033	0.919	1.088
LC_private limited	-0.326	0.129	-0.119	-2.533	0.012	0.777	1.287

The final model showed that the following variables, ranked by significance at the 95% significance level, influenced the EMS maturity level: ISO 14001, carbon market, environmental disclosure, water, professional management, insurance, age, textile sector, and private limited legal constitution.

Table 2 shows the model's analysis of variance, and Table 3 presents its adjustment indicators.

Table 2. **ANOVA**

	Sum of squares	Degrees of freedom	Squares mean	F	Sig.
Regression	251.713	9	27.968	28.638	‹ 0.001
Residual	321.300	329	0.977		
Total	573.013	338			

The F-test shown in Table 2 indicates that the model is significant; that is, at least one of the estimated coefficients is statistically different from zero.

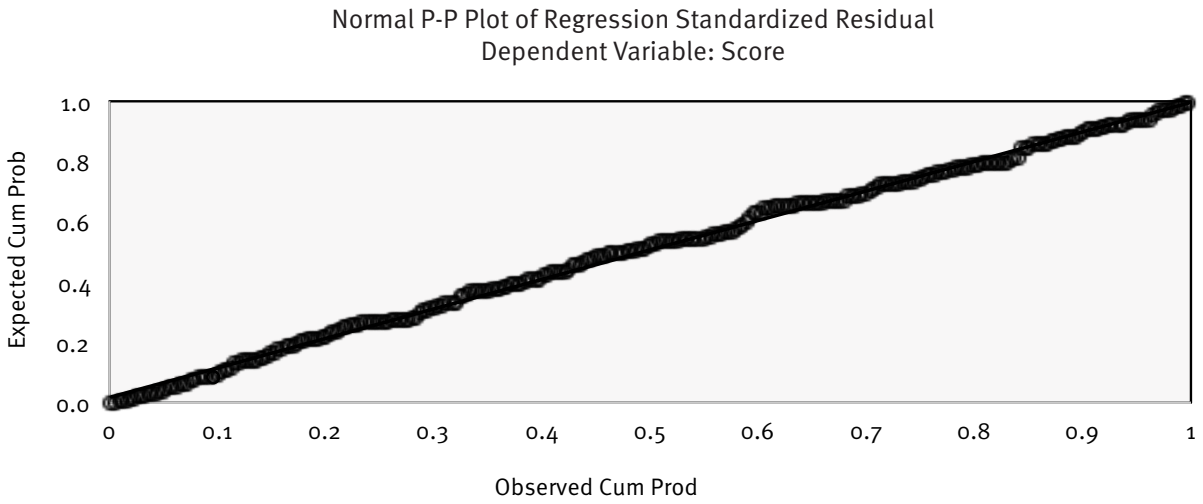
Tabla 3. **Indicators of adjustment for the selected model**

R	R^2	Adjusted R^2	Standard estimated error
0.663	0.439	0.424	0.988

The coefficient of determination (R^2) of the selected regression model (Table 3) showed that 44% of the variance of EMS maturity is explained by the independent variables.

The normality of the residuals is an assumption of linear regression and can be perceived by observing that most of the points are located on the straight line in Figure 3. The Kolmogorov-Smirnov adjustment test was performed to test the normality of the residuals, which was confirmed.

Figure 3. **Normality of residuals**



Another assumption is the absence of multicollinearity, that is, the assumption that independent variables should not be correlated. The variance inflation factor (VIF) and tolerance tests confirm the absence of multicollinearity among the independent variables, as there is no VIF greater than 10 or tolerance less than 0.1.

DISCUSSION OF RESULTS

The selected regression model is represented by the following equation to discuss the results presented in Table 1: EMS maturity = -0.513 + 1.064 * (the company has ISO 14001 certification) + 0.724 * (the company participates in the carbon market) + 0.419 * (the company discloses its information via reports) + 0.413 * (the company has a project to reduce water consumption) + 0.367 * (the company has a professional management model) + 0.325 * (the company has insurance against environmental accidents) + 0.022 * (company age) - 0.287 * (the company operates in the textile complex) - 0.326 * (the company has the legal constitution of a private limited company). Thus, of the 11 hypotheses formulated, only Hypotheses 10 and 11 were not supported.

The estimated coefficients (B) indicate the direction of the relationship between the dependent and independent variables as well as its intensity, while the p-value indicates the variables' significance. All the variables presented in Table 3 are significant, confirming that EMS maturity is associated with these variables: (1) "the company has ISO 14001 certification", (2) "the company participates in the carbon market," (3) "the company discloses its information via reports," (4) "the company has a program to reduce water consumption," (5) the management model influences the maturity of the company's EMS," (6) "the company has insurance against environmental accidents," (7) "company age," (8) "the company operates in the textile complex," and (9) "the company has the legal constitution of a private limited company".

An analysis of the coefficients showed that most of the independent variables positively influence the EMS maturity level (dependent variable). Moreover, the company having ISO 14001 certification is one of the factors that influenced the EMS maturity level the most, and once having certification increased the estimated EMS maturity value by 1.064 standard deviations. Boiral (2006), González-Benito and González-Benito (2006), and Halila and Tell (2013) agreed with this finding. They stated that proactive action was relevant for environmental issues in the decision-making process and in the strategic approach to evaluate the EMS of organizations according to the requirements of ISO 14001, which define their environmental policy, plans, and

CC BY

ISSN 0034-7590

actions (Corazza, 2016; To & Lee, 2014). EMS maturity can lead to effective control of environmental aspects, principles, and impacts in the process of improving the environmental level of the company, acting as a tool to improve business sustainability (Fonseca, 2015; Marimon et al., 2011).

The second factor, participation of the company in the carbon market, causes an increase of 0.724 standard deviations in the estimated EMS maturity level. This search for reversal or mitigation of the consequences of global warming, resulting from climate change, led to discussions and actions aimed at reducing gas emissions, such as the Kyoto Protocol and the carbon market (Perez et al., 2008). To mitigate global warming, the United Nations (UN), the European Union (EU), and many other countries have adopted legislation and mechanisms designed to reduce carbon emissions, with carbon-emission trading being one of the most effective mechanisms (Hua, Cheng, & Wang, 2011).

There are studies on carbon footprint along the supply chain and on its contribution to making the supply chain greener. Sundarakani, Souza, Goh, Wagner, and Manikandan (2010) analyzed the adoption of carbon footprint in the supply chain, showing that carbon emissions are a significant threat and warning that managers should act preventively in the project phase.

According to Jabbour, Teixeira, Oliveira, and Soubihia (2010), high management must be updated on strategic environmental issues that may influence the future of the company, such as the carbon credit market. Moreover, participation in the carbon market leads the company to develop projects that minimize the consumption of inputs and waste emissions.

The third factor with the greatest positive influence on the level of EMS maturity, accounting for an increase of 0.419 standard deviations, is the disclosure of information via reports (environmental disclosure). The disclosure of environmental information via reports makes public the environmental performance policy (Calixto, 2007; Cormier & Magnan, 2003). In addition to disclosing to stakeholders the actions, plans, and strategies aimed at preserving the environment, disclosure of environmental information via reports influences the EMS maturity level (Calixto, 2007; Ramos & Melo, 2006).

Environmental disclosures of 638 websites of Brazilian companies operating in 10 sectors of activity were analyzed, and the factor of environmental fines had the lowest disclosure (Trierweiller et al., 2013). Conversely, Xu et al. (2012) analyzed the stock market for environmental disclosure and found that the negative environmental events of Chinese companies had a weak effect on the stock market.

The fourth factor with the highest positive influence, the company having a project to reduce water consumption, had an increase of 0.413 standard deviations. This was due to the influence of water use on the efficiency of the use of inputs for essential environmental preservation, supporting the findings of Gupta and Innes (2014), Jabbour (2015), Melnyk et al. (2003), and Singh et al. (2015).

The fifth factor that showed positive influence, with an increase of 0.367 standard deviations, is the company having a professional management model, which indicates the extent to which the company has progressed, thus affecting its effectiveness and efficiency (Gupta & Innes, 2014; Singh et al., 2015). Ultimately, professional management supposedly seek market criteria, regulations, institutional analysis mechanisms, and determining factors for decision making (Alperstedt et al., 2010), while family management can largely use the feeling of the founding entrepreneur.

The sixth factor, having insurance against environmental accidents, had a positive influence, with an increase of 0.325 standard deviations. That is, having insurance reduces costs (Oliveira et al., 2010), which is a factor considered in the study of the process of disseminating the benefits obtained with the implementation of an EMS (Marimon et al., 2011; To & Lee, 2014). Thus, implementation of an EMS may contribute to reducing fines, saving energy, and reducing waste and environmental impacts (Trierweiller et al., 2013). Hiring insurance can mitigate the risks of environmental accidents that would impact the continuity of the company's operations, considering that the insurance premium is lower with the reduction of environmental accidents, which pressures the company to improve environmental performance (Singh et al., 2015).

The seventh factor, company age, has a positive influence on the level of EMS maturity, with an increase of 0.022 standard deviations. After all, maturity models define the structure for continuous improvement of actions, showing the extent to which a company has progressed over time in terms of the projects completed (Andersen & Jessen, 2003; Cooke-Davies & Arzymanow, 2003; Pennypacker & Grant, 2003, 2006; Spenassato, Peixe, Trierweiller, Bornia, & Tezza, 2015).

The eighth factor exerted a negative influence on EMS maturity level, with -0.287 standard deviations, and it refers to whether the company operates in the textile sector. Therefore, if a company operates in the textile segment, its maturity level is lower than if it operates in other sectors.

It is noteworthy that some studies, such as To and Lee (2014), analyzed the existence of specific patterns by sector of activity. The textile sector has attracted the attention of environmentalists around the world for its high consumption of water, chemical products, and energy, and for releasing

CC BY

ISSN 0034-7590

contaminated effluents at the end of the process that cause intense pollution, in addition to the atmospheric and noise pollution generated from the production phases (Mangala, 2001). Oliveira-Brasil, Abreu, Silva and Leocádio (2016) stated that the environmental issues are associated with high consumption of water and energy, transportation costs, use of pesticides in cotton plantations, bleaching and washing of fabrics, and the final destination of chemical waste after the fabric is dyed with the use of running water. They also consider animal rights and protection of the community. However, Jones, Hillier, and Comfort (2012) emphasized the development of innovative technologies as a way to mitigate the environmental and social impacts of the textile industry.

Moreover, the textile and apparel industry enables the development of research related to environmental issues, through its significant participation in the Brazilian economic and social scenario as well as its productive potential and job and income generation (Alencar, Simoni, Fiorelli, & Angelis, 2015).

The ninth factor, whether the legal constitution of the company is of a private limited company, has a negative influence on the level of EMS maturity, with -0.326 standard deviations. That is, it can be assumed that private limited companies tend to have less maturity, compared with joint-stock companies. After all, the adoption of standards and legal requirements by publicly traded companies requires the publication of environmental and social reports (Barbieri, 2008). Joint-stock companies have great publicity and exposure when compared with private limited companies. Thus, it is necessary to emphasize the systematized knowledge of the norms and principles that govern the quality of the environment (Carvalho, 2001; Silva, 2002).

FINAL CONSIDERATIONS

This article aimed to evaluate the factors that exhibited a significant relationship with the EMS maturity level of industrial companies in Brazil. A multiple linear regression analysis was used, and variables that positively and negatively associated with the EMS maturity level were identified. The results showed that possessing ISO 14001 certification, participating in the carbon market, disclosing information via reports, a project to reduce water consumption, a professional management model, insurance against environmental accidents, company age, being in the textile sector, and maintaining the legal constitution of a *company* are factors associated with the EMS maturity level of industrial companies.

The factors (variables) shown in the model support the findings of other researchers cited in the analysis and discussion of the results. Thus, the empirical results show that the EMS maturity level of industrial companies in Brazil is associated with the factors tested in the model.

The main limitation of this study is that only some factors associated with activities of industrial companies in Brazil have been analyzed, which prevents the generalization of the results to other sectors not included in the scope of this study.

We suggest researchers to expand this research to other sectors of activity, using quantitative, qualitative, and explanatory approaches to investigate the factors in this study that are more and less associated with the maturity level of the companies' EMS.

REFERENCES

Alencar, J. L. S. de., Simoni, J. H., Fiorelli, M. N., & Angelis, G. de., Neto. (2015). Sistema de gestão ambiental e ISO 14000 na indústria têxtil: A sustentabilidade como tendência. *Revista Eletrônica em Gestão, Educação e Tecnologia Digital*, *19*(2), 575-586. doi:105902/22361170/16962

Alperstedt, G. D., Quintella, R. H., & Souza, L. R. (2010). Estratégias de gestão ambiental e seus fatores determinantes: Uma análise institucional. *RAE-Revista de Administração de Empresas*, *50*(2), 199-214. doi:10.1590/S0034-75902010000200004

Andersen, E. S., & Jessen, S. A. (2003). Project maturity in organizations. *International Journal of Project Management*, *21*(6), 457-461. doi:10.1016/S0263-7863(02)00088-1

Balzarova, M. A., & Castka, P. (2008). Underlying mechanisms in the maintenance of ISO 14001 environmental management system. *Journal of Cleaner Production*, *16*(18), 1949-1957.

Barbieri, J. C. (2008). *Gestão ambiental empresarial: Conceitos, modelos e instrumentos* (2ª ed.). São Paulo, SP: Saraiva.

Boiral, O. (2006). Global warming: Should companies adopt a proactive strategy? *Long Range Planning*, *39*(3), 315-330. doi:10.1016/j.lrp.2006.07.002

Boiral, O., & Henri, J. F. (2012). Modelling the impact of ISO 14001 on environmental performance: A comparative approach. *Journal of Environmental Management*, *99*, 84-97. doi:10.1016/j.jenvman.2012.01.007

Calixto, L. (2007). Uma análise da evidenciação ambiental de companhias brasileiras: De 1997 a 2005. *Revista UnB Contábil*, *10*(1), 9-37.

Carvalho, C. G. (2001). *Introdução ao direito ambiental*. São Paulo, SP: Letras & Letras.

Castka, P., & Prajogo, D. (2013). The effect of pressure from secondary stakeholders on the internalization of ISO 14001. *Journal of Cleaner Production*, *47*, 245-252. doi:10.1016/j.jclepro.2012.12.034

Cooke-Davies, T. J., & Arzymanow, A. (2003). The maturity of project management in different industries: An investigation into variations between project management models. *International Journal of Project Management*, *21*(6), 471-478. doi:10.1016/S0263-7863(02)00084-4

 CC BY
ISSN 0034-7590

Corazza, R. I. (2016, Julho/Dezembro). Gestão ambiental e mudanças da estrutura organizacional. *RAE-Eletrônica*, *2*(2). Retrieved from https://rae.fgv.br/rae-eletronica/

Cormier, D., & Magnan, M. (2003). Environmental reporting management: A continental European perspective. *Journal of Accounting and Public Policy*, *22*(1), 43-62. doi.org/10.1016/S0278-4254(02)00085-6

Costa, B. A., Filho, & Rosa, F. de. (2017). Maturidade em gestão ambiental: Revisitando as melhores práticas. *REAd- Revista Eletrônica de Administração*, *23*(2), 110-134. doi:10.1590/1413.2311.030.59633

Fischer, Jan-Hendrik., Pfeiffer, D., Hellingrath, B., Scavarda, L. F., & Roberto, A. M. (2014). Robust parameter setting of supply chain flexibility measures using distributed evolutionary computing. *Procedia CIRP*, *19*, 75-80. doi:org/10.1016/j.procir.2014.05.023

Fonseca, L. M. C. M. (2015). ISO 14001:2015: An improved tool for sustainability. *Journal of Industrial Engineering and Management*, *8*(1), 35-50. doi:10.3926/jiem.1298

González-Benito, J., & González-Benito, O. (2006). *The role of stakeholder p*ressure and managerial values in the implementation of environmental logistics practices. *International Journal of Production Research*, *44*, 1353-1373. doi:10.1080/00207540500435199

Grant, K. P., & Pennypacker, J. S. (2006). Project management maturity: An assessment of project management capabilities among and between industries. *IEEE Transactions on Engineering Management*, *53*(1), 59-68. doi:10.1109/TEM.2005.861802

Gupta, S., & Innes, R. (2014). Private politics and environmental management. *Journal of Environmental Economics and Management*, *68*(2), 319-339. doi:10.1016/j.jeem.2014.05.002

Haddock-Freser, J. E., & Tourelle M. (2010). Corporate motivations for environmental sustainable development: Exploring the role of consumers in stakeholder engagement. *Business Strategy and the Environment*, *19*(8), 527-542. doi:10.1002/bse.663

Halila, F., & Tell, J. (2013). Creating synergies between SMEs and universities for ISO 14001 certification. *Journal of Cleaner Production*, *48*, 85-92. doi:10.1016/j.jclepro.2012.11.014

Hua, G., Cheng, T. C. E., & Wang, S. (2011). Managing carbon footprints in inventory management. *International Journal of Production Economics*, *132*(2), 178-185. doi:10.1016/j.ijpe.2011.03.024

Jabbour, A. B. L. S., & Jabbour, C. J. C. (2009). Are supplier selection criteria going green? Case studies of companies in Brazil. *Industrial Management & Data Systems*, *109*(4), 477-495. doi: org/10.1108/02635570910948623

Jabbour, C. J. C. (2015). Environmental training and environmental management maturity of Brazilian companies with ISO14001: Empirical evidence. *Journal of Cleaner Production*, *96*(1), 331-338. doi:10.1108/02635570910948623

Jabbour, C. J. C., Jabbour, A. B. L., Teixeira, A. A., & Freitas, W. R. S. (2012). Environmental development in Brazilian companies: The role of human resource management. *Environmental Development*, *3*, 137-147. doi:10.1016/j.envdev.2012.05.004

Jabbour, C. J. C., Santos, F. C. A., Fonseca, S. A., & Nagano, M. S. (2013). Green teams: Understanding their roles in the environmental management of companies located in Brazil. *Journal of Cleaner Production*, *46*, 58-66. doi:10.1016/j.jclepro.2012.09.018

Jabbour, C. J. C., Teixeira, A. A., Oliveira, J. H. C. de, & Soubihia, D. F. (2010) Managing environmental training in organizations: Theoretical review and proposal of a model. *Management of Environmental Quality: An International Journal*, *21*(6), 830-844. doi:10.1108/14777831011077673

Jones, P., Hillier, D., & Comfort, D. (2012). Fashioning corporate social responsibility. *Emerging Markets Case Studies*. doi:10.1108/20450621211295578

Mangala, J. (2001). Environmental management systems for the textile industry: A case study. *Indian Journal of Fibre & Textile Research*, *26*(1-2), 33-38.

