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INNOVATION AND SOCIO-ENVIRONMENTAL SUSTAINABILITY: A COMPARATIVE STUDY OF BRAZILIAN AND EUROPEAN FIRMS

INOVAÇÃO E SUSTENTABILIDADE AMBIENTAL E SOCIAL: UM ESTUDO COMPARATIVO ENTRE EMPRESAS DO BRASIL E DA EUROPA

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ABSTRACT

In this descriptive and qualitative study, we evaluated innovation and socio-environmental sustainability as strategic organizational profiles in 78 Brazilian and European public firms traded on BM&F-Bovespa or NYSE Euronext between 2010 and 2013 and listed in at least one of the following indices: the Corporate Sustainability Index (ISE), the Carbon Efficient Index (ICO2) and the Low Carbon 100 Europe index®. Information was retrieved from financial reports, explanatory notes and sustainability reports. Innovation was proxied by intangible innovation assets, patents and R&D. Sustainability was evaluated based on the disclosure of GRI indicators. The two strategies were found to be strongly incorporated in European firms (i.e., in developed economies). A growing demand for innovation and sustainability was observed in both settings, indicating an indirect relationship between the two strategic profiles. Our results suggest that country-level economic and institutional factors play an important role in the definition of innovation and socio-environmental sustainability as strategic organizational profiles.

Keywords: Strategic organizational profiles. Innovation. Sustainability.

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RESUMO

Esta pesquisa teve por objetivo caracterizar a inovação e a sustentabilidade ambiental e social na condição de perfis organizacionais estratégicos, em empresas de capital aberto brasileiras e europeias. O grupamento analisado reúne companhias listadas na BM&FBovespa e na Nyse Euronext, participantes de pelo menos um dos seguintes índices: Índice de Sustentabilidade Empresarial (ISE), Índice Carbono Eficiente (ICO2) e Low Carbon 100 Europe®. A amostra reúne 78 empresas, avaliadas nos exercícios de 2010 a 2013. Trata-se de estudo descritivo, com abordagem qualitativa, utilizando dados extraídos de demonstrações financeiras, notas explicativas e relatórios de sustentabilidade. A inovação foi mensurada por meio dos intangíveis de inovação, patentes registradas e P&D. A sustentabilidade foi avaliada com base na divulgação dos indicadores da GRI. Os resultados sinalizam que inovação e sustentabilidade são estratégias fortemente incorporadas às empresas europeias, portanto pertencentes a economias desenvolvidas. Embora se observe que as estratégias inovação e sustentabilidade sejam demandas crescentes nos dois grupos estudados, sinaliza-se uma relação indireta entre esses perfis organizacionais estratégicos. Sugere-se que as estruturas nacionais podem ser importantes para a definição dos perfis organizacionais estratégicos da inovação e da sustentabilidade.

Palavras-chave: *Perfis organizacionais estratégicos. Inovação. Sustentabilidade.*

1 INTRODUCTION

Seen from a deterministic perspective, firms are subject to interference from their surroundings in the form of imperatives prompting them to act or take a stand. However, the notion that firms are foreign to such demands and merely adapt to them passively seems inadequate. Rather, one of the tasks of corporate leadership is to build the firm's strategic profile based on analyses and interpretations of external events. This process of assessing, interpreting and adjusting to external changes, not to mention the eventual definition of a strategic profile, is referred to as 'strategic voluntarism' (Rosseto; Rosseto, 2005).

According to Pinsky, Dias and Kruglianskas (2013, p. 465), in times of sustainable development, global competitiveness and rapid technological transformations, firms are under growing pressure to innovate, with emphasis on sustainability. Innovation and socio-environmental sustainability are strategies capable of upgrading a firm's organizational profile in the quest for greater competitiveness, economic and institutional advantages, and perpetuation on the market (Hami; Muhamad; Ebrahim, 2015; Kneipp *et al*., 2011; Machado; Machado; Murcia, 2011; Menezes *et al.*, 2011a, 2011b; Tidd; Bessant; Pavitt, 2008). The assumptions underlying this outlook are also implicit in the competitiveness assessment model, which sees external economic factors as determinants of competitive advantage and value creation (Sambiase, Franklin & Teixeira, 2013).

