International Journal of Innovation Studies 2 (2018) 153–164

Contents lists available at ScienceDirect

International Journal of Innovation Studies

journal homepage: http://www.keaipublishing.com/en/journals/international-journal-of-innovation-studies

Innovation and financial performance of companies doing business in Brazil

Juliana Albuquerquer Saliba de Oliveira [a], Leonardo Fernando Cruz Basso [a], Herbert Kimura [b], Vinicius Amorim Sobreiro [b, *]

[a] Mackenzie Presbyterian University, São Paulo, São Paulo, 01302-907, Brazil
[b] Department of Management, Campus Darcy Ribeiro, University of Brasília, Federal District, Brasília, 70910-900, Brazil

ARTICLE INFO

Article history:
Received 25 June 2018
Accepted 22 November 2018
Available online 27 March 2019

Keywords:
Innovation
Efforts in innovation
Impacts of innovation
Financial performance
PINTEC
PIA

ABSTRACT

In this paper, we analyze the relationships among innovation efforts, the impacts of these innovations, and the financial performance of Brazilian companies. We hypothesize that innovation efforts do not directly translate into financial performance. Due to the inherent uncertainty of innovative projects, such efforts must first lead to effective innovation results or impacts before they are capable of contributing to a company's financial performance. Using the Brazilian Institute of Geography and Statistics' (IBGE) comprehensive official databases on innovation and performance, we study 5,025 firms using exploratory factor analysis and structural equation modeling. The results suggest that efforts in innovation possibly generate impacts; however, these impacts do not necessarily imply better financial performance. Therefore, although firms' efforts may lead to new products, they will not contribute to financial gains in the short term, reflecting the risky and costly nature of innovation. The study aims to contribute to the discussion on firm-level impacts of innovation from the context of a large developing country, since empirical results of the literature are mixed.

1. Introduction

According to Woodward (2009), one of the reasons for companies to undertake innovations is to achieve higher performance. Even though innovation is mainly related to the efforts of individual companies, it has become the central driver of a country's social welfare and economic growth (Chen, 2017); therefore, many nations strive to obtain a competitive advantage in the global innovation context (Atkinson, 2012). Both developed and developing economies are focusing on innovation to accelerate growth and competitiveness (Acs, Audretsch, Lehmann, & Licht, 2016; Chen, Yin, & Mei, 2018).

Tidd and Bessant (2013) suggested that the success of companies can be largely explained by innovation. In fact, Feeny and Rogers (2003) identified innovation as entailing, on average, an increase in performance, since expenditures on research and development (R&D) and patent applications are relevant factors that influence companies' market value. In addition, Lee and Chen (2009) argued that the introduction of new products in the market creates value for shareholders.

* Corresponding author.
E-mail addresses: julianasaliba@outlook.com (J.A. Saliba de Oliveira), leonardofernando.basso@mackenzie.br (L.F. Cruz Basso), herbert.kimura@gmail.com (H. Kimura), sobreiro@unb.br (V.A. Sobreiro).

https://doi.org/10.1016/j.ijis.2019.03.001

However, the literature on firm-level analysis does not indubitably support a positive relationship between innovation and performance. In this context, Christensen, Raynor, and McDonald (2015) discussed the cases of disruptive innovations such as the ones introduced by Amazon, Google, Netflix and Uber. Zaefarian, Forkmann, Mitręga, and Henneberg (2017) demonstrated the importance of businesses' relationship with customers and suppliers and the success of innovation in enhancing company performance. The authorsstated that the impact of these relationships is amplified by the organizational culture of companies. Madsen and Leiblein (2015) asserted that a firm's productive experiences and those of partner firms contribute to temporary innovative advantages, and that the aggregate experiences of partner firms bring longer lasting advantages than the stock of patents.

Vaccaro, Jansen, Van Den Bosch, and Volberda (2010) showed that corporate behavior contributes to innovative management. Their study suggested that smaller and less complex organizations benefit from transactional leadership; in contrast, large organizations, which need to be better organized to compensate for their complexity and to allow for processes of innovation, benefit from transformational leadership. Tsai (2001) suggested that the more central position organizational units hold in the network, the better their performance and the higher their innovations.

According to Chesbrough (2010), companies market new ideas and technologies through their business models. They require extensive investments and processes, with little ability to innovate their business models. Therefore, difficulties in the management of innovation may preclude companies from effectively generating value from their innovation efforts. For example, although some studies have found that innovation and company performance are positively correlated (Bierly & Chakrabarti, 1996; Liao & Rice, 2010), Santos, Basso, Kimura, and Kayo (2014) did not find relevant relationship between innovation and financial performance. In fact, Kandybin (2009) indicated that cases of successful innovations translating into profits is scarce. More emphatically, Artz, Norman, Hatfield, and Cardinal (2010) found that patents are negatively correlated with some financial performance measures, raising important questions about the effective role of patents in protecting intellectual capital value.

In contrast, Kim, Kim, Miller, and Mahoney (2016) argued that innovation is often viewed as a race, but firms could strategically wait until more information is available to not lose investments on R&D. For instance, market convergence to a single technological standard may jeopardize financial performance, even if the firm's innovation is technically better than that of competitors.

Additionally, Zhang et al. (2018) suggested an inverse U-shaped relationship between open innovation and firm profitability. Santos et al. (2014) did not find a significant relationship between innovation and financial performance. Silva, Styles, and Lages (2017) empirically showed that, from the context of international business, market innovation and strategic export performance are negatively correlated.

Therefore, the literature shows that the scope of research on innovation is extensive, and that results for the relationship between innovation and performance are mixed (González-Fernández & González-Velasco, 2018). Since these constructs are broad and evidence is not universal, studies on specific countries and firm-level analyses may shed light on the impact of innovation. Recent studies (Lewandowska, Szymura-Tyc, & Gołębiowski, 2016; Lee, Lee, & Garrett, 2017; González-Fernández & González-Velasco, 2018; Wadho & Chaudhry, 2018; Rajapathirana & Hui, 2018; Zhang et al., 2018) investigate firm innovation in Poland, Korea, Spain, Pakistan, Sri Lanka, and China. Analysis of different environments can help identify the foundation for the development of a more general and comprehensive theory on the impacts of innovation.

More specifically, due to the complexity of the relationship between innovation and performance and the conflicting results from empirical studies, further research is needed (Jiménez-Jiménez & Sanz-Valle, 2011). Taking advantage of the access to a unique micro-dataset from the Brazilian government, our study aims to contribute to the literature by providing evidence of a Latin American country, which has a leadership role in the region. As Jugend et al. (2018) emphasize, research on innovation has concentrated on North American, European, and Asian firms; only few studies have explored Latin or South American countries. In particular, since Brazil is the largest investor in R&D in Latin America, but has poor innovation performance compared to developed countries (Jugend et al., 2018), the analysis of this specific environment can uncover new elements for theory building. From a practitioner's perspective, the understanding of the phenomenon can help policymakers and corporate executives implement policies and strategies that could optimize wealth creation from investments in innovation. In this study, we analyze two comprehensive surveys conducted by the IBGE, the official governmental statistical agency, to investigate the relationship between innovation and organizational performance for a sample of 5,025 firms doing business in Brazil. We hypothesize that, due to the uncertainty related to innovation, efforts have an indirect impact on performance. In this context, efforts in innovation must first lead to innovation impacts, which in turn, may influence organizational performance.