Marimon, F., Casadesús, M., & Heras, I. (2010). Certification intensity level of the leading nations in ISO 9000 and ISO 14000 standards. *International Journal of Quality & Reliability Management*, *27*(9), 1002-1020. doi:10.1108/02656711011084800

Marimon, F., Llach, J., & Bernardo, M. C. (2011). Comparative analysis of diffusion of the ISO 14001 standard by sector of activity. *Journal of Cleaner Production*, *19*(15), 1734-1744. doi:10.1016/j.jclepro.2011.06.003

Melnyk, S. A., Sroufe, R. P., & Calantone, R. (2003). Assessing the impact of environmental management systems on corporate and environmental performance. *Journal of Operations Management*, *21*(3), 329-351. doi:10.1016/S0272-6963(02)00109-2

Miranda, M. B. (2010). A pessoa jurídica e o meio ambiente: Um panorama legal sobre a situação brasileira. *Revista Virtual Direito Brasil*, *4*(2). Retrieved from http://www.direitobrasil.adv.br/

Okongwu, U., Morimoto, R., & Lauras, M. (2013). The maturity of supply chain sustainability disclosure from a continuous improvement perspective. International *Journal of Productivity and Performance Management*, *62*(8), 827-855. doi:10.1108/IJPPM-02-2013-0032

Oliveira, O. J. de, & Serra, J. R. (2010). Benefícios e dificuldades da gestão ambiental com base na ISO 14001 em empresas industriais de São Paulo. *Revista Produção*, *20*(3), 429-438. doi:10.1590/S0103-65132010005000013

Oliveira, O. J. de, Serra, J. R., & Salgado, M. H. (2010). Does ISO 14001 work in Brazil? *Journal of Cleaner Production*, *18*(18), 1797-1806. doi:10.1016/j.jclepro.2010.08.004

Oliveira-Brasil, M. V. de, Abreu, M. C. S. de, Silva, J. C. L. da, Filho, & Leocádio, A. L. (2016). As relações entre eco-inovações e o impacto na performance empresarial: Uma pesquisa empírica na indústria têxtil brasileira. *Revista de Administração*, *51*, 276-287. doi:10.1016/j.rausp.2016.06.003

Ormazabal, M., & Sarriegi, J. M. (2014). Environmental management evolution: Empirical evidence from Spanin and Italy. *Business Strategy and the Environment*, *23*(2), 73-88. doi:10.1002/bse.1761

Peixe, B. C. S. (2014). *Mensuração da maturidade do sistema de gestão ambiental de empresas industriais utilizando a teoria da resposta ao item* (Doctoral Thesis, Universidade Federal de Santa Catarina, Florianópolis, SC). Retrieved from https://repositorio.ufsc.br/handle/123456789/128931

Pennypacker, J. S., & Grant, K. P. (2003). Project management maturity: An industry benchmark. *Project Management Journal*, *34*(1), 4-11. doi:10.1177/875697280303400102

Perez, R. A., Ribeiro, M. de S., Cunha, J. V. A. da, & Rezende, A. J. (2008). Reflexos contábeis e socioambientais dos créditos de carbono brasileiros. *Revista de Educação e Pesquisa em Contabilidade*, *2*(3), 56-83. doi:10.17524/repec.v2i3.34

Ramos, T. B., & Melo, J. J. de. (2006). Developing and implementing an environmental performance index for the Portuguese military. *Business Strategy and the Environment*, *15*(2), 71-86. doi:10.1002/bse.440

 CC BY
ISSN 0034-7590

Rodríguez, G., Alegre, F. J., & Martínez, G. (2011). Evaluation of environmental management resources (ISO 14001) at civil engineering construction worksites: A case study of the community of Madrid. *Journal of Environmental Management*, *92*(7), 1858-1866. doi:10.1016/j.jenvman.2011.03.008

Silva, J. A. Da. (2002). *Direito ambiental constitucional*. São Paulo, SP: Malheiros.

Singh, N., Jain, S., & Sharma, P. (2015). Motivations for implementing environmental management practices in Indian industries. *Ecological Economics*, *109*, 1-8. doi:10.1016/j.ecolecon.2014.11.003

Spenassato, D., Peixe, B. C. S., Trierweiller, A. C., Bornia, A. C., & Tezza, R. (2015). Vantagens do uso de testes adaptativos computadorizados para avaliação da maturidade do sistema de gestão ambiental de indústrias. *Interciência*, *40*(9), 596-603.

Stevens, P. A., Batty, W. J., Longhurst, P. J., & Drew, G. H. (2012). A critical review of classification of organisations in relation to the voluntary implementation of environmental management systems. *Journal of Environmental Management*, 113, 206-212. doi:10.1016/j.jenvman.2012.08.037

Sundarakani, B., Souza, M., R., Goh, M., Wagner, S. M., & Manikandan, S. (2010). Modeling carbon footprints across the supply chain. *International Journal of Production Economics*, *128*(1), 43-50. doi:10.1016/j.ijpe.2010.01.018

Thissen, D., Chen, W. H., & Bock, R. D. (2003). Multilog (version 7) [Computer software]. Lincolnwood, USA: Scientific Software International.

To, W. M., & Lee, P. K. C. (2014). Diffusion of ISO 14001 environmental management system: Global, regional and country-level analyses. *Journal of Cleaner Production*, *66*, 489-498. doi:10.1016/j.jclepro.2013.11.076

Trierweiller, A. C., Peixe, B. C. S., Tezza, R., Bornia, A. C., & Campos, L. M. S. (2013). Measuring environmental management disclosure in industries in Brazil with item response theory. *Journal of Cleaner Production*, 47, 298-305. doi:10.1016/j.jclepro.2012.10.025

Trierweiller, A. C., Tezza, R., Peixe, B. C. S., Pereira, V. L. D. do V., Pacheco, W., Jr., Bornia, A. C., & Andrade, D. F. de. (2012). Measuring organizational effectiveness in information and communication technology companies using item response theory. *Work (Reading, MA)*, *41*(Suppl. 1), 2795-2802. doi:10.3233/WOR-2012-0526-2795

Xu, X. D., Zeng, S. X., & Tam, C. M. (2012). Stock market's reaction to disclosure of environmental violations: Evidence from China. *Journal of Business Ethics*, *107*(2), 227-237. doi:10.1007/s10551-011-1035-2

Zobel, T. (2013). ISO 14001 certification in manufacturing firms: A tool for those in need or an indication of greenness? *Journal of Cleaner Production*, *43*, 37-44. doi:10.1016/j.jclepro.2012.12.014

CC BY

ISSN 0034-7590

ARTICLES

Submitted 11.17.2017. Approved 02.28.2018
Evaluated by the *double-blind review* system. Scientific Editor: Cláudio Lucinda
Translated version
DOI: http://dx.doi.org/10.1590/S0034-759020190105

REDEMPTION CONSTRAINTS OF BRAZILIAN EQUITY FUNDS, LIQUIDITY OF ASSETS, AND PERFORMANCE

Restrições de resgate em fundos de ações, liquidez dos ativos e desempenho

Restricciones de rescate en fondos de acciones, liquidez de los activos y desempeño

ABSTRACT

This paper analyzed the relation between redemption constraints and liquidity of assets under management of Brazilian equity funds, as well as its effect on performance. The sample included 2,706 Brazilian equity funds with investments in stocks listed on BM&FBovespa, or in shares of other equity funds, between 2009 and 2016. The analysis was carried out through descriptive statistics and linear regressions with panel data. The results indicated that redemption constraints positively impact equity funds performance. In addition, the results suggested that liquidity constraints allow the funds to exploit less liquid investments in stocks and shares of other funds. When verifying whether investments in low liquidity assets by equity funds imply superior performance from liquidity premia, the results did not indicate a positive effect.

KEYWORDS | Redemption constraints, portfolio liquidity, performance, equity funds, investment funds.

RESUMO

Este trabalho analisou a relação entre restrições de resgate e liquidez dos ativos sob gestão de fundos de ações brasileiros, bem como seu efeito no desempenho. A amostra contou com 2.706 fundos de ações brasileiros com investimentos em ações listadas na BM&FBovespa ou em cotas de outros fundos de ações no período entre 2009 e 2016. Os dados foram analisados a partir de estatísticas descritivas e aplicação de modelos de regressão linear com dados em painel. Os resultados indicaram que as restrições de resgate impactam positivamente o desempenho dos fundos de ações. Além disso, os resultados sugeriram que as restrições de resgate possibilitam aos fundos explorar investimentos menos líquidos em ações e em cotas de outros fundos. Por outro lado, o investimento em ativos de baixa liquidez por parte dos fundos de ações não necessariamente está relacionado à melhores indicadores de performance.

PALAVRAS-CHAVE | Restrições de resgate, liquidez de carteiras, desempenho, fundos de ações, fundos de investimento.

RESUMEN

Este trabajo analizó la relación entre restricciones de rescate y liquidez de los activos bajo gestión de fondos de acciones brasileños, así como su efecto en el desempeño. La muestra contó con 2.706 fondos de acciones brasileños con inversiones en acciones listadas en la BM&FBovespa o en cuotas de otros fondos de acciones en el período entre 2009 a 2016. Los datos fueron analizados a partir de estadísticas descriptivas y regresión lineal con datos de panel. Los resultados indicaron que las restricciones de rescate impactan positivamente en el desempeño de los fondos de acciones. Además, los resultados sugirieron que las restricciones de liquidez permiten a los fondos explotar inversiones menos líquidas en acciones y en cuotas de otros fondos. Al verificar si la inversión en activos de baja liquidez por parte de los fondos de acciones implica un desempeño superior proveniente del premio de liquidez, los resultados no necesariamente mostraron un efecto positivo.

***PALABRAS CLAVE** | Restricciones de rescate, liquidez de portfolio, desempeño, fondos de acciones, fondos de inversión.*

DERMEVAL MARTINS BORGES JUNIOR[1]
dermevaljr14@hotmail.com
ORCID: 0000-0003-2279-449X

RODRIGO FERNANDES MALAQUIAS[1]
rodrigofmalaquias@gmail.com
ORCID: 0000-0002-7126-1051

[1]Universidade Federal de Uberlândia, Programa de Pós-Graduação em Administração, Uberlândia, MG, Brazil

CC BY

ISSN 0034-7590

INTRODUCTION

Investment funds are subject to the demand for liquidity by investors, which may adversely affect their performance. Since this demand by investors may cause the fund manager to liquidate or acquire assets at inappropriate times, the income that the fund could raise may be reduced (Nanda, Narayanan, & Warther, 2000). To prevent this, certain investment funds limit the redemption of shareholders through mechanisms called redemption constraints or liquidity constraints. Liquidity constraints typically involve requirements for minimum invested amounts, lockup period, provisions for the frequency of redemptions, and redemption notice periods (Hong, 2014). Moreover, funds may use their rate structure to discourage redemptions, for example, by setting high exit rates (Nanda et al., 2000).

According to Agarwal, Daniel, and Naik (2009), liquidity constraints act as management incentives that can even positively impact the performance of funds; by limiting unexpected redemptions, they provide greater discretion in terms of management. Aragon (2007) states that the best performances in funds with liquidity constraints occur due to the efficient management of investments in low liquidity assets. This understanding is in line with Ang and Bollen (2010), who state that liquidity constraints enable gains from liquidity premiums, by allowing fund managers to invest in illiquid assets.

Thus, investment funds can establish mechanisms that restrict the exit of investors to reduce liquidity risks and collaborate in the managers' investment strategies. By reducing exits, liquidity constraints make it possible to exploit opportunities that take time to become profitable and prevent the liquidation of assets at inappropriate times and prices to meet unexpected redemption requests. Furthermore, given the argument that less liquid assets have higher returns, redemption constraints may encourage fund managers to invest in illiquid assets in the pursuit of better performance. Therefore, this study analyzes the relationship between redemption constraints and the liquidity of assets under management of Brazilian equity funds, as well as the effect of this relationship on their performance.

This study contributes to the literature by providing evidence of the effect that liquidity constraints imposed by funds have on investment options and their performance. Although international studies have already suggested that these constraints provide better performance for investment funds (e.g., Agarwal et al., 2009; Aragon, 2007; Bali, Gokcan, & Liang, 2007; Liang, 1999; Schaub & Schmid, 2013), the explanations for the origin of a superior performance, such as the liquidity premium from the investment in illiquid assets that operate despite the redemption constraints, are still little explored.

Studies on this subject that address the Brazilian market are almost non-existent. Normally, national studies on the performance of investment funds do not consider liquidity constraints and their relationship with the performance, or liquidity of assets under management. Moreover, there are some gaps in the few Brazilian studies that address liquidity constraints, and they need to be explored further. For example, Pontes, Rogers, and Malaquias (2015) studied the relationship between lockup constraints and the performance of Brazilian Long and Short multimarket funds, but their results showed that the funds in the sample do not necessarily deliver the lockup premium. Gonzaga (2016) found that funds with a redemption period longer than seven days had higher average annual returns, but only descriptive statistics were used in this study.

LITERATURE REVIEW

In order to efficiently manage liquidity risks, certain categories of investment funds use mechanisms that restrict the exit of investors, to prevent the fund manager from disposing assets at inappropriate times and at low prices to meet any sudden redemption requests from shareholders. These mechanisms are called liquidity constraints and refer to the minimum amount required to invest or the minimum balance to be maintained, minimum time to remain in the fund, deadlines for prior notification and redemption, and exit rates, among others (Hong, 2014).

According to Agarwal et al. (2009), redemption constraints are usually associated with a better performance of funds, since they provide greater freedom in management. Since such constraints discourage redemptions or oblige investors to remain in the fund for a certain period, managers gain greater discretion in investment strategies. For example, if a fund has a long lockup period, the manager may explore investment opportunities that take time to become profitable or may avoid selling assets at unfavorable prices.

Liang (1999) was one of the first studies to address the effect of liquidity constraints on the performance of investment funds; after analyzing descriptive statistics and stepwise regressions, it showed that the lockup period is decisive in determining hedge fund returns. The longer this period, the better is its performance. This is because lockup constraint prevents early redemptions, reduces the need to maintain cash availability, and enables the manager to focus on the long term.

CC BY

ISSN 0034-7590

Aragon (2007) conducted a study with a sample composed of hedge funds between January 1994 to December 2001, and after analyzing the data through descriptive statistics, probit models, and pooled regressions, observed that the funds with lockup periods had returns between 4% and 7% (depending on the criteria used in the tests), which was higher when compared to those funds that did not have this constraint. Furthermore, the results indicated that each US$ 1 million increase in the minimum investment value caused an increase in return between 0.60% and 0.81%, suggesting the existence of a liquidity premium from efficient portfolio management and investment in illiquid assets, despite the redemption constraints.

Hong (2014) analyzed the liquidity constraints of hedge funds through descriptive statistics and logit regression models, based on monthly data from January 2007 to May 2012, by focusing on aspects such as liquidity risk, liquidity of portfolio assets, and performance of the funds. He found that the funds change the structure of their liquidity constraints according to their needs, that is, hedge funds with high portfolio liquidity and low liquidity risks tend to soften the redemption constraints, suggesting a negative relationship between liquidity constraints and the liquidity of assets under management. He also found that although funds with weak liquidity constraints perform poorly (as they do not benefit from higher returns from illiquid assets), their capital flows are significantly higher (as they provide liquidity to investors).

According to Boyle, Li, and Zhu (2010), liquidity constraints have serious implications for both investors and fund managers regarding investment decisions. From the managers' perspective, liquidity constraints are desired, because they enable investments in illiquid assets without the concern of unexpected redemptions by shareholders. However, they can harm investors by forcing them to remain in a fund with weak performance for a longer period. In this context, the results from the study of Boyle et al. (2010), addressing hedge funds from 1978 to 2009, with data analyzed through descriptive statistics, regressions with fixed effects, and pooled OLS regressions, indicate that in the periods of economic stability, the funds with redemption constraints had significantly higher returns, lower volatility, and higher Sharpe ratio, while in the periods of economic crisis the effect was the opposite.

Moreover, the study of Bali et al. (2007), through descriptive statistics analysis and cross-section regressions, found a positive relationship between the lockup constraint and the returns of hedge funds. According to the results of this study, the funds that had a lockup period obtained significantly higher returns compared to the funds that did not have this constraint; this difference was statistically significant at 1% for different cuts in the sample, including active funds that ceased to exist at some point during the period under analysis. They attributed this to a liquidity premium, that is, since redemption is limited, the lockup constraint enables investments in low liquidity assets, which are generally more profitable.

Similarly, Schaub and Schmid (2013) addressed the impact of portfolio liquidity and the liquidity provided to investors, measured through liquidity constraints, on the performance of hedge funds, considering crisis and non-crisis periods from 1994 to 2008, with analysis through descriptive statistics, cross-section regressions, and pooled OLS regressions. They observed better performance of less liquid funds in periods of non-crisis, considering the premium generated to investors as compensation for limited liquidity. Despite this, in the periods of economic crisis (2007 and 2008), the most liquid funds performed better, that is, the liquidity constraints were not enough for the efficient management of illiquid assets during the crisis periods.

In the Brazilian context, despite the lack of studies addressing the impact of liquidity constraints on the performance of investment funds, Pontes et al. (2015) have investigated the determinants of the profitability of Brazilian multimarket funds (which are similar to the hedge funds existing in the international market), while focusing on the lockup provision. They analyzed a sample of 54 multimarket long and short funds from May 2009 to May 2014 and found no statistically significant evidence of the positive relationship between lockup constraint and performance of multimarket funds.

Conversely, when analyzing 545 Brazilian multimarket funds from 2010 to 2015, Gonzaga (2016) found that the funds with a redemption period longer than seven days, (classified in the study as less liquid) showed a higher average annual return (12.72% for funds with a performance rate and 14.65% without a performance rate) compared to funds with a redemption period shorter or equal to seven days, considered as more liquid (11.26% for funds with a performance rate and 11.05% for funds without a performance rate). Despite this, multimarket funds with lower liquidity were more volatile than those with higher liquidity.

Given the studies presented above, we raise the following hypotheses:

> H1: There is a positive relationship between redemption constraints and the performance of Brazilian equity investment funds.
>
> H2: There is a positive relationship between redemption constraints and illiquidity of assets under management of Brazilian equity investment funds.

CC BY

ISSN 0034-7590

H3: There is a positive relationship between the illiquidity of assets under management of Brazilian equity funds and their performance.

METHODOLOGY

Sample definition

In this study, we considered all the Brazilian equity funds with investments in stocks listed on BM&FBovespa, or in shares of other equity funds and that presented information about the composition of the portfolios (investments in stocks listed on BM&FBovespa and other funds) from 2009 and 2016, with data available on December 31 of each year. Therefore, the sample included 2,706 funds, totaling 12,447 observations over the entire period under review.

The time horizon of the sample, from 2009 to 2016, was mainly chosen due to data availability. The year 2009 was chosen because it represents the year when detailed information on the composition of the funds' portfolios were disclosed in the Economatica database. The year 2016 was chosen because it was the last year with complete information on the portfolios of the funds until the development of this study. It should be mentioned that, since data was collected on January 31, 2017, some values may have been omitted, since some funds have not yet disclosed the composition of their portfolios.

Regarding the criteria for classifying the assets that make up the portfolios with liquid and illiquid funds, we considered the liquidity indicators provided in the Economatica database. In its formula, the liquidity indicator (Stock Market Liquidity) takes into account the number of days in which the stock was traded at least once, how many times the stock was traded in the chosen period, how many times all the stocks were traded, the cash volume in the stock in the chosen period, and the cash volume in all the stocks in the chosen period. Initially, the stocks were classified on a monthly basis, and 12 indicators were generated per stock for 2016. Subsequently, they were classified on an annual basis. With a correlation matrix between each monthly liquidity index and the annual liquidity, the coefficients indicated that using an annual liquidity classification instead of a monthly one would not bring bias in the results, since the coefficients were all strong and significant at 1%. In order to classify the stocks according to their market stock liquidity, the market stock liquidity index was used for each year of the sample period. Based on these indicators, two dummy variables were established: i) one to identify actively traded stocks, whose cut-off criterion was the fourth quintile of the liquidity indicators of the stocks being available for acquisition by the funds at the end of each year; ii) and the other to identify thinly traded stocks, whose cut-off criterion was the first quintile of the liquidity indicators of the stocks available for acquisition by the funds at the end of each year.

Similarly, for the classification of funds into liquid and illiquid, two dummy variables were established: i) one to identify high liquidity funds, whose cut-off criterion was the lockup period being equal to 0 days and minimum balance being equal to R$ 0.00 and no exit rate; ii) and other to identify low liquidity funds, whose cutoff criterion was the lockup period being greater than or equal to 30 days or minimum balance being greater than or equal to R$ 10 thousand or the existence of an exit rate.

Furthermore, some procedures were carried out in order to treat outliers. First, all the funds whose sum of the percentage of the portfolio in equity investments and other funds resulted in zero were eliminated from the sample. The percentages of the portfolios allocated to stocks and funds were higher than 200% in some cases, so the 100 highest values were replaced by the value in the position 101 (in descending order). For example, the value of 112.621% represents the value in the 101st position in descending order for the variable stocks; thus, the 100 highest values (among 12,477 observations) of the variable stocks were replaced by 112.621%, this being the new maximum value for this variable, thus eliminating potential biases resulting from extremely high values in this variable. This same procedure was applied to the 100 highest values in percentage of actively traded stocks, thinly traded stocks, high liquidity funds (in the portfolios), and low liquidity funds (in the portfolios). Thus, the difs, diff and difa variables (Exhibition 1) were automatically adjusted to avoid bias from extremely high values. It should be noted that this procedure affected less than 1% of the data related to the composition of the portfolios. This same procedure was carried out with the 100 highest and 100 lowest values of the performance variables (Sharpe, Sortino, Alpha), affecting about 2% of the data related to performance.

Description of the variables

Given the objective of this study to analyze the relationship between redemption constraints and the liquidity of assets under management of Brazilian equity investment funds, and the effect of the interaction between liquidity of portfolios and redemption constraints on performance, we have chosen measures to represent redemption constraints, liquidity of portfolios, performance, and characteristics of funds. The study variables are presented in Exhibition 1..