Several authors have looked at how innovation and socio-environmental sustainability favor organizations, especially with regard to economic performance (Machado & Machado, 2011; Malaquias & Meirelles, 2009; Pätäri *et al.*, 2014; Saeidi *et al*., 2015; Samad, 2012; Silveira & Oliveira, 2013; Tang, Pee & IIjima, 2013; Vellani & Nakao, 2009; Wang *et al.*, 2014; Zemplinerová & Hromádková, 2012). The two strategies are by many considered crucial to the innovative and sustainable business model; in other words, an effective response to the demands of a dynamic market (Barbieri *et al.,* 2010).

Other studies have investigated the synergy between the two organizational profiles, arguing that while innovation renders products, processes and methods more sustainable, socio-environmental sustainability is a catalyst for innovation (Bessant & Tidd, 2009; Gomes *et al*., 2009; Kim, 2015; Santos *et al*., 2013).

This highlights the relevance of studies on strategic organizational profiles evaluating how firms incorporate innovation and socio-environmental sustainability into their activities. According to Resource-Based View (RBV) and Natural Resource-Based View (NRBV), innovation and socio-environmental sustainability may be converted into strategic resources capable of aggregating differentiation (Barney, 1991; Hart, 1995).

This study is an attempt to answer the following question: How do Brazilian and European public firms position themselves with regard to innovation and socio-environmental sustainability? Our sample consisted of firms classified as sustainable by the Corporate Sustainability Index (ISE), the Carbon Efficient Index (ICO2) (both BM&FBovespa) or the Low Carbon 100 Europe index® (NYSE Euronext).

Rather than limit the sample to Brazilian firms, we included European firms to determine whether differences in country-level economic, ideological and institutional factors were predictive of corporate investment in innovation and socio-environmental sustainability. Several scholars have suggested this may be the case (Arruda, Vermulm & Hollanda, 2006; Fernandes, Ferreira & Raposo, 2013; Figueiredo, 2012; Nascimento, 2012; Oliveira *et al.*, 2012; Pereira, 2009; Rauen & Furtado, 2014; Ribeiro, Van Bellen & Carvalho, 2011).

Academically speaking, our study contributes to the emerging field of study on the relevance of innovation and sustainability strategies to organizational profile. Moreover, the study provides a useful comparison between firms from developing vs. economically developed regions (Brazil and Europe). From the managerial perspective, it is hoped our findings will subsidize the development of corporate strategies in line with different economic contexts, including short-term and long-term approaches based on the identification and choice of resources capable of generating differentiation and competitiveness. Perhaps even more directly, the study may be justified by the claim of Kneipp *et al*. (2011, p. 442) that in order to view innovation as a factor of competitiveness, one must understand its multiple effects on society and the environment, including the organizational environment.

2 INNOVATION AND SOCIO-ENVIRONMENTAL SUSTAINABILITY AS STRATEGIC RESOURCES

The theoretical framework of this study is based on the tenets of RBV (Barney, 1991) and NRBV (Hart, 1995), both of which focus on the ability of strategic resources to create competitive advantage. A number of authors believe innovation and socio-environmental sustainability are crucial to firms looking to invest in differentiation. In other words, innovation and sustainability may be considered indispensable for the long-term survival of organizations (Menezes *et al*., 2011a; 2011b).

Interestingly, from the strategic point of view, innovation and sustainability are conflicting demands, making it difficult to visualize the innovative and sustainable model proposed by Barbieri *et al.* (2010). Innovation implies constant invention and change, while sustainability chimes with equilibrium and responsible production and consumption. Yet, Bessant and Tidd (2009) demonstrated that, while sustainability interferes in the development of national innovation systems, innovation in turn supports the introduction of cleaner and more efficient technologies. In this study, we subscribe to the notion that the combination of innovation and sustainability can help implement the triple bottom line framework in organizations: the former has a purely economic strategic bias; the latter is geared towards social well-being and the environment.

The innovative and sustainable model is a response to social, institutional and market pressures by way of economically efficient innovation and the adoption of socio-environmentally responsible practices. Such organizations acquire competitive advantage through the development or modification of products, services, processes and partnerships, without neglecting social, economic and environmental demands; in other words, they combine innovativeness with commitment to sustainability (Dormann; Holliday, 2002; Sambiase; Franklin; Teixeira, 2013).

Innovation: firms with a strategic profile centered on innovation are capable of building competitive barriers. Thus, while competitors strive to keep up with leaders in innovation, the latter are engaged in building barriers to strengthen their position on the market (Schumpeter, 1961). The observed association between innovation and company perpetuation may be explained by competitive advantages derived from innovative activities (Freeman; Soete, 2008; Santos *et al.,* 2014; Tidd; Bessant; Pavitt, 2008).