The paper is structured as follows. In the next section, we discuss studies that analyze innovation and organizational performance and develop our research hypotheses. Thereafter, we present the data and method used and analyze results of the study. The paper concludes with final considerations.

2. Theoretical framework

Many surveys conducted in several contexts and countries suggest that innovation and business performance are positively correlated. For instance, Bierly and Chakrabarti (1996) studied the US pharmaceutical industry and, through a cluster analysis, identified that companies classified as “innovators” and “explorers” are more profitable than “exploiters” and

"loners." Caves and Ghemawat (1992) identified differential factors, such as R&D expenses and licensing-and-royalty expenses, as more relevant to financial outcomes than cost-related factors.

Liao and Rice (2010) measured innovation using constructs associated with the intensity of R&D, training, and production technology. Based on a sample of Australian companies, the authors concluded that organizational performance is driven by innovation, with mediation effects of market engagement and transformation strategies.

Nybakk and Jenssen (2012) investigated the direct effects of innovation strategy on the financial performance of timber-industry firms from Norway. Using the results of a survey with chief executive officers, the authors suggested that the implementation of an innovation strategy can induce financial gains. Other studies (Damanpour & Evan, 1984; Schulz & Jobe, 2001; Thornhill, 2006) also suggest that firms receive benefits of innovation.

In contrast, Artz et al. (2010) analyzed the relationship between the impact of innovative investments and activities on the performance of US and Canadian companies, and found that patents can in fact diminish financial results. In addition, Santos et al. (2014) did not find a positive relationship between innovation and performance. The authors also explored Brazilian data from IBGE, although they used surveys from 2000, 2003, and 2005. They analyzed innovation as a second-order latent variable, which is related to first-order latent variables that express initiatives for innovation: human capital, innovative effort, and relational capital.

It is important to highlight that the focus on specific countries to study innovation is common. For instance, Bartels, Koria, and Vitali (2016) studied barriers to innovation in Ghana. Albort-Morant, Leal-Millán, and Cepeda-Carrión (2016) analyzed green innovation performance in the Spanish automotive components sector, and Clausen, Korneliussen, and Madsen (2013) investigated the relationship between different modes of innovation and actual product innovation in Norway.

One possible explanation for negative or neutral results regarding the relationship between innovation and performance is that innovation is expensive and risky, exposing firms to higher market fluctuations and costs (Simpson, Siguaw, & Enz, 2006) and potentially leading to nonpositive performance. Santos et al. (2014) concluded that innovation is related to efforts of the organization to innovate, and not to the direct outcome of innovation itself. Therefore, although a firm can allocate resources to produce innovative products, effective impacts of these efforts might not occur because of the very risky nature of innovation. However, once innovation efforts lead to results, such as patents or market share of new products, in contrast to Artz et al. (2010), we expect firms to experience superior performance.

This indirect relationship between innovation and performance can be observed in other studies, many of which use structural equation modeling (SEM). For instance, in the field of eco-innovation, Chang (2011) presented a model of a direct impact of corporate environmental ethics on competitive advantage and of an indirect impact mediated by green product and process innovation. Ramanathan, Black, Nath, and Muyldermans (2010) suggested that there is a direct impact of environmental regulation on performance and an indirect impact of environmental regulation on performance mediated by innovation. Chiou, Chan, Lettice, and Chung (2011) discussed a model of the impact of greening the supplier and green innovation on environmental performance and competitive advantage.

In addition, Bagur-Femenias, Llach, and del Mar Alonso-Almeida (2013) suggested a direct influence of environmental pressure on the adoption of environmental practices and an indirect impact of this latent variable on firm performance mediated by competitiveness. Hult, Hurley, and Knight (2004), using a construct different from ours for the ability to innovate (also called innovativeness), showed a direct impact of innovativeness on business performance. Hong, Kwon, and Roh (2009) elaborated a SEM in which green performance outcomes impact business unit performance.

Taking into account the extensive international literature suggesting a positive relationship between innovation and performance (see the direct effect model depicted in Fig. 1) and the high levels of risk inherent to innovation, we argue that the influence of innovation on performance is indirect, that is, a positive influence occurs only when innovation efforts are effective, generating relevant innovation outcomes (see the indirect effect model depicted in Fig. 1). These outcomes, which Technological Innovation Survey (PINTEC), a survey about innovation in Brazilian companies, considers impacts of innovation

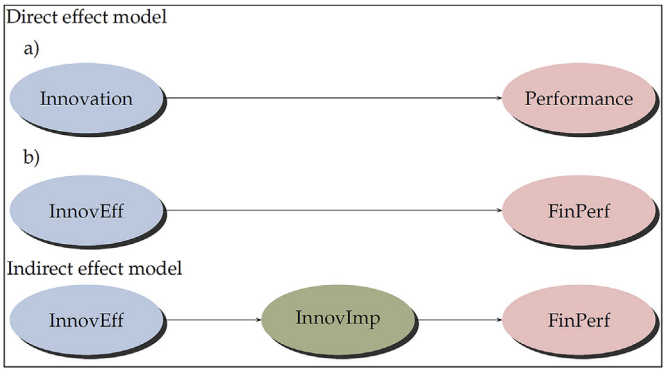

Fig. 1. Models for the relationship between innovation and performance.

(e.g., percentage of new-product revenues to total sales for both domestic and international markets, patents generated by the company), can eventually lead to better organizational performance.

From the literature review and considering the Brazilian context, we explicitly state q hypothesis of a positive relationship between innovation and performance as depicted in the graphical model in Fig. 1. However, since innovation and performance are multifaceted concepts, we focused on the efforts of firms to innovate (InnovEff) and on financial performance (FinPerf), described as latent constructs, shown in Fig. 2.

In addition, because efforts of innovation do not necessarily lead to successful results, we also analyze a hypothesis of indirect relationship. More specifically, from our theoretical discussion, we also hypothesize that financial performance is influenced by effective innovation results (InnovImp), as described in Fig. 3.

Although, as described earlier, the literature on innovation and performance of firms does not necessarily imply a definitive direction of the relationship between these constructs (González-Fernández & González-Velasco, 2018), we build our hypothesis on several studies that support a positive influence.

For instance, Lee et al. (2017), using a sample of Korean companies, identified synergy effects of product and process innovation on firm performance. Furthermore, Rajapathirana and Hui (2018) analyzed insurance companies from Sri Lanka and found a strong relationship between innovation efforts and firm performance. Following González-Fernández and González-Velasco (2018), we argue that innovation leads to competitive advantage, and the exclusivity of an innovative product (Lieberman & Montgomery, 1988) allows a company to market higher value-added products and derive large profits (Schumpeter, 1934). However, due to the uncertainty associated with innovation efforts, which can be unsuccessful, we also analyze the hypothesis that performance is not directly explained by innovation efforts, but rather by effective impacts resulting from these efforts.