CC BY

ISSN 0034-7590

Exhibiton 1. Study variables

Variable	Sign	Description
sharpe	..	Sharpe ratio by year (frequency of returns: monthly).
sharpepos	..	Sharpe ratio by year (frequency of returns: monthly), only returns from funds with a positive risk premium.
sortino	..	Sortino ratio by year (frequency of returns: monthly).
alpha	..	Jensen's alpha by year (frequency of returns: monthly).
nllockup	+	natural logarithm of (lockup in days + 1).
nlminbal	+	natural logarithm of minimum balance.
exitrate	+	dummy variable with value 1 for funds that charge an exit rate and 0 in others.
liqconst	+	dummy variable with value 1 for funds with lockup greater than or equal to 30 days or minimum balance greater than or equal to R$ 10 thousand or dummy variable that charge exit rate and have value 0 in the other funds.
iliqcart	+	dummy variable with value 1 for funds in which most of the portfolio is invested in low liquidity assets and have value 0 in others.
*const*iliqcart*	+	product of the multiplication of the variables liqconst and iliqcart (liqconst x iliqcart).
nlnw	+	natural logarithm of total net assets.
age	-	number of years since the registration of the fund in the CVM.
ifp2	+/-	*dummy with value 1 if the fund has a quantity equal or superior to 40% of its portfolio invested for other funds, and value 0 for other cases.*
manrate	-	the maximum management rate charged by the fund on an annual basis.
perrate	+	dummy variable that receives value 1 if the fund charges performance rate and value 0 for other cases.
difs	..	difference between the percentage of the portfolio allocated in thinly traded stocks and actively traded stocks.
diff	..	difference between the percentage of the portfolio allocated in low liquidity and high liquidity funds.
difa	..	difference between the percentage of the portfolio allocated in low liquidity and high liquidity assets.

CC BY

ISSN 0034-7590

Analysis procedures

Linear regression models with panel data were used for analyzing the variables. Initially, we aimed to determine the effect of liquidity constraints on the performance of Brazilian equity investment funds, also considering the possible influences of the fund's characteristics. The generic econometric model for these tests is given by:

$$Performance_{i,t} = \beta_0 + \beta_1 Liquidity\ Constraint_{i,t} + \gamma Control_{i,t} + \varepsilon_{i,t} \quad (1)$$

where $Performance_{i,t}$ is the performance of fund i in year t measured for each of the performance variables considered; $Liquidity\ Constraint_{i,t}$ represents each of the redemption constraint variables considered for fund I in year t; $Control_{i,t}$ represents the control variables for the characteristics of fund I in year t; β_0 is the intercept of the model and the β_1 and γ are the coefficients for the variables of interest and control variables, respectively; the error term is given by $\varepsilon_{i,t}$.

In a second step, we sought to determine the relationship between the liquidity constraints and the liquidity of the assets under management of Brazilian equity investment funds. Thus, the following econometric model was established:

$$Portfolio\ liquidity_{i,t} = \beta_0 + \beta_1 Liquidity\ Constraint_{,t} + \gamma Control_{i,t} + \varepsilon_{i,t} \quad (2)$$

where $Liquidity\ Constraint_{,t}$ is the difference between the percentage of low and high liquidity assets in the portfolio of fund I in year t measured for each of the three liquidity variables of the portfolios analyzed; $Liquidity\ Constraint_{,t}$ represents the redemption constraint variable considered for fund I in year t; $Control_{i,t}$ represents the control variables for the characteristics of fund I in year t; β_0 is the intercept of the model and β_1 is the coefficient for the variable of interest; the error term is given by $\varepsilon_{i,t}$.

Finally, the following econometric model was used for estimating the possible effects of the liquidity of the funds' portfolios on their performance:

$$Performance_{i,t} = \beta_0 + \beta_1 Portfolio\ liquidity_{i,t} + \gamma Control_{i,t} + \varepsilon_{i,t} \quad (3)$$

where$Performance_{i,t}$ is the performance of fund i in year t measured for each of the performance variables considered; $Portfolio\ liquidity_{i,t}$ represents the dummies for identifying the low liquidity portfolio of fund i in year t; $Control_{i,t}$ represents the control variables for the characteristics of fund i in year t; β_0 is the intercept of the model and the β_1 and γ are the coefficients for the variables of interest and control variables, respectively; the error term is given by $\varepsilon_{i,t}$.

We used the pooled model with robust standard errors clustered by funds for defining the panel data model. Pooled models were used in the studies of Aragon (2007), Boyle et al. (2010), and Schaub and Schmid (2013) for analyzing the relationship between liquidity constraints and performance of investment funds. Variance Inflation Factor (VIF) was used to detect possible multicollinearity problems in the models.

RESULTS

Redemption and performance constraints

Table 1 shows the descriptive statistics of the study variables regarding measures of performance, redemption constraints, and fund characteristics. Moreover, we developed the linear regression models shown in Table 2, namely: Model 1 estimates the effect of the lockup period on performance; Model 2 estimates the effect of minimum balance on performance; Model 3 estimates the effect of exit rate on performance; and Model 4 estimate the combined effect of these three redemption constraints on the performance of the funds. In addition to addressing these relationships, the models consider the characteristics of the funds that determine performance according to previous studies as control variables.

CC BY

ISSN 0034-7590

Table 1. Descriptive Statistics

Variables	Observations	Average	Standard Deviation	Min	Max
alpha	10,616	1.472	15.477	-41.940	59.673
sharpe	10,616	-0.085	1.524	-2.593	4.700
sharpepos	4,030	1.459	1.292	0.000	4.700
sortino	10,616	1.246	5.883	-2.228	38.076
nllockup	12,422	1.992	0.923	0.000	7.510
nlminbal	10,874	6.223	4.660	0.000	16.118
exitrate	7,154	0.208	0.406	0.000	1.000
liqconst	12,447	0.411	0.492	0.000	1.000
nlnw	11,857	17.021	1.716	5.534	24.405
age	12,447	5.939	6.068	0.003	50.219
ifp2	12,447	0.386	0.487	0.000	1.000
perrate	12,389	0.390	0.488	0.000	1.000
manrate	12,189	1.538	1.258	0.000	8.500

Notes: nllockup: natural logarithm of (lockup in days + 1); nlminbal: natural logarithm of minimum balance; exitrate: dummy variable with value 1 for funds that charge exit rate and value 0 for others; liqconst: dummy variable with value 1 for funds with lockup greater than or equal to 30 days or minimum balance greater or equal to R$10,000 or that have an exit rate, and value 0 for the other funds; nlnw: natural logarithm of total net assets; age: number of years since the registration of the fund at CVM; ifp2: dummy variables with value 1 if the fund has 40% or more of its portfolio invested in other funds and value 0 for other cases; manrate: maximum management rate charged by the fund annually; perrate: dummy variable that receives value 1 if the fund charges performance rate and value 0 in other cases.

Table 2. Liquidity Constraints and Sharpe Ratio

Variáveis	Model 01		Model 02		Model 03		Model 04	
sharpe	**b**	**rse**	**b**	**rse**	**b**	**rse**	**b**	**rse**
nllockup	0.023*	0.012	-	-	-	-	-	-
nlminbal	-	-	0.010***	0.002	-	-	-	-
exitrate	-	-	-	-	0.161***	0.031	-	-
liqconst	-	-	-	-	-	-	0.107***	0.020
nlnw	0.083***	0.007	0.088***	0.006	0.107***	0.011	0.081***	0.006
age	-0.017***	0.002	-0.016***	0.002	-0.024***	0.004	-0.016***	0.002
ifp2	0.150***	0.019	0.139***	0.020	0.141***	0.026	0.136***	0.019
manrate	-0.042***	0.007	-0.050***	0.007	-0.047***	0.010	-0.041***	0.007
perrate	0.060***	0.020	0.064***	0.020	-0.010	0.026	0.034*	0.019
Constant	2.028***	0.113	1.981***	0.113	1.956***	0.183	2.077***	0.111
Observations	10,039		8,894		5,506		10,064	
Maximum VIF	1.29		1.25		1.27		1.33	

Notes: ***significant at 1%; **significant at 5%; *significant at 10%; rse = robust standard error.

The results of the models shown in Table 2 indicate a positive and statistically significant relationship between all the variables used to represent the liquidity/redemption constraints in this study (lockup, minimum balance, exit rate, and the combination of the three constraints), and the performance of the stock funds (measured by the Sharpe ratio), which suggests that the funds that have redemption constraints perform better. Similarly, all the variables related to the characteristics of the funds, except for performance rate in Model 3, showed a statistically significant relationship with the Sharpe ratio.

In order to correct eventual inconsistencies in the measurement of the funds' performance by the Sharpe ratio when the risk-free rate is higher than the expected return, that is, when the risk premium is negative, models similar to those presented previously were estimated, after considering only the funds with a positive risk premium. The results for these models are shown in Table 3 and corroborate the findings presented in Table 2.

Table 3. **Liquidity Constraints and Sharpe Ratio (positive risk premium)**

Variables	Model 01		Model 02		Model 03		Model 04	
sharpepos	b	rse	b	rse	b	rse	b	rse
nllockup	0.074***	0.016	-	-	-	-	-	-
nlminbal	-	-	0.011***	0.003	-	-	-	-
exitrate	-	-	-	-	0.091**	0.040	-	-
liqconst	-	-	-	-	-	-	0.162***	0.027
nlnw	0.045***	0.009	0.046***	0.009	0.056***	0.015	0.042***	0.009
age	-0.018***	0.002	-0.017***	0.002	-0.027***	0.004	-0.016***	0.002
ifp2	0.106***	0.025	0.095***	0.026	0.049	0.034	0.096***	0.025
manrate	-0.047***	0.010	-0.057***	0.010	-0.050***	0.014	-0.045***	0.010
perrate	0.153***	0.027	0.164***	0.028	0.080**	0.034	0.131***	0.027
Constant	2.633***	0.164	2.720***	0.168	2.921***	0.252	2.775***	0.160
Observations	3,812		3,395		2,161		3,819	
Maximum VIF	1.25		1.27		1.24		1.37	

Notes: ***significant at 1%; **significant at 5%; *significant at 10%; rse = robust standard error.

Despite being a performance measure that is widely used in the evaluation of financial investments regarding the relationship between risk and return, the Sharpe ratio has certain limitations. In order to overcome these limitations and obtain greater evidence on the effect of liquidity/redemption constraints on the performance of stock funds, models were estimated using the Sortino ratio for measuring performance, as shown in Table 4. The results presented in the table indicate a positive and statistically significant relationship between the liquidity constraints and the Sortino ratio in all the estimated models, thereby corroborating the previous findings, which suggest that the funds using mechanisms that limit the redemptions of shareholders perform better. Regarding the characteristics of the funds, the results indicated that size, investment in shares of other funds, and performance rate are positively associated, while age and management rate are negatively associated with the Sortino ratio.

Table 4. **Liquidity Constraints and Sortino Ratio**

Variables	Model 01		Model 02		Model 03		Model 04	
sortino	b	rse	b	rse	b	rse	b	rse
nllockup	0.136***	0.046	-	-	-	-	-	-
nlminbal	-	-	0.032***	0.010	-	-	-	-
exitrate	-	-	-	-	0.322**	0.128	-	-
liqconst	-	-	-	-	-	-	0.389***	0.087
nlnw	0.133***	0.026	0.130***	0.029	0.170***	0.042	0.127***	0.026
age	-0.046***	0.006	-0.043***	0.006	-0.055***	0.011	-0.042***	0.006
ifp2	0.426***	0.079	0.418***	0.084	0.317***	0.096	0.391***	0.079
manrate	-0.105***	0.034	-0.136***	0.036	-0.175***	0.045	-0.102***	0.034
perrate	0.561***	0.086	0.574***	0.092	0.389***	0.101	0.495***	0.085
Constant	14.197***	0.578	14.627***	0.632	17.125***	0.961	14.422***	0.571
Observe.	10,039		8,894		5,506		10,064	
Max. VIF	1.29		1.25		1.27		1.33	

Notes: ***significant at 1%; **significant at 5%; *significant at 10%; rse = robust standard error.

Models considering Jensen's Alpha as a dependent variable were used for extending the evidence, and the results are summarized in Table 5. Jensen's Alpha tests confirmed the previously estimated findings of the models, regarding the positive relationship between liquidity constraints and performance.

CC BY

ISSN 0034-7590

Table 5. **Liquidity Constraints and Jensen's Alpha**

Variables	Model 01		Model 02		Model 03		Model 04	
alfa	b	rse	b	rse	b	rse	b	rse
nllockup	0.309*	0.179	-	-	-	-	-	-
nlminbal	-	-	0.082**	0.037	-	-	-	-
exitrate	-	-	-	-	2.108***	0.464	-	-
liqconst	-	-	-	-	-	-	1.035***	0.333
nlnw	1.105***	0.100	1.195***	0.099	1.509***	0.148	1.097***	0.100
age	-0.215***	0.024	-0.208***	0.025	-0.403***	0.061	-0.207***	0.026
ifp2	1.358***	0.284	1.236***	0.296	1.335***	0.391	1.243***	0.284
manrate	-0.653***	0.121	-0.747***	0.127	-0.530***	0.167	-0.628***	0.121
perrate	0.407	0.294	0.542*	0.318	-0.599	0.402	0.190	0.304
Constant	-5.939***	1.821	-6.859***	1.832	-3.669	2.826	-5.443***	1.817
Observations	10,039		8,894		5,506		10,064	
Maximum VIF	1.29		1.25		1.27		1.33	

Notes: ***significant at 1%; **significant at 5%; *significant at 10%; rse = robust standard error.

Redemption constraints, liquidity of assets under management, and performance

This subsection addresses the results obtained from the relationship between redemption constraints and the liquidity of assets under management of equity funds, as well as the effect of the interaction between portfolio liquidity and redemption constraints on performance. Initially, Table 6 shows the descriptive statistics of the analyzed data. Based on the descriptive statistics of the portfolio composition, it can be observed that the funds have 51.50% of their portfolios allocated in stocks and 39.55% allocated in other funds. Moreover, Brazilian equity funds have a higher percentage of assets, whether in stocks or shares of other funds considered as highly liquid. Although 41.08% of the funds in the sample have redemption constraint, only 14.12% of the funds have most of the portfolio allocated to low liquidity assets. The average value for the interaction between illiquidity of the portfolios and redemption constraints indicated that 7.6% of the funds have some redemption constraint and most of the portfolio is allocated to low liquidity assets. Nevertheless, this low percentage does not necessarily indicate that a small sample may compromise the proposed analyses, since other funds have a significant percentage of their portfolios allocated to low liquidity assets, but do not impose redemption constraints on their shareholders.

Table 6. **Descriptive Statistics of Funds' Portfolios**

Variables	Observations	Average	Standard Deviation	Min	Max
stocks	12,447	51.498	42.774	0	112.621
funds	12,447	39.546	46.742	0	102.748
difs	12,447	-36.283	38.215	-103.786	57.062
diff	12,447	-12.358	52.286	-102.071	100.094
difa	12,447	-48.683	58.399	-404.701	100.094
liqconst	12,447	0.411	0.492	0	1
iliqcart	12,447	0.141	0.348	0	1
restr*iliqcart	12,447	0.076	0.266	0	1

Notes: stocks: percentage of portfolios allocated in stocks; funds: percentage of portfolios allocated in other investment funds; difs: difference between the percentage of the volume of the portfolio allocated in low liquidity stocks and the percentage of the volume of the portfolio allocated in high liquidity stocks; diff: difference between the percentage of portfolio volume allocated to low liquidity funds and the percentage of portfolio volume allocated to high liquidity funds; difa: difference between the percentage of portfolio volume allocated to low liquidity assets and the percentage of portfolio volume allocated to high liquidity assets; liqconst: dummy variable with value 1 for funds with lockup greater than or equal to 30 days or minimum balance greater or equal to R$10,000 or that charge exit rate, and value 0 for the other funds; iliqcart: dummy variable with value 1 for funds that invest most of the portfolio in low liquidity assets and value 0 for the others; restr*iliqcart: product of the multiplication of the variables liqconst and iliqcart (liqconst x iliqcart).

CC BY

ISSN 0034-7590

In order to identify possible effects of redemption constraints on the liquidity of assets under management of equity investment funds, linear regression models were estimated. They are presented in Table 7, namely: Model 1 determines the effect of redemption constraints on the illiquidity of stocks in the funds' portfolios; Model 2 determines the effect of redemption constraints on the illiquidity of investments in shares of other funds; Model 3 determines the effect of redemption constraints on the illiquidity of assets in general, whether stocks or funds, of portfolios.

Table 7. **Portfolio Liquidity and Liquidity Constraints**

Variables	Model 01 difa		Model 02 diff		Model 03 dift	
	b	rse	b	rse	b	rse
liqconst	6.456***	0.939	8.693***	2.462	15.198***	2.637
nlnw	1.462***	0.369	-2.786***	0.508	-1.280**	0.636
age	-0.775***	0.110	-0.418**	0.184	-1.186***	0.207
ifp2	54.307***	0.780	-27.689***	2.679	26.504***	2.789
manrate	1.435***	0.395	-5.932***	1.059	-4.510***	1.118
perrate	3.241***	0.873	-16.665***	2.482	-13.404***	2.631
Constant	-91.514***	6.322	58.348***	9.172	-33.973***	11.300
Observations	11,629		11,629		11,629	
Maximum VIF	1.33		1.33		1.33	

Notes: ***significant at 1%; **significant at 5%; *significant at 10%; rse = robust standard error.

The results presented in Table 7 show that there is a positive and statistically significant relationship between the redemption constraints and the difference between the percentage of investment in low and high liquidity assets, in the case of stocks (Model 1), shares of other funds (Model 2) and both (Model 3), suggesting that redemption constraints imply a higher percentage of low liquidity assets in the funds' portfolio.

We estimated the models to determine whether the illiquidity of the funds' portfolio enables better performance from an eventual premium for liquidity, as shown in Table 8. In this table, Model 1 investigates the effect of the illiquidity of the portfolios on the performance of the funds, measured by the Sharpe ratio. Model 2 investigates the same but considers only the Sharpe ratio of funds that had a positive risk premium; Model 3 investigates the illiquidity effect of the portfolios on performance, measured by the Sortino ratio; Model 4 investigates the same but measures performance using the Jensen's Alpha.

Table 8. **Portfolio Liquidity and Performance**

Variáveis	Model 01 sharpe		Model 02 sharpepos		Model 03 sortino		Model 04 alpha	
	b	rse	b	rse	b	rse	b	rse
iliqcart	-0.010	0.034	0.022	0.044	0.181	0.119	-0.154	0.465
nlnw	0.084***	0.007	0.046***	0.009	0.137***	0.026	1.116***	0.101
age	-0.018***	0.002	-0.018***	0.002	-0.048***	0.006	-0.223***	0.025
ifp2	0.160***	0.023	0.120***	0.029	0.405***	0.087	1.498***	0.337
manrate	-0.040***	0.007	-0.042***	0.010	-0.092***	0.034	-0.624***	0.124
perrate	0.072***	0.019	0.195***	0.026	0.648***	0.083	0.551***	0.291
Constant	2.063***	0.114	2.734***	0.163	14.312***	0.574	-5.553***	1.850
Observations	10,064		3,819		10,064		10,064	
Maximum VIF	1.41		1.38		1.41		1.41	

Notes: ***significant at 1%; **significant at 5%; *significant at 10%; rse = robust standard error.

CC BY

ISSN 0034-7590

The results presented in Table 8 show that the superior performance of the funds does not come from investment in low liquidity assets (liquidity premium of the portfolios' assets), since the relationship between the variable that measures the illiquidity of the funds' portfolios and the different variables of performance was not statistically significant. In order to support this evidence, we estimated models that analyze the effect of the relationship between redemption constraints and portfolio liquidity on the performance of the funds, as shown in Table 9.

Table 9. **Liquidity Constraints, Portfolio Liquidity, and Performance**

Variáveis	Model 01 sharpe		Model 02 sharpepos		Model 03 sortino		Model 04 alpha	
	b	rse	b	rse	b	rse	b	rse
restr*iliqcart	0.042	0.039	0.065	0.494	0.060	0.125	0.002	0.476
nlnw	0.084***	0.006	0.046***	0.009	0.136***	0.026	1.118***	0.100
age	-0.017***	0.002	-0.018***	0.002	-0.048***	0.006	-0.222***	0.025
ifp2	0.149***	0.020	0.117***	0.026	0.456***	0.083	1.445***	0.294
manrate	-0.039***	0.007	-0.042***	0.010	-0.098***	0.034	-0.618***	0.122
perrate	0.073***	0.019	0.194***	0.026	0.636***	0.083	0.562*	0.289
Constant	2.053***	0.112	2.731***	0.161	14.354***	0.574	-5.598***	1.821
Observations	10,064		3,819		10,064		10,064	
Maximum VIF	1.29		1.25		1.29		1.29	

Notes: ***significant at 1%; **significant at 5%; *significant at 10%; rse = robust standard error.