Sustainability: firms which, in addition to their economic interests, are committed to environmental issues (e.g., pollution and conservation) and social issues (e.g., quality of life and human rights) may display a strategic bias very different from that of essentially innovative firms, but both stances are important to secure competitive advantage related to differentiation. Among the benefits obtained by sustainable firms are reputation and legitimacy in the eyes of society and on the market, the modeling of novel strategies, greater cost-efficiency of processes and activities, and even improved performance (Bessant & Tidd, 2009; Machado, Machado & Murcia, 2011; Maurer, 2011; Saeidi *et al.*, 2015; Scandelari & Cunha, 2013; Vellani & Nakao, 2009).

By detaining a given resource (including its potential exploitation), an organization is able to prevail over its competitors. The mere possession of a resource or competence by one firm alters the costs and benefits of competing firms, placing them in an adverse economic position on the market. This creates a resource position barrier which prevents the competitors from adopting a strategic profile similar to that of the organization controlling the resource or competence. There are also barriers preventing access to the market, but these are the result of general circumstances, not manageable resources. A position barrier is a way of protecting a resource with a large potential for gains associated with competitive advantage (Wernerfelt, 1984).

Following the reasoning of Wernerfelt (1984), innovation and socio-environmental sustainability may, as explained above, be considered strategic resources capable of generating competitive advantage from the moment the organization announces its commitment to these profiles. This is one of the assumptions of RBV (Barney, 1991) and NRBV (Hart, 1995).

The discussion about strategic corporate profiles, especially with regard to innovation and socio-environmental sustainability, gains more relevance when different national systems are compared—an argument inferred from a large body of research (Arruda, Vermulm & Hollanda, 2006; Fernandes, Ferreira & Raposo, 2013; Figueiredo, 2012; Nascimento, 2012; Oliveira *et al*., 2012; Pereira, 2009; Rauen & Furtado, 2014; Ribeiro, Van Bellen & Carvalho, 2011). According to these sources, national systems may be characterized by a set of economic, ideological and institutional variables. The economic dimension is relevant because countries differ in development and in their ability to make investments. As for the other two variables, the ideological makeup of a nation determines the importance it assigns to corporate profiles, while institutional factors help explain to what extent corporate commitment is determined by questions of social legitimacy (direct and indirect stakeholders).

Factors like economic sector, industrial life cycle, accumulation of technology and know-how, national innovation systems, external agents (regulation) and the nature of investments (national vs. international) may be reflected in corporate innovation profiles (Kannebley Júnior; Porto; Pazello, 2004; Lundvall *et al.*, 2002; Tidd; Bessant; Pavitt, 2008). Likewise, sustainable profiles may be influenced by economic sector, internationalization, stakeholders, economic conditions, socio-cultural background, regulation and the firm's own innovative activities (Bessant; Tidd, 2009; González-Benito; González-Benito, 2006; Heikkurinen; Bonnedahl, 2013; Masullo, 2004).

Furtado and Carvalho (2005) compared several countries (Brazil, Canada, Germany, Italy, Japan, Norway, Spain, the UK and the US) with regard to the level of technology, covering a 2-year period (1999-2000). The indicators employed included R&D ratio, R&D structure and aggregated value. The authors concluded that the sector classification of the Organization for Economic Co-operation and Development (OCDE) was inadequate for the Brazil setting. Unsurprisingly, Arruda, Vermulm and Hollanda (2006) found substantial differences between developed and developing countries with regard to innovation expressed as R&D investment and personnel, with special attention to Brazil's small technological potential.

Rauen and Furtado (2014) created a classification system for Brazilian high-tech industries based on the technology intensity of 16 OECD members, including Brazil. In their critique of the traditional literature on foreign trade, they identified four types of countries: surplus technology leaders, deficit technology leaders, surplus technology followers, and deficit technology followers. The authors also observed that production fragmentation compromises global technology chains.

Comparing firms from Australia, Brazil, Canada, Latin America, the UK and the US, Oliveira *et al.* (2012, 2014) and Ribeiro, Van Bellen and Carvalho (2011) found regulation to be a significant determinant of sustainability disclosure, more so in Brazil than in developed and emerging economies.

