EG | Estudios Gerenciales

Journal of Management and Economics for Iberoamerica

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Presentación revista Estudios Gerenciales N.° 153

Tenemos el gusto de presentar la revista *Estudios Gerenciales - Journal of Management and Economics for Iberoamerica-* número 153, correspondiente al periodo octubre – diciembre de 2019, en la cual se incluyen 10 artículos de autores de Brasil, España, México, Colombia, Chile y Perú, donde se tratan temas relacionados con finanzas, emprendimiento, innovación empresarial, gestión de recursos humanos, rendimiento empresarial, economía del bien común y responsabilidad social universitaria.

Por otra parte, aprovechamos para compartir información sobre la cantidad de veces que cada año se citan en *Web of Science* (WoS) los artículos de la revista *Estudios Gerenciales*. La figura 1 permite evidenciar un comportamiento creciente en el número de citas que nos conceden cada año, lo que refleja un aumento del impacto de la revista. Adicionalmente, hasta el tercer trimestre de 2019 se habían acumulado 212 citas concedidas.
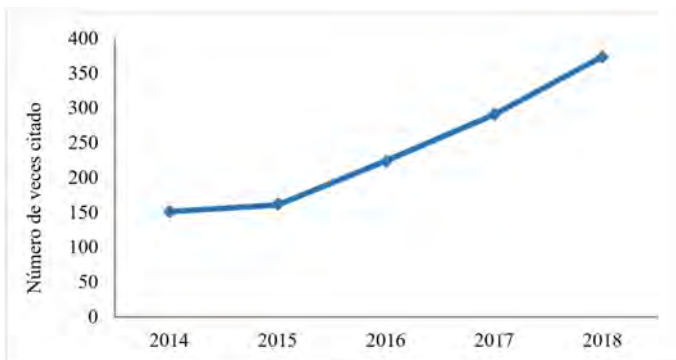
Figura 1. Número de veces al año que se citan artículos de *Estudios Gerenciales* en WoS
Fuente: Web of Science – WoS.

A continuación, se realiza una breve revisión de los artículos incluidos en el presente número.

Inicialmente, en el artículo de José Willer do Prado, Francisval de Melo Carvalho, Gideon Carvalho de Benedicto y André Luis Ribeiro Lima (Universidade Federal de Lavras, Brasil) se identifican los indicadores económico-financieros que mejor caracterizan a las empresas públicas brasileñas y se evalúan las técnicas más precisas utilizadas para pronosticar la bancarrota empresarial.

Por otra parte, los autores Karen Watkins (Universidad Internacional de La Rioja, España) y Lázaro Rodríguez (Universidad de Granada, España) realizan un análisis de la influencia de las características de los Directores Generales y de los Consejos de Administración en el emprendimiento internacional, lo anterior aplicado al caso de empresas familiares mexicanas.

Respecto al artículo de Marisela-Yazmín García, Gonzalo Maldonado y Sandra-Yesenia Pinzón (Universidad Autónoma de Aguascalientes, México), en este se analiza la influencia de las prácticas de innovación abierta sobre el rendimiento empresarial en las Pymes familiares y no familiares en México.

Posteriormente, Julián-Alberto Uribe (Instituto Tecnológico Metropolitano, Colombia), Diana-Patricia Giraldo, Luciano Gallón, Javier-Dario Fernandez y Santiago Quintero (Universidad Pontificia Bolivariana, Colombia) realizan un análisis del sistema regional de innovación en el departamento de Antioquia (Colombia), a partir de lo cual se determina un modelo que explora las dinámicas, estructuras y relaciones entre agentes del sistema, y se determinan las condiciones bajo las cuales los procesos de innovación se desarrollan a nivel regional.

En relación con el artículo de Renan Godinho-Bitencourt, Jandir Pauli y Alessandra Costenaro-Maciel (IMED Business School, Brasil), en este los autores analizan la influencia del apoyo organizacional en la motivación laboral de la Generación Y, a partir de lo cual encuentran que la motivación intrínseca de la Generación Y está directamente asociada con la percepción del apoyo organizacional, específicamente el apoyo del gerente.

Seguido se encuentra el artículo de Edgar Pamplona, Tarcísio-Pedro da Silva (Universidade Regional de Blumenau, Brasil) y Wilson Toshiro-Nakamura (Universidade Presbiteriana Mackenzie, Brasil), en este estudia la influencia de la holgura financiera en el rendimiento económico de empresas industriales brasileñas y mexicanas, a partir de lo

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cual se encuentra una relación positiva, aunque no lineal.

Los autores Jorge Muñoz, Sandra Sepúlveda, Carmen Veloso y Carlos Delgado (Universidad de Concepción, Chile) analizan los efectos de la propiedad extranjera y de las Normas Internacionales de Información Financiera (NIIF) sobre la madurez de la deuda en las empresas chilenas.

Por su parte, el profesor Juan Celestino León (Universidad Nacional Mayor de San Marcos, Perú) estudia en su artículo la influencia del emprendimiento empresarial sobre el crecimiento económico en Perú.

Los autores Joan-Ramon Sanchis y Vanessa Campos (Universidad de Valencia, España) realizan un análisis del enfoque empresarial del modelo de la economía del bien común y lo comparan con otras teorías organizativas.

Finalmente, Pedro Duque (Universidad Católica Luis Amigó, Colombia) y Luis-Salvador Cervantes (Universidad del Valle de Atemajac, México) realizan un análisis bibliométrico de la producción científica relacionada con la responsabilidad social universitaria, a través de una revisión en las bases de datos *Web of Science* y *Scopus*.

Agradecemos a los autores y evaluadores que participaron en la presente edición y, adicionalmente, extendemos nuestra invitación a los autores, pares y lectores, para que sigan participando y colaborando con nuestra revista.

Estudios Gerenciales

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Research article

Analysis of credit risk faced by public companies in Brazil: an approach based on discriminant analysis, logistic regression and artificial neural networks

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Abstract

The aims of the present article are to identify the economic-financial indicators that best characterize Brazilian public companies through credit-granting analysis and to assess the most accurate techniques used to forecast business bankruptcy. Discriminant analysis, logistic regression and neural networks were the most used methods to predict insolvency. The sample comprised 121 companies from different sectors, 70 of them solvent and 51 insolvent. The conducted analyses were based on 35 economic-financial indicators. Need of working capital for net income, liquidity thermometer, return on equity, net margin, debt breakdown and equity on assets were the most relevant economic-financial indicators. Neural networks recorded the best accuracy and the Receiver Operating Characteristic Curves (ROC curve) corroborated this outcome.

Keywords: credit risk, bankruptcy, Brazil, financial indicators.

Análisis del riesgo de crédito que enfrentan las empresas de capital abierto en Brasil: un enfoque utilizando análisis discriminante regresión logística y redes neuronales artificiales

Resumen

El objetivo del presente artículo es identificar cuáles son los indicadores económicos-financieros que mejor distinguen a las empresas brasileras de capital abierto por medio de concesión de crédito y evaluar cuáles de las técnicas utilizadas son las más precisas para prever la bancarrota de las empresas. Los métodos utilizados para prever la insolvencia fueron análisis discriminante, regresión logística y redes neuronales. La muestra fue compuesta por 121 empresas de diversos sectores, siendo 70 solventes y 51 insolventes. Los análisis utilizaron 35 indicadores económicos-financieros. Los indicadores económicos-financieros más relevantes fueron: necesidad de capital de trabajo sobre utilidad líquida, termómetro de liquidez, retorno sobre el patrimonio líquido, margen de beneficio, ratio de endeudamiento y patrimonio líquido sobre los activos. El modelo de redes neuronales presentó una mayor precisión y fue corroborada por la Curvas Características Operativas del Receptor (curva ROC).

Palabras clave: riesgo de crédito, bancarrota, Brasil, indicadores financieros.

Análise de risco de crédito enfrentada por empresas de capital aberto no Brasil: uma abordagem utilizando análise discriminante de regressão logística e redes neurais artificiais

Resumo

O objetivo deste artigo é identificar quais são os indicadores econômico-financeiros que melhor distinguem as empresas de capital aberto brasileiras por meio da concessão de credito e avaliar quais das técnicas utilizadas são as mais precisas para prever a falência das empresas. Os métodos utilizados para antecipar a insolvência foram analise discriminante, regressão logística e redes neurais. A amostra foi composta por 121 empresas de diversos setores, sendo 70 solventes e 51 insolventes. As analises utilizaram 35 indicadores econômico-financeiros. Os indicadores-econômico-financeiros mais relevantes foram: necessidade de capital de giro sobre lucro líquido, termômetro de liquidez, retorno sobre patrimônio líquido, margem de lucro, índice de dívida e patrimônio líquido sobre ativos. O modelo de rede neural apresentou maior precisão e foi corroborado pela curva ROC.

Palavras-chave: risco de crédito, falência, Brasil, indicadores financeiros.

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1. Introduction

Decisions about whether to grant credit or not play a crucial role in lending institutions. Insight into factors leading to business failure and solvency indications can make the difference between profit or loss. Both studies on significant economic-financial indicators for credit analysis or on methodologies to help provide credit are economically and socially important.

Managers must take into consideration the risks involved when there is a high volume of credit operations. At present, risks concern constant costs in credit operations; therefore, they are worth quantifying. The idea of risk is associated with the likelihood of facing outcomes related to expected returns; thus, risk heads towards the future and points out possible losses (Assaf Neto, 2014). Financial operations involving credit must be protected against constant operational risks or, at least, turn uncertainty into measurable risks (Silva, 1983).

The first publications in this field were an attempt to detect whether indicators of solvent companies were favorable and whether the indicators of insolvent companies were unfavorable. Some of the main (univariate) studies conducted in this field were *The Use of Multiple Measurements in Taxonomic Problems* by Fisher (1936) and *Risk Elements in Consumer Installment Lending* by Durand (1941). The univariate analyses performed in the late 1950s were replaced as soon as scholars turned their attention to credit scoring modeling techniques in the late 1960s (Sabato, 2009).

Seminal studies in this field were *Financial Ratios as Predictors of Failure* by Beaver (1966) and *Financial Ratios, Discriminant Analysis and the Prediction of Corporate Bankruptcy* by Altman (1968). These two studies mark the beginning of research based on multivariate discriminant analysis, which became a common technique in research on the topic until a publication by Ohlson (1980) called *Financial Ratios and the Probabilistic Prediction of Bankruptcy*. He applied the logit model to forecast bad debt, opening up the possibility of using other methodologies in this research field. A decade later, Odom and Sharda (1990) suggested a new model in their study *A Neural Network Model for Bankruptcy Prediction*, which was based on artificial intelligence techniques known as artificial neural networks.

Nowadays, there are many tools capable of carrying out credit analysis. Multivariate analysis techniques such as discriminant analysis and logistic regression are the most traditional tools to build credit risk models. Kumar and Ravi (2007) and do Prado et al. (2016) suggest that the 1990s brought along significant changes in this field, since publications based on logistic regression and neural networks became more numerous than the ones based on discriminant analysis, although it "was a very popular method for model development in the early stages of bankruptcy prediction" (Bellovary, Giacomino, & Akers, 2007, p. 2). However, Computational Intelligence techniques have called the attention of researchers to new possibilities (Barboza, Kimura, & Altman, 2017; Liu & Wu, 2019; Pal, Kupka, Aneja, & Militky, 2016; Santana, Lanzarini, & Bariviera, 2018; do Prado et al., 2016).

Kumar and Ravi (2007) and Wang, Ma and Yang (2014) state that literature in the financial field does not address the most expressive indicators in insolvency assessments. According to them, indicators are often chosen when they are related to data access and to researchers' perspectives, although different indicators are systematically applied in different studies.

Accordingly, the aims of this research are to identify the economic-financial indicators that best contribute to improving the accuracy of credit granting analyses applied to Brazilian public companies, and to assess the most accurate techniques (discriminant analysis, logistic regression and artificial neural networks) used in business bankruptcy forecasting.

Barboza et al. (2017) and do Prado et al. (2016) point out that credit risk analyses have been the subject of a series of in-depth studies in recent years. They are the main focus of financial and banking fields, mainly because of the recent international financial crisis, which had a severe effect on many financial organizations. Enhanced methodologies and the evolution of forecasting techniques help managers to keep business liquidity organized, since these techniques help to avoid bad debt or even bankruptcy. Bankruptcy leads to major problems in the market since it regards capital losses and social damages.

Studies on company solvency are relevant because they reinforce research into finances, provided there is good understanding about company behavior and financial strategies. The goal of the present approach is to help broaden knowledge of theoretical and empirical analyses applied to credit risks and of their potential to be used in business decision enhancement within the Brazilian capital market.

The present study addresses a theoretical framework of credit, its risks and the analysis thereof. The methodology highlights the main credit analysis indicators. Results of the credit analysis approach (discriminant analysis, logistic regression, artificial neural networks) were presented and individual analysis was applied to relevant financial indicators.

2. Theoretical framework

Soares and Rebouças (2015, p. 41) highlight that "supporting credit risk reduction is one of the most popular applications of solvency forecasting". Credit plays an important economic and social role in companies' lives. Silva (2008) stated that credit must enable companies to intensify their activities, encourage consumption and increase demand, as well as to fund projects that cannot be run only with internal resources. However, the inadequate use of credit can lead to bankruptcy (insolvency).

Uncertainty is a variable inherent to credit granting that is ever-present. According to Sicsú (2010), financial institutions are always subjected to the likelihood of loss in this type of transaction; thus, it is recommended to quantify loss probabilities in order to better classify appropriate loan applicants. According to the aforementioned author, "loss probabilities in credit operations are called credit risks" (Sicsú, 2010, p. 1).

Based on Silva (2008), multivariate statistical techniques are powerful tools to manage existing bad-debt risks in the provision of credit. The most efficient statistical technique to model companies' data must be identified in order to better forecast clients' behavior and to generate a credit risk forecasting model.

Schrickel (2000) states that credit is somehow connected to the likelihood of losses because it involves expectations about the return of the granted property. García, Guijarro and Moya (2013) and Yu (2014) emphasize that credit risk analyses have been the target of a series of detailed studies conducted in recent years. Credit risk became the main focus of both financial fields and banks, given the international financial crisis, which had a serious effect on many financial organizations. Bülbül, Hakenes and Lambert (2019) and Oreski and Oreski (2014) note that credit risk management, which has been significantly enhanced in recent decades, is one of the most important issues for the banking sector.

Assaf Neto (2014) states that risk is a cost often found in business; therefore, it must be quantified. García et al. (2013) argues that credit risk management is a key issue for companies at any time. The aforementioned authors also highlight several current methodologies aimed at forecasting bad-debt probabilities involving debtors. Some of these methodologies use logit analysis, or discriminant analysis, to classify debtors; however, new methodologies use neural networks or multi-criteria methods.

Based on Harris (2013), competition increase in the financial service sector helped companies to find innovative ways to deal with risk in order to reach and/or keep competitive advantages. Financial institutions face a greater risk of losses associated with inadequate credit approval, often due to poor decision-making in the context of the economic environment and current business. However, Kou and Wu (2014) state that the main goal of credit risk analysis lies in classifying clients as good or bad payers (solvent or insolvent).

According to Sicsú (2010), credit risk quantification through quantitative analysis techniques is a great advantage, since these techniques are faster, more consistent and lead to more adequate decisions. In addition, Kimura, Suen, Perera and Basso (2008) state that risk management through research and quantitative model implementations are becoming increasingly common in modern businesses.

Silva (2008) highlights that quantitative methods have been widely disseminated, making banks seek these techniques to assess credit risk. However, these forecasting methods cannot be interpreted as a 'magic bullet' to solve all issues linked to credit risks in financial operations.

3. Methodology

The present study can be classified by ends, means, data type and approach. The study is predominantly explanatory (Vergara, 2008) and its means can be categorized as *ex post facto* (Vergara, 2008). A literature review and document search were used for secondary data (Marconi & Lakatos, 2005). The document search was conducted in the annual financial reports available on the Economática®[database], and at the website of BM&FBOVESPA (Stock, Commodities and Future Market). The research follows the quantitative approach (Martins & Theóphilo, 2009). SPSS (*Statistical Package for Social Sciences*) and Minitab software were used to develop the study.

Insolvency is defined in the Bankruptcy and Concordat Law n. 7661, from June 21st 1945 (Brasil, 1945), which was repealed by Law n. 11101, from February 2005 (Brasil, 2005). At present, this law covers all current bankruptcy and concordat cases, meaning that the event determining companies' bankruptcy filing will be the time when they issue the formal Preventive Bankruptcy Filing or the Judicial Recovery at the Securities Committee (CVM - *Comissão de Valores Mobiliários*).

The year before companies had issued the bankruptcy filing (the year before the event, timet-1) provided their insolvency indicators. However, whenever possible at least one solvent company was selected for each insolvent company from the same economic sector, with accounting assets proportional to those of the insolvent institution. This methodology is based on previous studies by Altman (1968), Brito, Assaf Neto and Corrar (2009), and Sanvicente and Minardi (1998).

The number of insolvent companies was selected to enable sample size analyses, so that the modeling processes applied to the approached techniques would not be impaired. The sample comprised 121 companies; 70 solvent and 51 insolvent. The sample size used followed the recommendations by Hair et al. (2009, p. 236), who state that there must be at least 40 companies from each of the previously defined groups.

3.1. Defining the indicators

The most common indicators in studies in this field were used to select Traditional Financial Analysis Model indicators, which were defined based on considerations by Pereira, Domínguez and Ocejo (2007). They state that empirical evidence points out that new studies tend to choose indicators from previous studies that have recorded satisfactory results. Table 1 presents the indicators selected for the financial analysis, given their compliance with the selected theoretical reference and with the scope of the present research.

According to Bellovary et al. (2007), the number of indicators used in models has been analyzed through decades and these analyses show that the mean values have varied throughout time, while remaining close to 10 indicators on average. Techniques such as stepwise were recommended to help eliminate less significant indicators (based on F statistics) in order to conduct more parsimonious models and to identify the main economic-financial indicators that best distinguish solvent from insolvent companies in credit granting analysis.

Models were created after sampling data (solvent and insolvent companies) were collected. Data were subjected to the respective analyses and comparisons. Discriminant analysis (Hair et al., 2009), logistic regression (Hosmer & Lemeshow, 2004) and neural network models (Haykin, 2007) were used in the current study. Some practical examples of these methodologies can be seen in studies by Castro Junior

Table 1. Economic-financial indicators.

Code	Indicators	Formula	Authors
X1	WC on assets	WC / TA	Presented in the current study based on studies by Fleuriet et al. (2003)
X2	WC on net income	WC / NI	
X3	NWC on assets	NWC / TA	Brito, Assaf Neto and Corrar (2009) and Minussi, Damacena and Ness Junior (2002)
X4	NWC on net income	NWC / NI	
X5	Balance in treasury on assets	BT / TA	Brito, Assaf Neto and Corrar (2009), Horta (2010) and Sanvicente and Minardi (1998)
X6	Balance in treasury on net income	BT / NI	
X7	Financial liabilities over Current assets	FL / CA	Eifert (2003)
X8	Financial Structure Type	FST	Melo and Coutinho (2007)
X9	Liquidity Thermometer - LT	BT / (|NWC|)	Horta (2010) and Vieira (2008)
X10	Balance in treasury	BT= FA – FL	Melo and Coutinho (2007)
X11	Need of working capital	NWC = OA – OL	Melo and Coutinho (2007)
X12	Working Capital	WC = NCL – NCA	Melo and Coutinho (2007)
X13	Indebtedness	(FL + NCFL) / TA	Brito, Assaf Neto and Corrar (2009)
X14	Net working capital	(CA – CL) / TA	Altman (1968), Brito, Assaf Neto and Corrar (2009), and Sanvicente and Minardi (1998)
X15	Return on assets	EBIT / TA	Altman (1968), Altman, Baydia and Dias (1979) and Brito, Assaf Neto and Corrar (2009)
X16	Shareholder's equity divided by the total liabilities	NE / TL	Altman, Baydia and Dias (1979), Horta (2010) and Soares and Rebouças (2015)
X17	Asset turnover	NI / TA	Altman (1968), Brito, Assaf Neto and Corrar (2009) and Castro Junior (2003)
X18	Return on Assets	NP / TA	Eifert (2003), Horta (2010) and Soares and Rebouças (2015)
X19	Retaining earnings on assets	(AP + NI) / TA	Brito, Assaf Neto and Corrar (2009)
X20	Shareholder's equity return	NP / NE	Castro Junior (2003), Brito, Assaf Neto and Corrar (2009) and Kanitz (1978)
X21	Current Liquidity		Castro Junior (2003), Horta (2010), Matias (1978) and Silva (1983)
X22	Liquidity dry-ups	CA / CL (CA – stocks) / CL	Brito, Assaf Neto and Corrar (2009) e Horta (2010) and Kanitz (1978)
X23	General liquidity	(CA + RLT) / (CL + NCL)	Kanitz (1978) and Soares and Rebouças (2015)
X24	Operating income on financial expenses	EBIT / FE	Brito, Assaf Neto and Corrar (2009) and Soares and Rebouças (2015)
X25	Net margin	NP / NI	Brito, Assaf Neto and Corrar (2009) and Castro Junior (2003)
X26	Total Debt	(CL + NCL) / TA	Brito, Assaf Neto and Corrar (2009), Horta (2010) and Silva (1983)
X27	Structure indicator	SUPLIER / TA	Matias (1978) and Silva (1983)
X28	Debt breakdown	CL / (CL + NCL)	Castro Junior (2003)
X29	Third capital participation	(CL + NCL) / NE	Castro Junior (2003)
X30	Immobilization of equity	FIXED ASSETS / NE	Brito, Assaf Neto and Corrar (2009), Castro Junior (2003) and Soares and Rebouças (2015)
X31	Equity on assets	NE / TA	Brito, Assaf Neto and Corrar (2009) and Matias (1978)
X32	Stocks on assets	STOCKS / TA	Brito, Assaf Neto and Corrar (2009), and Silva (1983)
X33	Immediate liquidity	AVAILABLE / CL	Brito, Assaf Neto and Corrar (2009), Castro Junior (2003) and Horta (2010)
X34	Structure indicator	AVAILABLE / TA	Matias (1978), Silva (1983)
X35	Structure indicator	AVAILABLE / NCA	Silva (1983) and Soares and Rebouças (2015)

CA = Current assets; NWC = Need of working capital; FA = Financial assets; CL = Current liabilities; OA = Operating asset; FL = Financial liabilities; NCA = Non-current assets; NE = Net equity; TA = Total assets; OL = Operating liabilities; WC = Working capital; NCL = Non-current liabilities; FE = Financial expenses; NCFL = Non-current financial liabilities; FST = Financial Structure Type; = RLT = Realizable in the long term; TL = Total liabilities ; BT = Balance in treasury; AP = Accumulated profits; LT = Liquidity thermometer; EBIT = Earnings before interests and income taxes; NI = Net income; NP = Net profit
Source: own elaboration

(2003), Iturriaga and Sanz (2015), and Soares and Rebouças (2015).

4. Results and discussion

Three methods for indicator combinations were tested for model creation: 1) result of stepped methods, 2) result of advanced methods and, 3) human trial and error process. Thus, several possible combinations of indicators were tested for each model. The best results found for each model are presented in the next topics.

4.1. Discriminant analysis (DA)

The best model for discriminant analysis was found through a process of trial and error. The significant indicators (sig. < 0.05) were the relevant parameters for the modeling. The canonical correlation $(0.814)^2$ explained the 66% discrimination between groups. There was no stronger multicollinearity correlation (tolerance value > 0.1 and VIF values <10).