Table 9 shows that even when considering the relationship between liquidity constraints and portfolio liquidity in the models, the results corroborated previous findings regarding the interest variable and the characteristics of the funds.

Robustness tests

Different robustness tests were performed: i) funds with age less than or equal to three years were excluded from the sample in order to correct any incubation bias; ii) tests with a sample containing only actively managed funds, since indexed funds may not have sufficient incentives to invest in illiquid assets in the search for a liquidity premium; iii) tests with panel estimators (fixed effects, random effects or stacked MQO) as indicated by the Breush-Pagan, Chow and Hausman tests; iv) tests considering a sample containing only funds that had three redemption constraints simultaneously (lockup, exit rate, and minimum balance) or no constraints. The results for these tests were similar to those previously shown in Tables 1 to 7, presented in supplementary material, check it out: http://bibliotecadigital.fgv.br/ojs/index.php/rae/article/view/78260/75003.

The results of the robustness test in which the database was separated in two distinct periods: 2009–2013 and 2014–2016, are noteworthy, and the models were estimated again. The objective of this new round of tests was to determine whether the results would be equivalent in periods of relative economic prosperity when compared to periods of recession (the proxy for the second period was the years 2014–2016). The results are shown in Tables 8 to 23, presented in supplementary material, check it out: http://bibliotecadigital.fgv.br/ojs/index.php/rae/article/view/78260/75003. The combination of the effect of the funds' liquidity constraints and the liquidity of the assets in the portfolio remained equivalent, as did the effect of the funds' liquidity constraints on the portfolio liquidity. In other words, regardless of the period, the funds in the sample with greater redemption constraints had a higher percentage of their portfolios invested in less liquid assets. Conversely, the effect of redemption constraints on fund performance was positive and significant only in periods of recession, suggesting that liquidity constraints are not necessarily responsible for better performance indices of the funds in the sample in periods of financial constraints. These different results may be related to the regulatory change that occurred in 2014, opening opportunities for future studies on this subject.

CC BY

ISSN 0034-7590

DISCUSSION

In general, the results indicate that there is a positive and statistically significant relationship between the redemption constraints (whether lockup period, minimum balance, exit rate, or their combination) and the performance of Brazilian equity investment funds, suggesting that funds, which have redemption constraints, perform better. Thus, the first hypothesis of this work (H1) was not rejected. These findings are in line with previous studies such as Agarwal et al. (2009), Aragon (2007), Bali et al. (2007), Hong (2014), and Liang (1999), among others.

Similarly, when analyzing the relationship between liquidity constraints and illiquidity in the fund portfolios, the results corroborate the literature, specifically the findings of Aragon (2007), Hong (2014), and Schaub and Schmid (2013) that report lower liquidity of assets under management of funds with redemption constraints. The main argument of these authors is that liquidity constraints increase the discretion of the fund manager by limiting unforeseen redemptions by shareholders, thus enabling the efficient management of low liquidity assets, or opportunities that take time to become profitable. Thus, the H2 hypothesis was not rejected.

Conversely, although evidence suggest that funds with liquidity constraints have a higher percentage of low liquidity assets in their portfolios, it is not possible to identify any superior performance of the funds resulting from the investment in low liquidity assets (liquidity premium) from the results of the models, since the relationship between the variable that measures the illiquidity of the funds' portfolios and the different variables of performance was not statistically significant. Even when considering the relationship between liquidity constraints and portfolio liquidity in the models, the results were similar. Thus, the evidence did not allow the indication of a premium from the investment in illiquid assets; therefore, the H3 hypothesis was rejected.

With regard to the characteristics of the funds, there was a positive and statistically significant relationship between size and performance, that is, the larger funds performed better. This effect is in line with the studies of Castro and Minardi (2009), Milani and Ceretta (2013), and Rochman and Eid (2006). Nevertheless, according to Milani and Ceretta (2013), a large part of the literature on investment funds report results differently from those found in this study, regarding the relationship between these variables.

There was a negative and statistically significant relationship between age and performance; this means that new funds achieve better performance than old funds. It is worth noting that some studies, such as Ferreira, Keswani, Miguel, and Ramos (2013), Juvercina (2016), and Silva and Iquiapaza (2017) have already found evidence in this regard. A possible explanation for this result is market competitiveness, that is, for a given new fund to survive and attract customers, it must meet certain requirements or provide superior benefits (such as better performance), when compared to funds that are already established in the market.

When looking at the effect that investing in shares of other funds has on the performance of equity funds, the results suggest a positive relationship. Studies on this relationship are scarce since there is no consensus among the researches that investigate this subject. On one hand, some authors state that investment funds in investment fund shares (IFIFS) deliver lower performance on account of their structure, which involves double incidence of rates, coming from the underlying funds and IFIFS management. This hypothesis is corroborated by the studies of Denvir and Hutson (2006) and Ang, Rhodes-Kropf, and Zhao (2008). On the other hand, other authors state that even with the costly structure, the IFIFS obtain better performance from the diversification of markets and asset classes, managers, and management models. This hypothesis is corroborated by the studies of Dai and Shawky (2012) and Malaquias and Eid (2014). The evidence found in this study corroborates the latter hypothesis.

Furthermore, the results showed that management rate is negatively associated with the performance of the equity funds, that is, the higher the management rate charged by the fund, the lower its performance tends to be. Although high administration rates are usually justified by the remuneration of managers with superior ability, who achieve better performance for the fund, Brazilian studies conducted with equity funds, such as those of Dalmácio, Nossa, and Filho (2007), Matos, Penna, and Silva (2015), and Rochman and Ribeiro (2003) corroborate the findings of this work, in this specific aspect.

Finally, although a part of the estimated models indicates a positive relationship between the incidence of performance rate and the performance of equity investment funds, in some models (in which performance was measured by Sharpe ratio and Jensen's Alpha), the statistical significance was not sufficient to confirm this hypothesis.

FINAL CONSIDERATIONS

This study analyzed the relationship between redemption constraints and the liquidity of assets under management of Brazilian equity investment funds, as well as the effect of the relationship between portfolio liquidity and redemption

CC BY

ISSN 0034-7590

constraints on performance. Moreover, some determinants of fund performance were considered as control variables based on their characteristics.

The results of this study showed that the redemption constraints (whether lockup period, exit rate, minimum balance or even their combination) are positively related to performance, regardless of the performance measure used, which suggests that the funds with these constraints to shareholders have superior performance. However, they do not explain why this relationship occurs. We hypothesized that these constraints, by limiting redemptions at inopportune or unexpected moments on the part of shareholders, allow the fund manager to have room for his investment strategies, thus exploring profitable opportunities, but with a view of the long-term and low liquidity.

Therefore, regression models were estimated to analyze the relationship between redemption constraints and portfolio liquidity, as well as the effect of their interaction on fund performance, in order to present empirical evidence. Regarding the effect of redemption constraints on portfolio liquidity, the results indicate that the funds that establish redemption constraints tend to have portfolios with a higher percentage of investments in assets, stocks, and shares of less liquid funds. Regarding the effect that portfolios with low liquidity assets have on the performance of equity funds, the results were not sufficient to confirm the existence of a liquidity premium.

Thus, further studies can consider other categories of funds in their samples, especially multimarket funds, which are similar to hedge funds normally investigated in international studies on redemption constraints, portfolio liquidity, and performance. Furthermore, it would be interesting to compare the findings from the Brazilian market with other markets, or even to determine how economic crises affect the composition of redemption constraints and their related aspects. Other measures for portfolio liquidity could also be used to discover liquidity premium in Brazilian funds.

REFERENCES

Agarwal, V., Daniel, N. D., & Naik, N. Y. (2009). Role of managerial incentives and discretion in hedge fund *performance*. *The Journal of Finance*, *64*(5), 2221-2256. doi:10.1111/j.1540-6261.2009.01499.x

Ang, A., & Bollen, N. P. B. (2010). Locked up by a *lockup*: Valuing liquidity as a real option. *Financial Management*, *39*(3), 1069-1096. doi:10.1111/j.1755-053X.2010.01104.x

Ang, A., Rhodes-Kropf, M., & Zhao, R. (2008). Do funds-of-funds deserve their fees-on-fees? *National Bureau of Economic Research*, NBER Working Paper Series.

Aragon, G. O. (2007). Share restrictions and asset pricing: Evidence from the hedge fund industry. *Journal of Financial Economics*, *89*(1), 33-58. doi:10.1016/j.jfineco.2005.11.001

Bali, T. G., Gokcan, S., & Liang, B. (2007). Value at risk and the *cross-section* of hedge fund returns. *Journal of Banking & Finance*, *31*(4), 1135-1166. doi:10.1016/j.jbankfin.2006.10.005

Boyle, P., Li, S., & Zhu, T. (2010). Hedge fund redemption restrictions, financial crisis, and fund *performance*. *European Financial Management Association*. Toronto, Canada: York University.

Castro, B. R., & Minardi, A. M. A. F. (2009). Comparação do desempenho dos fundos de ações ativos e passivos. *Revista Brasileira de Finanças*, *7*(2), 143-161.

Dai, N., & Shawky, H. (2012). Diversification Strategies and the *performance* of funds of *hedge funds*. *The Journal of Alternative Investments*, *15*(1), 75-85. doi:10.3905/jai.2012.15.2.075

Dalmácio, F. Z., Nossa, V., & Zanquetto, H., Filho. (2007). Avaliação da relação entre a *performance* e a taxa de administração dos fundos de ações ativos brasileiros. *Revista de Educação e Pesquisa em Contabilidade*, *1*(3), 1-30. doi:10.17524/repec.v1i3.13

Denvir, E. & Hutson, E. (2006). The *performance* and diversification benefits of funds of *hedge funds*. *Journal of International Financial Markets, Institutions & Money*, *16*(1), 4-22. doi:10.1016/j.intfin.2004.12.002

Ferreira, M. A., Keswani, A., Miguel, A. F., & Ramos, S. B. (2013). The determinants of mutual fund *performance*: A cross-country study. *Review of Finance*, *17*(2), 483-525. doi:10.1093/rof/rfs013

Gonzaga, L. V. L. (2016). *Taxa de performance e os fundos multimercados brasileiros* (Dissertação de Mestrado). Retrieved from http://bibliotecadigital.fgv.br/dspace/

Hong, X. (2014). The dynamics of hedge fund share restrictions. *Journal of Banking & Finance*, *49*(1), 82-99. doi:10.1016/j.jbankfin.2014.08.002

Juvercina, E., Sobrinho. (2016). *Potenciais efeitos dos dividendos na composição e na performance de fundos de ações no Brasil* (Dissertação de Mestrado). Retrieved from https://repositorio.ufu.br/handle/123456789/5141

Liang, B. (1999). On the *performance* of *hedge funds*. *Financial Analysts Journal*, *55*(4), 72-85.

Malaquias, R. F., & Eid, W., Junior. (2014). Fundos multimercados: Desempenho, determinantes do desempenho e efeito moderador. *Revista de Administração Mackenzie*, *15*(4), 135-163. doi:10.1590/1678-69712014/administracao.v15n4p135-163

Matos, P. R. F., Penna, C. M., & Silva, A. B. G. (2015). Fundos mútuos de investimento em ações no Brasil: Incentivos, gestão e convergência. *Brazilian Business Review*, *12*(2), 115-147. doi:10.15728/bbr.2015.12.2.6

Milani, B., & Ceretta, P. S. (2013). Efeito tamanho nos fundos de investimento brasileiros. *Revista de Administração da UFSM*, *6*(1), 119-138. doi:10.5902/198346593607

Nanda, V., Narayanan, M. P., & Warther, V. A. (2000). Liquidity, investment ability, and mutual fund structure. *Journal of Financial Economics*, *57*(3), 417-443. doi:10.1016/S0304-405X(00)00063-5

Pontes, G. A., Rogers, P., & Malaquias, R. F. (2015). Os fundos *Long and Short* entregam o prêmio de *lockup*? Evidências empíricas no Brasil. *Revista Contabilidade Vista e Revista*, *26*(3), 106-123.

Rochman, R. R., & Eid, W., Junior (2006). Fundos de investimento ativos e passivos no Brasil: Comparando e determinando os seus desempenhos. *XXX Encontro da ANPAD*, Salvador, BA.

Rochman, R. R., & Ribeiro, M. P. A. (2003). Relação entre a estrutura, conduta e desempenho da indústria de fundos de investimento: Um estudo de painel. *XXVII Encontro da ANPAD*, Atibaia, SP.

Schaub, N., & Schmid, M. (2013). Hedge fund liquidity and *performance*: Evidence from the financial crisis. *Journal of Banking & Finance*, *37*(3), 671-692. doi:10.1016/j.jbankfin.2012.09.019

Silva, S. E., Iquiapaza, R. A. (2017). Fundos de investimentos socialmente responsáveis e fundos convencionais: Existem diferenças de desempenho? *Revista Evidenciação Contábil & Finanças*, *5*(3), 4-21. doi:10.18405/RECFIN20170301

PERSPECTIVES

Invited article
Translated version
DOI: http://dx.doi.org/10.1590/S0034-759020190106

CHALLENGES OF TEACHING STRATEGY IN PROFESSIONAL MASTERS AND DOCTORATE PROGRAMS

JORGE RENATO DE SOUZA VERSCHOORE [1,2]
jorgevf@unisinos.br
ORCID: 0000-0001-7588-7871

[1]Universidade do Vale do Rio dos Sinos, Programa de Mestrado e Doutorado em Administração, Porto Alegre, RS, Brazil

[2]Universidade do Vale do Rio dos Sinos, Programa de Mestrado e Doutorado Profissional em Gestão e Negócios, Porto Alegre, RS, Brazil

INTRODUCTION

Professional Masters Programs (PMPs) are common in the fields of Public and Business Administration, Accounting, and Tourism. They were conceptually originated in December 1965, with the publication of CFE Opinion No. 977 (Cury, 2005), and took shape in the 1990s (Fischer, 2005). Since its conception, the professional modality has been an alternative to the academic training of professors and researchers. It is oriented toward practical application and focused on the needs of the labor market (Paixão & Bruni, 2013), considering that "the expansion of the Brazilian industry requires a growing number of creative professionals, capable of developing new techniques and processes, and for whom only an undergraduate degree is not enough" (Almeida et al., 2005, p. 165).

Between 2006 and 2017, the number of PMPs in the area of Business Administration grew from 16 to 74, representing about 40% of all courses in the field (Coordenação de Aperfeiçoamento de Pessoal de Nível Superior - CAPES, 2017). In 2018, more professional masters graduated in the field than academic masters. The rapid and constant growth of PMPs is due to CAPES' resolutions and normative ordinances that regulate the professional modality and, mainly, the increase in demand for advanced degree courses with an emphasis on solution-oriented real-world applications. Starting in 2019, PMPs will be accompanied by recently approved professional doctorate programs (PDPs).

The rise of professional modality brought new challenges to graduate programs. Since the Brazilian experience of *stricto sensu* programs is a mixture of European and North American frameworks (Verhine, 2008), there is still no standard that establishes admission processes, qualifying exams, technical and technological productions, or even the final products of PMPs and PDPs. Such issues are amplified by the fact that the main objective of these masters and doctoral programs is not to train the professional; therefore, they are no longer called professionalizing masters and doctoral degrees. Currently, PMPs and PDPs aim to qualify professionals already active in the labor market in innovative and transformative practices, making them capable of generating solutions to complex problems that public and private organizations have not been able to solve.

Logically, this article does not intend to address all these issues. From the context presented, the analysis focuses on a rarely discussed issue in the context of Brazilian graduate programs: teaching challenges in professional masters and doctoral degree programs. In this article, the teaching of strategy, main issues, and professors' challenges will be discussed. The intention

CC BY

ISSN 0034-7590

here is not to guide the curricular structure of the programs. On the contrary, the intention is to resume the objectives and basic purposes of PMPs and PDPs in order to achieve the essence of the modality and stimulate peer-to-peer debate on the teaching of professionals. The issues and challenges here addressed result from the experience of the author as a professor of strategy in the *stricto sensu* modality for over a decade and a coordinator of a PMP for five years. Despite the overall theme of this article focusing on strategy and Business Administration and Business programs, the arguments expressed here can be transposed to other disciplines and areas of knowledge.

THE TEACHING OF PROFESSIONALS

PMPs and PDPs aim to take knowledge beyond the academy by bringing the theory studied in educational institutions closer to the activities mastered by practitioners. This is not trivial for Brazilian graduate programs. For this reason, those responsible for teaching professionals share common concerns, such as those presented here.

The first issue that a professor of the professional modality faces is students' pre-existing management routines that are rooted in 10, 20, 30 years of experience in the labor market. The natural impulse of the professor is to reinforce this prior knowledge of the group of students, adding new and more complex techniques and tools. In the discipline of strategy, this is expressed by emphasizing usual strategic planning and the teaching of current and advanced instruments of execution, evaluation, and control. This teaching method is pleasant for students because it is cognitively consonant with their own experiences. However, the validity of this approach for meeting the central objective of qualifying professionals in innovative and transformative practices is questioned.

This issue does not arise due to the well-known criticisms of strategic planning (Mintzberg, 1994) because strategic execution instruments can be innovative and transforming. The assumption to be rethought is that certain strategic practices are universally applicable to all businesses. In organizations, the strategic emphasis is on achieving goals and objectives. Consistently, professionals focus their attention on the strategy's structural elements and the resulting performance of the organization, dedicating little time to reflecting on the strategy's products. Thus, PMPs and PDPs constitute one of the rare spaces in which professionals can allow themselves to conceptually discuss strategy and question prevailing organizational logic that there is only one correct way of implementing strategy.

Another issue derived from the managerial practices of strategy and widely adopted by non-academic literature is that of the formula that ensures results. These are prescriptions of systematically organized and detailed strategic actions, corroborated by real examples that supposedly followed these precepts and reaped the rewards (Evans, 2013). The appeal of such prescriptions is understandable, given that professionals seek to reduce risks and increase gains. Basing strategic choices on guaranteed prescriptions makes their actions appear more assertive and effective. However, in the PMP and PDP context, it is essential to question the validity of these prescriptive approaches in order to fulfill the basic mission of training professionals to develop solutions for complex problems that organizations are unable to solve.

The dissemination of non-academic literature is responsible for a third issue typically faced by those who teach professionals: substantiating the theoretical framework of knowledge support. The simplest solution to account for the technical and applied bias of regular reading by professionals is the curricular adoption of scientific journals of management or practitioner-oriented literature. The texts published in these journals are objective, usually of short or medium length, written by researchers in the field of Business Administration and related areas, and aim to popularize scientific knowledge.

The issue is not the quality of the articles per se. Respected publishers and renowned institutions publish most of these journals. Some have high impact factors, such as Harvard Business Review and California Management Review. These are, therefore, good references for updating professionals and, above all, a gateway to research topics that have not yet been mastered. However, in isolation, such readings are insufficient to sustain the scholarship and abstraction necessary for conceiving innovative and transformative practices. They represent the bridge to be crossed, but not they are not the port of arrival. Conversely, the incorporation of seminal texts, provocative theoretical essays, and intricate empirical articles stimulates the reflective capacities and strengthens the rhetorical arguments of students.

These issues do not exhaust all concerns related to teaching in PMPs and PDPs. However, they do provide an opportunity to discuss the possibility of aligning the teaching of strategy with the objectives of the professional modality. To stimulate this debate, three challenges of teaching strategy in professional programs are presented below: pluralization, contextualization, and reflection.

PLURALIZATION

Every professional has already experienced the process of strategic decision or execution. Many have a preconceived truth

 CC BY ISSN 0034-7590

about strategy. Invariably, this truth was conceived in the cycles of planning, the readings of prescriptive texts, and the errors and successes that substantiate his career. This empirical knowledge is of high value and cannot be underestimated. However, the unique ways of understanding borne of this knowledge narrow one's understanding of the world and limit their ability to solve non-routine problems. Thus, the qualification of a master or doctor requires that the professional faces other perspectives and be open to the pluralization of ideas.