Nascimento (2012) concluded that the ideological dissemination of practices within the framework of sustainable development (which assumes the perennial coexistence of the environmental, social and economic dimensions) followed different patterns in developed and emerging economies. In fact, while the former were concerned with the growing levels of degradation threatening their quality of life, the latter feared economic activities restricting their products and obstructing their development, which was then at an early stage. It is however a fact that many resources are localized in countries with emerging economies, resulting in a new economic panorama: developed countries tend to preserve their own resources and seek alternatives, whereas developing countries assign more importance to socio-environmental issues.

In a study on environmental responsibility indicators, Freitas *et al.* (2013) found that Spanish firms made more disclosure of certain environmental indicators than did Brazilian firms. Among the possible explanations for this difference, the authors pointed to prominent EU imperatives affecting Spain but not Brazil. However, they also reiterated that, regardless of the economic context, commitment to responsible socio-environmental practices may be a response to pressure from society at large.

Emerging economies are seen as future business opportunities because, from the perspective of developing countries, understanding the role of innovation in the economy is important for the development of strategies promoting local competitiveness. The level of competitiveness is usually high in emerging economies as a result of a strong regulatory system which, by influencing or being influenced by technological transitions, is required to meet the ever-growing demands associated with sustainable development (Gomes *et al*., 2009). On one hand, emerging economies suffer from long-time problems like population growth and outdated technology (Pereira, 2009); on the other, in the long run, sizable consumer demands make such economies promising markets (Figueiredo, 2012).

This study differs from earlier investigations by evaluating corporate strategic profiles (innovation and sustainability) in relation to economic context. Our approach is based on RBV and NRBV, according to which the organizational profile is a determinant of competitive advantage, and, as shown by the literature, country-level factors have an influence on the definition of strategic profile. The relevance of the present study is also evident in the growing efforts by emerging countries like Brazil to accumulate technology and know-how and acquire legitimacy in the eyes of stakeholders.

3 METHODS

In this descriptive, qualitative and longitudinal desk study, we submitted to content analysis information retrieved from a large number of financial reports, explanatory notes, management reports, annual reports and sustainability reports, covering the period 2010-2013.

Based on the assumption that firms are encouraged by the market to adopt an organizational profile focused on innovation and sustainability, and following the procedures of the Oslo Manual (OECD, 2005), we composed a representative sample of 78 industries from among the 57 Brazilian firms included in the ISE and the ICO2 and the 100 European firms included in the Low Carbon 100 Europe® index. The sampled Brazilian (n=26) and European (n=52) firms were listed on BM&FBovespa and NYSE Euronext, respectively, in 2013.

Three variables were used to quantify innovation: intangible innovation assets, patents, and R&D. The first of these was based on the classification proposed by Lev (2001) which identifies the intangible assets disclosed in balance sheets and explanatory notes (brands, patents, copyrights, technology, internally developed assets, and intellectual property) which are directly associated with innovative activities. The same classification was used by Darroch and McNaughton (2002), Narvekar and Jain (2006), Queiroz (2011), Rogers (1998) and Teh, Kayo and Kimura (2008), who took into account investments in intangible assets disclosed in explanatory notes.

The number of patents filed by the sampled firms was obtained from the Espacenet website, which provides data from patent offices around the world, such as the European Patent Office (EPO), the United States Patent and Trademark Office (USPTO) and the National Institute of Intellectual Property (INPI, Brazil). The use of patents as a proxy for innovation is defended by several scholars (Deng, Lev & Narin, 1999; Megna & Klock, 1993; Moura & Galina, 2009; Póvoa, 2010; Teh, Kayo & Kimura, 2008).

Information on investment in R&D was retrieved from the explanatory notes of the financial reports published by the sampled firms. According to the literature, R&D is an important indicator of innovation (Chauvin & Hirschey, 1993; Jensen, Menezes-Filho & Sbragia, 2004; Lee & Chen, 2009; Nekhili, Boubaker & Lakhal, 2012; OECD, 2005).

Sustainability was measured with the social and environmental indicators proposed by the Global Reporting Initiative (GRI) and used by the sampled firms in their reports. To determine the level of disclosure, essential indicators and additional firm-specific indicators were assigned the value 1.0 and 0.5, respectively. The same metric was used by Batres, Miller and Pisani (2010), Braga *et al.* (2011), Burgwal and Vieira (2014), Correa, Ribeiro and Souza (2014), Michelon (2011) and Ribeiro, Van Bellen and Carvalho (2011).

4 ANALYSIS OF RESULTS

4.1 Description of firms from the perspective of innovation

Table 1 shows the distribution of sampled firms according to the proportion of disclosure of intangible innovation assets.