It is important to highlight some characteristics of the innovation survey conducted by IBGE in Brazil. PINTEC aims to establish sectoral indicators of innovation activities of companies in Brazil from both regional and national perspectives. The survey consists of industrial utilities and services firms and follows international guidelines, concepts, and methodologies

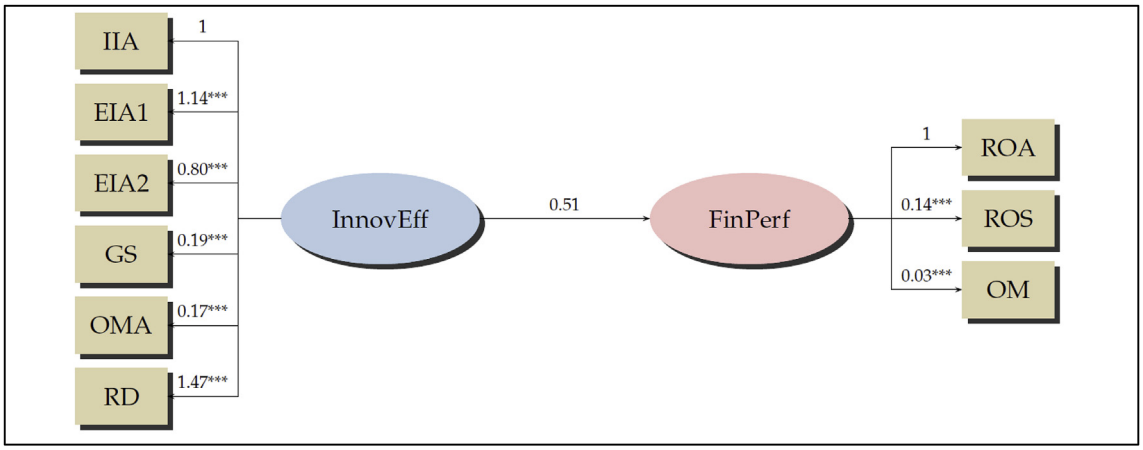

Fig. 2. Direct relationship between innovation efforts and financial performance.

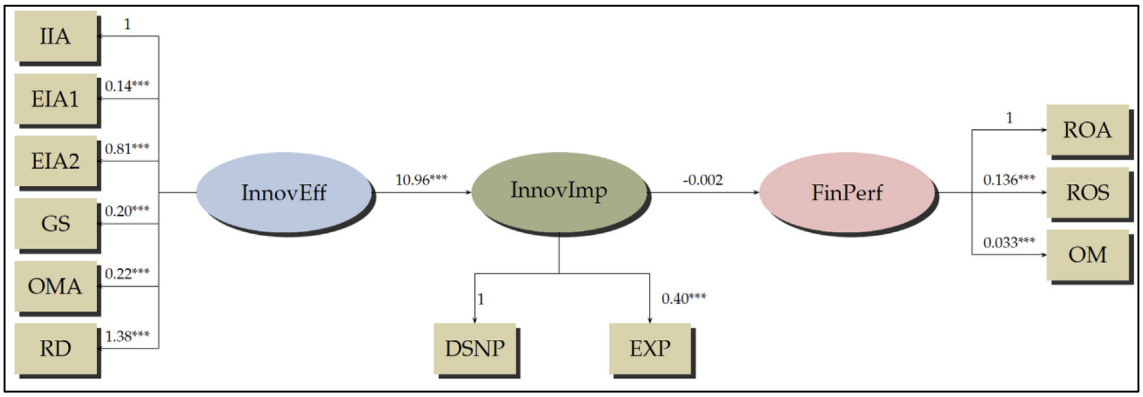

Fig. 3. Indirect relationship between innovation efforts and financial performance.

established in the Oslo Manual. IBGE builds its innovation survey by taking into account nine different blocks of questions: (i) innovative activities; (ii) funding sources; (iii) R&D acquisition; (iv) R&D internal activities; (v) impact of innovations; (vi) information sources; (vii) cooperation to innovation; (viii) governmental support; and (ix) organizational and marketing innovations. The other survey used in this study, the Annual Industrial Survey (Pesquisa Industrial Annual, PIA), is also conducted by IBGE and provides economic and financial information about Brazilian firms.

Some surveys have used the PINTEC-IBGE database to conduct research on innovation in Brazil. Brito, Brito, and Morganti (2009) investigated the relationship between companies' innovation and performance in the Brazilian chemical industry. The authors aimed to test two hypotheses that sought to analyze the relationship between investment in innovation and the company's growth rate and rate of profitability, respectively. In order to study this relationship, the authors used secondary data from the PINTEC database for the year 2000 (innovation construct) and from the annual balance sheet (performance) with information valid for the period from 1999 to 2001.

Kannebley, Sekkel, and Araújo (2008) analyzed whether Brazilian innovative companies present better economic performance compared to non-innovative companies. To empirically investigate this relationship, the authors used data on innovation and economic performance from five different databases over two periods, 1996–1997 and 2001–2002. To measure innovation, companies that were innovative, process innovators and product innovators, were classified according to the PINTEC definitions (2000). Kannebley et al. (2008) found that technological innovations led to higher revenues, productivity, and market share for the companies studied.

Mendes, Lopes, and Gomes (2012) studied the technical and scale efficiency of resources for innovative activities in 23 industry sectors using the data envelopment analysis method. The authors utilized variables related to expenditures on innovative activities and net sales revenue obtained through the PINTEC database for 2003 and 2005.

Mendes et al. (2012) concluded that although there was an increase in companies' average net revenue, there was a deterioration through time in the quality of investments incurred as expenses for R&D and purchases of machinery and equipment, among others, when comparing PINTEC's data for 2003 and 2005.

Gonçalves, Lemos, and de Negri (2011) studied the role of territory and individual firms in the innovation of the Brazilian industrial economy after 1998. The authors used the PINTEC and PIA databases for the period from 1998 to 2000, and analyzed variables such as firm size, expenditures on R&D, total spending on innovation, and origin of capital. To measure the influence of the regional environment, variables related to the education level of the adult population, level of industrialization, patenting per capita, intensity in R&D spending, accessibility to São Paulo, and industrial and technological scale were used.

Urraca-Ruiz and Bhawan (2010) compared the innovative behavior of multinational and domestic companies in Brazil by industrial activity. The authors used secondary data from PINTEC 2003 to calculate indices of similarity and to study the distances observed between multinational and domestic companies. The authors characterized innovative companies as those that carry out R&D, allocate resources to innovation, and obtain results from innovation.

Urraca-Ruiz and Bhawan (2010) concluded that multinational companies are generally more likely to innovate; however, the innovative intensity (propensity to innovate) is very similar to that of domestic companies. Furthermore, domestic firms use more external sources in terms of resource allocation, which reveals the scarcity of internal efforts in innovation by Brazilian companies (Urraca-Ruiz & Bhawan, 2010). Their results also suggest that the propensity to carry out radical and incremental innovations is greater in multinational companies.

Santos et al. (2014) evaluated the potential relationship between the innovation and performance of Brazilian firms. The authors used the PINTEC database for 2000, 2003, and 2005 to measure innovation and Serasa and Gazeta Mercantil databases for 2001, 2004, and 2006 to measure performance.