The classification function coefficient analysis shows a little more about the importance of each indicator in the discriminant function. Indicators presenting negative discriminant function coefficient values were Working Capital on Assets (X1- WC / TA) and Financial Structure Types (X8- FST = Financial Structure Types). These indicators helped to classify companies as insolvent. On the other hand, indicators presenting positive discriminant function coefficient values were Need of Working Capital on Assets (X3- NWC / TA); Liquidity Thermometer (X9- LT = BT / (|NWC|)); Shareholders' Equity Return (X20- NP / NE); Liquid Margin (X25- NP / NI); and Net Equity on Assets (X31- NE / TA). These helped classify companies as solvent.

As soon as the non-standardized canonical discriminant function coefficients were found, it was possible to elaborate the Discriminant Analysis function, i.e., the generated credit scoring could be expressed in equation 1:

$$Z = 1.649 - 0.180 . \left(\frac{WC}{TA}\right) + 1.207 . \left(\frac{NWC}{TA}\right) - 0.449 . (\text{Structure type}) + 0.046 . \left(\frac{BT}{NWC}\right) + 1.036 . \left(\frac{NP}{NE}\right) + 1.627 . \left(\frac{NP}{NI}\right) + .0693 . \left(\frac{NE}{TA}\right) \quad (1)$$

After elaborating the Discriminant Analysis Function, the cut-off point was calculated based on the centroids in each group, which were the means found through the individual distribution of groups. The weighted average between centroids in each one of the distributions set the cut-off point of the discriminant function. The optimal cut-off point recorded was 0.4978, this value classifies companies through their discriminant score, i.e., companies recorded below -0.4978 belonged to group "1" (insolvent) and companies recording discriminant scores above this belonged to group "0" (solvent).

4.2. Logistic regression (LR)

The Forward: LR method was applied to calculate the Logistics Regression, which recorded the best results. We validated the results through the following parameters: Cox & Snell 59%; Nagelkerke 79%; and Log-likelihood -2 (-2VL) 64.5% to explain the reasons why companies become insolvent; Hosmer and Lemeshow Sig. > 0.05 and Multicollinearity (Tolerance values > 0.1 and VIF values <10).

Results of indicators in the model presented the positive aspects of the attempts to estimate probabilities based on each coefficient. The Wald statistics presented a Wald coefficient higher than zero (wald >0) in each of the factors; thus, it imposed a discriminant effect over the probability of companies to be insolvent or solvent. Indicators were also significant at a probability level of 0.05 (Sig. < 0.05). Coefficients of independent factors listed in column Exp(B) (25.34) were within the limit set by the Inferior and Superior columns (3.12 to 205.38, respectively), as well as of all other used factors.

The Logistic Regression Model able to classify companies as insolvent and solvent used the regression coefficients. The Logistic Regression Equation, or the generated Credit Scoring, can be represented by Equation 2.

$$P(Y=1) = \frac{1}{1 + e^{-\left(-10.747 . \left(\frac{NWC}{TA}\right) - 2.800 . \left(\frac{NE}{TL}\right) - 7.329 . \left(\frac{NP}{NI}\right) + 3.232 . \left(\frac{CL}{CL + NCL}\right)\right)}} \quad (2)$$

P (Y =1) presented dichotomic-type output in the Logistic Regression analysis when only two possible values were taken into account, '0' and '1'. Thus, the closer to 1, the more insolvent the company, and the closer to zero (0), the more solvent the company. The cut-off point in the Logistic Regression is 0.5, as results vary from '0' to '1'. It is also possible to multiply this result by 100 and interpret it as the probability (in %) that a company will be insolvent.

Coefficients generated through Logistic Regression represent the influence of estimates of each independent variable (indicator) on the dependent variable (when the other indicators remain unchanged), i.e., the signal (+ or -) will set the direction (solvent = 0, insolvent = 1) to be taken by the dependent variable (solvent/insolvent). The higher the negative coefficient values, the greater the company's possibility of being solvent (Group 0), and the higher the positive coefficient values, the greater the chance of the company belonging to the insolvent group (Group 1).

4.3. Artificial neural networks (ANN)

The best Artificial Neural Network model was found through trial and error. The Multilayer Perceptron (MLPS) network was used with feedforward architecture; a back-propagation algorithm with a training error criterion of 0.0001 was used in the modeling process. Network information is shown in Table 2. The co-variables (eight units) represented the selected indicators. The hidden layer was defined with seven neurons (units). The hyperbolic tangent was the activation function in each hidden layer; the Softmax activation function was used in the output layer. The activation functions were defined because they presented the best performance among the tested functions.

The most important indicators for the neural networks model (in order of importance) were Liquidity Thermometer

(X09- LT = BT / (|NWC|)); Need of Working Capital on Net Revenue (X03- NWC / NI); Net Equity on Assets (X31- NE / TA); Shareholders' Equity Return (X20- NP / NE); Net Margin (X25 - NP / NI); Asset Turnover (X17- NI / TA); Net Equity on Total Liabilities (X16- NE / TL) and Debt Breakdown (X28- CL / (CL + NCL)).

However, the importance of an independent indicator was calculated based on the variation faced by the network in its forecasted value (output) and in different input values. It is not possible to state that higher values of indicator 'x' indicate a greater probability of companies becoming insolvent.

4.4. Model comparison

Table 3 shows the accuracy of the selected models with regard to Type I and Type II Precision levels. Type I Precision was opposite to Type I Error, i.e., the higher the Type I Precision, the lower the Type I Error – the same occurs with Type II Precision.

The Type I and II Error level analyses performed through precision models were essential for better understanding their quality. Based on Table 3, discriminant analysis and regression logistics recorded a 90% success level. However, the results of Type I and II Precision levels show that the logistic regression model is the best to classify Type I Precision, i.e., the percentage of companies classified either as insolvent or solvent is higher in the discriminant analysis model than in the logistic regression, a fact that leads to capital losses.

Models could also be assessed through Kolmogorov-Smirnov (KS) statistics in order to verify the score behavior of the two samples in each model. Distribution values of the generated models could improve understanding of the test by generating graphics showing the separation degree between solvent and insolvent companies through model scores (Figure 1).

Models recorded values above 0.75; however, neural network superiority became evident at 0.966. This outcome was followed by the Logistic Regression (0.816) and by the Discriminant Analysis results (0.795).

Besides the KS test, authors such as Baesens et al. (2003) and Sicsú (2010) assess the discriminant power of the classification models through the analysis used to apply ROC curve values (*Receiver Operating Characteristic Curves*), which led to good credit risk results. Figure 2 shows the ROC curves found in the best three generated models. The discriminant analysis presented the smallest area below the curve and the logistic regression presented better results than the discriminant analysis. However, the best performance was presented by neural networks, which occupied almost all the ROC curve area.

Models could be classified based on values found in the ROC curve area such as roc<= 0.5 non-exiting; 0.5<roc< 0.7 = low; 0.7<=roc<0.8 = acceptable; 0.8<=roc<0.9 = excellent; and roc>= 0.9 = above the average. Table 4 classified the

Table 2. Information parameters of the artificial neural network

			Model
Input Layer	Co-variables	1	X4) NWC / NI
		2	X9) LT = BT / (|NWC|)
		3	
		4	X16) NE / TL
		5	X17) NI / TA
		6	X20) NP / NE
		7	X25) NP / NI
		8	X28) CL / (CL + NCL)
			X31) NE / TA
	Number of unitsa		8
	Rescheduling method for co-variables		Standardized
Hidden layers	Number of hidden layers		1
	Number of layers in hidden layer 1		7
	Activation function		Hyperbolic Tangent
Output layer	Dependent variables	1	Scenario 0 1
	Number of units		2
	Activation function		Softmax
	Error function		Cross entropy

Source: research data.

Figure 2. Area under the ROC curve.
Source: own elaboration.

Table 3. Accuracy recorded by means of the three final models (at Type I and II error levels)

Model[1]	Type I precision	Type II precision	General precision
Discriminant analysis[2]	82.4%	97.1%	90.9%
Logistic analysis	90.2%	91.4%	90.9%
Artificial neural networks[3]	98.0%	98.6%	97.8%

[1] The simple arithmetic means was used in the models between the result of the training sample and the result of the validation sample (test).
[2] Model error was checked through the hold-out method (Train: 90%, Test: 10%).
[3] Model error was checked through the hold-out method (Train: 75%, Test: 25%).
Source: own elaboration.
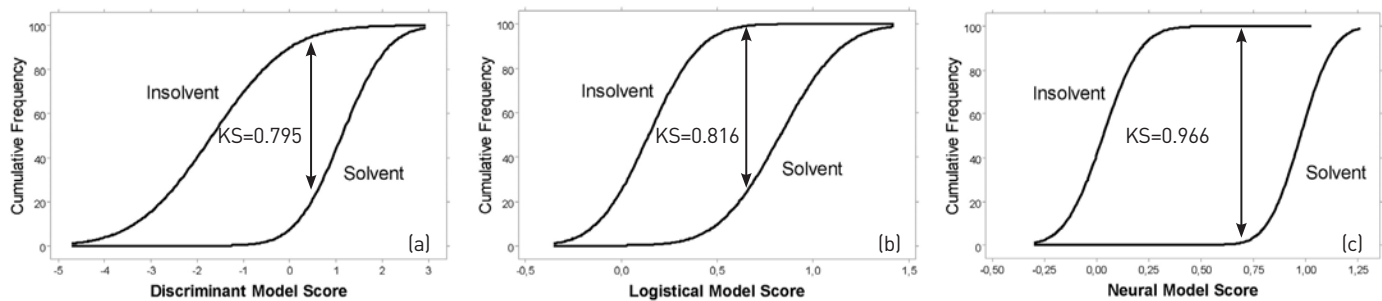
Figure 1. Distribution of cumulative frequencies for KS in the constructed models (a = Discriminant Analysis; b = Logistic Regression and c = Neural Networks).
Source: own elaboration.

discriminant analysis model below the ROC curve area in 0.897, which is an excellent outcome. On the other hand, the logistic regression and neural network models recorded 0.908 and 0.983, respectively. Both models exceeded the classification expectations, because they recorded more than excellent results.

Table 5 summarizes the performance measurements (Accuracy Level, Type I Error, KS tests and ROC Curve) used to compare the fine models. The Artificial Neural Networks recorded the best results in all conducted tests, i.e., high accuracy level, low Type I error, high values in the KS test and in the ROC curve.

The classification showed correctly classified companies and companies whose models were not able to be properly classified. Only *Tecnosolo*, which was originally classified

Table 4. Values found in the ROC curve area.

Models	Area	Standard deviation[a]	Sig. asymptotic[b]	95% Confidence	
				Inferior	Superior
Discriminant analysis	0.897	0.034	0.000	0.831	0.964
Logistic regression	0.908	0.031	0.000	0.847	0.969
Artificial neural networks	0.983	0.014	0.000	0.956	1.000

The variable, or variables, of the test results: Discriminant Analysis, Logistic Regression, Artificial Neural Networks have at least one bond between the real positive state group and the real negative state group. The statistics can be biased.
a. Under the non-parametric assumption. b. Null hypothesis: real area = 0.5.
Source: own elaboration.

Table 5. Performance measures in the generated models

Models	Accuracy level	Type I error	KS Test	ROC curve
Discriminant Analysis	90.9	17.6%	0.795	0.897
Logistic Regression	90.9	9.8%	0.816	0.908
Artificial neural networks	97.8	2%	0.966	0.983

Source: own elaboration.

as insolvent, was classified as solvent based on the three models, i.e., the rules created for this company were not able to find insolvency symptoms.

4.5. Indicator analysis

Table 6 depicts the most representative indicators in all groupings; all indicator groupings used in the present study recorded precision higher than 86%. Indicators of the Fleuriet Model were found in all groupings. Forward: LR in the logistic regression, Trial and error in the discriminant analysis and Trial and error in all artificial neural networks (such as the discriminant indicators 'X' – in bold - in Table 6) were the final three models presenting the best results - indicators that appeared three times or more were highlighted.

Need of Working Capital on Assets (X3); Liquidity Thermometer (X9); Shareholders' Equity Return (X20); Net Margin (X25) and Net Equity on Assets (X31) were the selected indicators in the three final models presenting low values for insolvent companies and high values for solvent companies. On the other hand, only two indicators recorded higher values for insolvent companies, namely: Working Capital on Assets (X1) and Financial Structure Type (X8).

Of the 35 initially selected indicators, only 17 participated in the last groupings. Of all 17 indicators presented in the Table 6, indicators X18, X29, X30 and X34 were not explored.

4.5.1. Analysis of working capital on assets

The indicator Working Capital on Assets (WCA) was representative in the final model, which was generated through discriminant analysis only. The sample presented positive values for solvent companies (0.166) and negative values for the insolvent ones (-0.302) at a total average of -0.031. However, the discriminant analysis presented a negative signal (-) in the coefficient, which means that the higher the value presented by the WCA indicator, the greater the probability of a company being insolvent in the discriminant function.

This result was the only sign of divergence presented by the models. Olinquevitch and Santi Filho (2009, p. 85) state that "in analytical terms, the simple availability of WC is not enough to indicate good economic-financial health: the resources available must fit the needs".

4.5.2. Considerations for need of working capital

According to Olinquevitch and Santi Filho (2009, p. 13), the Need of Working Capital value (NWC) can be positive or negative; a positive NWC signal indicates that Working Capital (WC) is more applicable than the WC sources, thus "expressing that the company is investing resources in the working capital". However, when NWC is negative, WC sources are greater than applications in WC, thus "expressing that the company is profiting (getting financed) due to resources resulting from working capital" (Olinquevitch & Santi Filho, 2009, p. 13).

NWC on Net income and on Assets as a group was the only indicator found in all proposed groupings (Table 6). Solvent companies were positive, on average, whereas the most insolvent companies showed negative values (Table 7). This outcome was confirmed by the discriminant analysis and logistic regression models, whose values indicated that the higher the NWC value, the greater the probability of the company being solvent. This indicator was significant at 95% probability and it explained the variation in the forecasted value of the neural network (output).

Table 6. Selected Indicators

Indicators	For-ward: LR	Step-wise	Trial and error, AD	Trial and error, ANN	Trial and error, other	Trial and error, other	Total of repe-titions
X1) WC / TA			X				1
X3) NWC / TA	X		X				2
X4) NWC / NI		X		X	X	X	4
X8) FST = Structure		X	X				2
X9) LT = BT / (|NWC|)		X	X	X			3
X10) BT = FA – FL					X	X	2
X11) NWC = OA – OL		X					1
X16) NE / TL	X			X			2
X17) NI / TA				X	X		2
X18) NP / TA		X			X		2
X20) NP / NE		X	X	X			3
X25) NP / NI	X		X	X		X	4
X28) CL / (CL + NCL)	X			X	X		3
X29) (CL + NCL) / NE					X		1
X30) Fixed asset / NE						X	1
X31) NE / TA			X	X		X	3
X34) Available / TA					X	X	2

Source: own elaboration.

These results diverge from those recorded by Minussi, Damacena and Ness Junior (2002, p. 122) who, by studying companies from the industrial sector, found NWC values on net income (IOG/net sales – variable X2") They recorded a mean value of 0.80 for the group of solvent companies and 3.50 for the insolvent group.

Results diverging from those of Minussi et al. (2002) concerned the fact that only 4 solvent companies in the sample had Type I Financial Structure 'Excellent', i.e., they presented positive WC and BT, and negative NWC (Table 8). On the other hand, most solvent companies presented a 'solid' Type 2 Financial Structure (32 companies, positive WC, NWC and BT) or 'dissatisfactory' Type 3 (22 companies, positive WC and NWC, and negative BT), wherein NWC was positive. This outcome has a direct impact on the mean values of NWC, so the solvent companies would be positive (0.175 or 0.258).

In total, 27 insolvent companies, more than half of the sample, were classified as Type V Financial Structure 'very bad' (24 companies, negative WC, NWC and BT) and as Type VI 'high risk' (3 companies, negative WC and NWC, and positive BT) and it justified the negative NWC values recorded for insolvent companies (-0.077 or -0.114). Companies in these two structure types presented negative NWC (Table 8).

The present results were consistent with those recorded by Padoveze and Benedicto (2010, p. 264), who highlight that "in general terms, companies look forward to performing a constant growth model by gaining or amplifying markets. Thus, there is constant need of additional working capital throughout time", because it represents the necessary resource for the company's operational performance.

Olinquevitch and Santi Filho (2009, p. 13) also state that "The variable Net need of Working Capital is the main determinant of companies' financial situations. Its values show the level of necessary resources to keep the business turning. Different from investments in Fixed Assets, which involve long-term decisions with slow capital recovery, calculations composing the Net Need of Working capital express short-term fast-effect operations. Changes in storage policies, in the credit policy and in purchase policy have an immediate effect on cash flow".

Table 7. Performance measures in the generated models

Comparative	Descriptive Statistics (Mean)				
Literature: Positive or Negative (Padoveze & Benedicto, 2010).	Scenario	N	X3	X4	X11
AD = (X3) Signal* (+) of the indicator, the higher the more solvent	Insolvent	51	-0.077	-0.114	23.671
LR = (X3) Signal* (-) of the indicator, the higher the more solvent	Solvent	70	0.175	0.258	251.798
ANN = (X4) significant – Normalized importance 95%	Total	121	0.069	0.101	155.645

*Signals presented by the discriminant analysis and logistic regression were opposite due to the way the calculation was performed; however, when they were inverted, they presented the same trend for the indicator: (AD = '+' and LR = '-'); the higher the indicator, the more solvent the company.
Source: own elaboration.

According to Olinquevitch and Santi Filho (2009), the assessment of, as well as the follow-ups on, Need of Working Capital, are true signs of a company's financial situation.

None of the solvent companies were classified as Type VI 'high risk' extract (Table 8); however, OGX Petróleo, which was defined as insolvent, was classified as Type I 'Excellent' extract. If the three best models classified OGX Petróleo as insolvent in the structure type assessment, its financial situation would go unnoticed.

4.5.3. Assessing the financial structure type

Financial Structure Types were proposed by Fleuriet et al. (1978) and expanded by Braga (1991), who added two more levels to them (Table 8). The indicator used in the current study represents a proxy recording value 1 for Type I, which increased to 6 for Type VI Financial Structure, i.e., companies classified as 1 were in the 'Excellent' extract, whereas companies classified as 6 were in the 'high risk' extract.

The indicator 'Financial Structure Type' was representative in the stepwise method and in the trial and error process, which generated the discriminant analysis indices. This analysis demonstrated that the coefficient of the indicator was consistent with information in the literature. The present results showed the same behavior (Table 9).

The Wilks' Lambda Test applied to the discriminant analysis model was the most significant one. It recorded the lowest value (0.562), and this outcome shows the high power of this indicator in distinguishing groups. Despite the relevance of this indicator to the discriminant analysis, it was not significant in the other final models. The fact that

the indicator was measured as a proxy from 1 to 6 may have influenced its exclusion when it was used with other financial indicators.

4.5.4. Reflections on liquidity thermometer and balance in treasury

According to Minussi et al. (2002) and Vieira (2008), the more negative the value recorded for Balance in Treasury, the greater the use of short-term resources from financial institutions; thus, companies' financial situation will tend to be worse. Horta (2010) stated that the Liquidity Thermometer method assures a financial reserve to be used in occasional NWC expansion, mainly in expansions of a seasonal nature. The temporary need of working investments can be supported by the existing balance limit, as long as they are not covered by long-term financing (Padoveze & Benedicto, 2010).

Both treasury balance and the liquidity thermometer recorded negative values for insolvent companies and positive values for the solvent ones (Table 10). However, the liquidity thermometer composed two of the presented final models; the positive value recorded for solvent companies was corroborated by the positive signal of the liquidity thermometer in the discriminant analysis, which indicated that the higher the value, the greater the probability of company solvency.

The liquidity thermometer presented normalized significance of 100%, and it explained the variation faced by the forecasted value of the neural network (output). This outcome represented the most important indicator for the best model found because it corroborated the statement by Padoveze and Benedicto (2010, p. 262), according to whom treasury bills "should be used to calculate corporate liquidity and solvency capacity in the short term".

Results recorded for the liquidity thermometer were consistent with those recorded by Horta (2010), when the liquidity thermometer was used to assess many sectors, namely: the basic material (solvent = 0.011 and insolvent = -0.003), cyclical consumer goods (solvent = 0.010 and insolvent = -0.032) and non-cyclical consumption goods sectors (solvent = 0.002 and insolvent = -0.047); as well as the economic sectors of industrial goods (solvent = -0.133 and insolvent = -0.133), construction and transport (solvent = 0.004 and insolvent = -0.219) and of IT and telecommunications (solvent = -0.007 and insolvent = -0.385). He used the Balance in Treasury on Asset; however, this method did not appear to be significant in his models.

Empirical results based on the means recorded for Balance in Treasury were consistent with the study by Minussi et al. (2002), who used the Balance in Treasury on Net Revenues in their research and recorded a value of -0.01 for solvent companies and 2.90 for insolvent ones. According to the aforementioned study, "sampling data clearly reflects the difficulty faced by insolvent companies in operationally financing themselves, so they tend to intensively use erratic sources" (Minussi et al., 2002, p. 121).

Table 8. Grouping companies through structure type and financial situation

Type	WC	NWC	BT	Situation	Solvent Companies	Insolvent Companies	Total sample
I	+	–	+	Excellent	4	1	5
II	+	+	+	Solid	32	3	35
III	+	+	–	Dissatis-factory	22	6	28
IV	–	+	–	Terrible	11	14	25
V	–	–	–	Very bad	1	24	25
VI	–	–	+	High risk	0	3	3
				Total	70	51	121

Source: adapted from Braga (1991, p. 10); Marques and Braga (1995, p. 56); Fleuriet et al. (2003, p. 15).

Table 9. Summary of results recorded for indicator X8 – Financial Structure Type.

Comparative	Comparative		
Literature: The smaller the best (Marques & Braga, 1995).	Situation	N	Mean
AD = Signal (-) of the indicator, the higher the more insolvent	Insolvent	51	4.294
LR = Non-significant	Solvent	70	2.614
ANN = Non-significant	Total	121	3.322

Source: own elaboration.

4.5.5. Analysis of net equity on total liabilities

The indicator Net Equity on Total Liability was proposed by Altman, Baydia and Dias (1979) as an attempt to adapt indicators found in the original model by Altman (1968) to the Brazilian context. Altman, Baydia and Dias (1979, p. 22), paid close attention to the characteristics of their sample. They found that "many companies do not have papers in the stock market, so it is impossible to measure the equity of the market value (number of papers issued multiplied by the last quotation in the stock market)". Thus, they used the Net Equity on Total Liability to generate a new indicator.

The indicator Net Equity on Total Liability' is a Debt/ Structure indicator, i.e., a financial-leverage indicator. Soares and Rebouças (2015, p. 56) state that "this indicator associates 'Net Equity' with 'Third Capital', and this association can be understood as a risk measure reversed through the leverage the company is subjected to".

The assessed sample presented lower values for insolvent companies, whereas solvent companies recorded higher values (Table 11). Such a trend is also corroborated by the signal generated through the logistic regression, wherein companies showing high values for these indicators were possibly classified as solvent. The Net Equity on Total Liability was also useful in explaining the 72% variation in the forecasted value (output) of the neural network of normalized significance.

Results were consistent with empirical studies by Altman, Baydia and Dias (1979), who recorded a mean value of 0.35 and 1.14 for insolvent and solvent companies respectively (Table 11). These results also match a study by Soares and Rebouças (2015), who assessed public companies in Brazil and recorded a mean value of -0.185 for insolvent companies and 1.040 for the insolvent ones. According to Soares and Rebouças (2015), this indicator was important for all techniques developed in their study.

It may be assumed that the higher the value presented by the indicator, the lower the leverage performed by the company, since indicators were used to measure the proportion of resources owned by companies in relation to third resources in the capital structure. On the other hand, the lower the value recorded for this indicator, the higher the company's leverage. The present results demonstrate that, based on the approached empirical studies, companies tend to be more leveraged.