Table 1: Annual distribution of firms with regard to the disclosure of intangible innovation assets, according to region. Period: 2010-2013.

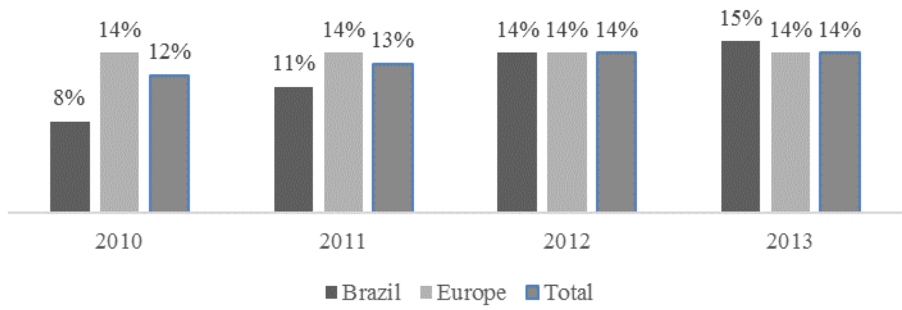
Group/Year		2010	2011	2012	2013
Brazil	Quantity	18	20	20	18
	Proportion (%)	72	80	77	69
Europe	Quantity	39	39	39	38
	Proportion (%)	75	75	75	73

Source: The authors.

As shown in Table 1, most firms owned intangible innovation assets, indicating the relevance of this type of asset to the sampled firms. At least 69.2% of the Brazilian firms and 73.1% of the European firms disclosed investments in innovation. Since innovation is an intangible asset (Teh, Kayo & Kimura, 2008), our results bear out the essential assumption of RBV, on which our approach was based: differentiation is achieved by the use of resources and incorporation of the respective benefits (Rosseto; Rosseto, 2005; Wernerfelt, 1984).

Figure 1 is a monetary representation of the intangible innovation assets held by the sampled firms.

Figure 1: Monetary representation of intangible innovation assets, according to region. Period: 2010-2013.



Source: The authors.

As shown in Figure 1, the proportion of resources invested in innovation (represented by the ownership of intangible assets) increased in Brazil throughout the study period, but remained constant in the European subsample. According to Gomes *et al.* (2009), emerging economies represent attractive long-term business opportunities and are therefore potential targets of innovation strategies. Our findings contradict the conclusions of Arruda, Vermulm and Hollanda (2006) who classified Brazil as a technologically lethargic market.

Table 2 shows the different types of intangible innovation assets identified in our sample.

Table 2: Annual distribution of firms with regard to intangible innovation asset type, according to region. Period: 2010-2013.

Intangible innovation assets	Region	2010	2011	2012	2013
Brands	Brazil	7	8	10	9
	Europe	24	24	24	23
	Total	31	32	34	32
Assets under development or internally developed assets	Brazil	10	12	11	10
	Europe	16	16	16	16
	Total	26	28	27	26
Patents	Brazil	8	9	10	9
	Europe	14	14	14	14
	Total	22	23	24	23
Technology (know-how)	Brazil	1	1	1	1
	Europe	8	9	8	10
	Total	9	10	9	11
R&D	Brazil	-	-	-	-
	Europe	6	5	5	6
	Total	6	5	5	6
Intellectual property	Brazil	-	-	-	-
	Europe	3	3	3	3
	Total	3	3	3	3
Copyrights	Brazil	-	-	-	-
	Europe	2	2	2	2
	Total	2	2	2	2

Source: The authors.

Investment in intangible innovation assets was greater among European firms than Brazilian firms, regardless of category. For example, only 7 of the 31 firms disclosing investments in brands in 2010 were Brazilian. R&D, intellectual property and copyrights were not even mentioned in Brazilian reports (Table 2). These discrepancies between the two regions support the conclusions of Furtado and Carvalho (2005) and Rauen and Furtado (2014) and may in part be explained by differences in the national innovation system and economic and regulatory framework of each region (Kannebley Júnior, Porto & Pazello, 2004; Lundvall *et al.*, 2002; Tidd, Bessant & Pavitt, 2008).

Table 3 shows a comparison between Brazilian and European firms with regard to mean investment in intangible innovation assets.

Table 3: Annual distribution of investment in intangible innovation assets, according to region. Period: 2010-2013.