To measure innovation, we used the human capital dimension (number of people with PhD, masters, and technical degrees, as well as university students exclusively dedicated to R&D activities), innovative effort (training, spending on internal R&D, spending on acquisition of machinery and equipment, and spending on introduction of technological innovations), and relational capital (spending on external R&D and spending on acquisition of external knowledge). To measure performance, return on assets (ROA), return on sales (ROS), return on equity (ROE), and operating margin (OM) were used. Santos et al. (2014) applied factor analysis, which confirmed the constructs of innovation. However, the authors did not find any significant relationship between innovation and performance variables through SEM.

In light of the theoretical discussion, we hypothesize that performance is driven by innovation impacts, which, in turn, depend on innovation efforts by the company. We use a modified version of the model proposed by Liao and Rice (2010), following the argument that posits an indirect relationship between dynamics capabilities and firm performance (Eisenhardt & Martin, 2000; Zott, 2003). Since the dynamic capabilities view relies on the Schumpeterian perspective of rent creation (Teece, Pisano, & Shuen, 1997), innovation can be a major driver of performance when it leads to transformation outcomes (Liao & Rice, 2010). More specifically, since performance is a broad concept, we analyze relationships between reflective latent variables for financial performance (FinPerf), innovation efforts (InnovEff), and innovation impacts (InnovImp), as shown in Fig. 2.

3. Data and research method

Our study analyzes data gathered by the IBGE in two nationwide surveys with firms from several sectors and of different sizes. PINTEC is a comprehensive survey on innovation of Brazilian firms. The survey is conducted by the IBGE with the support of the Ministry of Science, Technology and Innovation and the Studies and Projects Financing Entity. The survey aims

to build indicators of innovation activities at Brazilian firms taking into account the guidelines of the Oslo Manual. PIA is an annual survey from IBGE, gathering information on the Brazilian industrial sector, including economic and financial data, production value, intermediate consumption, value-added personnel employed, net sales, consumption of raw materials, auxiliary materials and components, costs of industrial operations, value of industrial processing, and so on.

Both surveys were based on responses to questionnaires; even though we had access to all data, we were only allowed to disclose aggregated results because of confidentiality requirements. Considering the availability of access to information from IBGE, even though organizational performance is a complex and multifaceted construct (Bentes, Carneiro, Silva, & Kimura, 2012; Cameron, 1986; Chakravarthy, 1986; Venkatraman & Ramanujam, 1986), in our analysis, we focused on financial performance (FinPerf), which we built as a reflective latent construct associated with ROA, ROS, and OM.

Innovation is a complex phenomenon and firm performance is a multifaceted construct, subject to several potential explanatory variables. The method we used, based on variance-covariance SEM, relies on the study of the relationship of latent constructs that are reflected in observed variables.

Our research design follows other studies that only focused on the main constructs using SEM, without considering specific control variables or conducting sector analysis (Emmann, Arens, & Theuvsen, 2013, which analyzes individual acceptance of biogas innovation; Gkypali, Filiou, & Tsekouras, 2017, which studies the impact of diversity on innovation; and Curado, Muñoz-Pascual, & Galende, 2018, which analyze innovation performance in small and medium enterprises).

However, control variables are relevant in the regression part of SEM. More specifically, omitting relevant explanatory variables may lead to endogeneity problems. Therefore, coefficients of the study may be biased and inconsistent. In critical cases, significance and even signs of coefficients may be compromised. Limitations of the method are discussed in the final section of the paper.

In our hypothesis, given the high risk inherent to innovation projects, effort of companies does not necessarily lead to financial value. Therefore, indirect links among innovation efforts, results of innovation, and financial performance also merit investigation. The variables for the reflective construct of innovation efforts (InnovEff) were grouped into internal innovative activity (IIA: R&D expenses, training expenses, efforts to introduce and distribute new products), external innovative activity (EIA1 and EIA2: acquisition of external R&D and knowledge, acquisition of software, machinery, and equipment), governmental support (GS: tax shield for R&D, scholarships or grants from funding agencies), organizational and marketing activities (OMA: new methods or processes, changes in marketing strategies and changes in the product) and human capital (HC: technical, undergraduate, masters, and PhD personnel allocated to R&D activities). We also built our model on a reflective construct of innovation impact (InnovImp), which is related to the percentage of domestic sales of new products and of exports of new products. We highlight that the reflective characteristic of innovation impact can be controversial, since innovation impact may not be reflected simultaneously in sales in both domestic and foreign markets.

Financial performance is a reflective latent construct associated with ROA (net earnings for the year divided by the total value of the assets), ROS (net operating profit for the year divided by gross sales revenue), and OM (net earnings of the year plus net loss of the year plus non-operating expenses minus non-operating income, divided by gross sales revenue). The profitability indices ROA and ROE take into account, in the denominator, point-in-time information of end-of-year values of assets and equity, respectively. Although these proxies may be biased, since final period data may not reflect average values during the given period when profits are generated, we follow traditional metrics extensively used in corporate finance studies. As Carton and Hofer (2007, p. 143) indicate, Compustat uses end-of-year values of assets and equity in ROA and ROE calculations. In addition, Carton and Hofer (2007, p. 143) compare several financial ratios using average values and ending balances, and find a correlation of 0.85. It is also important to point out that in the numerator of both ROA and ROE, we use earnings given by net profit or net income, even though the ROA could be more adequately depicted by the operating profit created by all assets, prior to discounting interest due to liabilities. However, our definition follows a well-used proxy, net income divided by total assets, as calculated in Compustat. Further details about the variables and information used in this article are presented in Table 1.

To preserve data confidentiality, research was conducted in IBGE's premises, in a “secrecy room,” as required by the institute. In the secrecy room, researchers can cross-check microdata of both PINTEC and PIA surveys. However, the computer in which the databases are analyzed does not have access to Internet and researchers cannot extracted results using any storage device. To protect confidentiality of companies, results after running the statistical models are analyzed by a technical team from IBGE, prior to the release of information to the researchers.

We also had to use only the software and hardware made available by IBGE. For the quantitative analysis, we relied on exploratory factor analysis to identify measured variables that could reflect latent constructs, and on SEM to analyze the study's hypotheses regarding the relationship among innovation efforts, innovation impacts, and financial performance. Innovation data from PINTEC were merged with performance data from PIA—both from the 2011 surveys—using an official unique entity identifier of each company. Though innovation can have impacts in the medium and long terms, we argue that short-term financial impacts can reflect the impact of innovations already in the market. However, one drawback of using surveys paired chronologically is that innovation efforts may not reflect in an innovation impact in the short term. Despite these potential problems, we run our analysis based on the available data for this study.

Table 1
Description of variables.