One primary challenge of teaching in PMPs and PDPs is broadening the horizons of professionals through the adoption of a plurality of perspectives, implementing cognitive dissonance as a lever for new opportunities of action. In other words, the challenge is to provide an education that promotes intellectual pluralism, theoretical flexibility, the valuing of multiple perspectives, motivation toward openness, dialogue, and the questioning of basic assumptions (Morrell & Learmonth, 2015). Although experienced professionals resist leaving comfortable areas of practice, the pluralization of intellectual perspectives is helpful in enabling them to seek complementary ways to deal with the problems faced by organizations.

Pluralization can occur in at least two ways in the teaching of strategy. The first and most usual is a sequential curriculum construction, in which each meeting is intended to address a different strategic perspective and is organized in a linear evolutionary sequence. In this case, professional students have contact with a plurality of perspectives throughout the discipline. The second way occurs through an spiral curriculum. Here, at the same meeting, different perspectives, antagonistic or not, are used to address a specific theme, face a theoretical problem, or debate a managerial decision. These and other methods of diversifying the teaching of strategy in PMPs and PDPs allow the professional student to review old problems from new perspectives.

Pluralization in the teaching of strategy can also contribute to updating students' knowledge. Lately, technological innovations have been affecting strategic decision making. Technologies such as artificial intelligence, blockchain, the Internet of things, and quantum computing are part of the business environment but are not always integrated into graduate curricula. The task of breaking down the conceptual foundations of these technologies ends up being undertaken by enthusiasts or experts in technology who do not typically structure their programs from an analytical point of view. Thus, continuously updating strategic perspectives in light of emerging technologies—in addition to providing students with a critical view of these phenomena—reinforces the plurality needed for innovation and organizational transformation.

CONTEXTUALIZATION

Professionals master the use of strategic tools. In their executive life, they experienced various forms of strategic planning and balanced ways of monitoring the achievement of goals and objectives. They analyzed strengths, weaknesses, threats, and opportunities. They have met cash cows, stars, question marks, and dogs. Then they came across with value chains and diamonds. Recently, they have filled blank canvas in order to create and validate hypotheses and finally, find their value proposition. However, most professional students are unaware of the origins of this practical spring.

The richness of the plurality of strategic perspectives stems precisely from the context in which they originated. Some strategies have a historical origin. They originate in contexts far from business, in the tricks of politics and the stratagems of war, unfolding in the perspectives of competition, protection of advantages, and conquest of market shares, or in collaborative alliances and the sharing of resources (Freedman, 2013). Others originated in the context of business, motivated by the rapid economic expansion in the post-war period, having been created by professionals who were leading business consulting firms that emerged in abundance (Kiechel, 2010). Contexts guide the use of strategies and, without them, different perspectives are reduced to instruments without effectiveness.

Therefore, one of the challenges in teaching strategy in PMPs and PDPs is to contextualize the different perspectives addressed. This is not a responsibility of undergraduate or *lato sensu* programs. It requires professors to connect the trajectory of strategic thinking with economic and social evolution. Moreover, the incorporation of the context in the classes enables a broad and deep understanding of the content. At the same time, it requires that professional students do not aim only to master the technical aspects but also deepen their knowledge of underlying issues.

However, the challenge of contextualization goes beyond the historical trajectory. The national, regional, and local contexts in which students operate determine the possibilities of their strategic choices. Therefore, PMPs and PDPs were created with the mission of being socially, scientifically, and technologically relevant as required by advanced training processes in certain localities. Therefore, the purpose of contextualization is to question the assumption of the universally applicable strategy and stimulate the student to develop innovative and transformative practices within their own contexts. By contextualizing strategy perspectives, the professor is consequently qualifying the professional to fulfill the role of strategist in the market in which they operate.

CC BY

ISSN 0034-7590

REFLECTION

The precise formulation of a problem is as important as its solution. Experienced professionals are used to solving everyday problems. Difficulties are part of their daily routine. They may be more prepared to teach problem-solving methods than the professors themselves. The challenge of teaching in PMPs and PDPs is not limited to seeking answers to known problems. The core of its mission is to raise new issues, bringing new perspectives and interpretations about a given scenario, and to identify and create opportunities that can be pursued by organizations. Therefore, the creative imagination and critical capacity that comprise so-called strategic thinking are essential (Dixit & Nalebuff, 2008).

Strategy is not just a means to achieve a goal. It is both the means and the goal (Gaddis, 2018). Trivial goals do not require strategy. Unattainable goals cannot be achieved. Strategic reflection enables the identification of issues and opportunities, organizing them by considering the scope and reality of professionals and their organizations. It is a model of thought that implies detachment from action through practice or the recurrent reproduction of decisions based on experience. Strategic reflection is based on multiple analytical models, convergent or not, that make professionals question themselves about usual problems and solutions.

Strategic reflection involves competencies that can be developed within PMPs and PDPs. To this end, Grant and Baden-Fuller (2018) discuss the merits and limits of the concepts, theories, and structures of strategic analysis and present the cognitive and behavioral skills needed to fill the gap between analytical tools and strategic choices. The results of a recent study show that human interaction motivates more active behavioral involvement and greater cognitive engagement (Hewett, Becker, & Bish, 2018). Providing an interaction that generates strategic reflection is one of the greatest challenges involved in teaching professionals. The time reserved in the disciplines for interaction among students is short. The analyses of the strategic choices presented in handbooks guide the interaction among students to the past. Therefore, it is imperative to structure a curriculum that enables professional students to interact around strategic decisions that occur in complex and ambiguous situations in their reality in a structured and goal-oriented manner, seeking subsidies on their own, generating unexpected discoveries, and learning together.

IMPENDING CHALLENGES

Teaching strategy in PMPs and PDPs also includes challenges posed to other disciplines. CAPES Ordinance No. 275, of December 18, 2018, regulated *stricto sensu* graduate programs in the distance learning modality. The regulations, while not specifically targeting disciplines, encourage the offer of distance learning credits in face-to-face courses. There are few experiences of out-of-person teaching in academic *stricto sensu* programs to follow as a guide. Given their peculiarities, professional courses can be the environment in which distance learning be tested in *stricto sensu* programs. Therefore, it is an impending challenge that adds to those faced in the teaching of strategy.

In the wake of non-contact disciplines, blended learning—which involves classroom participation and computer-mediated interactions—thrives with expressiveness. The positive results of blended learning are demonstrated by several studies (Bernard, Borokhovski, Schmid, Tamim, & Abrami, 2014). However, these results require that computational support covers cognitive issues, not just content, and that professors implement effective interactivity. Therefore, blended learning is another impending challenge for the teaching of strategy.

The rapid growth of professional programs raises concerns about ethical issues in disciplines. Ethical teaching is a formidable challenge in teaching strategy in PMPs and PDPs. This issue is not focused on reviewing content and incorporating the virtue of good values in the curriculum, because this type of effort tends to have a low impact on the behavior of students (Cohen, 2006). Given that business schools have been criticized for their complicit involvement in corporate scandals and international financial crises, the ethical challenges involved in teaching strategy include rethinking business schools' mission, principles, and beliefs (Murcia, Rocha, & Birkinshaw, 2018). Especially in the professional modality, this reflection demands a critical detachment from usual practices of strategic operation.

CONCLUSION

The *stricto sensu* graduate programs in PMPs and PDPs exhibit distinct characteristics from specialization programs and academic masters and doctoral programs. The purpose of this modality is to qualify, at a high level, professionals working in the labor market by making them capable of solving complex problems while innovating and transforming organizations. This purpose is put in practice in teaching activities. They constitute the appropriate environment to integrate theory and practice.

Among the several challenges that accompany the professional modality, this article emphasizes issues on strategy teaching. To this end, the concerns shared by professors of

 CC BY ISSN 0034-7590

PMPs and PDPs were brought to the debate. These concerns have fostered the discussion of three challenges—pluralization, contextualization and reflection—which should not be ignored by the curricula of strategy disciplines. Moreover, some potential challenges that currently affect education in PMPs and PDPs were raised. Thus, the difficult mission entrusted to the professors and the great dedication required of the students were emphasized. By valuing the essence of the modality, it is expected that the issues and challenges briefly addressed here are not viewed as a curricular orientation, but rather as provocations for Brazilian graduate programs which still take the first steps in the *stricto sensu* training of professionals.

ACKNOWLEDGMENTS

I would like to thank Andreia Cristina Dullius and Edson Ronaldo Guarido Filho for their comments and suggestions made in preliminary versions of the manuscript.

REFERENCES

Almeida, A., Júnior, Sucupira, N., Salgado, C., Barreto, J., Filho, Silva, M. R., Trigueiro, D., ... & Maciel, R. (2005). Parecer CFE nº 977/65, aprovado em 3 de dezembro de 1965. *Revista Brasileira de Educação*, (30), 162-173.

Bernard, R. M., Borokhovski, E., Schmid, R. F., Tamim, R. M., & Abrami, P. C. (2014). A meta-analysis of blended learning and technology use in higher education: From the general to the applied. *Journal of Computing in Higher Education*, *26*(1), 87-122. doi:10.1007/s12528-013-9077-3

Coordenação de Aperfeiçoamento de Pessoal de Nível Superior. (2017). *Coleta de dados, cursos da pós-graduação stricto sensu no Brasil 2017*. Retrieved from https://dadosabertos.capes.gov.br/dataset/coleta-de-dados-curso-da-pos-graduacao-stricto-sensu-no-brasil-2017

Cohen, J. (2006). Social, emotional, ethical, and academic education: Creating a climate for learning, participation in democracy, and well-being. *Harvard Educational Review*, *76*(2), 201-237. doi:10.17763/haer.76.2.j44854x1524644vn

Cury, C. R. J. (2005). Quadragésimo ano do parecer CFE nº 977/65. *Revista Brasileira de Educação*, (30), 7-20. doi:10.1590/S1413-24782005000300002

Dixit, A., & Nalebuff, B. J. (2008). *The art of strategy: A game theorist's guide to success in business and life*. New York, USA: W. W. Norton & Company.

Evans, V. (2013). *Key strategy tools: The 80+ tools for every manager to build a winning strategy*. London, UK: FT Press, Prentice Hall.

Fischer, T. (2005). Mestrado profissional como prática acadêmica. *Revista Brasileira de Pós-Graduação*, *2*(4) 24-29. doi:10.21713/2358-2332.2005.v2.74

Freedman, L. (2013). *Strategy: A history*. New York, USA: Oxford University Press.

Gaddis, J. L. (2018). *On grand strategy*. New York, USA: Penguin Press.

Grant, R. M., & Baden-Fuller, C. (2018). How to develop strategic management competency: Reconsidering the learning goals and knowledge requirements of the core strategy course. *Academy of Management Learning & Education*, *17*(3), 322-338. doi:10.5465/amle.2017.0126

Hewett, S., Becker, K., & Bish, A. (2018). Blended workplace learning: The value of human interaction. *Education + Training*. Publicação eletrônica antecipada. doi:10.1108/ET-01-2017-0004

Kiechel, W. (2010). *The lords of strategy: The secret intellectual history of the new corporate world*. Boston, USA: Harvard Business Press.

Mintzberg, H. (1994). The fall and rise of strategic planning. *Harvard Business Review*, *72*(1), 107-114.

Morrell, K., & Learmonth, M. (2015). Against evidence-based management, for management learning. *Academy of Management Learning & Education*, *14*(4), 520-533.

Murcia, M. J., Rocha, H. O., & Birkinshaw, J. (2018). Business schools at the crossroads? A trip back from Sparta to Athens. *Journal of Business Ethics*, *150*(2), 579-591. doi:10.1007/s10551-016-3129-3

Paixão, R. B., & Bruni, A. L. (2013). Mestrados profissionais: Características, especificidades, diferenças e relatos de sucesso. *Administração: Ensino e Pesquisa*, *14*(2), 279-310. doi:10.13058/raep.2013.v14n2.66

Verhine, R. E. (2008). Pós-graduação no Brasil e nos Estados Unidos: Uma análise comparativa. *Educação*, *31*(2), 166-172.

 CC BY
ISSN 0034-7590

PERSPECTIVES

Invited article
Translated version
DOI: http://dx.doi.org/10.1590/S0034-759020190107

TEACHING STRATEGY IN EXECUTIVE MBAS AND PROFESSIONAL MASTER'S PROGRAMS: THE OVERLOOKED ROLE OF EXECUTION

JORGE CARNEIRO[1]
jorge.carneiro@fgv.br
ORCID: 0000-0003-3321-5430

[1]Fundação Getulio Vargas, Escola de Administração de Empresas de São Paulo, São Paulo, SP, Brazil

INTRODUCTION

Textbooks and (conceptual or empirical) articles about strategy tend to present typologies based on competitive positioning (e.g., Mintzberg, 1988; Porter, 1985) or corporate decisions such as diversification and verticalization (Barney, 2010). However, they rarely address the fact that the development of a sustainable competitive position (a competitive advantage) depends on not only formulating a plan, but also on paying careful attention to its execution and revision. This requires people's motivation and engagement, and involves dealing with cognitive or behavioral limitations, so as to turn an intentional strategy into a realized strategy (Mintzberg & Waters, 1985).

As students are not formally exposed to strategy execution models in their master's and doctoral degree programs—because the literature lacks such models (*cf.* Oliveira, Carneiro, & Esteves [forthcoming])—and due to the challenges inherent to strategy execution, when they become professors in MBA programs, they tend to only address typologies based on competitive positioning (as in Mintzberg, 1988; Porter, 1985), or eventually "planning" models and the exercise of strategizing (as in Jarzabkowski, Balogun, & Seidl, 2007). However, they do not deal with the importance of implementation of a strategic plan in practice. At the very most, these professors make use of their professional experience to suggest that the path from intention to reality may not be immediate and may not even be guaranteed.

EXECUTING THE STRATEGY

Most textbooks and articles about strategy still implicitly assume that competitive positioning can be reached in a rational and systematized way, based on a structured exercise of evaluation of opportunities and threats of the external environment (macroenvironment and industry structure), the strengths and weaknesses of the company, and its resources and competencies. This effort would then lead to assessment of alternative strategies, with the subsequent selection of the best among them.

 CC BY ISSN 0034-7590

(This top-down approach is different from what is presented in entrepreneurship texts (e.g., Sarasvathy, 2001), where strategy is developed from the bottom up and is not even explicitly structured, in many cases. In this opinion-based article, I shall not be addressing this way of developing and carrying out the strategy.)

Everything occurs as if the "uncontested" logic behind this reasoning could lead naturally to the realization of its recommendations in practice. However, both the formulation of the plan and its execution depend on people—who bring their own limitations, biases, anguishes, and interests. Even though appeals for the consideration of microfoundations, which are explanations that are more disaggregated (i.e., at the individual level) about behaviors in a broader scope (e.g., at the company level), have been mentioned in the literature (Coff & Kryscynski, 2011; Felin & Foss, 2005; Foss & Pedersen, 2016; and others), the crucial role of people in the execution of the strategy tends to be lacking in the program content of MBAs.

Before moving on to these issues, I shall briefly discuss how the phenomenon of strategy execution could be conceptually structured.

Conceptualization of the phenomenon of strategy execution

Academic literature lacks reference to models about the conceptual components of the strategy execution construct. However, many books and other texts aimed at executive readership bring long lists of factors that serve either as enablers or else as obstacles to strategy execution (e.g., Atkinson, 2006; Beer & Eisenstat, 2000; Delisi, 2010; Hrebiniak, 2006; Kaplan & Norton, 1996; Mankins & Steele, 2005). Many examples of real stories are also presented (e.g., Bossidy & Charan, 2002), but without providing a high-level structure that would allow the organization of such factors in terms of macro-components, which would make it possible to understand the content of each one, and the relationship between them in the characterization of the phenomenon of strategy execution.

- Efforts in this regard, however, have been recently made. A model containing five components of execution was presented by Oliveira et al. (forthcoming):
- Unfolding (of the strategy or the strategic plan): This is a subdivision of the "great plan" into action plans, responsible people, objectives, and sub-objectives, as well as the respective goals, timeframes, budgets, and funding sources. (Naturally, the balanced score card [BSC] [*cf.* Kaplan & Norton, 1996] could be a good instrument.)
- Coordination: A consistent articulation among different actions and the different units of the company, as well as the transformation of conflicts into purposeful action, in order to seek mutual reinforcement between different initiatives, and reduce inconsistencies between them.
- Communication: Flow of information (downward, upward, and horizontally).
- Control and feedback: Monitoring of the external environment, follow-up on actions taken, measurement of results obtained, and support for the revision of the strategic plan.
- Development of HR policies and employees' competences: Definition of the necessary skills for the implementation of the strategy, as well as recruitment and training of staff, and development of policies for staff retainment.

MacLennan (2010) presented five "Cs" for strategy execution:

- Causality: Identification of the real causes of the problems observed.
- Criticality: Focus and concentration of efforts.
- Compatibility: Coherence and mutual reinforcement between different initiatives (this is similar to the "Coordination" component as proposed by Oliveira et al. [forthcoming]).
- Continuity: Splitting and cascading of the objectives, motivation of the people, and reduction of risks of distractions and inertia.
- Clarity: Guarantee that the people shall understand what needs to be done (this is similar to the "Communication" component as proposed by Oliveira et al. [forthcoming]).

With regard to communication, middle managers play a key role, as they are the people who "filter" information between the top and the base of the organization (in both directions). These managers need to be motivated and have good negotiation skills; more importantly, they must have good skills in strategic issue selling (Dutton & Ashford, 1993), which means the ability to catch the attention and get the support of top management and other parts within the organization.

CC BY

ISSN 0034-7590

A course on business strategy or strategic management should explicitly consider special mechanisms to address each of the above components, as part of the process to make "dreams" become reality, as well as regarding the challenges that must be faced in this venture. Some of these challenges refer to microfoundations, specifically, how people acquire knowledge, behave, and act. These points shall now be addressed.

Microfoundations of strategy execution

Among the different aspects that could lead people to adequately execute the strategic plan, the following shall be addressed in this paper: identification of the problem to be solved, formulation of the "diagnosis," and suggestions for "treatment" of the problem; ambivalence and inertia; and organizational politicking.

Formulating of the problem, and search for diagnosis

A key part of the formulation of a strategic plan is the review of the previous plan, from where one can collect input for execution as new observations are made. Throughout the execution of the plan (including the set of multiple actions that are part of daily life), one can perceive that the results are different from those expected, or that new information suggests that the future shall be different from what was originally envisaged. However, the process of identification of the problem (Baer, Dirks & Nickerson, 2013) or of the challenge (Rumelt, 2012) to be faced is faulty, and therefore, it often leads companies to propose "solutions" to the wrong problems. The difficulty in correctly expressing the "problem" to be tackled becomes critical in heterogeneous teams, due to the differences regarding the sets of information used, cognitive structures, and objectives (Baer et al., 2013).

For example, a company complained that their growth in sales had become "vegetative," meaning "only" (in the words of a manager) between 5% and 8% a year, when only a few years back the company would post annual growth rates between 15% and 20%. However, would this, in fact, be a "problem," and should the company realistically try to return to the previous growth levels? Well, an annual growth of 5% is quite significant: a growing perpetuity of 5% per annum at a capital cost of 10% per annum would mean that this company would be worth twice as much as another company with stable sales throughout its life ($NPV_0 = CF_1/(k - g)$, where NPV_0 = net present value in year 0, CF_1 = cash flow in year 1, k = capital cost, g = growth rate). The company could review its expectations, considering the new reality, and seek the real causes of this "problem"—maybe (natural) imitation by competitors, or changes in the needs of some clients—instead of forcing the sales team to hit new historic peaks in growth (and in market share), even at the cost of discounts or other promotions offered to clients.

Even when a problem is correctly identified, in many cases, the process for acknowledgment of its causes (Rumelt, 2012) is flawed (MacLennan, 2010). As a result, companies often propose incorrect diagnoses and thus end up carrying out actions that shall not solve the problem. Among the examples mentioned by MacLennan (2010), the following are worthy of mention here.

A company observed that its sales fell short of the established targets. Instead of seeking possible alternative explanations for this fact, the company (or rather one or a few decision makers within the company) hastily concluded that the underlying cause for this problem must be inadequate or insufficient training of the sales force. A special training plan was then drawn up, but sales did not recover. In fact, the problem could have had another cause, such as changes in customer preferences or needs, actions taken by competitors, or demotivation of the sales team because of unrealistic targets. Another company noticed that its employees appeared to be disheartened. Immediately, they concluded that the cause of this problem must be dissatisfaction with their income. Salaries and bonuses were raised, but demotivation continued. It is possible that the underlying cause, among other possible alternative explanations, could have been the excessive use of authority by top management and the lack of dialogue with middle management.