Intangible innovation assets	Region	Amount invested (BRL)			
		2010	2011	2012	2013
Brands	Brazil	236,532	306,277	494,436	603,650
	Europe	1,735,725	2,682,883	2,936,407	3,353,653
Assets under development or internally developed assets	Brazil	162,193	187,162	279,354	374,542
	Europe	1,322,645	1,636,000	1,604,114	1,952,620
Patents	Brazil	61,621	140,179	121,469	179,628
	Europe	993,606	977,424	1,000,735	1,272,626
Technology (know-how)	Brazil	12,011	15,600	9,540	32,436
	Europe	989,411	946,569	890,345	121,454
R&D	Brazil	n/a	n/a	n/a	n/a
	Europe	1,563,079	3,138,293	3,319,742	2,095,063
Intellectual property	Brazil	n/a	n/a	n/a	n/a
	Europe	1,217,672	1,349,304	1,405,259	1,925,038
Copyrights	Brazil	n/a	n/a	n/a	n/a
	Europe	1,091,499	1,086,932	1,504,761	1,551,808

Source: The authors.

Table 3 highlights the differences between the two groups. Even when country-level differences in purchasing power are adjusted for, investment in innovation remains substantially greater in European firms than in Brazilian firms.

Table 4 compares the annual number of Brazilian and European firms in the sample filing patents during the study period (2010-2013).

Table 4: Annual distribution of firms with patents, according to region. Period: 2010-2013.

Year	Brazilian firms			European firms			All firms	
	With patents	Total	Proportion (%)	With patents	Total	Proportion (%)	With patents	Proportion (%)
2010	7	25	28.0	35	52	67.3	42	54.5
2011	7	25	28.0	32	52	61.5	39	50.6
2012	12	26	46.2	32	52	61.5	44	56.4
2013	11	26	42.3	34	52	65.4	45	57.7

Source: The authors.

Table 4 shows a growing proportion of Brazilian firms making investments in innovation in the form of patents, from 2010 to 2013. The corresponding figures for European firms are also elevated. Thus, in the last year of the period, 4 out of every 10 Brazilian firms and 7 out of every 10 European firms filed patents. Investment in patents is a useful indicator of innovative activity as it reflects the creative profile of firms assigning value to this type of asset, as quantified with the innovation metrics developed by Brito, Brito and Morganti (2009) and by Teh, Kayo and Kimura (2008).

Table 5 shows how investments in patents by the sampled firms escalated between 2010 and 2013.

Table 5: Annual distribution of patents filed by the sampled firms, according to region. Period: 2010-2013.

Year	2010		2011		2012		2013	
Region	Quantity	Mean	Quantity	Mean	Quantity	Mean	Quantity	Mean
Brazil	37	5	62	9	86	7	95	6
Europe	701	20	1,080	34	1,966	61	2,274	67
Total	738	-	1,142	-	2,052	-	2,369	-

Source: The authors.

Although the number of new patents increased in both groups, the growth rate was not the same. Thus, European firms filed 19 times more patents than Brazilian firms in 2010, but nearly 24 times more in 2013. According to Arruda, Vermulm and Hollanda (2006) and Tidd, Bessant and Pavitt (2008), the process of technological accumulation in Brazil is not fast enough to keep up with global developments. As predicted by the literature, the overall level of innovation was very different in developed vs. developing countries.

Table 6 summarizes the level of disclosure of R&D investments.

Table 6: Annual distribution of firms with regard to disclosure of R&D investments, according to region. Period: 2010-2013.

Region	R&D disclosure	2010		2011		2012		2013	
		Quant.	%	Quant.	%	Quant.	%	Quant.	%
Brazil	Yes	7	28.0	6	24.0	6	23.1	6	23.1
	No	18	72.0	19	76.0	20	76.9	20	76.9
	Total	25	100.0	25	100.0	26	100.0	26	100.0
Europe	Yes	42	80.8	42	80.8	41	78.8	40	76.9
	No	10	19.2	10	19.2	11	21.2	12	23.1
	total	52	100.0	52	100.0	52	100.0	52	100.0

Source: The authors.