Construct	Variable name	Variable	Definition/Calculation	Collected data from
Innovation Efforts (InnovEff)	IIA	R&D expenses	Expenses in *Reais*	PINTEC
		Training expenses		PINTEC
		Efforts to introduce and distribute new products		PINTEC
	EIA1 and EIA2	Acquisition of external R&D and knowledge	Expenses in *Reais*	PINTEC
		Acquisition of software		PINTEC
		Machinery and equipment		PINTEC
	GS	Tax shield on R&D	Yes or No (answer)	PINTEC
		Scholarships or grants from funding agencies		PINTEC
	OMA	New methods or processes	Yes or No (answer)	PINTEC
		Changes in marketing strategies		PINTEC
		Changes in the product		PINTEC
	HC	Technical	Amount of human capital (number of employees)	PINTEC
		Undergraduates		PINTEC
		Masters		PINTEC
		PhD personnel allocated to R&D activities		PINTEC
Innovation Inpact (InnovImp)	DSNP	Percentage of domestic sales of new products	Percentage of domestic sales	PINTEC
	EXP	Exports of new products	Percentage of exportation	PINTEC
Financial Performance (FinPerf)	ROA	Return on assets	Net earnings for the year divided by the total value of the assets	PIA
	ROS	Return on sales	Net operating profits divided by gross sales revenue.	PIA
	OM	Operating margin	Net earnings for the year plus net loss for the year plus non-operating income, divided by gross sales revenue.	PIA

Notes: IIA: Internal Innovative Activity; EIA: External Innovative Activity; GS: Governmental Support; OMA: Organizational and Marketing Activities; HC: Human Capital; DSNP: Domestic Sales of New Products; EXP: Exports of New Products; ROA: Return on Assets; ROS: Return on Sales; OM: Operating Margin.

4. Main results

The final sample consisted of 5,025 firms, with 198 (4%) located in the mid-west region, 156 (3%) in the north region, 431 (8%) in the northeast region, 1,595 (32%) in the south region, and 2,645 (53%) in the south-east region of Brazil. More than half of the companies are located in the southeast area, which is the richest region in Brazil, reflecting geographical inequalities in the country's development. Regarding the number of employees, 40 firms (<1%) have 10–29 employees, 478 firms (10%) have 30–49 employees, 1,260 firms (25%) have 50–99 employees, 1,600 firms (32%) have 100–249 employees, 745 firms (15%) have 250–499 employees, and 902 (18%) firms have 500 or more employees. Mean and standard deviation are showed in Table 2. We can accomplish the following: a large amount is spent on R&D and machinery and equipment expenses; a small proportion of human capital is engaged in the innovation process in these companies; and a small percentage of domestic sales and exportation of new products is achieved, consequently leading to a low ROS and high ROA.

ROA and ROE are calculated as net profit over asset and equity, respectively, taking into account end-of-year data, as provided by firms in the IBGE surveys. We are aware of potential distortions of accounting data taken from a single point in time. However, IBGE's surveys do not gather information on a more frequent basis and all data for variables should reflect values in the end of the year, such as firm assets, or throughout the year, such as firm sales.

We first conducted an exploratory factor analysis from the measured variables in PINTEC and PIA taking into account techniques such as principal components analysis and the varimax rotation method. Results are depicted in Table 3. and include Kaiser-Meyer-Olkin statistic and Cronbach's alpha. For the latent construct IIA, R&D and the introduction of technological innovations presented higher factor loadings. For the external innovative activity (EIA), two distinct variables – acquisition of software and acquisition of external knowledge – were relevant. For government support, a number of measured variables were considered: government incentives and project funding, equipment and machinery funding, and scholarships. Organizational and marketing activities encompass organizational and strategic changes. Finally, the measured variables in human capital with higher factor loadings include the number of professionals with undergraduate and master's degrees.

Through a covariance-based SEM, we tested the research hypothesis, according to Fig. 3, contrasting results with a naïve model (depicted in Fig. 2), which does not incorporate the indirect effect of innovation efforts. Table 3 shows the hypothesis testing results using PINTEC and PIA data for 2011, showing statistical information for the structural model as well as for the measurement model. Results of the SEM analysis are shown in Table 3.

Results show that innovation efforts have a positive and significant influence on innovation impacts, suggesting that investments and initiatives by companies lead to effective results in terms of new products, as shown by the

Table 2
Descriptive statistics.

Construct	Variable	Mean	SD
Innovation Efforts (InnovEff)	R&D expenses	11.73	1.02
	Training expenses	1.34	1.08
	Efforts to introduce and distribute new products	3.09	4.70
	Acquisition of external R&D and knowledge	1.17	9.19
	Acquisition of software	2.95	4.19
	Machinery and equipment	70.05	13.70
	Tax shield to R&D	-	-
	Scholarships or grants from funding agencies	-	-
	New methods or processes	-	-
	Changes in marketing strategies	-	-
	Changes in the product	-	-
	Technical	0.003	0.019
	Undergraduates	0.007	0.055
	Masters	0.001	0.017
	PhD personnel allocated in R&D activities	0.001	0.006
Innovation Impact (InnovImp)	Percentage of domestic sales of new products	17.43	2.70
	Exports of new products	4.23	1.60
Financial Performance (FinPerf)	ROA	0.45	7.65
	ROS	0.14	0.40
	OM	0.15	0.43

Notes: ROA: Return on Assets; ROS: Return on Sales; OM: Operating Margin.

representativeness of new products in domestic and external sales. However, these impacts in innovation do not necessarily translate into financial performance. Therefore, the data only partially corroborated the hypotheses established in Fig. 1.

It is important to highlight that the study, and more particularly Figs. 2 and 3, reinforces the results of Santos et al. (2014), who used different data and find that financial performance is hardly explained by innovation for the Brazilian market. Kannebley et al. (2008) suggested that the exposure of Brazilian manufacturing companies to international competitors shows the technological distance between Brazil and other countries. The authors suggested that the Brazilian industry suffers from scarce investment in technology and R&D, and focuses on the acquisition of technology, mainly machines and equipment.

We also analyze some adequacy metrics of our model: comparative fit index (CFI = 0.95), Tucker Lewis index (TLI = 0.93), and root-mean-square error of approximation (RMSEA = 0.025). The chi-square statistics are likely to lead to a statistically significant result owing to the large dataset used in the study. According to base values suggested by Hair, Black, Babin, and

Table 3
Results of the structural equation model.

	Variable		Coef.	Std. Err.	Z	P > |Z|	95% Conf.	Interval
Structural	Impact	Innovation	109.5870	16.5890	66.1000	0.0000	77.0730	142.1010
	Performance	Impact	−0.0019	0.0084	−0.2300	0.8180	−0.0276	0.0145
	IIA	Innovation	1 (constrained)					
		_const	−5.68E-10	0.0141	0.0000	1.0000	−0.0276	0.0276
	EIA1	Innovation	0.1448	0.0543	0.6700	0.0080	0.0385	0.2512
		_const	−6.29E-10	0.0141	0.0000	1.0000	−0.0276	0.0276
	EIA2	Innovation	0.8147	0.0783	10.4000	0.0000	0.6612	0.9683
		_const	5.74E-10	0.0141	0.0000	1.0000	−0.0276	0.0276
	GS	Innovation	0.1959	0.0556	3.5200	0.0000	0.0869	0.3049
		_const	−2.22E-03	0.0155	−0.1400	0.8860	−0.0326	0.0282
	OMA	Innovation	0.2235	0.566	3.9500	0.0000	0.1127	0.3344
		_const	−9.62E-09	0.0141	0.0000	1.0000	−0.0276	0.0276
Measurement	HC	Innovation	13.839	0.1433	9.6600	0.0000	11.03	16.648
		_const	2.94E-09	0.0141	0.0000	1.0000	−0.0276	0.0276
	ROA	Performance	1 (constrained)					
		_const	0.5697	0.1243	4.5800	0.0000	0.3261	0.8134
	ROS	Performance	0.1357	0.0055	24.9500	0.0000	0.1250	0.1463
		_const	0.1859	0.0187	9.9200	0.0000	0.1492	0.2227
	OM	Performance	0.0330	0.0056	5.9300	0.0000	0.0221	0.043
		_const	0.1453	0.0061	23.9700	0.0000	0.1334	0.1517
	DSNP	Impact	1 (constrained)					
		_const	174314	0.3917	44.5000	0.0000	166.637	181.992
	EXP	Impact	0.3972	0.0867	4.5800	0.0000	0.2272	0.5672
		_const	42304	0.2332	18.1400	0.0000	39.735	46.874

Notes: IIA: Internal Innovative Activity; EIA: External Innovative Activity; GS: Governmental Support; OMA: Organizational and Marketing Activities; HC: Human Capital; DSNP: Domestic Sales of New Products; EXP: Exports of New Products; ROA: Return on Assets; ROS: Return on Sales; OM: Operating Margin.