4.5.6. Considerations about asset turnover

Asset Turnover is a profitability indicator that, according to Marion (2012, p. 158), means "companies efficiency in using their Assets in order to generate real sales. The more efficiently assets are used, the more sales are generated". Padoveze and Benedicto (2010) consider that it is worth having the greatest turnover possible, because the profit/margin in the goods or services offered by the company (revenue) lead to the possibility of generating higher profit and better profitability. They also state that "if the main profitability element is revenue, the investment turnover (of the asset) is the way" (Padoveze & Benedicto, 2010, p. 122).

The Asset Turnover indicator reached 74% normalized significance to explain the variation in the neural networks (Table 12); it recorded a higher mean turnover for solvent companies.

Results of neural networks which were beyond the indicator X17 – Asset Turnover. Indicators X25 – Net Margin - and X31 – Net Equity on Assets - were significant. According to Padoveze and Benedicto (2010, p. 131), these indicators composed the DuPont Model, which was "adapted to the profitability analysis of the net asset, according to the shareholder's perspective". According to them, the DuPont Model formula is presented in Equation 3, wherein ROE means Return on Equity.

$$ROE= \frac{(Asset\ Turn\ x\ Margin)}{(Participation\ in\ shareholder´s\ equity\ total\ assets)} \tag{3}$$

Padoveze and Benedicto (2010, p. 131) make it clear that the adapted DuPont Model "introduces an additional attention element. The lower the company's own capital participation (NE), the higher its profitability, according to the composition of the formula". Therefore, the model recommends the intense use of third capital. According to these authors, it is a financial

Table 10. Summarized results of indicators (X9 –LT and X10 – BT).

Comparative	Descriptive Statistics			
Literature: Whenever positive, the best (Fleuriet et al., 2003).	Situation	N	X9 Mean	X10 Mean
AD = (X9) Signal (+) of the indicator, the higher the more solvent	Insolvent	51	-5.871	-246.350
LR = Non-significant	Solvent	70	0.254	20.658
ANN = (X9) significant – Normalized Importance 100%	Total	121	-2.328	-91.883

Source: own elaboration.

Table 11. Summary of results recorded for indicator X16 – Net Equity on Total Liability.

Comparative	Descriptive Statistics		
Literature: The higher, the lower the leverage degree (Soares & Rebouças, 2015).	Situation	N	Mean
AD = Non-significant	Insolvent	51	0.120
LR = Signal (-) of the indicator, the higher the more solvent	Solvent	70	1.247
ANN = Significant – normalized importance 72%	Total	121	0.772

Source: own elaboration.

Table 12. Summarized results recorded for the indicator X17 – Asset Turn.

Comparative	Descriptive Statistics		
Literature: The higher the better (Marion, 2012).	Situation	N	Mean
AD = Non-significant	Insolvent	51	0.675
LR = Non-significant	Solvent	70	0.793
ANN = Significant – Normalized importance 74%	Total	121	0.743

Source: own elaboration.

leverage model focused on traditional finance theory, which concerns an optimal capital structure, allowing companies to improve their value through leverage.

The indicator 'Return on Net Equity" (ROE) was not found in previous studies, which were the source of indicators selected for the present research. The Analysis of the adapted DuPont Model was not the focus of the current study, but the fact that these three variables have an intrinsic relation to each other was taken into account, as shown by Padoveze and Benedicto (2010).

4.5.7. Reflections on shareholders' net equity return

According to Padoveze and Benedicto (2010, p. 115), profitability analysis is "the most important part of financial analysis', because it aims to demonstrate the return of the invested capital and elucidate the determinants of such profitability. The aforementioned authors emphasize that shareholders' Net Equity Return is the main indicator within profitability analysis, since it assesses the owners' capital from the shareholders' perspective. This method uses the equity of the balance sheet to analyze profitability.

Results recorded for Shareholders' Net Equity Return are shown in Table 13; the mean values recorded for the sample were consistent with the literature. This outcome was reinforced by results recorded for the discriminant analysis, which showed positive signals and indicated that the higher the value recorded for the Shareholders' Net Equity Return, the greater the probability of the company being solvent. The indicator reached 84% normalized significance level, and explained the variation in the forecasted value (output) of the neural network.

Matarazzo (2010, p. 115) highlights that the function of the Shareholders' Net Equity Return shows the profitability rate of the owned capital, "as net profit is excluded from inflation, Shareholders' Net Equity Return rate is real", thus, it can be compared with other market returns.

The present results converge to those in studies by Kanitz (1978), who states that the Shareholders' Net Equity Return is, on average, three times higher for solvent companies than for the insolvent ones. According to Kanitz (1978, p. 82), "one of the characteristics of a broken company is the drastic drop in profitability". The present study also coincided with a study by Brito (2005), who recorded the mean value for insolvent companies as -0.36 and 0.17 for solvent ones.

Table 13. Summarized results recorded for the indicator X20 – NE profitability.

Comparative	Descriptive Statistics		
Literature: The higher, the better (Padoveze & Benedicto, 2010)	Situation	N	Mean
AD = Signal (+) of the indicator, the higher the more solvent	Insolvent	51	-0.312
LR = Non-significant	Solvent	70	0.052
ANN = Significant – normalized importance 84%	Total	121	-0101

Source: own elaboration.

4.5.8. Assessment of the net margin

According to Marion (2012, p. 158), the Net Margin "means how many cents of real sales remain after all expenses are deducted (including income tax)"; it is evident that the higher the margin, the better. Based on Matarazzo (2010), the Net Margin shows how much the company earns on profit over sales.

The mean values recorded for the sample were consistent with the literature, i.e., the higher the value presented by the indicator, the better the profit margin reached by the company in relation to the volume of net sales in the period (Table 14). Such an amount is confirmed by the signals presented either by discriminant analysis or logistic regression. Based on this outcome, the higher the net margin value, the greater the probability of the company being solvent. The indicator also presented 78% normalized importance for the neural network model.

The indicator Net margin of the Traditional Financial Analysis Model stood out among the other indicators, because it was found in four of the proposed indicator groupings. Besides, it is integrated within the three models (AD, LR and ANN) presenting the highest significance in the analysis. The present results were consistent with the empirical study developed by Brito (2005), who recorded a mean value of -0.11 for insolvent companies and 0.01 for the solvent ones when assessing public companies in Brazil.

4.5.9. Analysis of debt breakdown

Debt breakdown is a Debt/Structure indicator which, according to Matarazzo (2010, p. 90), shows "the short-term obligation percentage in relation to total obligations". As these authors state, the lower the result, the better the company.

According to Marion (2012), companies operating with shorter-term debts are in an unfavorable position, and it impairs their financial situation. Matarazzo (2010) also argues that one thing is having shorter-term debts that need to be paid within shorter-term incomes, and another thing is to have longer-term debts that have time enough to be paid.

The indicator Debt Breakdown shown in Table 15 appeared to be significant in the present research, because the mean

Table 14. Summarized results recorded for indicator X25 – Net Margin.

Comparative	Descriptive Statistics		
Literature: The higher the better (Marion, 2012).	Situation	N	Mean
AD = Signal (+)* of the indicator, the higher the more solvent	Insolvent	51	-0.361
LR = Signal (-)* of indicator, the higher the more solvent	Solvent	70	0.040
ANN = Significant – normalized importance 78%	Total	121	-0.129

*Signals presented by the discriminant analysis and by the logistic regression were opposite, due to the way the calculation was done; however, when signals were reversed, they presented the same trend in these indicators; which, in the present case (AD = '+' and LR = '-') is: the higher, the better.
Source: own elaboration.

value recorded for solvent companies was lower than the one recorded for the insolvent ones. This finding was reinforced by the signal of the logistic regression model, which was consistent with the literature, i.e., the higher the signal, the greater the probability of the company being solvent. The indicator was also significant for the neural networks model.

The present results were consistent with those recorded by Castro Junior (2003, p. 112), who recorded a mean value of 0.5428 for insolvent companies and 0.4085 for solvent ones. Castro Junior (2003) also states that what really matters is to prove the initial hypothesis; the longer the short-term debt, the greater the probability of the company being classified as insolvent. This hypothesis was corroborated by Castro Junior (2003) in 5 of the 7 generated final models.

4.5.10 Assessing the net equity on assets

Padoveze and Benedicto (2010, p. 115) observe that the indicator Net Equity on Assets is used to measure asset financing because it aims to measure companies' financing structure. According to them, this indicator shows the fraction of the asset financed by the owned capital; thus, it demonstrates the reflex of financial leverage policies.

The Net Equity on Assets indicator recorded a negative value for insolvent companies and positive values for solvent ones (Table 16). Such a relation was also reinforced by the discriminant analysis model, which recorded a positive signal for the coefficient. Based on this outcome, the higher the Net Equity on Assets, the greater the probability of the company belonging to the group of solvent companies, i.e., leveraged companies present a greater probability of being insolvent.

Based on the analysis applied to indicator X17 – Asset Turnover -, which took into consideration the adapted DuPont

Table 15. Summarized results recorded for the indicator X28 – Debt Breakdown.

Comparative	Descriptive Statistics		
Literature: The lower, the better (Matarazzo, 2010).	Situation	N	Mean
AD = Non-significant	Insolvent	51	0.623
LR = Signal (+) of the indicator, the lower the more solvent	Solvent	70	0.569
ANN = Significant – normalized importance 54%	Total	121	0.592

Source: own elaboration.

Table 16. Summarized results recorded for indicator X31 – Net Equity on Assets.

Comparative	Descriptive Statistics		
Literature: Represents the company's financial structure	Situation	N	Mean
AD = Signal (+) of the indicator, the higher the more solvent	Insolvent	51	-0.259
LR = Non-significant	Solvent	70	0.480
ANN = Significant – Normalized importance 84%	Total	121	0.169

Source: own elaboration.

Model, and according to Padoveze and Benedicto (2010), this indicator becomes a financial leverage model focused on traditional financial theory. According to Durand (1952), if the company grows beyond the optimal capital structure, even when it reaches better results, it will face unjustified bankruptcy costs.

The present results are consistent with those recorded by Brito (2005) who, by studying public companies, recorded lower values for insolvent companies (mean 0.34) and higher values for solvent ones (mean 0.56).

5. Conclusion

The best model for each technique was presented by comparing the techniques used to forecast companies' insolvency. The superiority of artificial neural networks over logistic regression, as well as of logistic regression over discriminant analysis, was noteworthy. These results were confirmed by the success levels presented by the techniques: discriminant analysis, 90.9%; logistic regression, 90.9%; and artificial neural networks, 97.8%.

Indicators belonging to the Fleuriet Model were significant for the groupings. The contributions from the Fleuriet Model became clearer when the individual participation of each indicator was assessed in the final credit granting models.

Liquidity Thermometer and the Need of Working capital were the two most representative indicators belonging to the Fleuriet Model. They contributed to the best neural network models, since they recorded 100% and 95% normalized significance respectively, and explained the variation in the forecasted values recorded for the network (output).

Results of Liquidity Thermometer showed the importance of financial calculations (treasury bills) at the time of calculating companies' liquidity and solvency capacity in the short term.

The NWC was the only indicator belonging to all proposed groupings, it became the main determinant of companies' financial situations. Overall, companies look forward to performing a constant growth model by expanding or gaining markets; thus, there is always the need of additional working capital throughout time, because their value represents the necessary resource level to maintain business turnover and operational performance. Working Capital, Financial Structure Type and Balance in Treasury stood out among the Flueriet Model indicators.

The Net Margin stood out among calculations of the Traditional Financial Analysis Model. Shareholders' Net Equity Return was another important indicator, so it was selected for the discriminant analysis model and for the artificial neural networks. Net Equity on Assets was another indicator participating in the discriminant analysis and artificial neural networks techniques, since it was consistent with traditional financial theory.

One of the limitations of the present study lies in the impossibility of generating models per specific sector, something that could have improved either the precision of the models or to broaden understanding of factors determining the insolvency of public companies in Brazil. Further studies are recommended, because they will make it possible to

develop hybrid models based on Computer Intelligence to improve credit risk modeling accuracy and to assess the contribution from the adapted DuPont Model recommended by Padoveze and Benedicto (2010) for credit risk analysis. The indicators used to calculate Return on Net Equity (ROE) were significant for the artificial neural networks model.

The present study can elucidate some of the characteristics of insolvent companies in the sample. These contributions are essential for credit risk studies and to help develop the topic through the comparison of analysis techniques (DA, LR and ANN). The general application of these methods can be seen in the forecasting capacity of the generated model in the balance sheet analysis applied to insolvent companies, one year before they issued a preventive bankruptcy filing or judicial recovery request.

Finally, indicators effectively contributed to forecasting companies' insolvency. Enhancements in the methodologies used, as well as the evolution of forecasting techniques, helped the personnel in charge to maintain business liquidity and to avoid bad debt or even bankruptcy.

Conflict of interest

The authors declare no conflict of interest.

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Research article

International entrepreneurship and Mexican listed family firms' CEO/Board characteristics

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Abstract

The objective of this research is to analyze the influence on international entrepreneurship of both Chief Executive Officers (CEOs) and board of directors' traits. It takes into account 52 listed family firms in Mexico (2001-2015), an emerging market where ownership concentration is particularly high. Results obtained from a binary probit model show that family involvement reduces the odds of pursuing foreign endeavors. However, when the CEO has a business administration academic background, the probability of having subsidiaries or branches abroad rises considerably. Finally, there is evidence that the presence of women on boards reduces the odds of international entrepreneurship.

Keywords: quantitative analysis, international entrepreneurship, family firm, Mexico.

Emprendimiento internacional y características de los Consejos de Administración y Directores Generales de las empresas familiares listadas en México

Resumen

El objetivo de este trabajo es analizar la influencia tanto de características de los Directores Generales (CEO, por su sigla en inglés) como de los consejos de administración, en el emprendimiento internacional. Se contemplan 52 empresas familiares listadas en México (2001-2015), un mercado emergente donde la concentración de la propiedad es particularmente alta. Los resultados obtenidos a partir de un modelo probit binario muestran que la participación de la familia reduce las probabilidades de internacionalización. No obstante, cuando el CEO tiene formación académica en negocios, la probabilidad de tener filiales o sucursales en el extranjero aumenta. Finalmente, hay evidencia que la presencia de mujeres en los consejos reduce las probabilidades de emprendimiento internacional.

Palabras clave: análisis cuantitativo, emprendimiento internacional, empresa familiar, México.

Empreendedorismo internacional de empresas familiares mexicanas listadas e características do CEO / Conselho de administração

Resumo

O objetivo deste trabalho é analisar a influência das características dos Gerentes Gerais (CEO) e dos conselhos de administração, no empreendedorismo internacional. Existem 52 empresas familiares listadas no México (2001-2015), um mercado emergente onde a concentração de propriedades é particularmente alta. Os resultados obtidos a partir de um modelo probit binário mostram que a participação da família reduz as chances de internacionalização. No entanto, quando o CEO tem uma formação acadêmica nos negócios, a probabilidade de ter subsidiárias ou filiais no exterior aumenta. Finalmente, há evidências de que a presença de mulheres nos conselhos reduz as chances de empreendedorismo internacional.

Palavras-chave: analise quantitativa, empreendedorismo internacional, empresa familiar, México.

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1. Introduction

After Brazil, Mexico is the largest economy in Latin America (International Monetary Fund, 2017). It is also the leading export country in this geographical area. In 2017 Mexico's export value was 410 billion U.S. dollars (ranked 13th in the world), followed by Brazil with 215 billion U.S. dollars and coming 27th in the global ranking (The World Factbook, 2018). Although Mexico is a key player in the global arena, little research has been developed on Mexican companies' international entrepreneurship (IE).

International entrepreneurship is understood as the exploitation of business and financial opportunities present in external markets, in order to attain competitive advantages and increase profits (Oviatt & McDougall, 2005). IE is therefore a type of entrepreneurial activity that implies venturing into external markets. Internationalization opportunities take place whenever gaps in external markets can be filled by local companies (Karra & Phillips, 2004).

Entrepreneurship, including IE, is an strategy that depends on companies' top management and board of directors (Perks & Hughes, 2008). It has been documented that board diversity and certain Chief Executive Officer (CEO) characteristics favor entrepreneurship (Wincent, Thorgren, & Anokhin, 2014; Ahn, Minshall, & Mortara, 2017). Previous literature demonstrates a positive relationship between IE and top management international work experience, foreign education, and academic achievements (Zahra & George, 2002; Herrmann & Datta, 2005). However, related studies for family firms (especially for listed family-owned companies) are scarce (Wright, De Massis, Scholes, Hughes, & Kotlar, 2016; Ramón-Llorens, García-Meca, & Duréndez, 2017). This paper studies the influence of CEOs' and board members' attributes with regard to IE, taking into account large (listed) family firms in Mexico - an emerging market economy where most listed companies are family-owned, and where ownership concentration is above all high (on average 54%). Entrepreneurial behavior of family firms has a family and a firm level component (Martin & Lumpkin, 2003; Zellweger, Nason, & Nordqvist, 2012). The family element incorporates considerations of security and control, stability, and long-term orientation (Wright et al., 2016). Family involvement influences entrepreneurship (and IE), however the direction of this association is not trivial (Eddleston, Kellermanns, & Zellweger, 2010; Daspit, Chrisman, Sharma, Pearson, & Long, 2017).

The objective of this research is to determine the influence of CEO and board of directors' characteristics on international entrepreneurship (IE), taking into account listed family firms in Mexico. The pursuit of this type of entrepreneurship depends, among other factors, on the particularities of boards and top management. Specifically, the influence of board diversity (gender, independent directors, family and non-family members) and CEO characteristics (membership or non-membership of the family), tenure, international exposure, academic background and achievement) on international entrepreneurship are analyzed.

The present study contributes to the literature, as most studies on international entrepreneurship deal with English-speaking economies (Meyer, Libaers, Thijs, Grant, Glanzel, & Debackere, 2014). Corporate governance practices of Mexican firms are quite different from those prevailing in English-speaking nations. Accounting principles, legal requirements, and information disclosure standards are stricter in those more developed countries. Mexican companies that intend to become international face greater costs, as they must meet more stringent requirements in terms of corporate governance. The latter somehow reduces the benefits of exploiting opportunities abroad. In addition, in Mexico a larger percentage of corporations are family owned, with higher ownership concentration and predominance of family members in strategic positions. It is not clear in the literature whether decision centralism and excessive power harms or helps entrepreneurial actions and firm performance (Molina-Parra, Botero-Botero, & Montoya-Restrepo, 2017). These, among other distinctive factors, influence international entrepreneurship (Bai, Tsang, & Xia, 2019).

The paper is organized as follows: section 2 reviews relevant literature on international entrepreneurship and CEO/Board characteristics, from which hypotheses are derived. Section 3 describes the data, variables, and methodology employed to test the hypotheses. Results are presented in section 4, and section 5 offers some conclusions.

2. Literature review and hypotheses

This section begins with a literature review on international entrepreneurship (IE -subsection 2.1). The relationships between IE and different CEO/Board characteristics are presented in subsections 2.2-2.5. The CEO/Board traits (variables) considered are family involvement, CEO tenure, foreign exposure, education, and board diversity (gender, independency, participation of non-controllers). Hypotheses were constructed for each of these variables and their relationship with IE.

2.1 International entrepreneurship (IE)

Entrepreneurship involves the ability and disposition to bear uncertainty and take advantage of business opportunities, developing new products or markets to increase profits (Venkataraman, 1997). Entrepreneurship deals with autonomy, competitive aggressiveness, innovation, proactivity, risk-taking, venturing, and strategic renewal (Lumpkin & Dess, 1996; Zahra, 1993). In an attempt to unify the definition for entrepreneurship, Sharma and Chrisman (1999) propose the following: "Entrepreneurship encompasses acts of organizational creation, renewal, or innovation that occur within or outside an existing organization" (p.17).

International entrepreneurship (IE) is a type of entrepreneurship that extends local boundaries. It seeks opportunities beyond domestic markets to increase competitiveness and returns. As such, internationalization is an entrepreneurial action, which involves innovation, risk-taking, and strategic change (Schumpter, 1934). International entrepreneurship has been defined as "a combination

of innovative, proactive, and risk-seeking behavior that crosses national borders and is intended to create value in organizations" (McDougall & Oviatt, 2000, p. 903). IE includes "cooperative alliances, corporate entrepreneurship, economic development initiatives, entrepreneur characteristics and motivations, exporting and other market entry modes, new ventures and initial public offerings (IPOs), transitioning economies, and venture financing" (McDougall & Oviatt, 2000, p. 903).

International entrepreneurship involves both opportunities and challenges. It is a venture full of risks, where market and relational knowledge are vital (Casillas, Barbero, & Sapienza, 2015). IE comprises top management motivation, commitment, and firm preparation; generally companies gradually become international, although some follow a rapid path and others are born global (Wright & Etemad, 2001). The IE literature mentions three different internationalization dimensions: "time (to internationalization), market presence, and mode" (Dimitratos, Johnson, Plakoyiannaki, & Young, 2016, p. 1212).

2.2. Family involvement and international entrepreneurship

Family firms, compared to non-family companies, face both restrictions and advantages in order to become international (Calabró & Mussolino, 2013). Long-term orientation, high commitment, and a greater number of communication channels constitute positive family level components for IE. However, higher risk aversion and the search for alternative objectives (related to socio-emotional wealth) create barriers for IE. Therefore, the relationship between family involvement and IE is unclear (Daspit et al., 2017; Pukall & Calabró, 2014).

Within family firms, inconclusive evidence has been found which suggests that the presence of family members in strategic positions impacts international entrepreneurship. Internationalization is complex and full of uncertainties. Family-member CEOs tend to have better information and more experience in their companies than non-family CEOs. This provides knowledge that can be used for new insights and innovation (Le Breton-Miller, Miller, & Bares, 2015), which gives companies headed by family-member CEOs an advantage when undergoing internationalization (Weerawardena, Sullivan, Mort, Liesch, & Knight, 2007).

However, a family-member CEO might not have the adequate managerial skills in order to pursue international entrepreneurial acts (Pinheiro & Yung, 2015). Family CEOs might make more conservative strategic decisions, being more cautious about internationalization ventures (Binacci, Peruffo, Oriani, & Minichilli, 2016; Chirico & Nordqvist, 2010). Furthermore, family CEOs have limited exposure to the external environment, as most of their professional experiences lie within the family business. This limits CEOs' aptitudes when visualizing novel prospects and promotes the conservation of the status quo (Hambrick & Fukutomi, 1991). In contrast, a non-family CEO offers the firm additional contacts and managerial/market knowledge (Arregle, Hitt, Sirmon, & Very, 2007; Claver, Rienda, & Quer, 2009). The

nomination of a non-family CEO favours the adoption of more risky initiatives and stimulates decisions based on logic and rational analysis (Block, 2011). Accordingly, hypothesis 1 is proposed:

• H1: companies headed by family-member CEOs are less likely to become international.

2.3. CEO tenure and international entrepreneurship

Tenure is an indicator of experience and human capital; it enlarges the ability to process information and make decisions (Herrmann & Datta, 2005). Longer tenure facilitates the understanding and managing of complexities related to internationalization, which improves the odds of pursuing international entrepreneurship (Jaw & Lin, 2009; Rivas, 2012). In addition, CEO tenure is associated with firm-specific knowledge, deeper networks, and better internal communication channels, which are crucial for international expansion (Li, 2018).

Nevertheless, it has also been proven that long term CEOs avoid strategic changes (Finkelstein & Hambrick, 1996). The number of years that a CEO works with a firm is positively correlated with their preference to preserve the status quo (Hambrick & Fukutomi, 1991). Particularly in family firms, where risk-aversion is higher and decisions tend to be more conservative, CEOs' tenure can reinforce the obstacles in the way of international entrepreneurship. Therefore, hypothesis 2 is proposed:

• H2: CEO tenure is negatively associated with the probability of becoming international.