In my own experience, I have observed interesting cases. In a bank in a Latin American country, the sales managers complained that the answers given by the credit analysis department about granting loans to clients took too long a time. The first explanation that arose was that the process for issuance of a loan letter was manual; all that would suffice, therefore, would be to make it automated. However, other explanations were raised and studied, including excessive workload of the credit analysis department or demotivation within the department, or even excess strictness in the process of credit analysis. Another company said that the company had achieved its sales target, but not its intended profit target. The diagnosis was quite clear (albeit somewhat hasty): the commercial team was giving too many discounts. However, the real cause of the problem—and the explanation as to why salespeople were giving out discounts—could have been different; for example, lack of understanding of the impact of discounts upon company profits (meaning that the company could be aiming at market share rather than profit, which is not uncommon) or changes

CC BY
© RAE | São Paulo | 59(1) | January-February 2019 | 62-67
ISSN 0034-7590

in the attitudes of clients or in offers made by competitors, which would make the clients more price-sensitive. Another company lamented the failure to win important contracts and blamed the legal department for taking too long to hand the proposals to the prospective clients. In fact, the problem had a different cause: the price was considered too high by the prospective clients. A metallurgy company suffered from chronic excess of stock. Top management concluded that this was due to faulty communication between the production and sales departments (a plausible explanation) and decided to fire some professionals from both departments and take on new staff "without communication problems." However, the problem could have been solved by holding meetings and more frequent exchanges of information between the two teams. It turns out that the mere exchange of professionals did not solve the problem, and the company kept on falling short of its profit targets.

Presented this way, it seems evident that there could be many possible explanations for any given problem, and that a company should not accept the first plausible explanation that is put on the table.

Bias in the decision-making process

Why, then, do companies fail to pinpoint problems and propose diagnoses (causes)? The answer lies in the biases present in cognitive and judgment processes and in decision making (Bazerman & Moore, 2008; Kahneman, 2003a, 2003b; Kahneman & Tversky, 2013; March, 1978; Simon, 1979; Tversky & Kahneman, 1974, 1978). For example:

- Bounded rationality: Making decisions based on incomplete or mutually contradictory information, as well as mental limitations to process information.
- Confirmation bias: A tendency to seek, interpret, focus, and remember information in a way that confirms prior or preconceived expectations.
- Anchorage (first impression bias): A tendency to show excess trust, or "to anchor oneself," in one aspect (usually the first information acquired about the subject, or suppositions considered undisputable) when making decisions.
- Escalation of commitment (sunk-cost fallacy): An increase in investment in a certain course of action based on previously accumulated investment, even though new evidence suggests that the original decision was probably wrong.
- Overconfidence bias: Excessive confidence or trust in one's own perceptions.
- Attribution bias: A tendency to assign the causes of success to oneself, and to assign the causes of failure to others (or to external factors).
- Loss aversion *versus* gain securing (prospect theory): The utility of forsaking an object (e.g., a known situation) tends to be more than the utility associated with it when purchasing it.

Thus, students should be exposed to real cases and put in the shoes of multiple decision makers (for example, in group dynamics), always being challenged to bring "more scientific rigor" to their process of formulating the problem, in addition to the diagnosis of causes and proposed solutions (MacLennan, 2010), asking themselves:

- Is the proposed solution based on empirical observation, rather than just on logical reasoning?
- Was the process for data collection and analysis carried out systematically?
- Was care taken to reduce possible bias as much as possible?
- Do the empirical results support the conclusions (diagnosis and proposed solutions)?
- Have alternative explanations for the problem been considered?
- Can the proposed solution be generalized, or is it restricted to certain contexts?
- Can the solution be implemented in practice, and is it economically feasible?

Ambivalence and inertia

Another obstacle blocking the execution of the strategy is the ambivalence as perceived by managers—meaning the experience of positive and negative feelings at the same time—regarding a decision, person, situation, objective, or task (Rothman, Pratt, Rees, & Vogus, 2017). On experiencing ambivalence, some managers tend to become less flexible, while others become more flexible and open.

On the one hand, as examples of possible reactions suggesting cognitive inflexibility, the following can be mentioned: response amplification (individual people can idealize their relationship with their organization, casting aside all negative

CC BY

ISSN 0034-7590

sentiments, leading to biased and simplistic views), reduced ability to decide (hesitation, and postponement when making decisions), and confirmation bias (selective creation of unilateral information, and confirmatory processing of information). On the other hand, in terms of reactions that suggest cognitive flexibility, the following are some examples: cognitive breadth and scope of attention (openness to different perspectives, and detachment from what is already known), as well as motivation to use contradictory and conflicting signals as a stimulus to consider multiple views and perspectives in a balanced way.

Inflexibility can also be behavioral, as in the case of paralysis, either because of excessive analysis (Langley, 1995) or of inertia (Powell, 2017), and resistance to change. In terms of the possible reactions to ambivalence that suggest behavioral flexibility, the following could be mentioned: individual opening to change and reduction of the escalation of commitment, as well as interpersonal and collective adaptability.

The execution of the strategy also tends to be harmed because companies quite often indulge in automated behavior and resistance to change, whether through inertia or because of deeply ingrained standards or policies. As a result, managers tend to make an excessive investment in those forces that have made the company successful in the past, and underinvest in the weaknesses that need to be overcome so that the company may be successful in the future (Powell, 2017). In order to avoid this trap, Powell (2017) suggests an approach based on "strategic diligence," by which companies should break free of the usual logic, and rethink the prioritization between different activities (for example, the development of new products, stock management, production, procurement, distribution, branding, and staff training). In this way, they should allocate more funds to those activities that have a low ratio of relative performance to relative priority—implying those activities where the marginal gain in terms of results for the company could be greater. Lawrence (1998), in turn, proposes an interesting outline with 10 steps to take people out of inertia and away from the comfort zone of repeating the past, so as to get them genuinely involved in the organizational change that would be necessary.

Organizational politicking

Moreover, the tussle for power and prestige could lead some managers to practice "organizational politicking" in the company, meaning that they act based on their own interests and deliberately, albeit in disguised form, harming the execution of the strategy, particularly when this can lead to a change in the balance of powers (Kim & Mauborgne, 2015). To deal with such situations, top management needs to gather strength (for which not everyone has the necessary skills or willingness) to fight what Kim and Mauborgne (2015) call "devils," and support the so-called "angels," laying bare the actions of one group and the other, so that it becomes clear who is for, and who is against, the change.

To make students experience the different situations as presented, professors may request examples of past companies (so as to avoid social desirability bias) where the students have worked, and where they have been able to see examples of these situations. In practice, the students shall be thinking about their own current realities.

CONCLUSIONS

According to Powell (2017), "success tends to depend less on "big strategy" [ambitious plans, carefully crafted], than on the relentless management of disciplined action" (p. 181).

In executive MBA programs, the subject of business strategy (strategic management) should, therefore, contain real cases of companies, and then employ dynamics among students, allowing them to use their mental processes to try to correctly identify the problem (challenge) to be tackled, and to establish the correct diagnosis. Furthermore, students should be encouraged to recognize which biases are present in the judgment process and decision making that could affect the strategy to be executed, as well as which attitudes and behaviors (such as ambivalence, inertia, and politicking) would tend to be present in those situations—and how to deal with such obstacles and with such forms of biases.

As part of the set of courses of an executive MBA program, the strategy course can be complemented by topics addressed in other courses, such as decision making, negotiation, and governance. Moreover, the learning acquired in these subjects should be explicitly used for the discussion of cases of the strategy course.

While business strategy courses continue to focus on pseudo-rational models for plan formulation, without explicitly addressing behavioral and emotional aspects within the process of execution of the plan, we shall not be preparing our executives for the reality of the business world. On the contrary, we will be making them hostages of hope that the dream will come true and victims of disappointment in not being able to turn their plans, so carefully crafted, into reality.

CC BY
© RAE | São Paulo | **59(1)** | **January-February 2019** | 62-67
ISSN 0034-7590

REFERENCES

Atkinson, H. (2006). Strategy implementation: A role for the balanced scorecard? *Management Decision*, *44*(10), 1441–1460. doi:10.1108/00251740610715740

Baer, M., Dirks, K. T., & Nickerson, J. A. (2013). Microfoundations of strategic problem formulation. *Strategic Management Journal*, *34*(2), 197–214. doi:10.1002/smj.2004

Barney, J. (2010). *Gaining and sustaining competitive advantage* (4th ed.). New York: Pearson.

Bazerman, M. H., & Moore, D. A. (2008). *Judgment in managerial decision making*. Berkeley, CA: Wiley.

Beer, M., & Eisenstat, R. A. (2000). The silent killers of strategy implementation and learning. *Sloan Management Review*, *41*(4), 29–40.

Bossidy, L., & Charan, R. (2002). *Execution: The discipline of getting things done*. New York, NY: Crown Business.

Coff, R., & Kryscynski, D. (2011). Drilling for micro-foundations of human capital-based competitive advantages. *Journal of Management*, *37*(5), 1429–1443. doi:10.1177/0149206310397772

Delisi, P. (2010). *Strategy execution: The next major "point of inflection."* Fremont, CA: Organization Synergies. Retrieved from http://www.org-synergies.com/docs/Strategy%20Execution%20Paper3.pdf

Dutton, J. E., & Ashford, S. J. (1993). Selling issues to top management. *Academy of Management Review*, *18*(3), 397–428. doi:10.2307/258903

Felin, T., & Foss, N. (2005). Strategic organization: A field in search of micro-foundations. *Strategic Organization*, *3*(4), 441–455. doi:10.1177/1476127005055796

Foss, N. J., & Pedersen, T. (2016). Microfoundations in strategy research. *Strategic Management Journal*, *37*(13), E22–E34. doi:10.1002/smj.2362

Hrebiniak, L. G. (2006). Obstacles to effective strategy implementation. *Organizational Dynamics*, *35*(1), 12–31. doi:10.1016/j.orgdyn.2005.12.001

Jarzabkowski, P., Balogun, J., & Seidl, D. (2007). Strategizing: The challenges of a practice perspective. *Human Relations*, *60*(1), 5–27. doi:10.1177/0018726707075703

Kahneman, D. (2003a). Maps of bounded rationality: Psychology for behavioral economics. *The American Economic Review*, *93*(5), 1449–1475. doi:10.1257/000282803322655392

Kahneman, D. (2003b). A perspective on judgment and choice: Mapping bounded rationality. *American Psychologist*, *58*(9), 697–720. doi:10.1037/0003-066X.58.9.697

Kahneman, D., & Tversky, A. (2013). Prospect theory: An analysis of decision under risk. In L. C. MacLean, & W. T. Ziemba, *Handbook of the fundamentals of financial decision making: Part I* (pp. 99–127). Toh Tuck Link, Singapore: World Scientific.

Kaplan, R., & Norton, D. (1996). *The balanced scorecard: Translating strategy into action*. Boston, MA: Harvard Business Review Press.

Kim, C., & Mauborgne, R. (2015). *Blue ocean strategy: How to create uncontested market space and make the competition irrelevant* (expanded edition). Boston, MA: Harvard Business Review Press.

Langley, A. (1995). Between "paralysis by analysis" and "extinction by instinct." *Sloan Management Review*, *36*, 63–63.

Lawrence, D. (1998). Leading discontinuous change: Ten lessons from the battlefront. In D. Hambrick, D. Nadler, & M. Tushman (Eds.), *Navigating change: How CEO's, top teams, and boards steer transformation* (pp. 291–308). Boston, MA: Harvard Business School Press.

MacLennan, A. (2010). *Strategy execution: Translating strategy into action in complex organizations*. London, UK: Routledge.

Mankins, M. C., & Steele, R. (2005). Turning great strategy into great performance. *Harvard Business Review*, *83*(7), 64–72.

March, J. G. (1978). Bounded rationality, ambiguity, and the engineering of choice. *The Bell Journal of Economics*, *9*(2), 587–608.

Mintzberg, H. (1988). Generic strategies: Toward a comprehensive framework. In R. Lamb, & P. Shrivastava (Eds.), *Advances in Strategic Management* (Vol. 5, pp. 1–67). Greenwich, CT: JAI Press.

Mintzberg, H., & Waters, J. A. (1985). Of strategies, deliberate and emergent. *Strategic Management Journal*, *6*(3), 257–272. doi:10.1002/smj.4250060306

Oliveira, C. A., Carneiro, J., & Esteves, F. (forthcoming). *Conceptualizing and measuring the "strategy execution" construct. Journal of Business Research*.

Porter, M. E. (1985). *Competitive advantage: Creating and sustaining superior performance*. New York, NY: Free Press.

Powell, T. C. (2017). Strategy as diligence: Putting behavioral strategy into practice. *California Management Review*, *59*(3), 162–190. doi:10.1177/0008125617707975

Rothman, N. B., Pratt, M. G., Rees, L., & Vogus, T. J. (2017). Understanding the dual nature of ambivalence: Why and when ambivalence leads to good and bad outcomes. *Academy of Management Annals*, *11*(1), 33–72. doi:10.5465/annals.2014.0066

Rumelt, R. (2012). *Good strategy/Bad strategy: The difference and why it matters*. New York, NY: Crown Business.

Sarasvathy, S. D. (2001). Causation and effectuation: Toward a theoretical shift from economic inevitability to entrepreneurial contingency. *Academy of Management Review*, *26*(2), 243–263. doi:10.5465/amr.2001.4378020

Simon, H. A. (1979). Rational decision making in business organizations. *The American Economic Review*, *69*(4), 493–513.

Tversky, A., & Kahneman, D. (1974). Judgment under uncertainty: Heuristics and biases. *Science*, *185*(4157), 1124–1131. doi:10.1126/science.185.4157.1124

Tversky, A., & Kahneman, D. (1978). Judgment under uncertainty: Heuristics and biases: Biases in judgments reveal some heuristics of thinking under uncertainty. In P. Diamond, & M. Rothschild, *Uncertainty in economics* (pp. 17–34). London, UK: Palgrave Macmillan.

CC BY

ISSN 0034-7590

BOOK REVIEW

Translated version
DOI: http://dx.doi.org/10.1590/S0034-759020190108

THE HISTORY OF THERANOS AND THE LESSONS LEARNED FROM A DROP OF BLOOD

BAD BLOOD: Secrets and lies in a Silicon Valley startup

John Carreyrou. London, UK: Alfred A. Knopf, 2018, 352 p.

How did a Silicon Valley startup that achieved a valuation of billions of dollars in just a few years prove to be one of the biggest corporate frauds in recent American history? The rise and fall of Theranos, a biotechnology firm, and its founder, Elizabeth Holmes, is the subject of this meticulous journalistic investigation by Wall Street Journal (WSJ) reporter and two-time Pulitzer Prize-winning author, John Carreyrou.

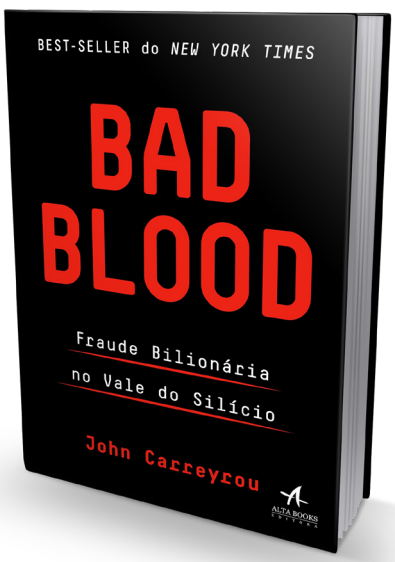
The company claimed to be able to perform hundreds of tests (cholesterol, cancer, infections, and even pregnancy) with only a few drops of blood, for a fraction of the price and much faster than traditional laboratories. For this breakthrough, its founder and CEO, Elizabeth Holmes, had been compared to Apple founder, Steve Jobs.

The book is divided into two parts. The first three quarters (chapters 1 to 18) are narrated in third person and provide a retrospection of the facts prior to the author's first contact with the case. Carreyrou reports on how Holmes, still very young, was able to take full advantage of her family's high-level connections to attract her first investors, who were neither too keen on detail nor skeptical of her ideas. The author also reveals how Holmes was able to convince an impressive roll of other influential supporters based on the good name and reputation of these early investors.

Gifted with high doses of charm, charisma, and astuteness, Holmes started out from the promise of a revolutionary technology potentially able to save millions of lives to building an inspiring narrative around her. Consequently, she took on the role of a prodigal girl (who, at age 19, dropped out of Stanford University's Chemical Engineering course to start her own business) and was a living symbol of progress, innovation, and female empowerment.

In a tech universe filled with apps developed for saving on rent and urban transportation, her quixotic ambition echoed loudly. Within a short time, she was able to surround herself with prominent and influential people with stellar reputations, such as former US Secretaries of State George Shultz and Henry Kissinger, who joined the company's board of directors.

Catapulted to stardom due to all these factors, Holmes was able to raise hundreds of millions of dollars of venture capital and sign million-dollar contracts. Surprisingly, she accomplished all of that without ever presenting any real evidence that her technology did indeed work. One of the contracts was signed with a large pharmacy chain, Walgreens, to offer these tests to the general public.



By

DANIEL CHU
danielchu@gvmail.br
ORCID: 0000-0002-7909-5748

Fundação Getulio Vargas, Escola de Administração de Empresas de São Paulo, São Paulo, SP, Brazil

CC BY

ISSN 0034-7590

In its glory days, Theranos was considered one of the most promising unicorns—startup companies valued at over 1 billion dollars—with its stock market valuation hitting 9 billion dollars. At that time, the company experienced exuberant growth, reaching a total of 700 employees, including renowned PhD researchers.

Things started falling apart in 2013 when Theranos had to honor its agreement with Walgreens. Some of Theranos' employees, aware of the tests' flaws and the dangers to patients' lives, began to ask questions and look for ways to expose the truth.

At this point begins the second part of the book (chapters 19 to 24). The author changes the narrative to first person and explains, in detail, his actions to disentangle this great conspiratorial farce. With a tip from an acquaintance familiar to the case, Carreyrou began a meticulous investigation, building a case against Theranos, mostly based on accusations from certain former employees' accounts.

Although seriously threatened by the company for confidentiality breach, they provided sufficient evidence to the author and his editor, in 2015, with the support of their lawyers, to publish a series of articles on the case in the WSJ. These articles eventually unveiled the entire fraud scheme headed by Holmes and her direct advisor, Sunny Balwani, then president and COO of the company.

As extraordinary as Holmes has been in deceiving investors, customers, regulators, experts, and the media in general, there were people who doubted her promises. The reason for collecting large volumes of blood in conventional medical tests is that peripheral blood is susceptible to various types of contamination. The smaller the sample, the greater the risks of variations in the results. Experts familiar with the clinical process know this well, and certain venture capital investors who had been approached by Holmes were not convinced by her arguments, and sometimes, her attempts to raise funds were frustrated.

The facts reported in this book should be appreciated by business professionals as an alert that offers at least two great lessons. First, while it is true that individuals and organizations need to cultivate the art of storytelling, attention must also be given to the actions of cheaters and manipulators. While stories often offer symbiotic benefits to both the storyteller and the listener, it is important to recognize that they are primarily in the interest of the storytellers themselves.

The tragedy of Holmes and Theranos shows that success stories generate intense feelings which act, so to speak, as "anesthetics" for logic and skepticism. In a positive way, good stories—fictional or otherwise—make people more open minded. On the other hand, they make people excessively credulous.

When questioned about the difficulties of obtaining reliable results from such small blood samples, Holmes was reported to have found ways to overcome these difficulties and expressed that she could not disclose the details as a matter of intellectual property protection. Such an argument guaranteed the longevity of the farce, despite the fact that there is a significant difference in introducing technology for the healthcare industry as compared to other industries. In this case, due to the risks to human lives, a company cannot be exempted from presenting its technology to be reviewed by its peers.

Second, the belief that entrepreneurs can be allowed to take risks and break certain rules to make their magic happen should be viewed with caution. Ethical rules should not be broken. In this sense, this book serves to incite a discussion about ethics in light of the nuances imposed by the process of technological development, nowadays heavily influenced by individualism, extreme competition, society of spectacle, and consumption.

In this context, ethics, as observed by Kant (2009), implies the ability to think about the conduct and values of companies, simultaneously meeting the imperatives of freedom and responsibility. The latter is in line with laws and collective interests while the former is an incentive to technological development.

ACKNOWLEDGMENTS

I would like to thank Valentina Barbosa, Marilena Cheng, and Emily Joyce for the review and translation of this text.

REFERENCE

Kant, I. (2009). *Fundamentação da metafísica dos costumes*. Lisboa, Portugal: Edições 70.