Anderson (2009), RMSEA is below acceptable levels, whereas CFI and TLI are compatible with the adequacy of the structural model. Empirical evidence must be treated with caution due to the non-random characteristic of the sample. Hypotheses of the study were only partially corroborated, indicating that efforts lead to innovation but not necessarily to improved performance.

5. Discussion and conclusion

The aim of this study was to analyze whether efforts to innovate have a positive influence on the impact of innovations and on the financial performance of companies doing business in Brazil. Since a direct observation of some variables is not possible, the main variables of our study are latent constructs associated with innovation efforts, innovation impact, and financial performance.

Previous studies analyzed the relationship between innovation and performance using PINTEC microdata (Frank, Cortimiglia, Ribeiro, & de Oliveira, 2016; Santos et al., 2014, 2018), reflecting efforts of a group of Brazilian researchers that aim to better understand the concept and impacts of innovation by focusing on the country's environment.

One main difference between the present study and that of Santos et al. (2014) relates to the dataset. Santos et al. (2014) analyzed microdata from PINTEC 2000, 2003, and 2005 surveys, and financial information gathered from third-party data providers. In contrast, our study uses PINTEC 2011 data, which was the most recent survey at the time of our research; performance data were gathered from another survey (PIA) conducted by IBGE.

Both studies follow a static SEM; however, according to Santos et al. (2014), the hypothesis sustain a positive direct influence of a broad construct of innovation on financial performance measured only by ROA, while in our study, we also analyze the hypothesis that the efforts in innovation should generate financial performance indirectly. In this context, we take into account the risky nature of innovations, since investments in, for instance, R&D, do not necessarily translate into successful innovative products or services.

In addition, whereas, we continued to explore potential relationships between performance and innovation, Santos et al. (2018) focused on the trajectory of innovation, emphasizing a construct that reflects the ability to innovate and attempting to link it to financial performance, taking into account data from five consecutive PINTEC surveys. Our study maintains the focus on efforts of the firm to innovate and does not tackle specific elements of the resource-based view or capability-based theory, which could be connected to the ability to innovate. Even though surveys from IBGE do not follow a constant frequency and are sometimes dependent on the availability of financial resources from the government, the study by Santos et al. (2018), using different cross-sectional data over time, can enable the analysis of innovation and performance in different macroeconomic states of the economy.

Considering the research hypotheses, we found that efforts to innovate have a positive and significant relationship with innovation impact. However, there is no significant relationship between innovation impact and financial performance. Therefore, results suggest that the efforts to innovate lead to effective innovation, which in turn does not translate into financial performance. Therefore, innovation does not seem to consistently overcome the influence of Brazil's specific institutional environment and economic uncertainty on the performance of firms.

We now discuss the limitations of the study. First, although our study used a comprehensive and large dataset compared to other studies that investigate innovation and performance, our empirical database comprised only companies operating in Brazil. Therefore, while the study contributes to a better understanding of innovation in Brazil, potential generalization of results independent of country-specific characteristics is limited.

Furthermore, because all analyses were conducted inside IBGE's secrecy room, we are not able to provide additional results, controlling for firm size or new product sales. We acknowledge that these variables are relevant, and further studies could take them into account.

Nevertheless, the study contributes to the discussion of external validity analysis of the relationship between innovation and performance by focusing on one country. Separate investigations of specific countries can be used to evaluate a general hypothesis about innovation and performance.

Second, although using a thorough and official database constitutes a strength, it also brings limitations. Since the analysis had to be conducted on IBGE's premises, confidentiality concerns and restraints to retrieving results from the secrecy room give us little flexibility to conduct additional analysis. For this research, IBGE allowed just two retrievals of files with the results of the quantitative analysis. In addition, output data did not allow profile identification of a single entity or a small group of firms. In this context, although we tested many different specifications for the models and conducted robustness checks in the secrecy room using all the available data, we only had access to a limited and general set of the generated results. For instance, this restraint precluded us from analyzing the phenomenon by unbundling data by sector.

Third, since we had to work only on the provided databases, we were not able to use other information, aiming to reduce common method bias and to resolve endogeneity issues. Using two different sources for data—gathered with different instruments—helps reduce common method bias. We are aware that there may be omitted variables in the structural equation, and that, due to the complexity of both innovation and performance concepts, problems with simultaneity can occur. Thus, performance can be affected not just by innovation efforts or innovation impacts, but by other factors too, both exogenous and endogenous to the firm. In addition, simultaneity and cause-effects issues may arise. Innovation efforts can impact performance; nevertheless, a financially healthier firm could be more prone to engage in innovation efforts, making it more difficult to analyze the phenomenon based only on cross-sectional data.

In light of the above, it should be highlighted that this study differs from previous studies in two aspects:

1. As we found evidence in the literature that corroborate the two hypotheses, we let the data speak;
2. We introduced two variables that measure the outcome of the innovation process before the financial result; our hypothesis (indirect model) was corroborated.

Our study did not include sectoral analysis due to confidentiality constraints. Since the Brazilian market has many monopolistic and oligopolistic segments, with large or state-owned enterprises, some sector results could depict the behavior of specific firms. Different industries may have distinct competitive environments and particular innovation strategies, and thus, this omitted important variable can impact endogeneity, which we discuss in the final section of the paper.

Our study has important research implications for decision makers, entrepreneurs, and the Brazilian government. The creation of incentives by the Brazilian government and support for ongoing research are relevant decisions related to public policies. Therefore, thorough research can help evaluate which components of the latent innovation variable (capacity to innovate) are more effective. This analysis allows directing public policy instruments toward focusing on what is relevant to the country's innovation strategy.

The research also while the exchange rate appreciation during this period facilitated the external acquisition of new machinery and equipment, it rendered Brazilian companies more vulnerable to competition with foreign products and made it difficult for Brazilian companies to export (IBGE, 2011). Longitudinal SEM and static and dynamic panel data models could be employed to evaluate the long-term impact of innovation on financial performance, and to assess whether there is another type of causality, since financial performance can impact innovation efforts.