2.4. CEO Foreign exposure, education, and international entrepreneurship

CEOs' experiences abroad, by working in external markets and/or studying in foreign institutions, increases their knowledge and willingness to pursue international ventures (Wei & Ling, 2015). CEOs' international exposure relates to achievements in foreign language proficiency and travel experience, in addition to better tolerance and understanding of other cultures and ways of doing business (Andersen & Rynning, 1994; Zucchella, Palamara, & Denicolai, 2007). The latter reduces uncertainties from international endeavors and foments a global mindset (Hsu, Chen, & Cheng, 2013; Alayo, Maseda, Iturralde, & Arzubiaga, 2019). It has been emphasized that CEOs who have lived in other countries tend to export more and internationalize their companies faster than others (Reuber & Fischer, 1999). For these reasons, the following hypothesis is proposed:

• H3: the odds of international entrepreneurship are higher when CEOs have studied in foreign universities.

Education raises human capital (Peni, 2014). Management studies add knowledge, perspective, and understanding on how to run a business, and increase the willingness to exploit

growth opportunities present in external markets (Andersen & Rynning, 1994). A rigorous academic training favours the development of socio-cognitive skills, promoting the ability to learn and accept new ideas (Hitt & Tyler, 1991) and also becoming more open-minded towards other cultures (Herrmann & Datta, 2005). CEOs with elevated business educational qualifications are considered more adaptive and competent in implementing new strategies in response to changing market conditions (Goll, Johnson, & Rasheed, 2007). Education provides tools and opportunities in order to process information faster and make better decisions. The higher the educational level, the greater the possibilities for CEOs to analyse complex situations and manage risk effectively, which encourages entrepreneurship (including IE). Previous studies have proven that highly educated CEOs are more interested in internationalization (Amorós, Etchebarne, Torres-Zapata, & Felzensztein, 2016; Ramón-Llorens et al., 2017). Therefore, hypotheses 4 and 5 will be tested:

• H4: CEOs who are Business Administration graduates increase the odds of international entrepreneurship.
• H5: CEOs with postgraduate qualifications are more likely to internationalize their companies.

2.5. Board diversity and international entrepreneurship

Board diversity includes gender diversity, a combination of independent and non-independent board members, and a mixture of family and non-family directors. Board diversity has implications for the management of the firm and previous literature generally shows a positive effect on international entrepreneurship. Diversity implies different and complementary knowledge and abilities, which favors strategic complex decisions such as IE (Rivas, 2012; D´Angelo, Majocchi, & Buck, 2016; Alayo et al., 2019).

It has been argued that gender diversity can increase international entrepreneurship, as the presence of women on boards expands firms' competitive advantages due to their greater market understanding and the positive image they reflect on the customers (Ramón-Llorens et al., 2017). In addition, women complement male capabilities and skills, which stimulate IE (Kirsch, 2018). However, women tend to have less managerial and board experience than men, diminishing their potentially positive impact on international entrepreneurship (Dang, Bender, & Scotto, 2014). In addition, female business leaders tend to be more risk-averse than males, which can hinder internationalization (Amorós et al., 2016). This is particularly true in family firms, where females tend to adopt a more traditional, security-oriented role (Bianco, Ciavarella, & Signoretti, 2015). Therefore, hypothesis 6 is proposed:

• H6: female board representation negatively relates with internationalization odds.

Independent board members can bring international knowledge to the companies, in addition to external experiences and managerial abilities that positively influence revenues and strategic orientation. Independent directors are able to reduce internationalization uncertainties, due to their industry and global experiences and expertise (Chen, Hsu, & Chang, 2016). Compared with family board members, outside directors tend to be less risk-averse and more eager to internationalize (Herrera-Echaverri, Geleilate, & Gaitan-Riaño, 2016). Independent board members pursue entrepreneurial objectives, without being directly involved in family issues or career progress concerns, which positively impacts internationalization efforts (Mitter, Duller, Feldbauer-Durstmüller, & Kraus, 2014; Min & Smyth, 2014). As these board members are mainly aware of their reputation in directors´ labor markets, they look for profit-maximizing strategies, playing an active role in monitoring and advising top management and family entrepreneurs in order to succeed in international endeavors (Chen et al., 2016). Independent directors face less resistance to change and can influence family entrepreneurs with growth and diversification ideas, including internationalization (Kellermanns & Eddleston, 2006). Therefore, hypothesis 7 will be tested:

• H7: the greater the presence of independent board members, the higher the probability of international entrepreneurship.

Excessive family control can be detrimental for international entrepreneurship (Fernández & Nieto, 2005). A combination of family and non-family board members is required in order to take advantage of outsiders' resources, networks, knowledge and skills for the foreign expansion of family firms (Cerrato & Piva, 2012). External directors can extend family entrepreneurs' vision, in order to benefit from opportunities present in international markets (Ramón-Llorens et al., 2017). In addition, greater inclusion of outsiders on the board of directors signals more professionalization and better corporate governance arrangements, which aid in complex decisions such as those related to international entrepreneurship (Rivas, 2012). As such, hypothesis 8 is proposed:

• H8: the greater the percentage of non-family members on the board of directors, the greater the odds of international entrepreneurship.

3. Methodology

This section explains the data, variables, and methodology used in the study.

3.1. Data

For this research, annual balanced data for 89 non-financial companies quoted in the Mexican Stock Market from 2001-2015 is considered. Financial and state-owned companies were excluded in the dataset, given the differences in their shareholding structure and the fact that their strategies are significantly affected by government regulations.

The data derives from a prior research project financed by CONACYT, the Mexican Council of Science and Technology. It is the first and only detailed corporate governance dataset constructed for companies listed on the Mexican Stock Exchange (Bolsa Mexicana de Valores - BMV). The data compiled, referring to corporate governance, internationalization, and financial information, was obtained from companies' annual reports, which are available online from BMV. These reports were complemented by an extensive search to identify the final controllers of each company and consequently determine its familial or non-familial nature.

Among other aspects, the following data was recorded: the name of the CEO; board members' names, gender, and their participation as family, non-family or independent contributors; the top ten shareholders of the firm and their respective shareholdings; the education background of the CEO (Doctor of Philosophy - PhD, Master's, Bachelor - BA, or no university studies); the university which awarded the highest degree obtained by the CEO and the title of the degree pursued (for those with university studies); the CEO's number of years' experience within the firm; total assets; stockholders' equity; net income; and presence of subsidiaries or branches in foreign markets.

The average ownership concentration of these firms is 54%. Following previous literature for Mexico (San Martín-Reyna & Durán-Encalada, 2012), in this study a family business is defined as such when a family owns at least 51% of the firm's shares (52 companies fit this definition).

3.2. Variables

In accordance with the data compiled for Mexican listed family businesses, the following variables were constructed:

• Dependent variable: international entrepreneurship (IE). IE is approximated by a dichotomous variable, being 1 if during a particular year the company had subsidiaries or branches in foreign markets and 0 otherwise. On average, 57% of the companies studied participated in this type of foreign endeavour.
• CEO attributes: b1. Family affiliation (FA). This was measured by a dummy variable, being 1 if the CEO belongs to the family that owns the company (on average this is the case for 45% of CEOs), and 0 otherwise; b2. Tenure (TE). This refers to the number of years the CEO has worked in the firm (the mean value being 20 years); b3. International exposure (IX). This is approximated by a categorical variable, being 1 if the CEO studied abroad, and 0 otherwise (on average 34% of CEOs have attained foreign education); b4. Academic background (AB). This was constructed as a dummy variable, being 1 if the CEO majored in Business Administration (on average this is the case for 48% of CEOs), and 0 otherwise; b5. Academic achievement (AA). This is measured by a dichotomous variable, being 1 if the CEO pursued graduate studies (the mean value is 38%), and 0 otherwise.
• Board diversity: c1. Gender diversity (GD). This is measured as the percentage of board membership which is female (on average female participation on boards is only 4%); c2. Board independency (BI). This was constructed as the percentage of independent directors on boards (the mean value being 44%); c3. Family vs. non- family members (FN). This indicates the percentage of non-controllers on boards (on average they correspond to 76% of board members).
• Control variables: d1. Firm size (FS). This is measured by the natural logarithm of total assets. d2. Return on equity (ROE). This variable reflects book value, and is calculated as net income over equity.

3.3. Methodology

The relationship between international entrepreneurship and CEO/board characteristics was empirically studied through a binary probit model. For this model, a significant positive (negative) sign on an independent variable's parameter indicates that greater values of the variable increment (reduce) the odds of international entrepreneurship. Heteroscedasticity was taken into account by employing QML (Huber/White) robust standard errors. Marginal effects were obtained for all significant explanatory and control variables (p-value<0.01). Hence, the following equation was formulated:

$$IE_{it} = \partial_0 + \partial_1 FA_{it} + \partial_2 TE_{it} + \partial_3 IX_{it} + \partial_4 AB_{it} + \partial_5 AA_{it} + \partial_6 GD_{it} + \partial_7 BI_{it} + \partial_8 FN_{it} + \partial_9 FS_{it} + \partial_{10} ROE_{it} + \mu_{it} \qquad (1)$$

Where i refers to the company; t is time; IE corresponds to the dependent variable: international entrepreneurship; FA, TE, IX, AB, and AA are the CEO attributes: family affiliation, tenure, international exposure, academic background, and academic achievement; GD, BI, and FN stand for the board diversity variables: gender diversity, board independency, and family vs. non-family board members; FS and ROE are the control variables: firm size and return on equity; and μ is a random error term.

4. Results

4.1. Descriptive statistics

Table 1 shows descriptive statistics for the 780 observations recorded for Mexican listed family firms. The correlations between the variables are shown in Table 2. Most of the explanatory and control variables correlate significantly with family businesses' international entrepreneurship, measured by the dichotomous variable IE (being 1 if during a particular year the company had subsidiaries or branches in foreign markets). This finding validates the explanatory power of these variables on internationalization and justifies their inclusion in the model. The greatest correlations are between academic background (AB) and academic achievement (AA), and between academic achievement (AA) and international exposure (IX). However, in all cases the variance inflation factors are less than 10. The highest value is observed for AA (9.6), followed by IX (9.4); therefore, multicollinearity does not require any further treatment.

4.2. Econometric results

The econometric results of the relation between inter-national entrepreneurship and CEO/board traits of listed Mexican family businesses are presented in Table 3. Marginal effects for the significant explanatory and control variables (p-value<0.01) are shown in Table 4.

Results indicate low family-level international entrepre-neurship in Mexican listed companies. The probability of having subsidiaries or branches abroad declines 24% when the CEO is a family member and rises 6% with each 10% increment of non-controllers on the board. This finding suggests a family inclination towards security, stability, and tradition, counteracting firm-level IE behavior. This outcome contrasts evidence found for the U.K. and the U.S. (Wright et al., 2016; Zahra, 2003), where it has been documented that the presence of a family-member CEO positively impacts innovation and IE.

In addition, the probability of IE increases 42% when the CEO majored in business administration. This education background favours strategic planning and management. It facilitates information processing, reduces risk aversion, provides a stronger international outlook, enables visionary thinking, and opens the way to innovation (Durán,

Kammerlander, van Essen, & Zellweger, 2016; Christiansen, Joensen, & Rangvid, 2008; Dalziel, Gentry, & Bowerman, 2011).

Results also indicate that a 1% increment in female representation on boards decreases the likelihood of IE by 2%. Previous research suggests that gender diversity on boards facilitates entrepreneurship. It has been argued that women on boards promote a more positive environment, extend discussions on strategic matters, increase human capital, and reduce conflicts (Wilson, Wright, & Scholes,

Table 1. Descriptive statistics.

Variables	Minimum	Maximum	Average	S.D.
IE	0	1	0.57	0.50
FA	0	1	0.45	0.50
TE	0	60.0	19.93	11.01
IX	0	1	0.34	0.47
AB	0	1	0.48	0.50
AA	0	1	0.38	0.49
GD	0	0.3	0.04	0.07
BI	0.1	0.9	0.44	0.15
FN	0	1	0.76	0.21
FS	9.7	27.9	23.00	1.95
ROE	-1.6	1.3	0.07	0.21

Source: own elaboration.

Table 3. IE and CEO/Board traits binary probit model.

Variable	Coefficient		Std. Error
Constant	-5.51	***	2.09
FA	-0.80	***	0.27
TE	-0.01		0.01
IX	-0.44		0.31
AB	1.38	***	0.26
AA	0.42		0.31
GD	-6.55	***	1.51
BI	-0.17		0.88
FN	1.89	***	0.47
FS	0.21	***	0.08
ROE	-0.97		0.72
R-squared	0.34		
LR statistic	107.26		
Prob(LR statistic)	0.00		

*** Significant at 1% level
Source: own elaboration.

Table 4. Marginal effects

Variables	Effect
FA	-0.24***
AB	0.41***
GD	-1.97***
FN	0.57***
FS	0.06***

*** Significant at 1% level
Source: own elaboration.

Table 2. Correlation Matrix.

	IE	FA	TE	IX	AB	AA	GD	BI	FN	FS	ROE
IE											
FA	-0.31***										
TE	-0.14**	0.18***									
IX	-0.03	0.09	-0.03								
AB	0.34***	0.12*	0.01	-0.06							
AA	0.12*	0.29***	0.13**	0.37***	0.38***						
GD	-0.13**	0.09	0.35***	-0.18***	0.13**	0.19***					
BI	0.05	0.16**	-0.09	0.31***	0.13**	0.33***	-0.12				
FN	0.27***	-0.30***	-0.17***	0.27***	0.05	0.08	-0.02	0.26***			
FS	0.19***	-0.36***	0.05	-0.11*	-0.17***	-0.06	0.22***	-0.25***	-0.07		
ROE	-0.06	-0.15**	-0.07	-0.09	-0.12**	-0.26***	0.04	-0.06	-0.06	0.26***	

*** p-value < 0.01; ** p-value < 0.05; * p-value < 0.10.
Source: own elaboration.

2013; Huse, Nielsen, & Hagen, 2009). However, a recent paper (Sepúlveda & Bonilla, 2014) employing APS surveys from the GEM project for several Latin American countries shows that fear of failure, and therefore risk aversion, is higher for women than men.

Regarding control variables, company size positively relates with the probability of IE, while ROE does not show a significant effect on IE likelihood.

5. Conclusions

International entrepreneurship involves - among other factors - complex decision-making, effective risk management, international knowledge, and experience. Family firms, in particular those where ownership is highly concentrated, tend to be more conservative in terms of their strategy and risk orientation. In addition, their resources are limited as important business decisions and implementation rely mostly on family collaborators. This reduces the probability that the company will engage in international entrepreneurship.

In spite of the restrictions these family businesses face with regard to internationalization, their governance structure and executive attributes - which in this study are referred to as CEO/board traits - play an important role in determining the companies' international entrepreneurship. The literature emphasizes family involvement, executives' education and experience (as well as board diversity) as determinants for entrepreneurship, internationalization, and outcomes.

For this study, 52 non-financial family firms quoted in the Mexican Stock Exchange from 2001-2015 were considered. Of these, 57% had subsidiaries or branches in foreign markets. Mean ownership concentration for these companies was 54%, which is indicative of elevated family control. Results confirm that family involvement reduces the odds of pursuing foreign endeavors. On average, the presence of family-member CEOs decreases the probability of having subsidiaries or branches abroad by 24%. In addition, it was found that the probability of following this type of internationalization venture grows significantly by reducing the proportion of controllers in the board of directors.

Regarding executives' education, the results show that CEOs' academic backgrounds influence international entrepreneurship. In particular, CEOs that majored in busi-ness administration raise the probability of having subsidiaries or branches abroad by 42%. This educational background helps develop professional expertise and international perspective. It contributes to knowledge, vision, and understanding of the technical and theoretical concepts of international business administration. Business studies facilitate information-processing, complex decision-making, and open the way to innovation and internationalization. In addition, management training provides CEOs with better skills to deal with risk and balance the family's and company's objectives, making foreign ventures more attractive.

The results also show that the presence of female board members reduces the likelihood of international entrepreneurship. In Mexican listed family firms, women have less managerial and board experience than men. It is a fact that for the 52 companies studied, there was not a single female CEO during the period 2001-2015. Additionally, on average only 4% of board members were women. The latter indicates that women play a more conservative, traditional, family-oriented, security role in these firms, which restrains internationalization decisions. It may also suggest that companies with higher inclination towards family objectives (related to socio-emotional wealth) are the ones that include women on their boards.

The present study contributes to the literature on international entrepreneurship by addressing listed family firms in an emerging market with extremely high ownership concentration. The international literature defines a family business as such, when the family controls between 10% (for English-speaking countries) and 25% (for the European Union) of shares. This research defines a family business as when a family owns at least 51% of the shares. Future research could separate family CEOs into founders and later generations, contrast internationalization undertakings considering family vs. non-family firms, and integrate into the study non-listed family businesses.

Conflict of interest

The authors declare no conflict of interest.

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Research article

The influence of open innovation practices on business performance in Mexican family and non-family SMEs

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Abstract

Open innovation has emerged as a topic of great importance due to the recognized benefits that it brings to the company's business performance; however, it has been sparsely addressed in SMEs from developing countries. Therefore, this study aims to analyze and discuss the relationship between open innovation and business performance in family and non-family SMEs in Mexico. A survey-based study was carried out on a sample of 308 firms. Following this, the data was analyzed through a structural equation model. The results show that for these companies, the outflow and especially the inflow of external knowledge exert a positive influence on business performance.

Keywords: open innovation, inbound, outbound, business performance, family firms, non-family firms.

Influencia de las prácticas de innovación abierta en el rendimiento del negocio en Pymes familiares y no familiares en México.

Resumen

La innovación abierta se ha convertido en un tema de gran importancia debido a los reconocidos beneficios que aporta al rendimiento empresarial, sin embargo, se ha abordado escasamente en las Pymes de los países en vías de desarrollo. Por lo tanto, este estudio tiene como objetivo analizar y discutir la influencia entre la innovación abierta y el rendimiento empresarial en las Pymes familiares y no familiares en México. Se implementó una investigación basada en encuestas en una muestra de 308 empresas, los datos se analizaron a través del modelo de ecuaciones estructurales y los resultados obtenidos muestran que, para estas empresas, la salida y especialmente la entrada de conocimiento externo ejercen una influencia positiva en el rendimiento empresarial.

Palabras clave: innovación abierta, entrada, salida, rendimiento empresarial, empresas familiares, empresas no familiares.

Influência das práticas de inovação aberta no desempenho dos negócios nas PMEs familiares e não familiares no México.

Resumo

A inovação aberta tornou-se um tópico de grande importância devido aos benefícios reconhecidos que traz para o desempenho dos negócios; no entanto, tem sido pouco abordada nas PME dos países em desenvolvimento. Portanto, este estudo tem como objetivo analisar e discutir a influência entre inovação aberta e desempenho comercial nas PMEs familiares e não familiares no México. Uma investigação baseada em pesquisa foi implementada em uma amostra de 308 empresas, os dados foram analisados através do modelo de equações estruturais e os resultados obtidos mostram que, para essas empresas, a saída e principalmente a entrada de conhecimento externo exercem influência positiva sobre desempenho de negócios.

Palavras-chave: inovação aberta, entrada, saída, desempenho comercial, empresas familiares, empresas não familiares.

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1. Introduction.

The concept of traditional innovation involves attributes, results and processes, and can also be seen as an enhancer of the company's progress (Morris, 2009). As such, innovation provides new ideas, products, strategies, and practices which create competitive advantages. Innovation helps the organizations to identify different opportunities for transformation, and take advantage of them (Tidd & Bessant, 2009), it is considered a fundamental aspect of any company that wishes to survive under the current competitive environment.

The evolution from closed traditional innovation towards a more open concept involves the use of ideas coming from the exterior of the organization alongside those from the interior, (Chesbrough, 2003). This transformation allows companies not only to use information exclusively created from the inside, but also to incorporate external viewpoints to obtain more benefits.

Undoubtedly companies nowadays are becoming more conscious of their inability e to fully compete with others using only internally developed ideas. As a result, there is a stronger trend towards collaboration, including the development and adaptation of processes through sharing collaborative activities (Michelino, Caputo, Cammarano, & Lamberti, 2014; Tobiassen & Pettersen, 2018). Therefore, open innovation is seen as a new scenario where companies must leave their comfort zones and open themselves up to external professionals combining internal and external knowledge.

Some of the benefits of opening up innovation practices may be obvious for large multinational firms. However, in the field of small to medium enterprises (SMEs) in developing countries the picture is different (Chesbrough, 2010) and more so for family and non-family business. Regrettably, in these contexts studies are even scarcer, despite these types of firms being a great source of opportunity in the open innovation panorama, as they can contribute faster, specialize better and easily adapt to opportunities that emerge from beyond their particular market.

Additionally, as these benefits greatly enhance business performance, the capability to innovate is a critical element for competitive improvement in volatile markets (Rajapathirana & Hui, 2018). Open innovation prioritizes the development of new products and services that may become essential in a firm's performance (Hauser, Tellis, & Griffin, 2006), especially in family firms where pressures to innovate are higher in order to compete properly with other Open innovation includes inbound and outbound practices which, when exerted, may increase the company's strength. Both are primordial factors for the company's proper functioning and survival, and may increase its position in the highly competitive markets to which family businesses belong (McCann, Leon-Guerrero, & Haley, 2001). Open innovation has been considered as an essential topic on family firms investigations (De Massis, Sharma, Chua, & Chrisman, 2012), since it brings new ideas of products and processes to the ones that already exist. Furthermore, family businesses are considered as the

main engine of the economies worldwide, due to the huge contribution to the growth and stability they provide (Klein, 2000). Some other authors even suggest that such companies are the main generators of highest profits that contribute in a very high part of the world's wealth (Craig & Dirbrell, 2006). In addition, family firms enhance competitiveness, generate progress, and represent 85% of all organizations in OECD (Organization for Economic Cooperation and Development) countries (Van den Berghe & Carchon, 2003).

There is evidence to suggest that after the generalization of the concept of open innovation, many (principally large) companies began to implement it in their processes (Chesbrough & Crowther, 2006; Schroll & Mild, 2011; Sisodiya, Johnson, & Grégoire, 2013; Chesbrough, & Brunswicker, 2014; Ollila & Yström, 2015; Wang, 2018). In Europe and the United States of America these practices are mostly exercised and with very good results. However, in emerging economies (such as the state of Aguascalientes, Mexico) there are still certain limitations and ignorance of open innovation practices carried out within SMEs.

Within this panorama, the Mexican context may also be significant, since Mexico is the country with the highest number of family firms (La Porta, Lopez-de-Silanes, & Shleifer, 1999). However, to thrive it is necessary to face big challenges; most of these companies are founded to generate jobs and heritage but strength is needed to survive.

Therefore, the main purpose of this investigation is to contribute to the literature with empirical evidence of the influence that open innovation has on business performance in family and non-family SMEs in Aguascalientes, Mexico, through a survey-based quantitative research method and using structural equation modelling to analyse the obtained data.

The present article is organized into the following sections: section 2 consists of the literature review and hypotheses related to the influence of open innovation on business performance; section 3 explains the methodology used to test the hypotheses posited in the study; section 4 discusses the obtained results; and finally, section 5 addresses the conclusions, recommendations and limitations for future investigations.