 CC BY ISSN 0034-7590

EDITORIAL INFORMATION 2018

ARTICLE STATUS		2017	%	2018[1]	%
AUTHORS	**Submitted**	895	100%	786	100%
EDITORIAL (Format evaluation)	Inapropriate[2]	285	32%	284	36%
	Withdrawn before the blind review process	74	8%	45	6%
	Sent for desk review	**536**	**60%**	**457**	**58%**
EDITOR (*desk review*)	Rejected	231	26%	211	27%
	Rejected and resubmission	28	3%	35	4%
	Awaiting for desk review	10	1%	29	4%
	Sent to Scientific Editors	**267**	**30%**	**182**	**23%**
SCIENTIFIC EDITORIAL BOARD (preliminary review)	Rejected	102	11%	79	10%
	Rejected and resubmission	9	1%	3	0%
	In preliminary review stage	27	3%	23	3%
	Sent to Evaluators	**129**	**14%**	**77**	**10%**
REVIEWERS	Rejected	60	7%	36	5%
	Rejected and resubmission	7	1%	7	1%
	In double blind review	30	3%	12	2%
	Sent to authors for improving	**32**	**4%**	**22**	**3%**
AUTHORS	In Improvement stage	9	1%	10	1%
	Withdrawn after the blind review process	0	0%	0	
Scientific Editorial Board (re-evaluation)	Reevaluation after authors' improvements	**2**	**0%**	**3**	**1%**
AUTHORS	**Approved**	**15**	**2%**	**7**	**1%**
	Rejected after Reevaluation	**6**	**0%**	**2**	**1%**
Editorial	**Published**	**0**	**0%**	**0**	

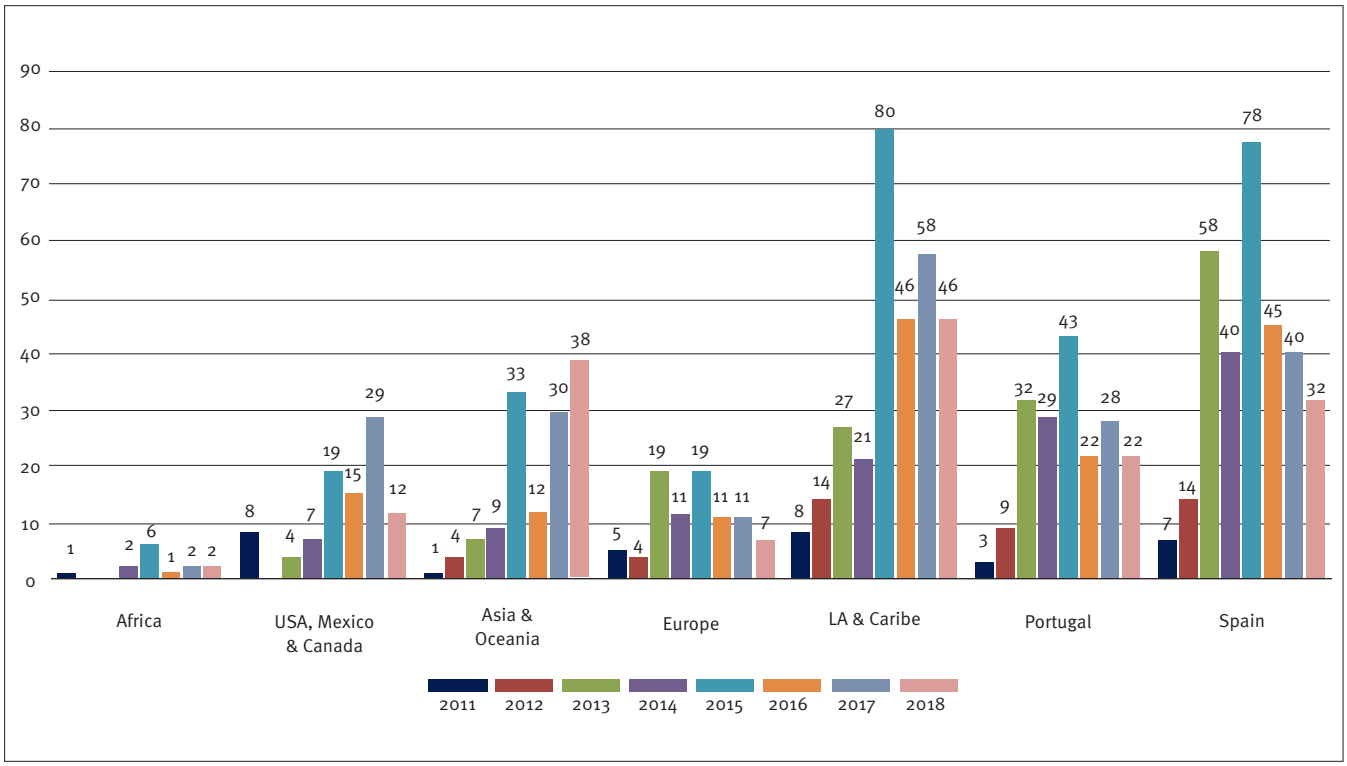
[1]Status on 01.04.2019.

[2]In the initial screening, the articles undergo format evaluation and detection of plagiarism through the iThenticate® software; the evaluation is carried out by the editorial staff, according to the norms established by the RAE Manual.

Note: The percentages presented in the table are based on the total number of articles submitted.

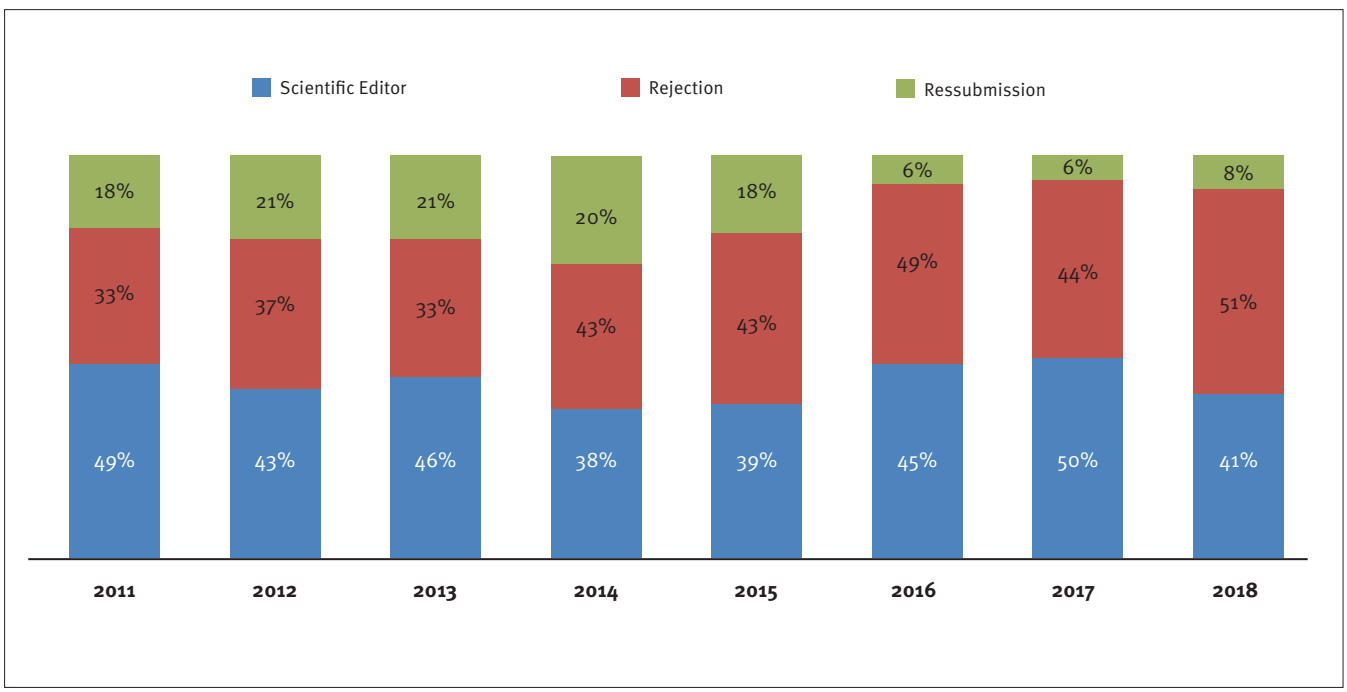
 CC BY

SUBMISSIONS BY INTERNATIONAL AUTHORS



Note: Articles sent for desk review, after format evaluation and plagiarism check.

DESK REVIEW EVALUATION (ANNUAL)



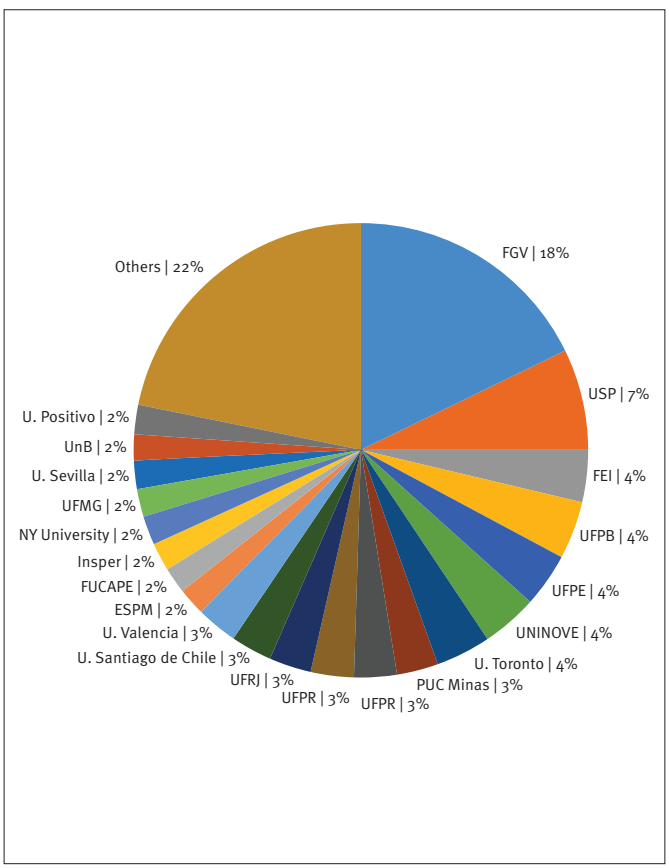
Note: The percentages presented in the table refer to the total number of articles sent for desk review by the Editor-in-Chief.

CC BY

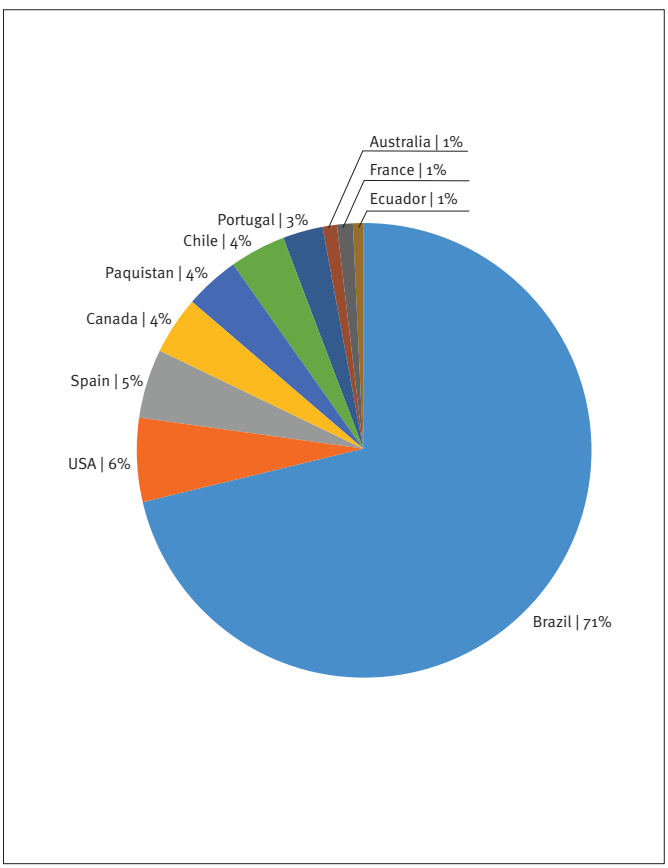
PUBLISHED ARTICLES

	2017	2018
Total number of published articles	42	48
Submitted for double-blind review	34	32
Guest authors	11	16
Geographical partnership between authors		
Brazilian authors only	25	32
International authors only	15	14
International collaboration only	5	2

Institutional Diversity in authorship of articles (%)

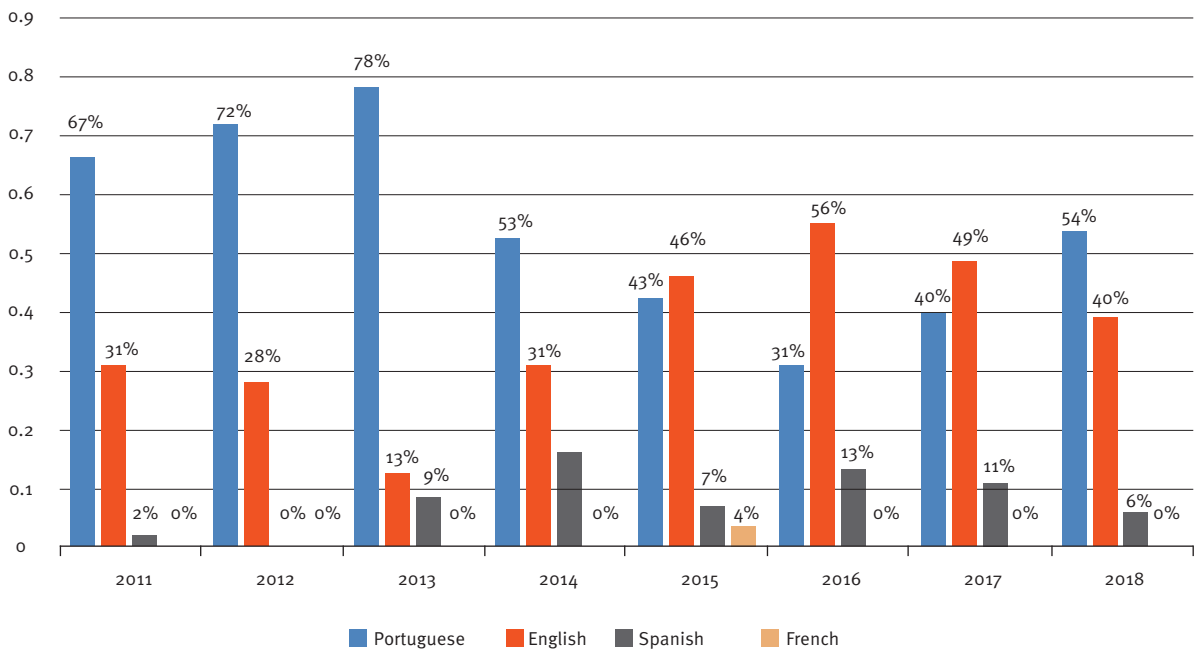


Geographical diversity in authorship of articles (%)



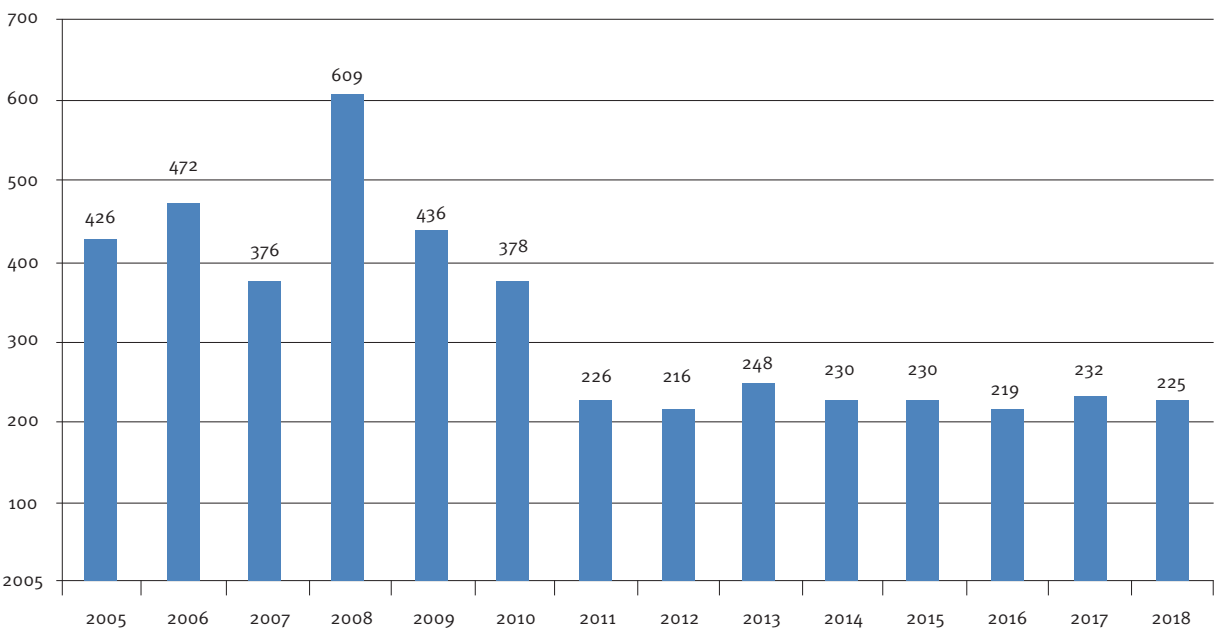
CC BY

LANGUAGE OF PUBLISHED ARTICLES



Note: In 2018, RAE started publishing articles in English, along with a Portuguese or Spanish version. The information presented captures the language in which the article was originally submitted.

ANNUAL AVERAGE NUMBER FROM THE PROCESS OF EVALUATION UNTIL APPROVAL



CC BY

COLLABORATORS

RAE would like to thank the researchers who, with their experiences and knowledge, collaborated to the improvement of the submitted articles. This voluntary contribution is indispensable for improving of the quality of the articles to we published. In 2018, the Scientific Editorial Board was renewed; this allowed the development of valuable new partnerships among the members of the board, guest editors, authors, and reviewers.

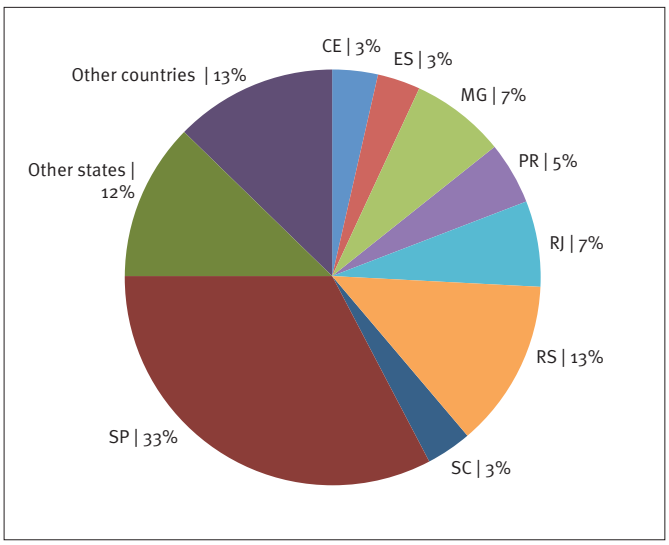
We acknowledge the collaboration of the members of the Scientific Editorial Board and Reviewers and we selected the best of the year, whose contribution was decisive for the quality of articles published in RAE. The choice was based on three criteria: the number of reviews performed, the time to process the review, and the quality of the reviews. The scientific editors participated in the preliminary review and follow-up of 2.6 articles each and used an average of 9.51 days to complete their reviews. Among the reviewers who collaborated in our blind review process in 2018, each one, on average, performed 2.8 evaluations and used 13.2 days to conclude their reviews.

From January to December 2018 we count on the participation of 229 contributors (pages 75-79). Our special thanks to all!