Despite limitations, our analysis provides useful insights about managing innovation in emerging countries, particularly in Brazil, where political and economic volatility may suppress the direct benefits of innovation for value creation. The proposed model can be improved; a longitudinal analysis would be interesting to understand the long-term effects of efforts to innovate or even to provide a better perspective of the cause and effect relationship. Another interesting research direction would be to further analyze industrial sectors and to compare domestic and foreign capital companies, among others. We also suggest that additional research with access to relevant innovation and performance data from different countries could be conducted with an aim to enhance external validity.

Finally, it is important to highlight that the exaggerated focus on the significance of results from statistical hypothesis testing is under crescent criticism (Schwab, Abrahamson, Starbuck, & Fidler, 2011). In fact, the tests do not directly analyze the validity of the hypothesis, but rather the likelihood of the data, given that the null hypothesis is true (Cohen, 1994). Therefore, for the purposes of theory building, a qualitative analysis with some innovative companies would also be valuable in providing insights regarding the complex phenomenon of innovation.

Conflicts of interest

The authors declare no conflict of interest.

Acknowledgments

We acknowledge the Fundo Mackenzie de Pesquisa (MACKPESQUISA) and the Conselho Nacional de Desenvolvimento Científico e Tecnológico (CNPq) for financial support and the Instituto Brasileiro de Geografia e Estatística (IBGE) for operational support.

References

Acs, Z. J., Audretsch, D. B., Lehmann, E. E., & Licht, G. (2016). National systems of innovation. *The Journal of Technology Transfer, 42*(5), 997–1008. https://doi.org/10.1007/s10961-016-9481-8.

Albort-Morant, G., Leal-Millán, A., & Cepeda-Carrión, G. (2016). The antecedents of green innovation performance: A model of learning and capabilities. *Journal of Business Research, 69*(11), 4912–4917.

Artz, K. W., Norman, P. M., Hatfield, D. E., & Cardinal, L. B. (2010). A longitudinal study of the impact of R&D, patents, and product innovation on firm performance. *Journal of Product Innovation Management, 27*(5), 725–740.

Atkinson, R. (2012). Innovation economics: The race for global advantage. In G. Madhavan, B. Oakley, D. Green, D. Koon, & P. Low (Eds.), *Practicing sustainability* (pp. 123–126). New York: Springer Science + Business Media.

Bagur-Femenias, L., Llach, J., & del Mar Alonso-Almeida, M. (2013). Is the adoption of environmental practices a strategical decision for small service companies? *Management Decision, 51*(1), 41–62.

Bartels, F. L., Koria, R., & Vitali, E. (2016). Barriers to innovation: The case of Ghana and implications for developing countries. *Triple Helix, 3*, 12.

Bentes, A. V., Carneiro, J., Silva, J. F. d., & Kimura, H. (2012). Multidimensional assessment of organizational performance: Integrating BSC and AHP. *Journal of Business Research, 65*(12), 1790–1799.

Bierly, P., & Chakrabarti, A. (1996). Generic knowledge strategies in the U.S. pharmaceutical industry. *Strategic Management Journal, 17*(S2), 123–135.

Brito, E. P. Z., Brito, L. A. L., & Morganti, F. (2009). Inovação e o desempenho empresarial: Lucro ou crescimento? *RAE eletrônica, 8*(1), 1–24.

Cameron, K. S. (1986). Effectiveness as paradox: Consensus and conflict in conceptions of organizational effectiveness. *Management Science, 32*(5), 539–553.

Carton, R. B., & Hofer, C. W. (2007). *Measuring organizational performance: Metrics for entrepreneurship and strategic management research* (1st ed.). Cheltenham, Gloucestershire, England: Edward Elgar Pub.

Caves, R. E., & Ghemawat, P. (1992). Identifying mobility barriers. *Strategic Management Journal, 13*(1), 1–12.

Chakravarthy, B. S. (1986). Measuring strategic performance. *Strategic Management Journal, 7*(5), 437–458.