2. Theoretical framework

Open innovation has gained popularity in recent years due to several studies in the literature which concur that this construct can be classified as one of the most important performance drivers for many companies (Hauser et al., 2006; Lichtenthaler, 2009; Lee, Park, Yoon, & Park, 2010; Mazzola, Bruccoleri, & Perrone, 2012; Chaston, 2013; Kuang-Peng & Chou, 2013; Caputo, Lamberti, Cammarano, & Michelino, 2016; Casprini, De Massis, Di Minin, Frattini, & Piccaluga, 2017; Park & Kwon, 2018). The concept is wide-ranging; it can be defined as a new set of forms that serve as a model in innovation administration (Gassmann, 2006), it uses sources of internal and external knowledge that help in the acceleration of innovation (Van de Vrande, De Jong, Vanhaverbeke, & De Rochemont, 2009), and it involves procedures related to external collaboration and cooperation

to promote the growth and development of new products or technologies (Freel, 2006).

According to Inauen and Schenker-Wicki (2011), over time it has become easier for certain companies to acquire knowledge and technological skills previously shared by other companies, which are available thanks to the transformation of traditional closed innovation towards more open innovation. With this change, companies can share their strategies, helping others to replicate good practices and discard those that were defective.

Moreover, closed innovation is diametrically opposed to open innovation (Park & Kwon, 2018); which implies that companies must change their way of viewing things, from assuming that only the best people work in their organizations, to admitting that not all the best people are part of the company (Chesbrough & Crowther, 2006). In short, they must change closed ideas for more open ones.

Consequently, companies have increasingly recognized that open innovation should be practiced in order to obtain external knowledge, experience and wisdom of workers who are not part of their workforce, and to acquire functional practices that have previously been carried out by other companies (Elmquist, Fredberg, & Ollila, 2009).

Additionally, open innovation encompasses any knowledge exchange between companies with the aim of boosting performance through the transformation of processes or products (Christensen, Olesen, & Kjaer, 2005; Lichtenthaler, 2011). Continuing with this perspective, open innovation embraces collaboration to achieve performance increases; therefore, firms would be wise to align these two variables to take the greatest advantage possible and turn it into profit. It is worth mentioning that in open innovation processes, companies have a strong interaction with their environment (Cooper, 2008), allowing them to obtain more knowledge about political, economic, cultural, social, and demographic factors that may affect the business. This knowledge may help in the generation of synergies, which has led several organizations, mainly in R&D intensive large firms (Spithoven, Clarysee, & Knochaett, 2010) and high tech large companies in developed countries to migrate from their current innovation system to a more open model.

Another approach of the concept is that for the correct implementation of open innovation practices, it is necessary to trust in companies' in-house capabilities, allowing them to express their technological management strategies together with the innovation processes. There is a spectrum of companies on a scale from completely closed innovation to those with fully open innovation processes (Hung & Chou, 2013). It is essential that companies know how to integrate only the knowledge they require and share only the information that may be useful for others, without risking the position of the company.

According to Henry Chesbrough, one of the pioneers of open innovation, over the past decade most of the academic attention has moved significantly from the old ideas of closed innovation to a more open philosophy (Hung & Chou, 2013), in which new concepts and understandings are readily admitted, allowing companies to adapt external knowledge to their own processes to contribute to their internal acceleration of innovation.

For companies to remain profitable, it is necessary to understand that innovation should not be generated exclusively within organizational, on the contrary, it is essential to take advantage of external information that serves as a basis for implementing improvements. Companies must be willing to share knowledge that can also help other companies, and it is necessary to implement both inbound and outbound open innovation practices (Van de Vrande et al., 2009).

Regarding open innovation practices, several authors suggest that there are two ways of getting and sharing the knowledge to promote internal innovation and enlarge the market: inflows and outflows of information (Lichtenthaler, 2009; Chesbrough, 2010; Chiaroni, Chiesa, & Frattini, 2010). Companies practicing open innovation not only use their internal efforts and processes, but also attach external knowledge to generate value for customers (Van der Ploeg, 2011). Open innovation also provides tools that especially help family and non-family SMEs (Alberti, Ferrario, Papa, & Pizzurno, 2014; Basco & Calabrò, 2016; Casprini et al., 2017) to develop internal innovation activities, which are complemented with information from outside the company to create profitable innovation (Basco & Calabrò, 2016).

Specifically, a distinction can be made between the two directions of outbound and inbound open innovation (Lichtenthaler & Ernst, 2006; Spithoven et al., 2010; Mazzola et al., 2012; Michelino et al., 2014; Scuotto et al., 2017). The former explains the external sharing of technology in open function methods, involving the transfer of knowledge to the external environment (Lichtenthaler, 2009). It is also the practice of creating relationships among external associates to take innovations to the market quicker and to commercially use technological opportunities (Mazzola et al., 2012).

In contrast, it is recommended that outbound open innovation practices are implemented and replicated in similar organizations and within which the information can flow continuously without distortions (Chesbrough & Crowther, 2006). This allows the companies to focus on finding innovation activities that can be commercialized or licensed (Spithoven et al., 2010, Wang, 2018) outside the organization´s boundaries. For large companies, is easier to generate innovation or to implement inbound innovation due to their organizational structure and the monetary resources available for these activities. However, SMEs despite the lack of the human and monetary resources required to produce innovation, are taking advantage of the information disseminated by big companies and attempt to replicate the same results according to their capabilities.

It is important to mention that every inbound practice coming from a company must be reciprocated by an equal outbound practice from another organization (Chesbrough & Crowther, 2006). In previous studies that have addressed practices of open innovation, inbound practices have been highlighted as exerting more influence on business performance, but fewer studies show the importance of outbound practices in business performance as these have been relatively abandoned (Lichtenthaler, 2009).

Within this context and taking into consideration the previously presented information the first hypothesis can be formulated:

• H1: the outbound practices exerted in the firms have a positive influence in the business performance.

Obtaining information on the company's external environment can occur through different business partners, customers, competitors and suppliers (Lichtenthaler, 2015; Santoro, Ferraris, Giacosa, & Giovando, 2016). Moreover, inbound practices certainly produce a positive influence on the firm's performance, since they incorporate and develop important concepts, procedures or technologies from outside which can be added to local innovation (Wang & Zhou, 2010; Michelino et al., 2014).

This practice exactly defines the art of taking advantage by exploiting other people's findings, trusting fully in different external research and development departments and not only in one's own (Chesbrough & Crowther, 2006). Companies need to supervise their context to acquire proper expertise and experience in addition to their own already-implemented processes, or research and develop new products to improve existing ones through scientific investigation (Spithoven et al., 2010) that can guide them to improved business performance. With this information, the second hypothesis can be formulated:

• H2: the inbound practices exerted in the firms have a positive influence in the business performance.

Companies might track inbound open innovation, which implies an outside-in process of gaining external knowledge (Lichtenthaler, 2015). Additionally firms can determine outbound open innovation, which describes an inside-out process of transmitting knowledge to the exterior environment. Based on what has previously been described, companies may follow a coupled mode of open innovation, which is a mixture of the outbound and inbound practices (Enkel, Gassmann, & Chesbrough 2009).

The growing importance of open innovation is evident in theory and in practice (Wang, 2018). Firms profit from these open innovations, such as through exposure to new know-ledge, higher flexibility, adaptability to external technology and maximizing inner opportunities. A company needs to make sure it fully captures the value of its technology, which represents a major challenge in the organization (Arora, Fosfuri, & Gambardella, 2001). On the other hand, the potential obstacle is that the conventional approach to innovation in several companies is to be possessive by implementing a closed approach to innovation. Chesbrough (2003) considers that some firms have moved towards sharing, depending on their strategy, with outside organizations in order to gain competitive advantages through innovation. Nevertheless, it is fundamental to protect a business's intellectual property by rigorously regulating the information, knowledge or technology, which is shared with the exterior (Lichtenthaler, 2009). According to the literature, most family business show a tendency to following inbound practices, and on the contrary non-family businesses use outbound practices of open innovation (Basco & Calabrò, 2016; Lambrechts, Voordeckers, Roijakkers, & Vanhaverbeke, 2017).

Family firms have a significant function in worldwide markets (Spanos, Tsipouri, & Xanthakis, 2008), not only because of their contribution to the economy (Porter, 2003), but also for the generation of employment (Morck & Yeung, 2003; Belausteguigoitia, & Balaguer, 2013). Many companies that are now considered successful started as family businesses. According to Dawson & Hjorth (2012), family firms are more likely to be effective and lucrative than other kinds of businesses. In addition, the International Finance Corporation (IFC) of the World Bank (2011) indicates that these companies are the oldest and most predominant form of commercial organization worldwide. Despite representing more than 70% of all firms however, they often do not survive across generations (Heck 2004; Gómez, Haynes, Núñez, Jacobson, & Moyano, 2007).

Family business practices are often different to other types of business, which may be due to the involvement of family members (Basco & Pérez-Rodriguez, 2009). To maintain a successful business requires skills and strategies along with empirically acquired expertise. Relevant research shows that only 30% of family companies survive to the second generation, and only 10% survive to the third, with the rest being sold or closed (Laforet, 2016). Another cause of failure during the first year of production is the lack of growth potential due to the absence of formal processes (Van Gils, Voordeckers, & Hagedoorn, 2008). Innovation in family and non-family SME´s may be a key growth driver, as these companies are also a significant part of the global economy (Sraer & Thesmar, 2007). Although in recent literature there are a number of studies that have previously investigated innovation in family businesses (McAdam, Reid, & Mitchell, 2010; Brines, Shepherd, & Woods, 2013; Laforet, 2016; Steeger & Hoffmann, 2016; Rondi, De Massisa, & Kotlarb, 2018), open innovation in family firms (Lambrechts et al., 2017; Park & Kwon, 2018) and open innovation and business performance (Kuang-Peng & Chou, 2013; Wang, Chang, & Shen, 2015; Greco, Grimaldi, & Cricelli, 2016; Lazzarotti, Bengtsson, Manzini, Pellegrini, & Rippa, 2017; Wang, 2018), there are no studies on the influence of open innovation on business performance in family and non-family firms in an emergent economy like Mexico. For this reason, it is considered that more research is needed to empirically ground the picture of this influence, thereby contributing to business growth and stability.

Emphasizing the above there have been numerous studies over recent years in this field on large high-tech multinational companies, however, some matters still need additional clarification in developing countries (Zeng, Xie, & Tam, 2010; West, Salter, Vanhaverbeke, & Chesbrough, 2014), therefore further studies are recommended. This study helps different companies, like family and non-family firms in Aguascalientes, Mexico, to have a clearer understanding of the importance that open innovation practices have in business performance.

3. Methodology.

An empirical research in family and non-family firms in Aguascalientes was conducted in order to answer the two hypotheses that were established and tested using Structural Equation Modelling (SEM). For this study, a sample of 308 small and medium companies was considered, using the directory of the Business Information System for Mexico in the state of Aguascalientes which had registered 5,194 companies for the month of December 2016. For the purposes of this empirical study, only companies with between 5 and 250 employees were considered, meaning the directory was reduced to 1,261 companies. Likewise, the sample was selected randomly with a reliability level of 96% and a sampling error of ±4.5%, obtaining a total sample of 308. The surveys were carried out from January to April 2016.

Data was obtained through a questionnaire designed to be answered by managers and/or owners of the selected companies, delivered personally to each of the 308 companies. Of the completed surveys obtained, 205 (66%) were considered family businesses and 103 (34%) non-family businesses. Finally, the survey collected information about the characteristics of each company (whether a family SME or a non-family SME), as well as the adoption and implementation of corporate social responsibility.

Likewise, for the measurement of open innovation the scale developed by Van de Vrande et al. (2009) was used, who also considered that open innovation can be measured through 7 items. The first two measure outbound open innovation practices and the remaining 5 measure inbound open innovation practices. All items were designed on a five-point Likert scale, with 1 = *Totally disagree* to 5 = *Completely agree* as limits. Additionally, business performance was measured through a scale of 3 items (1: return of investment; 2: profits compared to the competition; and 3: market participation compared to the competition) adapted from Tan and Litschert (1994) and measured by means of a five-point Likert scale, with 1 = *Totally disagree* to 5 = *Completely agree*.

A Multigroup Factorial Confirmatory Analysis (FCA) was implemented to evaluate the reliability and validity of the scales utilized in the study by using the method of maximum likelihood with the structural equation modeling software EQS 6.1 (Brown, 2006; Byrne, 2006). The reliability of the scales was evaluated by means of Cronbach's Alpha and the Composite Reliability Index (CRI) recommended by Bagozzi and Yi (1988). The results found are shown in Table 1, and they specify that the model had good data (S-BX^2 (df = 74) = 387.5822; p < 0.000; NFI = 0.796; NNFI = 0.790; CFI = 0.827; RMSEA = 0.079), and the values of both Cronbach's Alpha and the CRI were above 0.7 (Hair, Anderson, Tatham, & Black, 1995), which provided evidence of reliability and justified the internal reliability of the scales.

Table 1 illustrates the data obtained after applying the multigroup factorial confirmation analysis, proving the reliability of the scales and the correct data adjustment of the theoretical model.

As evidence of the convergent validity, the results of the multigroup FCA denoted that all items of the related factors were significant (p < 0.01). The size of all the standardised factorial loads were above 0.60 (Bagozzi & Yi, 1988) and the Extracted Variance Index (EVI) of every construct of the theoretical model represented a value above 0.50 as established by Fornell and Larcker (1981). These standards indicate that the theoretical model presented a good data adjustment.

Table 2 shows the non-existing value of the unit, which proves the existence of discriminant validity of the proposed theoretical model.

Table 1. Internal consistency and convergent validity of the theoretical model

Variable	Indicator	Loading factorial	Robust t-value	Cron-bach´s Alpha	CRI	EVI
Family business						
Outbound open innovation	PI1	0.806***	1.000 [a]	0.812	0.825	0.702
	PI2	0.869***	16.443			
Inbound open innovation	PI3	0.807***	1.000 [a]	0.941	0.952	0.704
	PI4	0.863***	27.838			
	PI5	0.846***	22.658			
	PI6	0.850***	19.600			
	PI7	0.827***	21.637			
Business performance	IR1	0.811***	1.000 [a]	0.915	0.914	0.780
	IR2	0.956***	19.288			
	IR3	0.876***	22.143			
Non-family business						
Outbound open innovation	PI1	0.848***	1.000 [a]	0.912	0.853	0.744
	PI2	0.877***	16.443			
Inbound open innovation	PI3	0.756***	1.000 [a]	0.934	0.946	0.656
	PI4	0.806***	27.838			
	PI5	0.806***	22.658			
	PI6	0.845***	19.600			
	PI7	0.835***	21.637			
Business performance	IR1	0.869***	1.000 [a]	0.930	0.914	0.780
	IR2	0.956***	19.288			
	IR3	0.820***	22.143			

S-BX2 (df = 74) = 387.5822; p < 0.000; NFI = 0.796; NNFI = 0.790; CFI = 0.827; RMSEA = 0.079; a = parameters limited to this value in the identification process; *** = p < 0.01.
Source: own elaboration.

Table 2. Discriminant validity of the theoretical model

Variables	Outbound open innovation	Inbound open innovation	Business performance
Outbound open innovation		0.6-0.968	0.17-0.454
Inbound open innovation	0.6-0.968		0.204-0.488
Business performance	0.17-0.454	0.204-0.488	

Note: above the diagonal, the confidence interval test of family firms is presented (square correlation). Below the diagonal, the confidence interval test of non-family firms is also presented, the estimation of the correlation of the factors with confidence interval of 95% is shown.
Source: own elaboration.

Considering the evidence of discriminant validity, the measurement is provided by the confidence interval test that can be seen in detail in Table 2. Firstly, with an interval of 95% reliability, none of the specific elements of the dormant factors of the correlation matrix had a value of 1.0 (Anderson & Gerbing, 1988). Consequently, based on these criteria, it can be said that the different measurements provided sufficient evidence of reliability as well as convergent and discriminant validity.

4. Results.

To acquire the results, a structural equation model (SEM) was developed and in the same way to answer the hypotheses formulated in this empirical study the EQS 6.1 (Brown, 2006; Byrne, 2006) software was used. Table 3 contains the results obtained from Family and Non-Family SEMs after applying the equations.

The results obtained in this empirical research presented in the table above, point out that for family business located in Aguascalientes, Mexico, the first hypothesis β = 0.052 p < 0.05, is not significant, meaning that outbound practices of open innovation do not have any effect on business performance. Nevertheless, the second hypothesis β = 0.346 p < 0.05, does indeed demonstrate a significant effect on business performance, which reveals that inbound practices

Table 3. SEM results

Hypotheses	Structural relationship	Standardised coefficient	Robust t value
Family business			
H1: the outbound practices exerted in the firms have a positive influence in the business performance.	I. Outbound→ Performance	0.052	0.160
H2: the inbound practices exerted in the firms have a positive influence in the business performance.	I. Inbound→ Performance	0.528**	2.635
Hypotheses	Structural Relationship	Standardised coefficient	Robust t value
Non-Family business			
H1: the outbound practices exerted in the firms have a positive influence in the business performance.	I. Outbound→ Performance	0.024	0.070
H2: the inbound practices exerted in the firms have a positive influence in the business performance.	I. Inbound→ Performance	0.346**	2.145

S-BX2 (df = 70) =269.373; p < 0.000; NFI = 0.858; NNFI = 0.859; CFI = 0.890; RMSEA = 0.079; **= p < 0.05
Source: own elaboration.

of open innovation in family business have a significant effect on performance. On the other hand, for non-family business also located in Aguascalientes, Mexico, the first hypothesis β = 0.024 p < 0.05 is not accepted, suggesting that the practice of outbound activities does not influence business performance. Finally, the second hypothesis, β = 0.346 p < 0.05, showed that inbound practices have a significant effect on business performance within non-family businesses in Aguascalientes (Mexico).

Based on the results found it is possible to assert that outbound practices of open innovation do not exert influence on business performance for either family or non-family businesses. However, inbound practices have a significant influence on business performance in both types of companies. In other words, family and non-family firms guide their efforts and activities towards inbound practices, like obtaining external knowledge or technology to help innovation, which allows them to significantly improve their business performance. It can also be shown that inbound practices for family businesses have a greater effect than on non-family business.

5. Conclusion.

This paper examines the influence of inbound and outbound practices of open innovation on the business performance of family and non-family businesses in Aguascalientes, Mexico. The results show the significant effects produced by inbound practices on business performance for both company types, which means that for these companies, the participation of external agents such as suppliers or clients greatly influences their innovation processes. In addition to activities developed based on external networks to support innovation processes, acquiring external knowledge and even human capital, it is very important to have holdings in new or established companies in order to gain access to their knowledge or to have other synergies. The purchase of innovation and development services from other organizations, such as universities, public research organizations, commercial engineers or suppliers also contributes to inbound practices. Other measures which may improve business performance include the purchase or use of intellectual property, like patents, copyrights or trademarks of other organizations.

On the contrary and following the obtained results, outbound practices for family and non-family business in Aguascalientes, Mexico, do not have an important effect on performance. In other words, the sale of licenses or royalty agreements to other companies to obtain the benefits of their intellectual property, patents or trademarks is not very relevant. It is neither important to start new businesses from the internal knowledge of the companies themselves, nor is it relevant in influencing business performance.

In general, the outcome of this investigation provides empirical evidence proving that outbound open innovation practices for family and non-family businesses in the state of Aguascalientes, Mexico, do not exert influence on business performance. On the other hand, inbound practices positively influence performance; this additionally shows that most open innovation practices have been neglected in small and medium

companies. This paper also addresses this gap by studying the incidence of these practices within the Mexican context, specifically in Aguascalientes State.

Therefore, in order to significantly improve business performance, it is necessary for these companies to incorporate both outbound and inbound practices in equal proportion. This requires not only the promotion of knowledge acquisition on the basis of external networks to support innovation processes, but also reinforcement of the process of obtaining internal company knowledge Promoted in tandem, these benefits could result in higher economic remuneration.

The results achieved from this study may also provide a different perspective for decision makers who lead these firms, helping them to improve, support and develop practices of open innovation even more by understanding the positive effect that these practices have on the business performance and competitiveness of SMEs. To do this, firms should begin working internally on activities to enhance or promote knowledge among all their members. Moreover, businesses need to be willing to sell or offer licenses or royalty arrangements to other enterprises to achieve the benefits of their intellectual property, patents or trademarks. This will eventually promote the growth of the local and regional economy. Additionally, the results found from this analysis will also allow the companies to incorporate more integration practices of open innovation as part of their business's global strategy.

This empirical research has some limitations, which must be taken into consideration with similar studies in the future. The first limitation is related to the characteristics of the organizations studied. The selected firms were only those SMEs employing between 5 and 250 employees, leaving aside those with fewer than 5 workers, which represent a considerable proportion of Mexican SMEs and a significant percentage in other countries with emerging economies. As a result, in future investigations, it will be important to contemplate this kind of company. This will help to contribute to supporting the results found in this study.

The second limitation relates to the scales used to measure both open innovation practices and business performance. In this case, only two dimensions were used to measure open innovation (i.e. outbound practices and inbound practices), with a total of 7 items, and only one dimension, with 3 items, to measure business performance. In future investigations, it will be indispensable to use other scales to confirm the obtained results.

Another limitation is that the survey was only distributed to SMEs in the state of Aguascalientes, Mexico, with a high concentration of this type of company in the state capital. Consequently, future research may contemplate other states of Mexico, or even other developing countries, to investigate if the achieved results are similar and whether a comparative study is appropriate.

The next limitation is that the questionnaire was only distributed among managers and/or owners of family and non-family SMEs. There was therefore an assumption that these people were familiar with open innovation practices and prevailing business performance. Future studies may consider using the same questionnaire with employees, clients and even suppliers of family and non-family SMEs, to corroborate and expand the obtained results.

The final limitation identified for this study is the fact that only qualitative variables were considered for the measurement of open innovation practices and business performance. Hence, future research could use hard data from the company and quantitative variables such as R&D investment to confirm if there are significant differences in the results.

Finally, it is recommended to go beyond the results obtained in this paper to investigate and discuss the importance of outbound and inbound open innovation practices on business performance. Verification of the results of this study would be greatly facilitated by increasing the sample size, for example by including other Mexican states or even other countries.

Conflict of interest

The authors declare no conflict of interest.

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Estudios Gerenciales

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Research article

Analysis of dynamics, structures and agent relationships in Regional Innovation Systems

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Abstract

This paper analyzes the regional innovation system of the department of Antioquia in Colombia, from a complex systems perspective and using an agent-based simulation model. Among the results is a model with significant variables and indicators for generating new knowledge and innovation on a regional scale. This provides evidence that more favorable conditions exist, insofar as a significant number of explorers encourages greater reciprocal actions with other agents in the regional structure. The number of patents and publications being generated will increase significantly and better network clustering becomes evident as a result. Finally, the model explores the dynamics, structures and relationships among agents in the system, paying special attention to the conditions within which innovation processes unfold at a regional level.

Keywords: simulation, innovation, complexity, modelling, network clustering.

Análisis de las dinámicas, estructuras y relaciones de los agentes en Sistemas Regionales de Innovación

Resumen

Este trabajo analiza el sistema regional de innovación en el departamento de Antioquia en Colombia, desde una perspectiva compleja utilizando modelos de simulación basado en agentes. Los resultados presentan un modelo con variables e indicadores significativos para generar nuevos conocimientos e innovaciones a escala regional. Lo anterior proporciona evidencia de que existen condiciones favorables, en la medida en que un número significativo de exploradores alientan mayores acciones recíprocas con otros agentes en la región. Por lo tanto, el número de patentes y publicaciones generadas aumentará significativamente y, como resultado, se hará evidente un mejor índice de clusterización. Finalmente, el modelo explora las dinámicas, estructuras y relaciones entre agentes del sistema, prestando especial atención a las condiciones bajo las cuales los procesos de innovación se desarrollan a nivel regional.

Palabras clave: simulación, innovación, complejidad, modelación, agrupación de redes.