If taken together, the number of firms investing in R&D was nearly the same throughout the period covered by the analysis. The proportion, however, ranged between 23.1% and 28% for Brazilian firms and from 76.9% to 80.8% for European firms. These results support the notion that firms in developed countries invest more aggressively in innovation. Thus, the observed difference between the two groups with regard to the number of patents and the size of investments in R&D is not an unexpected finding. The mean R&D investment was compatible with the level of disclosure. In 2010 the mean investment was BRL 73,299 for Brazilian firms and BRL 2,366,146 for European firms (a factor of 31). In the following years, the mean investment was BRL 87,578 (2011), BRL 95,844 (2012) and BRL 97,243 (2013) for Brazilian firms and BRL 2,755,090 (2011), BRL 3,183,700 (2012) and BRL 3,868,798 for European firms. In terms of growth, between 2010 and 2013 the annual investment in R&D rose by 32.7% in the Brazilian subsample and by 63.5% in the European subsample.

4.2 Description of firms from the perspective of sustainability

Table 7 shows the level of disclosure in the sustainability reports issued by the sampled firms, quantified according to GRI criteria.

Table 7: Annual distribution of firms with regard to sustainability disclosure, according to region. Period: 2010-2013.

Region	Firms	Year 2010	2011	2012	2013
Brazil	Quantity	14	19	21	21
	Proportion (%)	56.0	76.0	80.8	80.1
Europe	Quantity	21	25	28	30
	Proportion (%)	40.4	48.1	53.8	57.7

Source: The authors.

Differences in the circumstances determining the socio-environmental issues prevalent in each region (Figueiredo, 2012; Nascimento, 2012; Pereira, 2009) may explain the results displayed in Table 7 and are compatible with the conclusions of Oliveira *et al.* (2012, 2014) and Ribeiro, Van Bellen and Carvalho (2011). Economic factors may also have an impact, as shown above. Comparatively, sustainability disclosure was greater among Brazilian firms (80.8%) than European firms (57.7%), contrary to what was observed for innovation disclosure.

Table 8 shows the level of environmental disclosure in the analyzed reports.

Table 8: Annual distribution of firms with regard to environmental disclosure, according to region. Period: 2010-2013.

Year	Environmental disclosure	Quantity	Minimum (%)	Median (%)	Maximum (%)	Mean (%)
2010	Brazilian firms					
	Essential	14	17.7	70.6	100.0	68.1
	Total	14	14.9	62.8	100.0	64.7
	European firms					
	Essential	21	35.3	94.1	100.0	83.2
	Total	21	27.7	80.4	100.0	74.3
2011	Brazilian firms					
	Essential	19	35.3	70.6	100.0	72.4
	Total	19	31.9	70.2	100.0	71.0
	European firms					
	Essential	25	41.2	94.1	100.0	84.2
	Total	25	36.2	83.0	100.0	76.8
2012	Brazilian firms					
	Essential	21	17.7	88.2	100.0	76.4
	Total	21	14.9	70.2	100.0	71.3
	European firms					
	Essential	28	41.2	94.1	100.0	84.3
	Total	28	36.2	80.8	100.0	74.5
2013	Brazilian firms					
	Essential	21	11.8	93.3	100.0	73.3
	Total	21	10.6	73.3	100.0	70.0
	European firms					
	Essential	30	11.8	97.1	100.0	81.5
	Total	30	12.8	79.8	100.0	72.9

Source: The authors.

Even though Brazilian firms are more committed to the disclosure of environmental indicators in their sustainability reports, European firms were more efficient at communicating with their stakeholders. Thus, environmental disclosure was greater among firms traded on NYSE Euronext than among firms traded on BM&FBovespa (Table 8).

A similar pattern was observed for the disclosure of social indicators, as shown in Table 9.

Table 9: Disclosure of social GRI indicators: Brazil vs. Europe.

Year	Social disclosure	Quantity	Minimum (%)	Median (%)	Maximum (%)	Mean (%)
2010	Brazilian firms					
	Essential	14	12.0	82.0	100.0	67.4
	Total	14	13.9	76.9	100.0	66.7
	European firms					
	Essential	21	24.0	96.0	100.0	76.0
	Total	21	18.5	76.9	100.0	73.9
2011	Brazilian firms					
	Essential	19	20.0	76.0	100.0	76.0
	Total	19	30.8	67.7	100.0	73.9
	European firms					
	Essential	25	28.0	92.0	100.0	80.6
	Total	25	24.6	76.9	100.0	71.0
2012	Brazilian firms					
	Essential	21	20	87.5	100.0	80.4
	Total	21	21.5	80	100.0	78.3
	European firms					
	Essential	28	28	92	100.0	81.9
	Total	28	24.6	76.9	100.0	72.2
2013	Brazilian firms					
	Essential	21	16	76	100.0	69
	Total	21	16.9	75.4	100.0	68.4
	European firms					
	Essential	30	28	92	100.0	78.3
	Total	30	24.6	78.5	100.0	72.3

Source: The authors.