Chang, C.-H. (2011). The influence of corporate environmental ethics on competitive advantage: The mediation role of green innovation. *Journal of Business Ethics, 104*(3), 361–370.
Chen, J. (2017). Towards new and multiple perspectives on innovation. *International Journal of Innovation Studies, 1*(1), 1–4.
Chen, J., Yin, X., & Mei, L. (2018). Holistic innovation: An emerging innovation paradigm. *International Journal of Innovation Studies, 2*(1), 1–13.
Chesbrough, H. (2010). Business model innovation: Opportunities and barriers. *Long Range Planning, 43*(2–3), 354–363.
Chiou, T.-Y., Chan, H. K., Lettice, F., & Chung, S. H. (2011). The influence of greening the suppliers and green innovation on environmental performance and competitive advantage in Taiwan. *Transportation Research Part E: Logistics and Transportation Review, 47*(6), 822–836.
Christensen, C. M., Raynor, M. E., & McDonald, R. (December 2015). What is disruptive innovation? *Harvard Business Review, 93*(12), 44–53.
Clausen, T. H., Korneliussen, T., & Madsen, E. L. (2013). Modes of innovation, resources and their influence on product innovation: Empirical evidence from R&D active firms in Norway. *Technovation, 33*(6–7), 225–233.
Cohen, J. (1994). The earth is round ($p < .05$). *American Psychologist, 49*(12), 997–1003.
Curado, C., Muñoz-Pascual, L., & Galende, J. (2018). Antecedents to innovation performance in SMEs: A mixed methods approach. *Journal of Business Research, 89*, 206–215.
Damanpour, F., & Evan, W. M. (1984). Organizational innovation and performance: The problem of "organizational lag". *Administrative Science Quarterly, 29*(3), 392–409.
Eisenhardt, K. M., & Martin, J. A. (2000). Dynamic capabilities: What are they? *Strategic Management Journal, 21*(10–11), 1105–1121.
Emmann, C. H., Arens, L., & Theuvsen, L. (2013). Individual acceptance of the biogas innovation: A structural equation model. *Energy Policy, 62*, 372–378.
Feeny, S., & Rogers, M. (2003). Innovation and performance: Benchmarking Australian firms. *The Australian Economic Review, 36*(3), 253–264.
Frank, A. G., Cortimiglia, M. N., Ribeiro, J. L. D., & de Oliveira, L. S. (2016). The Brazilian industry: Market-orientation vs. technology-acquisition strategies. *Research Policy, 45*(3), 577–592.
Gkypali, A., Filiou, D., & Tsekouras, K. (2017). R&D collaborations: Is diversity enhancing innovation performance? *Technological Forecasting and Social Change, 118*, 143–152.
González-Fernández, M., & González-Velasco, C. (2018). Innovation and corporate performance in the Spanish regions. *Journal of Policy Modeling, 40*(5), 998–1021.
Gonçalves, E., Lemos, M. B., & de Negri, J. A. (2011). The role of firm and territory in innovative activities in Brazilian post-opening economy. *Economia Aplicada, 15*(1), 103–130.
Hair, J. F., Black, W. C., Babin, B. J., & Anderson, R. E. (2009). *Multivariate data analysis* (7th ed.). Upper Saddle River, NJ: Prentice Hall.
Hong, P., Kwon, H.-B., & Roh, J. J. (2009). Implementation of strategic green orientation in supply chain: An empirical study of manufacturing firms. *European Journal of Innovation Management, 12*(4), 512–532.
Hult, G. T. M., Hurley, R. F., & Knight, G. A. (2004). Innovativeness: Its antecedents and impact on business performance. *Industrial Marketing Management, 33*(5), 429–438.
IBGE. (2011). *Pesquisa de inovação tecnológica*. Rio de Janeiro: Instituto Brasileiro de Geografia e Estatística. Retrived from ftp://ftp.ibge.gov.br/Industrias_Extrativas_e_de_Transformacao/Pesquisa_de_Inovacao_Tecnologica/2011/pintec2011.pdf.
Jiménez-Jiménez, D., & Sanz-Valle, R. (2011). Innovation, organizational learning, and performance. *Journal of Business Research, 64*(4), 408–417.
Jugend, D., Jabbour, C. J. C., Scaliza, J. A. A., Rocha, R. S., Junior, J. A. G., Latan, H., et al. (2018). Relationships among open innovation, innovative performance, government support and firm size: Comparing Brazilian firms embracing different levels of radicalism in innovation. *Technovation, 74–75*, 54–65.
Kandybin, A. (2009). Which innovation efforts will pay?. In *MIT Sloan Management Review*. Retrived from https://sloanreview.mit.edu/article/which-innovation-efforts-will-pay/.
Kannebley, S., Sekkel, J. V., & Araújo, B. C. (2008). Economic performance of Brazilian manufacturing firms: A counterfactual analysis of innovation impacts. *Small Business Economics, 34*(3), 339–353.
Kim, B., Kim, E., Miller, D. J., & Mahoney, J. T. (2016). The impact of the timing of patents on innovation performance. *Research Policy, 45*(4), 914–928.
Lee, R. P., & Chen, Q. (2009). The immediate impact of new product introductions on stock price: The role of firm resources and size. *Journal of Product Innovation Management, 26*(1), 97–107.
Lee, R., Lee, J.-H., & Garrett, T. C. (2017). Synergy effects of innovation on firm performance (in press) *Journal of Business Research*. https://doi.org/10.1016/j.jbusres.2017.08.032. Retrived from . (Accessed 23 February 2017).
Lewandowska, M. S., Szymura-Tyc, M., & Gołębiowski, T. (2016). Innovation complementarity, cooperation partners, and new product export: Evidence from Poland. *Journal of Business Research, 69*(9), 3673–3681.
Liao, T.-S., & Rice, J. (2010). Innovation investments, market engagement and financial performance: A study among Australian manufacturing SMEs. *Research Policy, 39*(1), 117–125.
Lieberman, M. B., & Montgomery, D. B. (1988). First-mover advantages. *Strategic Management Journal, 9*(S1), 41–58.
Madsen, T. L., & Leiblein, M. J. (2015). What factors affect the persistence of an innovation advantage? *Journal of Management Studies, 52*(8), 1097–1127.
Mendes, C. S., Lopes, L. S., & Gomes, A. P. (2012). Eficiência dos dispêndios em inovação nas indústrias de transformação do Brasil. *Revista Brasileira de Inovação, 11*(1), 193–218.
Nybakk, E., & Jenssen, J. I. (2012). Innovation strategy, working climate, and financial performance in traditional manufacturing firms: An empirical analysis. *International Journal of Innovation Management, 16*(2), 1–26.
Rajapathirana, R. P. J., & Hui, Y. (2018). Relationship between innovation capability, innovation type, and firm performance. *Journal of Innovation & Knowledge, 3*(1), 44–55.
Ramanathan, R., Black, A., Nath, P., & Muyldermans, L. (2010). Impact of environmental regulations on innovation and performance in the UK industrial sector. *Management Decision, 48*(10), 1493–1513.
Santos, D. F. L., Basso, L. F. C., & Kimura, H. (2018). The trajectory of the ability to innovate and the financial performance of the Brazilian industry. *Technological Forecasting and Social Change, 127*, 258–270.
Santos, D. F. L., Basso, L. F. C., Kimura, H., & Kayo, E. K. (2014). Innovation efforts and performances of Brazilian firms. *Journal of Business Research, 67*(4), 527–535.
Schulz, M., & Jobe, L. A. (2001). Codification and tacitness as knowledge management strategies: An empirical exploration. *The Journal of High Technology Management Research, 12*(1), 139–165.
Schumpeter, J. A. (1934). *The theory of economic development: An inquiry into profits, capital, credit, interest, and the business cycle*. Harvard University Press.
Schwab, A., Abrahamson, E., Starbuck, W. H., & Fidler, F. (2011). PERSPECTIVE—researchers should make thoughtful assessments instead of null-hypothesis significance tests. *Organization Science, 22*(4), 1105–1120.
Silva, G. M., Styles, C., & Lages, L. F. (2017). Breakthrough innovation in international business: The impact of tech-innovation and market-innovation on performance. *International Business Review, 26*(2), 391–404.
Simpson, P. M., Siguaw, J. A., & Enz, C. A. (2006). Innovation orientation outcomes: The good and the bad. *Journal of Business Research, 59*(10–11), 1133–1141.
Teece, D. J., Pisano, G., & Shuen, A. (1997). Dynamic capabilities and strategic management. *Strategic Management Journal, 8*(7), 509–533.
Thornhill, S. (2006). Knowledge, innovation and firm performance in high- and low-technology regimes. *Journal of Business Venturing, 21*(5), 687–703.
Tidd, J., & Bessant, J. R. (2013). *Managing innovation: Integrating technological, market and organizational change* (5th ed.). Hoboken, NJ: John Wiley & Sons.
Tsai, W. (2001). Knowledge transfer in intraorganizational networks: Effects of network position and absorptive capacity on business unit innovation and performance. *Academy of Management Journal, 44*(5), 996–1004.
Urraca-Ruiz, A., & Bhawan, R. (2010). Diferenças de comportamento inovador entre empresas nacionais e estrangeiras no Brasil. *Revista Brasileira de Inovação, 9*(1), 29–68.

Vaccaro, I. G., Jansen, J. J. P., Van Den Bosch, F. A. J., & Volberda, H. W. (2010). Management innovation and leadership: The Moderating role of organizational size. *Journal of Management Studies, 49*(1), 28–51.
Venkatraman, N., & Ramanujam, V. (1986). Measurement of business performance in strategy research: A comparison of approaches. *Academy of Management Review, 11*(4), 801–814.
Wadho, W., & Chaudhry, A. (2018). Innovation and firm performance in developing countries: The case of Pakistani textile and apparel manufacturers. *Research Policy, 47*(7), 1283–1294.
Woodward, R. (2009). *The organisation for economic Co-operation and development (OECD)* (1st ed.). London: Taylor & Francis Online.
Zaefarian, G., Forkmann, S., Mitręga, M., & Henneberg, S. C. (2017). A capability perspective on relationship ending and its impact on product innovation success and firm performance. *Long Range Planning, 50*(2), 184–199.
Zhang, S., Yang, D., Qiu, S., Bao, X., & Li, J. (2018). Open innovation and firm performance: Evidence from the Chinese mechanical manufacturing industry. *Journal of Engineering and Technology Management, 48*(1), 76–86.
Zott, C. (2003). Dynamic capabilities and the emergence of intraindustry differential firm performance: Insights from a simulation study. *Strategic Management Journal, 24*(2), 97–125.