Análises das dinâmicas, estruturas e relações dos agentes nos Sistemas Regionais de Inovação

Resumo

Este artigo analisa o sistema regional de inovação de Antioquia, Colômbia, a partir de uma perspectiva complexa de sistemas adaptativos, usando um modelo de simulação baseado em agentes. Entre os resultados, está uma espécie de modelo com variáveis e indicadores significativos para gerar novos conhecimentos e inovações em escala regional. Isso fornece evidências de que existem condições mais favoráveis na medida em que um número significativo de exploradores incentiva maiores ações recíprocas com outros agentes na estrutura regional. O número de patentes e publicações sendo geradas aumentará significativamente e, consequentemente, um clustering de rede melhor ficará evidente. Finalmente, o modelo explora a dinâmica, as estruturas e as relações entre os agentes do sistema, dando atenção especial às condições em que os processos de inovação se desdobram no nível regional.

Palavras-chave: simulação, inovação, complexidade, modelagem, cluster de rede.

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1. Introduction

Antioquia is a Colombian department and one of the nation's principal economic drivers. With a population of over 6.3 million (2013), Antioquia's gross domestic product (GDP) and economic growth rate of 3% (Londoño, Restrepo, Álvarez, & Ospina, 2018) are above the national average. Antioquia's economy is based on the manufacturing industry, service sector and natural resource exploitation (Llisterri & Pietrobelli, 2011). Income, industry, population, post-secondary education and investment in research and development are concentrated in the metropolitan area of Medellin. Along with Bogotá and Cali, the three cities form the "Golden Triangle" (Secretaría de educación para la cultura de Antioquia, 2011).

Development theory from an innovation systems perspective and in particular regional innovation systems (henceforth RIS) has been influenced by different schools of thought including the school of evolutionary economics, institutional economics, new regional economies, the learning economy, the innovation economy and network theory (Quintero & Robledo, 2013).

For over two decades the development of Antioquia's RIS has been based on local initiatives with a bottom-up approach, with key agents in the process considered to be the foundation (Llisterri & Pietrobelli, 2011). As early as the 1980s science and technology in Antioquia had strengths and a certain structure in the academic, productive and public sectors. During this period, the challenge was to develop a policy for science, technology and innovation (STI) that would evolve around agent interactions (Llisterri & Pietrobelli, 2011).

With changes to Colombia's political constitution in the 1990s, certain powers and functions were granted to the regions which as a result had the autonomy to make decisions to promote capacity building and institutional strengthening, as well as to create the basic infrastructure for a science and innovation system. Nevertheless, policies developed in the regions were not sufficient for shaping the dynamics of innovation (Llisterri & Pietrobelli, 2011).

In the last decade the university-business-state committee was created, and ties were built with regional competitiveness councils and the departmental Science, Technology and Innovation council. This allowed Antioquia to advance in the field of innovation among RIS agents (Llisterri & Pietrobelli, 2011).

The objective of this paper is to evaluate the structures, interactions and dynamics of agents in Antioquian RIS using an agent-based simulation model. To this end, part 2 describes the context within which RIS are developed and presents the structures and interactions of regional agents. Part 3 looks at RIS from a complex adaptive systems (CAS) perspective, which enables a better understanding of how systems operate as a support for the cognitive process of decision making for policymakers. Part 4 highlights the importance of addressing RIS dynamics and the RIS of Antioquia in particular. An agent-based model (ABM) is proposed and the results of its simulation are presented.

Finally, conclusions and suggestions for future research are provided, with the aim of achieving a better understanding of the RIS of Antioquia as a product of interactions between its agents.

2. Theoretical framework

The concept of the RIS has been widely discussed by various authors. Since the 1980s and the beginning of the 1990s, pioneering works by Freeman (1987), Lundvall (1992) and Nelson (1992), provided the basis for the definition and characterization of the national innovation system. Asheim and Gertler (2005) define it as the institutional infrastructure that supports innovation in a region's productive structure. In 1992, Cooke coined the term "regional innovation system" and attempted to explain it as the best practices in the context of regional innovation by engaging in a process of learning through interactions (Su & Chen, 2015). In accordance with this, RIS have two central elements: 1) a strong and dense network of relationships between autonomous and heterogenous agents (subsystems of "explorers, exploiters, catalysts and regulators of knowledge") and 2) a level of competitiveness attributed to the co-evolution of the productive organization and to the location of formal and informal institutions within the system (Quintero & Robledo, 2013).

These definitions are complex and require further explanation, as they refer to interactions between different actors with the purpose of producing innovation collectively through the interaction of knowledge-based assets. This interaction is studied by looking at a set of networks made up of agents or actors where capacities, knowledge and feedback are shared. This allows them to benefit from their own infrastructure in order to modify, achive and increment knowledge and innovation (Lau & Lo, 2015). These actors operate in an area that is geographically defined and they are governed by common policies at the sectoral, regional and national levels (Doloreux, 2002).

While still recognizing the existence of sectoral and national innovation systems, this definition suggests that demarcating the RIS is key (Tödtling & Trippl, 2005). If the implementation of policies at the regional level is desired, the following three parameters must be defined: firstly, the existence of industrial specialization patterns, as this generates localized economies that exist between companies with similar productive contexts and where knowledge is generated within them (Li, 2015); secondly, the influence of knowledge on the process of innovation and tacit knowledge; and thirdly, issues that are demarcated spatially. This confirms that all regions behave differently and cannot be measured in the same way.

Each RIS requires a particular type of analysis and approach in order to define and describe it, given that all RIS are made up of various subsystems of actors or agents. The first subsystem is that of the exploiters who apply and take advantage of knowledge. All companies with their respective clients, suppliers and competitors belong to this category. The second subsystem is comprised of actors or agents that explore new and existing knowledge and are

defined as explorers. This group of actors produces and diffuses knowledge and skills. Research institutes including laboratories and educational institutions such as universities are grouped within this category (Tödtling & Trippl, 2005). This means that regional development in innovation requires the dedication and commitment of these agents. The complex interrelationships that emerge between these actors are referred to as the innovation habitat (Oliveira, Echeveste, Cortimiglia, & Gonçalves, 2017).

Actors in these systems have become more specialized in recent years in terms of their functions (Zollo, De Crescenzo, & Ponsiglione, 2011) and have emerged as four types of agents: explorers, defined as those who produce new ideas, methods and techniques from the fringes of knowledge; intermediaries (Watkins, & Horley, 1986) or catalysts (Smits & Kuhlmann, 2004), defined as those who facilitate the transfer, acceptance and use of knowledge (Ruiz, Quintero, & Robledo, 2016); exploiters, defined as actors who transform knowledge into market value and include companies (especially small and medium ones); and the fourth actor is the national innovation agency, which is the government player charged with establishing guidelines and coordinating the innovation network. An additional element (which is equally important to policy creation and implementation in a given region) is the environment or setting in which the RIS develops and evolves. This element is not identified as a key agent or actor in the current literature (Quintero, Ruiz, & Robledo, 2017).

2.1. RIS Proposed model for Antioquia

The RIS to be studied here spans the territory of the department of Antioquia, located in northwestern Colombia. Figure 1 presents the proposed model for the RIS, which is comprised of three actors with the following characteristics (Carlsson, Jacobsson, Holmén, & Rickne, 2002): firstly, explorers are responsible for generating and diffusing knowledge, and include educational and research institutes; secondly, catalysts play the role of facilitating the transfer, acceptance and use of knowledge, and include business incubators, technology parks and chambers of commerce; thirdly, exploiters include industrial companies and organizations.

In the case of the RIS of Antioquia where the main actor in the policy creation subsystem is the regional government, it is assumed that this actor will represent the competitive environment or setting in which the RIS develops. This environment defines policies, tracks innovation processes and is the framework for interaction between actors, with the purpose of influencing competitiveness in the region and its development over the long term. It should be noted that this assumption is made because there is no regional agency present in the policy creation subsystem to dictate and lead as the principal actor or agent.

The RIS of Antioquia takes other external systems into consideration including the National Innovation System (henceforth NIS), international organizations and other RIS. Their relationships cross borders (Trippl, 2006) in order to obtain economic and knowledge support. Additionally, this enables them to learn from the experiences of other
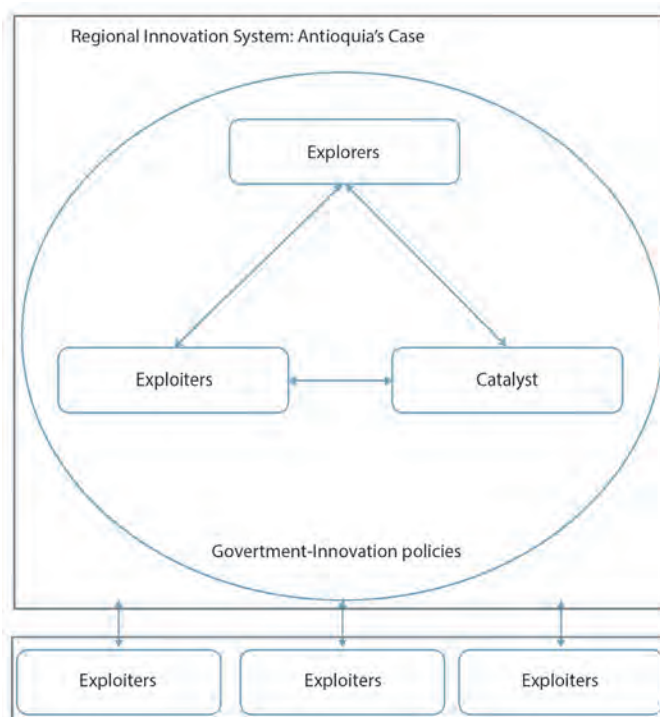
Figure 1. Model of RIS of Antioquia.
Source: own elaboration.

organizations that have an impact on innovation in such a way that they will be able to adapt this new knowledge to their region. Moreover, the RIS of Antioquia makes substantial contributions to different bodies, organizations and systems at the national and international levels. These contributions can take the form of new knowledge, innovation products and changes to macro policies regarding innovation.

As a result, the relationships between actors in the RIS of Antioquia are not soft and can be bidirectional thanks to framework agreements, joint research projects, publications, research project management, provision of goods and services, organizing of networking events for actors and advising and consulting services. This means that actors can receive feedback on the results obtained by other actors using the knowledge shared between them, with the purpose of engaging their skills for generating, diffusing and using knowledge and creating market value (Carlsson et al., 2002), thereby bringing learned capacities and competence to the system.

RIS can be explained through the concept of the Complex Adaptive System (CAS). CAS are made up of a set of interacting elements (Bertalanffy, 1968) and are characterized by a multi-level structure. The components in levels in the hierarchy tend to show significant levels of autonomy, while the behavior of the system is the result of self-organized components, where organization is not controlled or directed by any external body.

Such complex systems perceive their environment and respond to changes within it in potentially different ways (Ahrweiler, Pyka, & Gilbert, 2004; Vicsek, 2002). In addition, many complex systems are also adaptive. In these adaptive systems, the behavior of the basic components can evolve

over time, giving rise to a certain response capacity in the face of changes to the environment in which mechanisms such as individual learning or selection and replacement (large-scale learning) are used. Ottino (2004) adds elements to complex systems including emergencies, adaptation and self-organization as characteristics that are present in multi-agent or complex adaptive systems and in self- organized systems, also referred to as collective intelligence systems.

Some authors explain the role of collective intelligence from a collective memory perspective, focusing on properties such as levels of aggregation (Yamins, 2007), randomization (Lorenz, 1963), emergency (Damper, 2000; Wolf & Holvoet, 2005), redundancy and robustness. These properties are possible as long as the system demonstrates adaptability, interaction and rules.

3. Design and methodological construction model

On the basis that RIS are CAS, an ABM was formulated for the RIS of Antioquia. To this end, characteristic elements described and disseminated in the literature were identified and the current system was observed and modelled. In it the following can be found: 1) extensive interactions between agents operating at the local level and a lack of central control (Iandoli, Palumbo, Ponsiglione, Tortora, & Zollo, 2012); 2) multi-level organizations with distributed interactions (Iandoli, Palumbo, Ponsiglione, Tortora, & Zollo, 2012); 3) continuous adaptation among agents (Iandoli, Palumbo, Ponsiglione, Tortora, & Zollo, 2012); 4) the presence of disruptive elements (new markets, technologies and behaviors) (Iandoli, Palumbo, Ponsiglione, Tortora, & Zollo, 2012); 5) limited rationality (Iandoli, Palumbo, Ponsiglione, Tortora, & Zollo, 2012); 6) continuous evolution (Iandoli, Palumbo, Ponsiglione, Tortora, & Zollo, 2012); 7) a regional dimension to innovation (Iandoli, Palumbo, Ponsiglione, Tortora, & Zollo, 2012) and 8) a systematic and systemic nature (Iandoli, Palumbo, Ponsiglione, Tortora, & Zollo, 2012). These elements can be identified in the RIS, and as such these systems are considered to be complex systems comprised of agents with limited rationality that learn adaptatively and interact at different levels (Quintero et al., 2017).

The following methodology was used in the design and development of the RIS of Antioquia ABM (Sterman, 2000):

1. Articulation of the problem, which answers questions like "What are the key concepts and variables?"
   Here, the time frame for the model is set and the historical behavior of the key concepts and variables is examined.

2. Formulation of the hypothesis, in which a theory that considers the behavior of the problem is developed. Reference models are used here, and data is researched to support and enhance the model being developed.

3. Formulation of a simulation model in which the structure of the model, parameters and initial conditions are specified.

In brief, using two input variables, the RIS explains the principal relationships, dynamics and structures, thereby generating output information such as the number of publications and patents in the system. To explain structure and relationships, basic studies were carried out on the RIS as a network using graph theory concepts, with a clustering index and levels of distribution of the networks formed within the RIS. This can be observed in Figure 2.

Agents interact with one another and generate diverse results for the output variables until the end of the time frame required for the simulation. A five-year limit was estimated for the design of the system as the time needed for it to be carefully developed and generate projects, patents and publications. Authors Fritsch & Slavtchev (2011) consider that patent applications are only published 12 to 18 months after being submitted. This is the time required for the patent office to review the application and the basic conditions for guaranteeing the patent.

Figure 3 shows the process that the system undergoes to generate RIS products during the simulation.

In accordance with the proposed methodology, Table 1 represents the variables selected for developing the simulation model.

As such, the input variables for this model are:

• Gross Domestic Product Expediture on R&D.
• Number of regional agents in the system (explorers, exploiters, catalysts, government).

Other variables important for modelling are:

• Number of ties, represented by two variables in the CAS theory: E_interrelationship and U_interrelationship.
• In CAS, the interaction between agents and the environment is important because it shows how agents operate and how results vary.
• Random variables to simulate resource allotment for different agents within the system (these allotments are presented in Table 1).
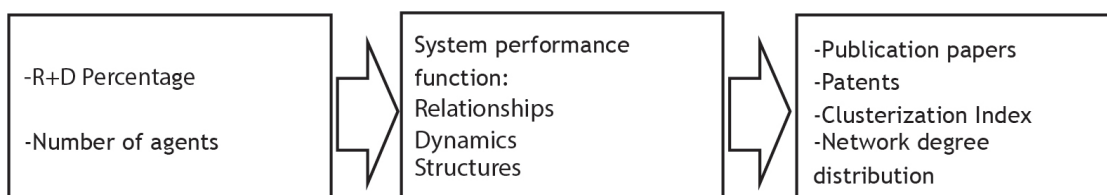

Figure 2. RIS flow
Source: own elaboration.

The following performance measures were used to gauge regional innovation behavior:

- Scientific publications (Wang & Sun, 2016).
- Patents (Wang & Sun, 2016).
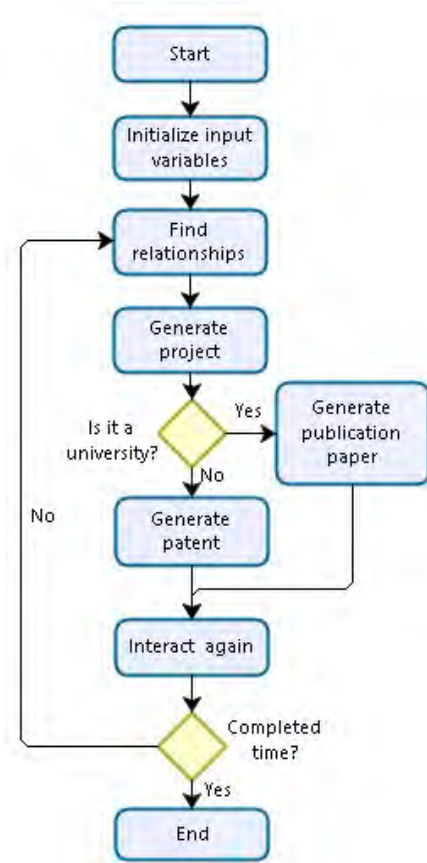- System ties and network density (Cancino et al., 2008).

Figure 3. Flow chart of the RIS of Antioquia model.
Source: own elaboration.

With the help of NetLogo Version 5.0.3, a model of the RIS of Antioquia was developed with the variables, parameters, time frames and results mentioned above. Diagrams for this simulation model can be seen in Figure 4, which represents the schematic approach of an interactive network for SRI, universally considered as the ideal perspective of SRI (Stuck, Broekel, & Revilla, 2016). On the diagram, the red dots are exploiters, blue dots are explorers and the green square is the representation of politics. Figure 5 shows a map of Antioquia and the location of agents on the map; however, the Valle de Aburra region is very small with a high concentration of agents, making it difficult to see them clearly. Figure 6 shows the regions of Antioquia according to agent concentration; the Valle de Aburra region can be seen more clearly at this larger scale.

A review of the literature shows that a fundamental problem with the study of all RIS is that it has not yet been precisely determined how to graphically depict an RIS (Doloreux & Parto, 2005). It is for this reason that different spatial configurations are proposed for the design of the Antioquian RIS model.

The first configuration makes it possible to study and simulate innovation networks in an environment where public and private agents interact on multiple levels. This creates a broader dynamic without regional divisions within companies. In the second, with the map of Antioquia, the spatial configuration of the networks, regions and agents is studied. Table 2 shows that the distribution of agents in the department is not equal, as 69% of them are located in the Valle de Aburra, a small area within the region. Nevertheless, it provides a real picture of network dynamics in the department. Finally, the Antioquia unequal distribution graphic configuration is proposed in order to study dynamics and networks within the area occupied by the agents.

4. Results and analysis

Once the ABM for the RIS of Antioquia had been developed, a series of experiments were carried out in which the various

Table 1. Variables of the RIS of Antioquia model.

Variables of the RIS model	Explanation of the variable
E_interrelationship	This is the length of the tie between a firm (exploiter agent) and other agents in the system, measured in distance patches. It involves a geographical relationship.
U_Interrelationship	This is the length of the tie between a university (explorer agent) and other agents in the system, measured in distance patches. It involves a geographical relationship.
%Firms	Percentage of participation with respect to the R&D % of exploiter agents (companies) within the system.
%University	Percentage of participation with respect to the R&D % of explorer agents (universities) within the system.
P_University	Random variable for resource allocation within the system.
P_Firms	Random variable for resource allocation within the system.
Exploiters	This is the number of exploiter agents (companies) that the system will have in the simulation.
Explorers	This is the number of explorer agents (universities) that the system will have in the simulation.
Catalysts	This is the number of catalyst agents (technological centers) that the system will have in the simulation.
%R&D	This is the percentage of national research and development to be simulated for the RIS.
Image	The graphic form to be used in the simulation of the RIS. This can be no image, Antioquia image or Antioquia unequal image.

Source: own elaboration.

input parameters were changed in order to obtain output results. These experiments can be observed in Table 3.

The first result of this set of experiments is a study of the number of patents that the system can generate with the input data. In Table 3 it can be observed that Experiment 14 succeeded in generating a larger number of patents on average in comparison to the others. Experiments 8 and 13 also achieved a high number of patents. The results can be observed in Table 4.

The second expected result of the simulations is the observation of the behavior of the number of publications generated by the RIS, in which Experiments 8 and 14 once again show the highest results compared to the others. Experiment 9 shows equally high results for generating knowledge in terms of publications within the system. All results can be observed in Table 5.

Another type of analysis used to understand the behavior of RIS involves studying the concept of an RIS as a network. A network is therefore defined as an arrangement of bodies (nodes) with connections between them (vertices) (Newman, 2003). As such, a system that takes this form can be called a graph in mathematical literature and can have different connotations, including social networks, credit networks, friend networks, genealogical networks, economic networks,

Table 2. Subregions of Antioquia and distribution of agents.

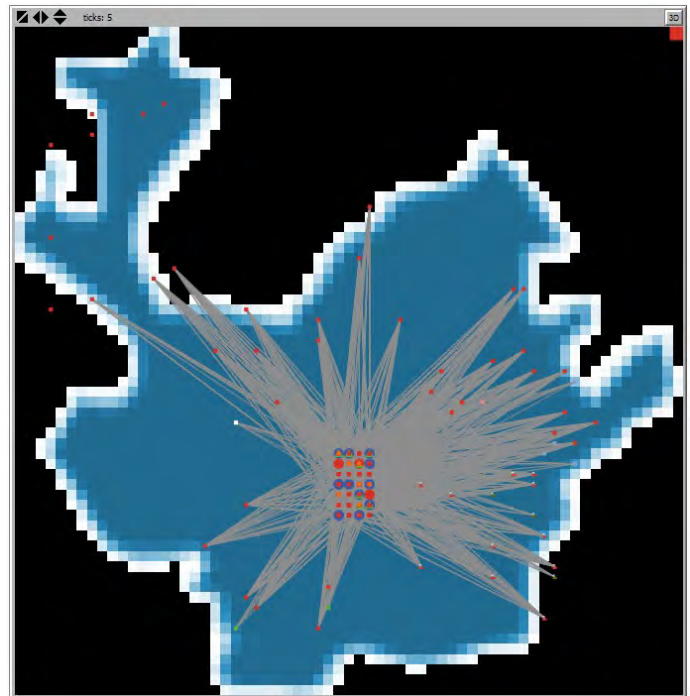| Subregion of Antioquia	Coloured area in figure	Distribution of Agents
Bajo Cauca	Blue	2%
Magdalena Medio	Light Green	5%
Northeastern	Red	4%
Northern	Yellow	3%
Western	Orange	1%
Eastern	Green	7%
Southwestern	Light blue	4%
Urabá	Violet	5%
Valle de Aburra	White	69%
9 Subregions		100%

Source: own elaboration.

Figure 5. RIS simulation with map of Antioquia.
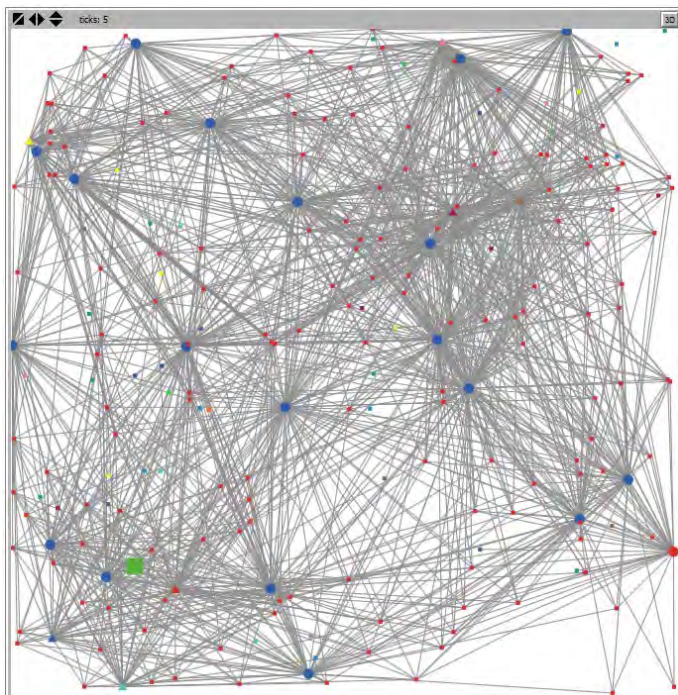Source: own elaboration.