However, it should be pointed out that the two groups did not differ significantly with regard to the disclosure of socio-environmental indicators.

We also evaluated the intersection of the two strategies, based on studies which have identified innovation and sustainability as important strategic resources in the creation of competitive advantage. The comparison of socio-environmental disclosure in firms with and without innovation (patents, R&D, intangible assets) yielded no significant difference. A similar pattern was observed when the comparison was inverted: innovation in firms with and without sustainability disclosure. The only exception was the number of patents, which was significantly greater in firms classified as sustainable in this study. In this respect, our results are supported by Bessant and Tidd (2009) who concluded that commitment to sustainability affects innovative activity.

Our observations reinforce the conclusions of Queiroz and Podcameni (2014) with respect to the conflicting interaction between the strategic corporate goals of innovation and sustainability, but disagree with those of Barbieri *et al.* (2010), Gomes *et al.* (2009), Kim (2015) and Scandelari and Cunha (2013). Both innovation and sustainability have been associated with substantial benefits and many of the firms in our sample which invested in innovation were also concerned with socio-environmental issues. This highlights the importance of these two corporate profiles as a response to market demands and, to some extent, bears out the assumptions of RBV and NRBV.

5 FINAL CONSIDERATIONS

In light of RBV and NRBV, we investigated the corporate profiles of innovation and sustainability in a 4-year longitudinal cohort of public firms from two different economic, social and institutional settings (Brazil and Europe). Our design allowed us to include organizations which i) presented a wide range of stakeholders and ii) were *a priori* sustainable from the perspective of the capital market.

The literature has both theoretically and empirically revealed a preexisting innovation gap between developed and emerging national systems. The process of technology accumulation (along with the economic bias of resource availability and the demise of social paradigms typical of developing countries) has made firms shift their strategic focus to long-term goals. In this study, European firms surpassed Brazilian firms in terms of investment in innovation and disclosure. Innovation, from the point of view of resource incorporation, innovative efforts and the results of such efforts, offers a wealth of opportunities for Brazilian firms. Thus, considering the growing number of firms adopting an innovative profile, our projections are optimistic.

A similar trend was observed concerning the disclosure of information on socio-environmental sustainability. The literature shows that developed economies have put behind them most basic concerns about the quality of the social structure. These countries make greater efforts to manage environmental damage because, historically, their economic development was achieved at the expense of degradation. Likewise, developing economies are under much external pressure to find solutions to present and future environmental challenges. Commitment to environmental action is a response to pressures from society and the market rather than a structured plan to meet national structural needs. Our study allows to infer that more commitment and effort go into sustainability in Brazilian firms than European firms, at least when it comes to communicating the strategy to society and the market. However, more information is disclosed by European firms, possibly for the reasons given in the literature, namely stronger enforcement and more advanced markets. It is also possible that resources are applied to areas which are not considered a priority in emerging economies. In other words, in the presence of more pressing demands, the establishment of a sustainable profile may not be an organizational priority in view of the elevated cost (trade-off).

In addition to confirming our expectations of discrepancies between the two groups, our study supports two important aspects of the discussion on innovation and sustainability (alone or in combination) and on the benefits of these strategies for organizations. First, the emerging market (in this case epitomized by Brazil), with its potential for the establishment of long-term strategic plans, shows promising signs of progress. *Mutatis mutandis*, innovation is increasingly common in Brazilian firms, potentially leading to the creation of market barriers or the opening of new markets. Investment in innovation theoretically increases the likelihood of acquiring and maintaining competitive advantage. The same is true for sustainability. Second, a large proportion of the sampled firms had adopted innovative and sustainable profiles, showing these two strategies to be in demand on the contemporary market. Our sample consisted of firms considered sustainable in their respective markets (based on their inclusion in stock market sustainability indices), favoring the notion of a dialogue between the two strategies.

The study was limited by our reliance on reports published by the sampled firms. In future studies this might be attenuated by using information collected *in loco*, directly from managers and stakeholders, to create a model capable of identifying the effective and potential competitive advantages of each organizational profile. It would also be useful to evaluate the contribution of the two strategies to corporate performance both from the financial perspective (strategic) and from the market perspective (institutional compliance).

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