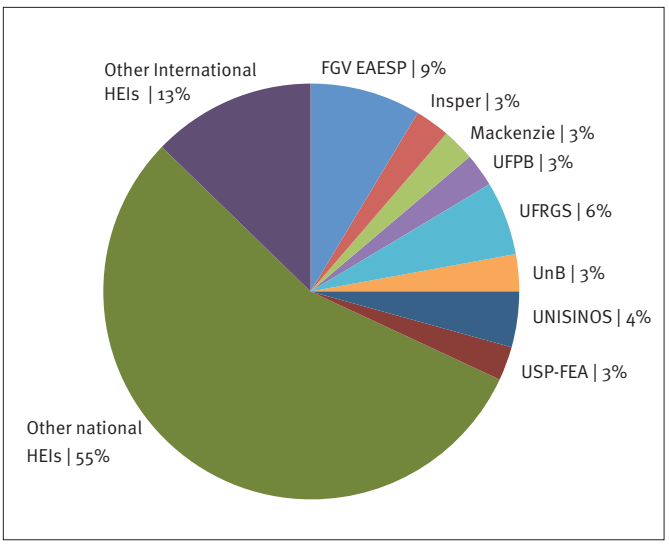
Scientific Editors	Institution
Allan Claudius Queiroz Barbosa	UFMG
Antonio Lopo Martinez	Fucape
Fernanda Finotti C. Perobelli	UFJF
Glicia Vieira dos Santos	UFES
Jorge Renato de Souza Verschoore Filho	UNISINOS
Luciano Barin Cruz	HEC-Montreal
Marcelo de Souza Bispo	UFPB
Salomao Alencar de Farias	UFPE

Reviewers	Institution
Alexandre de Pádua Carrieri	UFMG
Claudia Buhamra Abreu Romero	UFC
Francisco Sales	UFMG
Marconi Freitas-da-Costa	UFPE
Ronan Torres Quintão	CEFET-MG
Severino Pereira	INSPER
Stefania Ordovas de Almeida	PUC-RS

Geographic Diversity of the Scientific Editorial Board and Reviewers



Institutional Diversity of the Scientific Editorial Board and Reviewers



CC BY

Adalberto Azevedo
UFABC, Santo André, SP, Brazil

Adriana Roseli Wünsch Takahashi
UFPR, Curitiba, PR, Brazil

Alcides Barrichello
Mackenzie, São Paulo, SP, Brazil

Alexandre Cappellozza
Universidade Metodista, São Bernardo do Campo, SP, Brazil

Alexandre Carrieri
UFMG, Belo Horizonte, MG, Brazil

Alexandre Reis Graeml
UTFPR, Curitiba, PR, Brazil

Alexandre Zanini
UFJF, Juiz de Fora, MG, Brazil

Alsones Balestrin
UNISINOS, São Leopoldo, RS, Brazil

Amon Narciso de Barros
FGV EAESP, São Paulo, SP, Brazil

Ana Augusta Freitas
UECE, Fortaleza, CE, Brazil

Ana Maria Malik
FGV EAESP, São Paulo, SP, Brazil

Ana Silvia Rocha Ipiranga
UECE, Fortaleza, CE, Brazil

André Luis de Castro Moura Duarte
INSPER, São Paulo, SP, Brazil

André Luiz de Souza-Leão
UFPE, Recife, PE, Brazil

André Machado
UFPB, João Pessoa, PB, Brazil

Andrea Cristina Versuti
UnB, Brasília, DF, Brazil

Andrea Lago da Silva
UFSCAR, São Carlos, SP, Brazil

Andrea Leite Rodrigues
USP-EACH, São Paulo, SP, Brazil

Andrea Maria Accioly Fonseca Minardi
INSPER, São Paulo, SP, Brazil

Andrea Oltramari
UFRGS, Porto Alegre, RS, Brazil

Andréa Segatto
UFPR, Curitiba, PR, Brazil

Andres Rodriguez Veloso
USP-FEA, São Paulo, SP, Brazil

Ángel Francisco Villarejo Ramos
Universidad de Sevilla, Sevilla, Spain

Angela Cristiane Santos Póvoa
PUCPR, Curitiba, PR, Brazil

Anielson Barbosa da Silva
UFPB, João Pessoa, PB, Brazil

Antonio Carlos Gastaud Maçada
UFRGS, Porto Alegre, RS, Brazil

Antonio Domingos Padula
UFRGS, Porto Alegre, RS, Brazil

Antonio Lopo Martinez
FUCAPE, Vitória, ES, Brazil

Antonio Zoratto Sanvicente
FGV EESP, São Paulo, SP, Brazil

Ariane Corradi
UFMG, Belo Horizonte, MG, Brazil

Beatriz Villardi
UFRRJ, Seropédica, RJ, Brazil

Benjamin Rosenthal
FGV EAESP, São Paulo, SP, Brazil

Bibiana Volkmer Martins
UNISINOS, São Leopoldo, RS, Brazil

Bruno Fischer
UNICAMP, Campinas, SP, Brazil

Cândido Vieira Borges Junior
UFG, Goiânia, GO, Brazil

Carlos Denner dos Santos Júnior
UnB, Brasília, DF, Brazil

Carlos Ricardo Rossetto
UNIVALI, Itajaí, SC, Brazil

Celso Augusto de Matos
UNISINOS, São Leopoldo, RS, Brazil

Charbel Chiappetta Jabbour
Montpellier Business School, Montpellier, French Riviera, France

Charles Kirschbaum
INSPER, São Paulo, SP, Brazil

Christian Luiz da Silva
UTFPR, Curitiba, PR, Brazil

Cintia Rodrigues de Oliveira Medeiros
UFU, Uberlândia, MG, Brazil

Clarissa Sóter
Cesar School, Recife, PE, Brazil

Claudia Afonso Silva Araujo
UFRJ, Rio de Janeiro, RJ, Brazil

Claudia Buhamra
UFC, Fortaleza, CE, Brazil

Daiane Neutzling
UNIFOR, Fortaleza, CE, Brazil

Dálcio Roberto dos Reis
UP, Curitiba, PR, Brazil

Daniela Jakubaszko
USCS, São Caetano do Sul, SP, Brazil

Danilo Dantas
HEC-Montréal, Montréal, QC, Canada

Darcy Mitiko Mori Hanashiro
Mackenzie, São Paulo, SP, Brazil

Delane Botelho
FGV EAESP, São Paulo, SP, Brazil

Diego Coraiola
University of Alberta, Edmonton, AB, Canada

 CC BY

Diego de Faveri
FGV EBAPE, Rio de Janeiro, RJ, Brazil

Diogenes de Souza Bido
Mackenzie, São Paulo, SP, Brazil

Diogo Henrique Helal
UFPB, João Pessoa, PB, Brazil

Edimara Luciano
PUCRS, Porto Alegre, RS, Brazil

Edmilson de Oliveira Lima
UNINOVE, São Paulo, SP, Brazil

Edson Sadao Iizuka
Centro Universitário FEI, São Paulo, SP, Brazil

Eduardo André Teixeira Ayrosa
UNIGRANRIO, Rio de Janeiro, RJ, Brazil

Eduardo de Rezende Francisco
FGV EAESP, São Paulo, SP, Brazil

Eduardo Fonseca Mendes
FGV EMAp, Rio de Janeiro, RJ, Brazil

Eduardo Paes Barreto Davel
UFBA, Salvador, BA, Brazil

Eduardo Tomé
Universidade Europeia, Lisbon, Portugal

Edwin Vladimir Cardoza Galdamez
UEM, Maringá, PR, Brazil

Elaine Maria Tavares Rodrigues
UFRJ, Rio de Janeiro, RJ, Brazil

Eli Lopes da Silva
SENAC-SC, Florianópolis, SC, Brazil

Eliane Pereira Zamith Brito
FGV EAESP, São Paulo, SP, Brazil

Eliciane Silva
FGV EAESP, São Paulo, SP, Brazil

Elizabeth Krauter
USP-FEA/RP, Ribeirão Preto, SP, Brazil

Ernesto Giglio
UNIP, São Paulo, SP, Brazil

Evandro Luiz Lopes
UNINOVE, São Paulo, SP, Brazil

Fabiana Ortiz Tanoue de Mello
FUNEPE, Penápolis, SP, Brazil

Fabio Vizeu
UP, Curitiba, PR, Brazil

Fernanda Finotti Perobelli
UFJF, Juiz de Fora, MG, Brazil

Fernanda Reichert
UFRGS, Porto Alegre, RS, Brazil

Fernanda Spanier Amador
UFRGS, Porto Alegre, RS, Brazil

Fernando Caio Galdi
FUCAPE, Vitória, ES, Brazil

Fernando Chague
FGV EESP, São Paulo, SP, Brazil

Fernando Santini
UNISINOS, São Leopoldo, RS, Brazil

Fernando Serra
UNINOVE, São Paulo, SP, Brazil

Filipe João Bera de Azevedo Sobral
FGV EBAPE, Rio de Janeiro, RJ, Brazil

Flavia Gutierrez Motta
IPT, São Paulo, SP, Brazil

Flávio Hourneaux Junior
USP-FEA, São Paulo, SP, Brazil

Francielle Molon da Silva
UFPEL, Pelotas, RS, Brazil

Francisco José da Costa
UFPB, João Pessoa, PB, Brazil

Francisco Vicente Sales Melo
UFPE, Recife, PE, Brazil

Gabriela Spanghero Lotta
FGV EAESP, São Paulo, SP, Brazil

Gabriel Sperandio Milan
Faculdade CNEC Farroupilha, Farroupilha, RS, Brazil

Gazi Islam
INSPER, São Paulo, SP, Brazil

Geciane Silveira Porto
USP-FEA/RP, Ribeirão Preto, SP, Brazil

Gláucia Maria Vasconcellos Vale
PUC Minas, Belo Horizonte, MG, Brazil

Glicia Vieira dos Santos
UFES, Vitória, ES, Brazil

Guilherme Dornelas Camara
UFRGS, Porto Alegre, RS, Brazil

Guilherme Kirch
UFRGS, Porto Alegre, RS, Brazil

Guilherme Silveira Martins
INSPER, São Paulo, SP, Brazil

Guillermo Rodríguez Abitia
UNAM, Ciudad de Mexico, Mexico

Henrique Luiz Côrrea
Rollins College Crummer, Winter Park, FL, USA

Henrique Muzzio
UFPE, Recife, PE, Brazil

Herbert Kimura
UnB, Brasília, DF, Brazil

Indira Guzman
Trident University, Cypress, CA, USA

Iuri Gavronski
UNISINOS, São Leopoldo, RS, Brazil

Ivete Delai
UFSCAR, São Carlos, SP, Brazil

Jair Nascimento Santos
UNEB, Salvador, BA, Brazil

Jairo Borges-Andrade
UnB, Brasília, DF, Brazil

Janaina Ruffoni
UNISINOS, São Leopoldo, RS, Brazil

Janaína Bueno
UFU, Uberlândia, MG, Brazil

 CC BY

Janete Lara de Oliveira
UFMG, Salvador, BA, Brazil

Jeferson Lana
UNIVALI, Itajaí, SC, Brazil

Jesuina Maria Ferreira
UniFBV, Recife, PE, Brazil

Joaquim Rubens Fontes Filho
FGV EBAPE, Rio de Janeiro, RJ, Brazil

Joaquín Alegre
Universitat de València, València, Spain

João Porto de Albuquerque
University of Warwick, Warwick, Warwickshire, England

Jocimari Tres
INSPER, São Paulo, SP, Brazil

Jorge Manoel Teixeira Carneiro
FGV EAESP, São Paulo, SP, Brazil

Jorge Verschoore
UNISINOS, São Leopoldo, RS, Brazil

Jose Afonso Mazzon
USP-FEA, São Paulo, SP, Brazil

José Eduardo Ferreira Lopes
UFU, Uberlândia, MG, Brazil

José Elias Feres de Almeida
UFES, Vitória, ES, Brazil

José Luiz Kugler
FGV EAESP, São Paulo, SP, Brazil

José Mauro da Costa Hernandez
Centro Universitário FEI, São Paulo, SP, Brazil

José Milton Sousa-Filho
UNIFOR, Fortaleza, CE, Brazil

Juan Espinosa-Cristia
PUCV, Valparaíso, Chile

Juliana Bonomi
FGV EAESP, São Paulo, SP, Brazil

Lauro Gonzalez
FGV EAESP, São Paulo, SP, Brazil

Leandro Guissoni
FGV EAESP, São Paulo, SP, Brazil

Lee-Lee Chong
Multimedia University, Cyberjaya, Selangor, Malaysia

Lélis Espartel
PUCRS, Porto Alegre, RS, Brazil

Leticia Casotti
UFRJ, Rio de Janeiro, RJ, Brazil

Letícia Fantinel
UFES, Vitória, ES, Brazil

Lilian Soares Pereira Carvalho
Saint Paul Educacional, São Paulo, SP, Brazil

Lindomar Pinto da Silva
UNIFACS, Salvador, BA, Brazil

Lisiane Closs
UFRGS, Porto Alegre, RS, Brazil

Lucia Barbosa de Oliveira
FGV EBAPE, Rio de Janeiro, RJ, Brazil

Luciana Cezarino
UFU, Uberlândia, MG, Brazil

Luciano Barin Cruz
HEC-Montréal, Montréal, QC, Canada

Luciano Rossoni
UNIGRANRIO, Rio de Janeiro, RJ, Brazil

Ludmilla Montenegro
UFS, São Cristovão, SE, Brazil

Luís Eduardo Afonso
USP-FEA, São Paulo, SP, Brazil

Luis Pinochet
UNIFESP, Osasco, SP, Brazil

Luiza Venzke Bortoli Foschiera
IFRS, Viamão, RS, Brazil

Lya Porto de Oliveira
FGV EAESP, São Paulo, SP, Brazil

Maira Petrini
PUCRS, Porto Alegre, RS, Brazil

Manuel Portugal Ferreira
UNINOVE, São Paulo, SP, Brazil

Marcela Mandiola
Universidad Alberto Hurtado, Santiago, Chile

Marcello Zappellini
UDESC, Florianópolis, SC, Brazil

Marcelo de Rezende Pinto
PUC Minas, Belo Horizonte, MG, Brazil

Marcelo de Souza Bispo
UFPB, João Pessoa, PB, Brazil

Marcelo Ferreira Tete
UFG, Goiânia, GO, Brazil

Marcelo Jacques Fonseca
UNISINOS, São Leopoldo, RS, Brazil

Marcelo Moll Brandão
UFES, Vitória, ES, Brazil

Marcelo Vinhal Nepomuceno
HEC-Montréal, Montréal, QC, Canada

Marcia Dutra de Barcellos
UFRGS, Porto Alegre, RS, Brazil

Marcia Juliana d'Angelo
FUCAPE, Vitória, ES, Brazil

Marconi Freitas da Costa
UFPE, Caruaru, PE, Brazil

Marcos André Mendes Primo
Faculdade dos Guararapes, Jaboatão dos Guararapes, PE, Brazil

Marcos Barros
Grenoble Ecole de Management, Grenoble, Isère, France

Marcus Vinicius Peinado Gomes
University of Exeter, Exeter, Devon, England

Maria Beatriz Rodrigues
UFRGS, Porto Alegre, RS, Brazil

Maria Carolina Zanette
ESLSCA Business School Paris, Paris, France

 CC BY

Maria Cristina Rocha Barreto
UERN, Mossoró, RN, Brazil

Maria Luisa Mendes Teixeira
Mackenzie, São Paulo, SP, Brazil

Maria Tereza Leme Fleury
FGV EAESP, São Paulo, SP, Brazil

Maribel Carvalho Suarez
UFRJ, Rio de Janeiro, RJ, Brazil

Marina Amado Bahia Gama
FGV EAESP, São Paulo, SP, Brazil

Mário Henrique Ogasavara
ESPM, São Paulo, SP, Brazil

Mário Sacomano Neto
UFSCAR, São Carlos, SP, Brazil

Martin Jayo
USP- EACH, São Paulo, SP, Brazil

Mateus Canniatti Ponchio
ESPM, São Paulo, SP, Brazil

Mauricio Custódio Serafim
UDESC, Florianópolis, SC, Brazil

Mauricio Reinert
UEM, Maringá, PR, Brazil

Michel Machado
CPS-SP, São Paulo, SP, Brazil

Michele Nascimento Jucá
Mackenzie, São Paulo, SP, Brazil

Minelle Silva
UNIFOR, Fortaleza, CE, Brazil

Moacir Manoel Rodrigues Junior
FURB, Blumenau, SC, Brazil

Mônica Mac-Allister
UFBA, Salvador, BA, Brazil

Naja Brandão Santana
UFSCAR, Buri, SP, Brazil

Natalia Aguilar Delgado
HEC-Montréal, Montréal, QC, Canada

Natália Rese
UFPR, Curitiba, PR, Brazil

Pablo Collazzo
Grenoble Ecole de Management, Grenoble, France

Pablo Isla
Universidad Técnica Federico Santa María, Valparaíso, Valparaíso, Chile

Patricia Unger Raphael Bataglia
UNESP, Marília, SP, Brazil

Patricia Gabaldón
IE Business School, Madrid, Spain

Paulo Roberto Barbosa Lustosa
UnB, Brasília, DF, Brazil

Peter Alexander Whigham
University of Otago, Dunedin, Otago, New Zealand

Pietro Dolci
UNISC, Santa Cruz do Sul, RS, Brazil

Priscila Laczynski de Souza Miguel
FGV EAESP, São Paulo, SP, Brazil

Rafael Diogo Pereira
UFMG, Belo Horizonte, MG, Brazil

Rafaela Cordeiro
USP-EACH, São Paulo, SP, Brazil

Raquel de Freitas Oliveira
FECAP, São Paulo, SP, Brazil

Ricardo Goulart Serra
FECAP, São Paulo, SP, Brazil

Ricardo Ratner Rochman
FGV EESP, São Paulo, SP, Brazil

Ricardo Silva
University College London, London, England

Ricardo Teixeira Veiga
UFMG, Belo Horizonte, MG, Brazil

Roberto Lima Ruas
UNINOVE, São Paulo, SP, Brazil

Roberto Patrus
PUC Minas, Belo Horizonte, MG, Brazil

Robson Rocha
Aarhus University, Aarhus, Denmark

Rodrigo Baroni de Carvalho
PUC Minas, Belo Horizonte, MG, Brazil

Ronan Torres Quintão
IFSP, Jacareí, SP, Brazil

Rosiléia das Mercês Milagres
FDC, Nova Lima, MG, Brazil

Salomão Alencar de Farias
UFPE, Recife, PE, Brazil

Sergio Bulgacov
FGV EAESP, São Paulo, SP, Brazil

Sérgio Fernando Loureiro Rezende
PUC Minas, Belo Horizonte, MG, Brazil

Sergio Luís Boeira
UFSC, Florianópolis, SC, Brazil

Sergio Olavarrieta
Universidad de Chile Santiago, Santiago, Chile

Severino Joaquim Nunes Pereira
UFRRJ, Nova Iguaçu, RJ, Brazil

Sidinei Rocha de Oliveira
UFRGS, Porto Alegre, RS, Brazil

Silvia Pereira de Castro Casa Nova
USP-FEA, São Paulo, SP, Brazil

Silvio Eduardo Alvarez Candido
UFSCAR, São Carlos, SP, Brazil

Silvio Luís de Vasconcellos
FURB, Blumenau, SC, Brazil

Simone Vasconcelos Ribeiro Galina
USP- FEA/RP, Ribeirão Preto, SP, Brazil

Stefânia Ordovás de Almeida
PUCRS, Porto Alegre, RS, Brazil

Sonia Maria Guedes Gondim
UFBA, Salvador, BA, Brazil

Soong Moon Kang
University College London, London, England

Susana Esper
HEC-Montréal, Montréal, QC, Canada

Teniza da Silveira
UFRGS, Porto Alegre, RS, Brazil

Teresa Diana Lewe van Aduard de Macedo-Soares
PUC-Rio, Rio de Janeiro, RJ, Brazil

Tomás de Aquino Guimarães
UnB, Brasília, DF, Brazil

Valcemiro Nossa
FUCAPE, Vitória, ES, Brazil

Valter Afonso Vieira
UEM, Maringá, PR, Brazil

Vicente Crisóstomo
UFC, Fortaleza, CE, Brazil

Wagner Ladeira
UNISINOS, Porto Alegre, RS, Brazil

Wagner Kamakura
Rice University, Houston, TX, USA

Wenner Glaucio Lopes Lucena
UFPB, João Pessoa, PB, Brazil

Wesley Mendes-Da-Silva
FGV EAESP, São Paulo, SP, Brazil

Wilson Costa de Amorim
USP-FEA, São Paulo, SP, Brazil

Wilson Nakamura
Mackenzie, São Paulo, SP, Brazil

Yeda Swirski De Souza
UNISINOS, São Leopoldo, RS, Brazil

Yuna Souza dos Reis Fontoura
FGV EBAPE, Rio de Janeiro, RJ, Brazil

 CC BY