Figure 4. RIS simulation, no map.
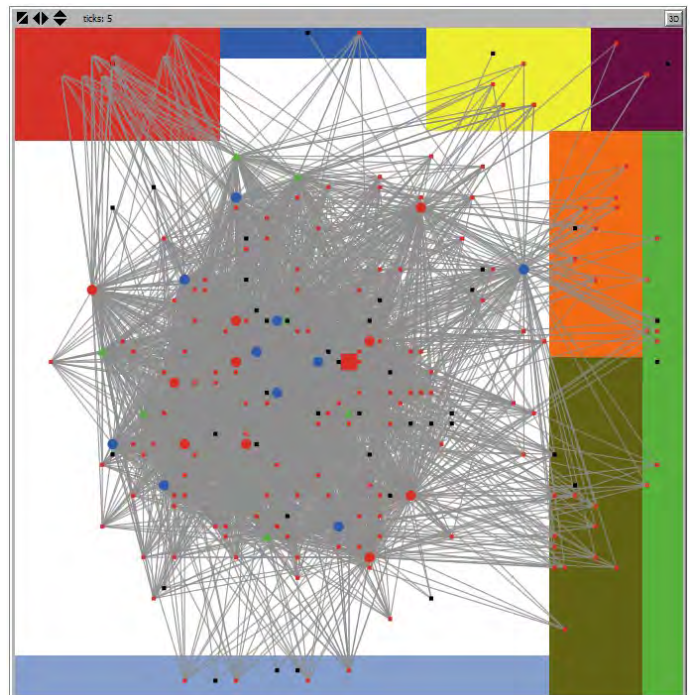Source: own elaboration.

Figure 6. RIS simulation with Antioquia unequal distribution.
Source: own elaboration.

Table 3. Table with the number of experiments performed and the values of the variables for the Antioquian RIS model.

Experiment	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15
E Interrelationship	4	4	4	4	4	6	10	10	10	10	10	6	10	10	10
U Interrelationship	7	7	7	8	8	10	10	15	15	15	20	10	10	10	15
%Firms	0.56	0.56	0.56	0.56	0.56	0.56	0.4	0.4	0.4	0.65	0.65	0.56	0.4	0.4	0.65
%University	0.44	0.44	0.44	0.44	0.44	0.44	0.6	0.6	0.6	0.35	0.35	0.44	0.6	0.6	0.35
P_Firms	1	1	1	1	1	2	1	3	1	1	1	2	1	1	1
P_University	3	3	3	3	3	3	3	3	2	3	3	3	3	2	3
%R&D	0.16	0.2	0.16	0.2	0.16	0.16	0.25	0.3	0.3	0.16	0.16	0.16	0.25	0.3	0.2
Catalysts	7	7	7	7	7	7	7	7	7	7	7	7	7	7	7
Exploiter	70	70	70	70	70	70	70	35	70	70	70	70	70	70	70
Explorer	5	5	5	15	15	20	20	25	25	25	25	20	20	25	25

Source: own elaboration.

Table 4. Average results in terms of number of patents for each experiment.

	Number of patents				
Experiment	1	2	3	4	5
1	0	13.3	11.2		
2	0	10.2	12		
3	0	11.8	14		
4	0	4.5	4		
5	0	2.3	3.3		
6	0	2	2	1.5	
7	0	11.8	11.6	11.4	
8	0	14.8	14	14.3	15
9	0	13.3	13	13.3	13.5
10	0	1.7	1.3	1.7	1.3
11	0	0.7	0.8	0.9	0.6
12	0	2.5	3.5	3	
13	0	15.3	13.3	14	
14	0	13.9	14.6	14.7	14.3
15	0	2	2.1	1.5	1.9

Source: own elaboration.

Table 5. Average results in terms of number of publications for each experiment.

	Number of publications				
Experiment	1	2	3	4	5
1	0	0	0		
2	0	8.1	70.3		
3	0	31.4	31.4		
4	0	13	15.6		
5	0	10.7	27.3		
6	0	29	27	22.8	
7	0	217.1	232.8	225.4	
8	0	758.5	1061	850.8	1,139.8
9	0	778.9	646.6	830.1	838.4
10	0	23	22.7	25	33
11	0	18.2	18.6	19.5	18.8
12	0	34.5	34.5	29.5	
13	0	263.3	310.8	222	
14	0	755.3	1,007.6	1,039.6	1,045.4
15	0	36.4	33.3	31.8	30.1

Source: own elaboration.

disease transmission networks, etc. (Epstein & Axtell, 1996).

A network can therefore also be defined as a configuration of one-dimensional nodes tied to a fixed number of neighbors, where the more connections there are, the more cohesive the system will become (Miller & Page, 2007).

A network analysis has properties for studying behavior, including a network clustering coefficient and the degrees of network distribution, which show how connected the network of agents in the RIS is (Newman, 2003).

Clustering in networks is defined as the number of groups of three that are connected to a single vertex; in other words, an arrangement of three nodes connected to each of the others. Clustering takes on a value of 0 to 1. The clustering coefficient measures the quantity of triangles in a network and can be defined as the average clustering of each node

in the network (Newman, 2003; Watts & Strogatz, 1998). The degree of network distribution is defined as the number of vertices that agents in the system have, described in the form of a histogram that shows their degree of connection (Newman, 2003); this is also called network connectivity and is generally measured by the density of ties per node (Pyka & Scharnhorst, 2009).

In order to study the behavior of the RIS network, the following experiments are proposed. They can be observed in Table 6.

Based on the simulation of the experiments, Experiment 8 has the highest clustering coefficient. The results obtained are presented in Table 7.

Table 6. Experiments used to study the behavior of the RIS network.

Experiment	E Interrela-tionship	U Interrela-tionship	%Firms	%University	P_Firms	P_University	%R&D	Catalysts	Exploiter	Explorer
1	4	7	0.56	0.44	1	3	0.16	7	70,000	5
2	4	7	0.56	0.44	1	3	0.2	7	70,000	5
8	10	15	0.4	0.6	3	3	0.3	7	35,000	25
10	10	15	0.65	0.35	1	3	0.16	7	70,000	25

Source: own elaboration.

Table 7. Results for the clustering coefficient and RIS network distribution.

Number of Agents	Ties Within the Network						Clustering Coefficient
Experi-ment	0	1	2	3	4	5 or more	
1	60,15	8,00	1,10	700	50	0	0.02
2	59,11	10,00	800	90	0	0	0
8	0	0	0	2,877	9,353	22,77	0.13
10	65,04	2,90	0	0	0	2,06	0.1

Source: own elaboration.

5. Conclusions

In the simulation model, a greater number of networks are centralized in Medellin. This is mainly due to the fact that a large percentage of regional agents, approximately 69%, is located in this region.

The network analysis shows that in Experiment 8 there was a higher clustering index, indicating greater grouping and interrelationships between agents. This is mainly due to a higher percentage of university participation in the system and a higher percentage of R&D, coupled with more extensive creation of ties between the different agents in the network.

Similarly, the results indicate that the simulation of Experiment 8 shows greater patent and publication generation during the final simulated period. This is due to a higher percentage of R&D investment and increased participation of explorer agents in the system.

With a 46% increase in the percentage of R&D (from 0.16% to 0.30%), a 74.8% increase in patent generation at the regional level is obtained in the simulation model, going from an average of 3.77 patents to 15.00.

A higher clustering index in the agent network implies behavior similar to log-normal distribution while a lower clustering index shows negative exponential distribution in the network.

With respect to the simulation model, it is important to point out that the agents are homogenous; in other words, there is no segregation between them nor do they have specializations. As such, different economic sectors are not included in the model and the prevailing rule in the model is that of interaction and association based on proximity and participation in the percentage of R&D. This means that the simulation model presented offers a single initial, simplified view of the system in order to draw probable behavior. In addition, the model does not interact with exogenous factors or other regional or national innovation systems; it is a microenvironment that is contained and demarcated by its own capacities and behaviors.

The RIS in Antioquia responds to a complex grouping of agents which over time looks for groupings of other agents to cooperate in the system, thereby learning to transform the space through rules. This demonstrates that the RIS in Antioquia responds to the characteristics of a complex adaptive system, encompassing the science of complexity as a means to understand the communities immersed in the various RIS.

For future research with a bottom-up approach, we propose even more extensive coverage of network dynamics with regards to system agent communication patterns as well as invention and learning patterns, and in particular localized learning that allows for specialization among agents resulting in better performance. We also recommend developing models that shed light on emerging phenomena in RIS including knowledge-sharing patterns and their localized search and exploration procedures, integration and specialization of localized networks and the resulting alignment of modes of governance, as well as the dependence of historical experience on innovation processes.

Macroeconomic policies such as foreign trade and investment stimulate the demand for higher quality education. At the same time, education makes trade and investment more profitable. In other words, both variables benefit from positive feedback ties that encourage innovation in general. This must go hand in hand with better institutions and more open and competitive economies.

The success of an RIS is associated with the growth process, seen as a dynamic system in which human and knowledge innovations are increasingly significant. As such, these dynamics require a political vision that is holistic and global.

Conflict of interest

The authors declare no conflict of interest.

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Research article

Influence of the organizational support on Generation Y's work motivation

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Abstract

This study intends to analyze the influence of organizational support on Generation Y's work motivation. For this, a cross-sectional survey was conducted with 326 subjects with ages between 17 and 37 years old. Data analysis was conducted using statistical software and interpreted based on the Self Determination Theory and the Leader-Member Exchange. The results show that the intrinsic motivation of Generation Y is directly associated with the perception of organizational support, but is significantly moderated by manager support. These results demonstrate the influence of manager support on the intrinsic motivation of the individuals belonging to Generation Y, indicating that leaders are the moderating agents of the institution, acting as a bridge between institution and employees.

Keywords: self-determination theory, intrinsic motivation, organizational support, leader-member exchange, Generation Y.

Influencia del apoyo organizacional en la motivación laboral de la Generación Y

Resumen

Este estudio pretende analizar la influencia del apoyo organizacional en la motivación laboral de la Generación Y. Para esto, se realizó una encuesta transversal con 326 sujetos con edades entre 17 y 37 años. El análisis de los datos se realizó con un programa estadístico y se interpretó según la teoría de la autodeterminación y el intercambio de líderes y miembros. Los resultados muestran que la motivación intrínseca de la Generación Y está directamente asociada con la percepción del apoyo organizacional, pero está moderada significativamente por el apoyo del gerente. Estos resultados demuestran la influencia del apoyo del gerente en la motivación intrínseca de los individuos que pertenecen a la Generación Y, lo que indica que los líderes son los agentes moderadores de la institución, actuando como un puente entre la institución y el empleado.

Palabras clave: teoría de la autodeterminación, motivación intrínseca, apoyo organizacional, relación jefe-subordinado, Generación Y.

Influência do apoio organizacional na motivação para o trabalho da Geração Y

Resumo

Este estudo pretende analisar a influência do suporte organizacional na motivação para o trabalho da Geração Y. Para isso, foi realizado um estudo transversal com 326 indivíduos com idades entre 17 e 37 anos. A análise dos dados foi realizada em software estatístico e interpretada com base na Teoria da Autodeterminação e no Intercâmbio de Líderes. Os resultados mostram que a motivação intrínseca da Geração Y está diretamente associada à percepção do suporte organizacional, mas é significativamente moderada pelo suporte do gerente. Esses resultados demonstram a influência do suporte do Gerente na motivação intrínseca dos indivíduos pertencentes à Geração Y, indicando que os líderes são os agentes moderadores da instituição, atuando como uma ponte entre a instituição e os empregados.

Palavras-chave: teoria da autodeterminação, suporte organizacional à motivação intrínseca, troca entre membros e líderes, Geração Y.

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1. Introduction

This article analyzes the relationship between motivation and organizational support for individuals who are part of the so-called Generation Y. Also known as "the children of technology" (Tapscott, 2008), individuals who are part of this generation tend to be motivated by challenges. Work, in their perspective, is much more than a source of income, since their motivation lies in the quest for knowledge, learning and satisfaction (Lombardía, Stein, & Pin, 2008).

There is no consensus among authors about the time span that defines the beginning and end of this generation, and it may vary between those born in 1981 and 2001 (Howe & Strauss, 1992), between 1978 and 2000 (Tulgan, 2009) and between 1979 and 2000 (Cerbasi & Barbosa, 2009). On the other hand, from a broad perspective, studies depict this generation as one connected to brand-new technologies of information and communication, and driven by challenges of innovation and entrepreneurship. In order to carry out this study, individuals born between 1981 and 2001 were considered as part of Generation Y. Nevertheless, it is important to emphasize that any generational definition must take into consideration the specific traits and historical milestones contributing to the formation of the generational group's viewpoint (Rocha-de-Oliveira, Piccinini, & Bitencourt, 2012). The date of birth is not the only element that groups together people of the same generation; historical processes and the way these events are experienced by different age groups are also important factors (Tomizaki, 2010). Therefore, a study centered on Brazil's Generation Y may encounter different characteristics in comparison to a study focused on young people who are part of the American or European Generation Y, as they belong to developed countries, with historically different experiences from those experienced by young Latin Americans.

In the Latin American context, studies have pointed out that Generation Y does not consider job security as pivotal, being focused instead on learning values of their generation (Zavala-Villalón & Frías Castro, 2018). Individuals who are part of this generation also tend to prioritize the balance between personal and professional life rather than job security and higher wages (Silva, Dutra, Veloso, Fischer, & Trevisan, 2015; Twenge & Campbell, 2012), as they attempt to find a flexible and information-sharing environment (García, Gonzales-Miranda, Gallo, & Roman-Calderon, 2019; Veloso, Dutra, & Nakata, 2016; Reis & Braga, 2016).

Generation Y's behavior has been the source of major challenges to companies, such as understanding the motivational elements in Generation Y's work environment (Allen, 2005). Falaster, Ferreira and Reis (2015) state that Generation Y has high regard of sustainable companies whose routines are flexible and dynamic, enabling positive personal interactions between colleagues and leaders in a friendly environment, and with less authoritarian management.

The relationship between leaders and subordinates of this generation deserves to be thoroughly assessed, since the latter expect a high level of feedback, centered on personal and professional success, personal attention, empowerment and the need for freedom, flexibility and meaning (Hannus, 2016; Allen, 2005). This reality makes motivation a challenge for companies and requires new approaches to leadership and organizational support, in order to maximize the commitment and the establishment of long-lasting bonds as well as the engagement of Generation Y (Perrone, Engelman, Schaurich Santos, & Rodrigues Sobrosa, 2013).

Several studies have also emphasized the importance of organizational support (OS) and the influence of support provided by the manager on the motivation of Generation Y employees. Du Plessis (2013) stresses that the positive relationship between the OS and manager support (MS) has a direct influence on workers' perception and will result in lower turnover for the institution. Pinho (2014) argues that Generation Y needs the presence of the manager and both the OS and the SM are independent, but work quite well together and are decisive for employee satisfaction. Madero-Gómez and Olivas-Luján (2016) present a positive relationship between organizational support and job satisfaction among young people starting their careers.

Following on from the notion that the leader/follower relationship is an important factor in the relationship between motivation and the OS (as perceived by Generation Y), the objective of this study is to detail the influence of OS and leader relations on Generation Y's work motivation. The following objectives were determined to accomplish this goal: a) to describe the influence of OS on the intrinsic motivation of individuals who are part of Generation Y and b) to show how the support provided by managers moderates the relationship between organizational support and Generation Y employees' motivation.

To attain this objective, Self Determination Theory (SDT) motivation will be defined (Ryan & Deci, 2000b; Gagné & Deci, 2005). Secondly, a review of the literature on the subject of Organizational Support (OS) will be presented (Eisenberger, Huntington, Hutchison, & Sowa, 1986).

The relationship between members of Generation Y and their managers will be analyzed based on the Leader Member Exchange (LMX), focussing on how the quality of the manager/subordinate relationship influences Generation Y employees. This influence not only manifests itself in the perception of support, but in its relationship towards work motivation. Leaders must motivate, provide support, develop talent, and communicate, mainly through values and examples in their management (da Silva & Struckel, 2013).

The method used in this quantitative survey research study included a cross-sectional cohort and the use of a closed-question questionnaire, with options on a 1-5 Likert scale. 326 individuals belonging to Generation Y, from different Brazilian regions, participated in this study. The data analysis followed the criteria of reliability and adequacy of the model, assessed by Cronbach's Alpha and the Confirmatory Factor Analysis, and the hypotheses were tested with the use of linear regression and moderation.

The article is organized into four sections. The first presents the research's theoretical framework. In the second section, the methodological aspects of the research will be presented. In the third section will be made the analysis and discussion of the results found. The study concludes with final considerations on the results, limitations and suggestions of future studies.

2. Theoretical framework

The section presents the research's theoretical framework: Self-Determination Theory, The Leader-Member exchange (LMX) and the organizational support. This presentation aims to relate these different perspectives and support the hypotheses of the study.

2.1. Self-determination theory

Motivation is a complex concept, studied in different fields of knowledge. Motivation can be depicted as a driving force with hidden sources within each human being (Bergamini, 2000), or also as a reason, purpose or stimulus found in each human being that motivates them to search for something specific.

In the organizational field, the very first studies about human motivation emerged given the need to find a pattern for all employees and institutions. It was believed that monthly remuneration (wages) was the main source of motivation and encouragement for people to generate better productivity and results (Miranda, 2009).

Lately, SDT has been widely used to study motivation within a multidimensional perspective. SDT suggests a model that observes peoples' psychological needs, clarifies the actions and skills of each individual, as well as the principles of their intrinsic (from within the individual) and extrinsic (externally regulated) motivation. SDT considers social context as an agent of influence of human behavior, both in development and in demotivation (Engelmann, 2010). Therefore, SDT provides a better understanding of a person's motivation and trust in their own abilities and skills. According to the authors, all human beings have the following basic psychological needs: the need for autonomy, the need for competence and the need to be part of something; and the satisfaction of needs is essential for personal development, growth and personal inclusion in the work environment (Ryan & Deci, 2000b).

Numerous studies have confirmed SDT as a predictor of engagement (Gillet, Huart, Colombat, & Fouquereau, 2013), from the perspective of manager autonomy (Gillet, Gagné, Sauvagère, & Fouquereau, 2013), commitment (Mahmoud, 2008) and reactions to new technologies (Mitchell, Gagné, Beaudry, & Dyer, 2012). Based on SDT, research by Weinstein and Hodgins (2009) shows that those participants with greater autonomy to carry out activities experienced better satisfaction, persistence, energy and well-being, contributing to the assumption that autonomy simplifies effective regulation and promotes positive results.

SDT continues to be a conceptual reference for evaluating different motivations. Figure 1 demonstrates the continuum between a lack of motivation and intrinsic motivation.

Figure 1 shows that motivation is a reason that withstands the actions of every single human being. Self-determination theory has two fundamental components: intrinsic and extrinsic motivation (Chen & Jang, 2010). Intrinsic motivation is seen as a mediator in a person's acquisition of skills (Lopes, Pinheiro, da Silva, & de Abreu, 2015). According to Ryan and Deci (2000a) intrinsic motivation is related to humans' natural ability to pursue challenges and novelties, it also symbolizes the capacity to conduct a specific action voluntarily, for the simple pleasure of accomplishing it. These constitute fundamental characteristics for cognitive development and social inclusion.

Extrinsic motivation is related to the execution of specific activities in order to achieve external results. For Guimarães (2004), extrinsic motivation is actually a motivation to
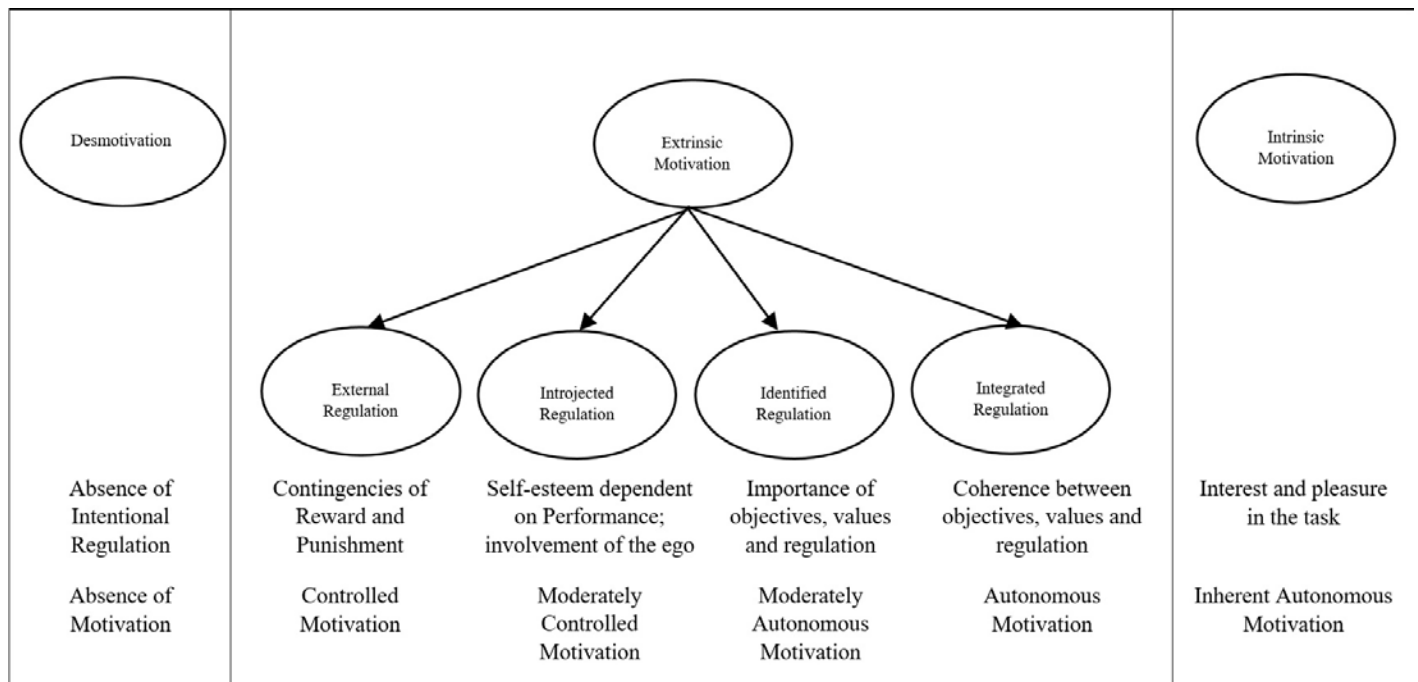

Figure 1. Continuum of self-determination, types of motivation – the locus of causality and regulatory processes.
Source: Gagné and Deci (2005, p. 6)

work for external actions, to achieve social/professional acknowledgement, to be given bonuses, to be rewarded, even the need to accomplish demands in order to demonstrate competence.

The relationship between SDT and work motivation lies in the support provided by the leader (Deci, Connell, & Ryan, 1989), since the autonomy and trust given to the employee by their manager positively influences motivation, whereas more controlled support has a negative influence (Gagné & Deci, 2005). The positive relationship between the employee and the manager is the factor that determines organizational perception, a relationship of trust and autonomy increases motivation and also employee satisfaction (Madero-Gómez & Olivas-Luján, 2016; Baard, Deci & Ryan, 2004; Deci, Ryan, Gagné, Leone, Usunov, & Kornazheva, 2001; Gagne, Koestner, & Zuckerman, 2000; Ilardi, Leone, Kasser, & Ryan, 1993; Kasser, Davey, & Ryan, 1992).

Based on SDT literature and studies available on Generation Y's motivation, this study focuses on intrinsic motivation, associated with pleasure and satisfaction in work, particularly considering the characteristics of autonomy, flexibility, space for creativity and the need to sustain positive relationships. The characteristics of the "Intrinsic Motivation" factor will be outlined in the methodology and in the analysis of the results.

2.2. Support provided by the organization and manager

The subject of OS is relevant, given its contribution to a better quality of life in the institution, as well as its influence on physical and mental health, the sense of belonging, decreased turnover and increased productivity. OS is perceived through a psychological aspect, in other words, the perspectives interpreted by the employee in relation to their treatment within the institution, which may eventually influence the relationship between the employee and the institution, as well as motivation and efforts to accomplish work tasks (Berthelsen, Hjalmers, & Soderfeldt, 2008).

OS is referred to as assistance provided by the institution, which influences the employee's safety. This support from the institution promotes the well-being and satisfaction of employees, increasing quality of life at work and the perception of OS (Chaves Correia-Lima, Loiola, Pereira, & Guedes Gondim, 2017).

The perception of OS is also related to the employee's health and can have a negative impact on the work environment. An intense emotional load, pressure to achieve goals, negotiation, confrontations, changes, all constitute daily phenomena that can generate psychological issues such as stress, depression, and emotional exhaustion directly affecting both the employee and the institution (Tamayo & Tróccoli, 2002; Covacs, 2006).

Harter, Schmidt and Keyes (2003) confirm that well-being at work still depends on the quality of support provided to employees, by acquiring the conditions necessary to provide activities that will show the institution's expectations. Basic needs at work range from the clarification of what is expected from the employee, to the support required to accomplish

the activities, raw materials and resources. Other studies show that this support corresponds, at least partially, to the credibility that the employee may have within the institution (Covacs, 2006).

According to the literature on the subject, OS is a predictor of employee autonomy (Eisenberger, Stinglhamber, Vandenberghe, Sucharski, & Rhoades, 2002; Gagné, 2003; Gillet et al., 2013), well-being and motivation (Estivalete, de Andrade, Faller, Stefanan, & Souza, 2016), and organizational trust (Stinglhamber, Cremer, & Mercken, 2006). OS is an important factor for well-being in the institution, hence the leader's importance as a mediator to expand organizational perceptions (Paschoal, Torres, & Barreiros Porto, 2010).

Managers must act as institutional agents, whose role is to moderate the relationship between the institution and the employee, in which the primary responsibility is to guide, instruct and assess the performance of the employee's actions (Hochwarter, Witt, Treadway, & Ferris, 2006). This support may also manifest itself negatively, which will have greater impact in the context of high-level leadership and contributes to voluntary employee turnover (Eisenberger et al., 2002; Aselage & Eisenberger, 2003).

Institutional commitment to employees influences cooperation between employees and OS, a relationship that solidifies engagement and motivation for the institution (Siqueira & Padovam, 2008). When there is perceived support at work, the development, performance, and engagement of the employee will take place naturally, improving job satisfaction and well-being, as the employee identifies themselves with the institution.

2.3. Leader-member exchange (LMX)

Generation Y employees' need for constant feedback on their performance is also emphasised in research by Lipkin and Perrymore (2010), revealing managers' difficulty in elaborating constructive criticism to motivate such individuals. Furthermore, individuals of this generation seek transparent relationships with their immediate hierarchical superiors and are unafraid of turnover (Lombardia, Stein, & Pin, 2008). This condition presents yet another challenge for managers who need to activate the creativity and involvement of their subordinates, making them motivated and engaged in a way that allows them to feel part of the institution, since good wages, aggressive demand and layoffs are ineffective, and insufficient to keep them in tune with the institution (Lancaster & Stillman, 2011).

The theory of exchange between leader and employee (known as Leader-member exchange or LMX) suggests that several elements may eventually influence employees' behavior, motivation and actions, including the manager's way of leading, and resulting in the type of relationship established between the manager and the employee (de Oliveira & da Costa Rocha, 2017). Furthermore, for workers of Generation Y, there is a positive relationship between engagement and job satisfaction, as well as a greater positive impact on satisfaction when they participate in decisions about general aspects of the company (García et al., 2019).

LMX theory states that leaders may develop different relationships with employees, the relationship with each employee can be distinct, influenced by an exchange of experiences, trust, similarities, or a created identity (Brant, 2016). There is a perception among employees on the qualitative difference of the leader's relationship between one group and another, a matter often related to the allocation of more time or resources (Oliveira & da Costa Rocha, 2017).

According to Harris, Li and Kirkman (2014), there are situations in which the leader has a higher-quality relationship meaning that differentiation between groups is lower, and the work team is reciprocal and engaged. Therefore, when there is a perception of differentiation, the work team represses itself and ends up neutralizing desirable relationships between the leader and the institution. On the other hand, organizational support can improve employee motivation and thus strengthen the quality of the manager-employee relationship (Santos, 2012).

Generally speaking, one can attest that a quality relationship between leader and employee (LMX) increases the perception of OS, improves organizational performance (Selvarajan, Singh, & Solansky, 2018) and develops trust among employees. It is a relationship that may determine satisfaction, empowerment, engagement and motivation of employees in relation to the institution (Malik, Wan, Ahmad, Naseem, & ur Rehman, 2015).

Based on these theoretical arguments, this study will test the following hypotheses:

• H1: organizational support has a positive and meaningful influence on the intrinsic motivation of individuals who are part of Generation Y.
• H2: manager support moderates the relationship between organizational support and the intrinsic motivation of Generation Y employees.

Therefore, we suggest the following model of analysis. Figure 2 illustrates the theoretical model of the study.

3. Methodology

The objective of this study is to analyze the influence of organizational support on Generation Y employees' work motivation. In order to do this, a quantitative research survey was conducted, with a cross-sectional cohort (Malhotra, 2012). Survey research determines the occurrence and classification of the characteristics and opinions of popula-
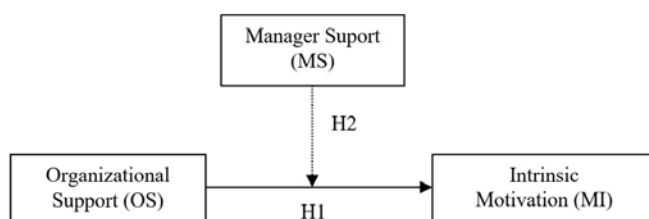
tions and people, attributing to work the characteristics of small, but presumably representative samples of such populations (Kerlinger, 1979).

The study is also descriptive, which allows us to draw conclusions about the data collected from planned and structured research instruments (Malhotra, 2012). The text encompasses observations involving a descriptive part of what takes place and a reflexive part, which contains personal observations of the researchers on the results of the data collection (Godoy, 1995).

The method of data collection used was a cross-sectional questionnaire and a 1-5 Likert scale. The data were collected using an online questionnaire between May and June 2018. The questionnaire was hosted on the Qualtrics® platform. The study sample consisted of 326 respondents, aged between 17 and 37 years old.

Regarding data processing, the questionnaires were entered into Microsoft Excel spreadsheets, after which the information was submitted to a database developed through statistical analysis software, the IBM SPSS Statistics v.2.1 (Statistical Package for the Social Sciences). Descriptive statistics, a regression and moderation analysis were used. For the moderation analysis, scales were standardized using the Z-score technique to reduce the effects of multi-collinearity (Field, 2013).

Cronbach's Alpha (α) was used to assess the internal consistency of the scales. For the motivation construct, the alpha of the Intrinsic Motivation factor, composed of nine variables, was 0.823, while the alpha of Extrinsic Motivation was 0.755. As for the organizational support construct, the alpha for the Company Support factor, with six variables, was 0.755, while the Manager Support factor, with five factors included, was 0.901. It is observed that all measures ranked above the minimum required index to validate the consistency of the data collection instrument ($\alpha \leqslant 0.700$).

Pearson's correlation analysis was conducted to measure the degree of association between the variables, using table-based descriptive statistical analyses with graphical representation (Box-plot). The analyses were conducted by the IBM SPSS Statistics package (v. 21, Chicago IL). An error probability of 0.05 was taken into consideration in all inferential analyses.

Confirmatory Factor Analysis (CFA) is a multivariate analysis technique used to verify whether the hypothetical model adjusts the data, in other words, whether the four factors of the model (Motivation – intrinsic and extrinsic, Organizational Support and Managerial Support) were adjusted based on the data collected. The indicators used in this study were questions organized in a structured questionnaire, in which the respondents indicated their choices on a Likert-type scale. CFA was used to group these indicators, which are manifest variables, centered on factors, which are latent variables that were not directly observed (Hair et al., 2009).

CFA was used in this study since it attempts to confirm the factors present in the scales used and validated in previous studies. The confirmation of factors was conducted using the Varimax with Kaiser Normalization rotation method. The CFA

Figure 2. Design of the theoretical research model.
Source: own elaboration.

is an important step for verification of the analysis' structural model. The construction of the model followed the precepts of Structural Equation Models (SEM), used to analyze the relationships between the multiple observed variables and the latent variables or factors of a construct (Hair, Hult, Ringle, & Sarstedt, 2016).

The indices observed in this study were the Chi-square (x^2) and degrees of freedom (df), along with the Confirmatory Fit Index (CFI), Trucker Level Index (TLI) and the Root Mean Square Error of Approximation (RMSEA). X^2 displays the magnitude of the discrepancy between the observed and modeled covariance matrix, testing the probability of adjusting the data to the theoretical model. The x^2/df relationship was observed based on the confidence interval between 1 and 3 (Kline, 2005). The CFI measures the relative improvement of the fit of the proposed model to a standard model. Unlike the CFI, the TLI does not normalize the data, and it may express values outside the range of 0 and 1. Nonetheless, the TLI is interpreted similarly to the CFI, regarding values close to 1 as a well-adjusted model. For the CFI and the TLI, values above 0.90 point to an appropriate model. The RMSEA is a measure of discrepancy based on chi-square's non-centralized distribution, expressing the model's poor specification degree. Values below 0.05 are ideal, but scores up to 0.08 are acceptable (Kline, 2005).

After analyzing the fit of the model, linear regression was used to analyze the predictive ability of the independent variable Organizational Support (OS) on the dependent variable Intrinsic Motivation (IM). Linear regression allows the interpretation of the model's explanatory capacity, measured with r^2, of the statistical significance of the relationship between the independent and the dependent variable (p) and the coefficient of variation of this same relationship, measured by the standardized beta (β). It is important to take into account that the higher the r^2, the greater the model's explanatory capacity, measured as a percentage, whereas "p" measures the confidence interval (95%, < 0.005) and β measures the direction (positive or negative) and strength of the relationship. The closer to zero the beta is, the lower the influence intensity.

Based on this analysis, a moderation analysis was suggested, in which manager support (MS) was established as a moderating variable of the relationship between OS and IM. The moderation effect corresponds to a variable that influences the direction or intensity of the relationship between a predictive variable (independent) and a dependent variable (Baron & Kenny, 1986). This moderation takes place in certain validity conditions, especially due to intensity, strengthening of the relationship between X and Y, or even changes in the direction of this relationship (Baron & Kenny, 1986). The moderation analysis followed the proposition by Aiken and West (1991), allowing the creation of a graph of combinatorial estimates between high and low values of the independent variable OS and the moderating variable MS on the dependent variable IM. The SPSS macro process was used for the moderation analysis and regression coefficients were measured using the Johnson-Neyman technique (Hayes, 2013). In addition to verifying the interaction's direct

and indirect effect and generating information from the analysis model, the macro allows the creation of graphs to identify regions of significance, displaying the effect of the moderation based on the ranges of values found.

The respondents answered a 31-question survey with two scales: the Scale of Organizational Support (OS) from Eisenberg et al. (1986) and the "Motivation at Work Scale" developed by Gagné et al. (2008). This study used the translated and adapted version by Chambel, Castanheira, Oliveira-Cruz and Lopes (2015). At the end, participants also filled out sociological information. In accordance with established research ethics, the study followed the recommendations of the Resolutions of the National Health Council (CNS) no. 466 of December 12, 2012 and CNS 510/16 of April 7, 2016 and of the Handbook of Good Practices of the National Association of Postgraduate Studies and Research in Administration (ANPAD).

4. Analysis of the results

After checking the data using a normality, multicollinearity, missing-values and outliers test, a reliability test was applied to the scales. Cronbach's Alpha test was used, which requires values above 70 to indicate an internal consistency of the scale (Hair et al., 2009). The motivation scale had an alpha of 0.869 and the OS alpha was 0.941. Taking into account the OS factors that comprise the theoretical model of this study, the Organizational Support alpha was 0.901, whereas Manager Support had 0.905. The tests conducted confirmed that the scales have good internal consistency.

Regarding the social characteristics of respondents, the sample consisted of 54.6% females and 45.4% males, and 67.8% of the respondents are attending or have already completed a degree or a postgraduate degree, while 84.4% of respondents said they have chosen their profession. The criteria for inclusion in the sample were: a) having, at the date of participation, an age between 17 and 37 years old and b) being regularly employed.

CFA was the technique used to define the convergent and discriminatory validity of the measures used. The result confirmed the division of the motivational scale into two factors (Figure 3), named Intrinsic Motivation (IM, with nine variables) and Extrinsic Motivation (EM, with eight variables). SEM was used to measure the fit of the model, presenting indices r^2/df = 3.06, RMSA = 0.081, TLI = 0.901 and CFI = 0.928. These indices are within the acceptable range to consider fitting the model as appropriate.

SEM was also used to analyze the fit of the organization and boss support model. The analysis of the interactions presented very low values between the variable six and the factor Organization Support, which led to the exclusion of this item, leaving the model with five variables associated with the factor (Figure 4). The model presented the following results: x^2/df = 4.2, CFI = 0.937, TLI = 0.917, RMSE = 0.085. It can be seen that the Chi-square (x^2) division by the degree of freedom (df) generated a value of 4.2, above the level suggested for a good statistical model (≤ 3), but within the limit of 5, which allows us to accept the model, as supported by Tanaka (1993). The

RMSEA (= 0.085) also showed indices outside the suggested limit (≤ 0.08), something that can be explained by the size of the sample, since this measure does not behave satisfactorily in "small" samples (Iacobucci, 2010).

For the descriptive analysis of the motivation variable, assessed through the level of importance that respondents give to work environments, the average of the scales and the standard deviation (σ) were taken into consideration. Individuals from Generation Y believe that the most important thing is to achieve personal fulfillment (4.58, σ=0.669), such as through the tasks performed (4.52, σ=0.862) and the pleasure taken from work (4.50, σ=0.668). The results show that Generation Y is motivated not only by the wages or benefits offered by the institution, but also by self-development and personal satisfaction.

The less significant results for Generation Y are the material benefits they are given (3.97, σ=0.892) and "being employed while I can't find a better job" (3.73, σ=1.120). This concurs with the theoretical framework, which states that this generation seeks challenges and that financial compensation is not enough to keep them engaged.

Likewise, a descriptive analysis of the OS variable was performed, analyzing what Generation Y respondents take into account in the workplace regarding the institution and management. The answers that had the highest level of significance according to the average of the scales were if the employee has a good working relationship with the manager (4.02, σ=0.967), if the manager trusts the employee to stand for the latter's decisions even when absent (3.74, σ=1.027)
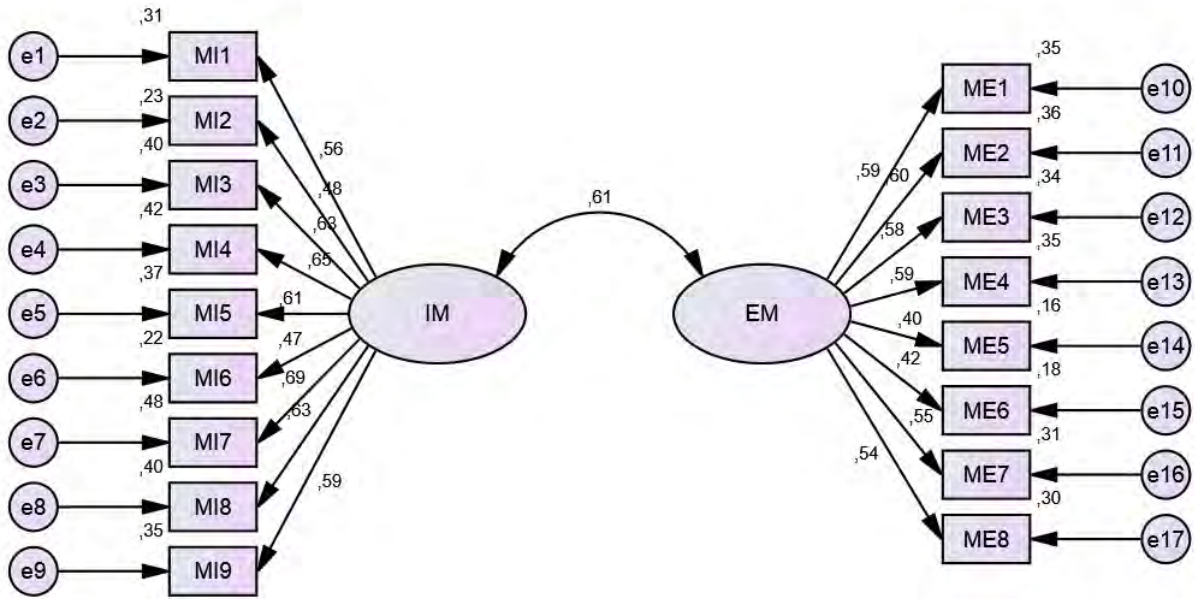

Figure 3. Diagram of the Confirmatory Factor Analysis of Motivation Constructs.
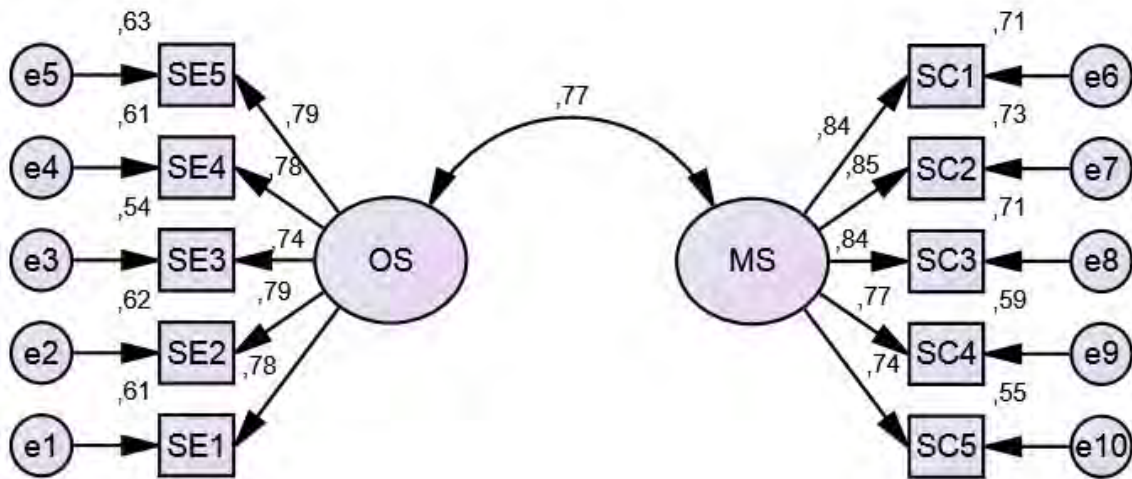Source: own elaboration.

Figure 4. Diagram of the Confirmatory Factor Analysis of Organizational Support Constructs.
Source: own elaboration.

and if the manager recognizes their potential (3.70, σ=1.124). The answers show that Generation Y needs to have a good relationship with the leader, the leader has to trust them, and they need to be praised for their performance.

The variables with the lowest averages were "The company cares about the employee's well-being" (3.45, σ=1.094), "the company takes into account the goals and personal values of the employees" (3.39, σ= 1.095) and "the company takes into account the interests of the employee when making a decision that directly affects them" (3.18, σ=1.154).

The results show that the highest averages are related with the "manager support" factor, reinforcing employees' appreciation of this item. As referred to in theory, leader must motivate, provide support, develop talent, and communicate, particularly through values and examples in their management, which this generation deems relevant (da Silva & Struckel, 2013).

Figure 5 compares the averages of the factors associated with motivation (intrinsic and extrinsic) and the support (organizational and leadership).

After the frequency and descriptive analysis, the first hypothesis tested was the influence of OS on the intrinsic motivation of Generation Y (H1). The hypothesis was confirmed with a highly significant correlation (p = 0.000; β = 0.318) between the two constructs and with an explanatory capacity of the model (r^2) of 0.101. The results according to Table 1 can confirm that OS influences Generation Y.

The second hypothesis was then tested, concerning the moderating effect of the relationship with the leader on the association between OS and the intrinsic motivation Generation Y employees.

The moderation analysis provides the values of significance of the indirect effect to be used in the region of significance technique, provided by the Macro Process. Figure 6 shows that, based on 2.765, moderation becomes significant (p = 0.05), in other words, as manager support increases, the effect becomes positive. The dashed lines represent a 95%
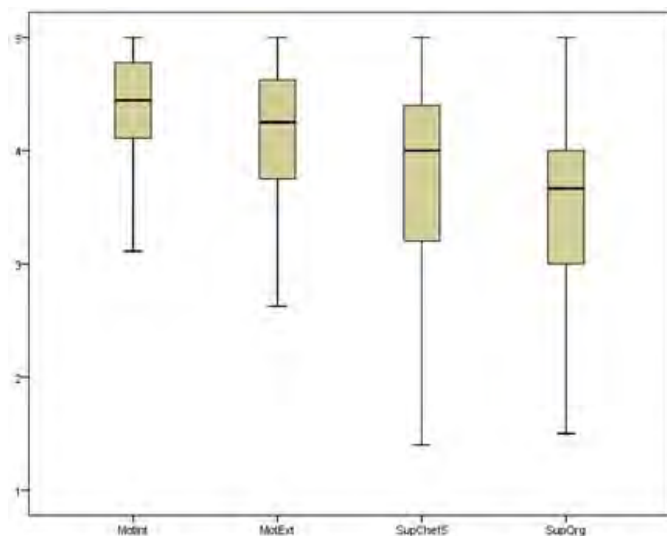
confidence interval (upper and lower bootstrapping of 95%), since there can be no "zero" effect or change of direction in this interval (Hayes, 2013)

Figure 6 allows the observation of the level of significance, based on non-standard betas and on upper and lower confidence intervals. The analysis shows that moderation is negative until -1.156, after which it begins to exert a positive and significant effect (p = 0.05), demonstrating that there is a moderating effect of the leader in the interaction between organizational support and the intrinsic motivation of Generation Y.

These results demonstrate the importance of general OS in the intrinsic motivation of the individuals belonging to Generation Y, indicating that leaders are institutional moderating agents, ideally acting as a bridge between institution and employee. Such leaders guide, instruct and evaluate the performance of their employees, actions that served as indicative or as OS. This conclusion is in line with SDT theoretical proposition when affirming that OS is manifested in the employee's perception of your importance to the company, as well as in the satisfaction of their relationship with the manager, positively influencing their commitment (Eisenberger et al., 1986).

Therefore, for Generation Y, intrinsic motivation is directly associated with the perception of OS, but is significantly moderated by manager support. Thus, it is possible to establish a relationship between quality of leadership and motivation, a result similar to that encountered by Nunes and Gaspar (2017), who have shown that the relationship between

Table 1. Influence of organizational support on intrinsic motivation

Model	Non-standardized coefficients		Standardized coefficients	T	Significance
	B	Default error	Beta		
Constant	4.380	0.025		172,253	0.000
Organizational support	0.154	0.026	0.318	5.932	0.000

Dependent variable: intrinsic motivation

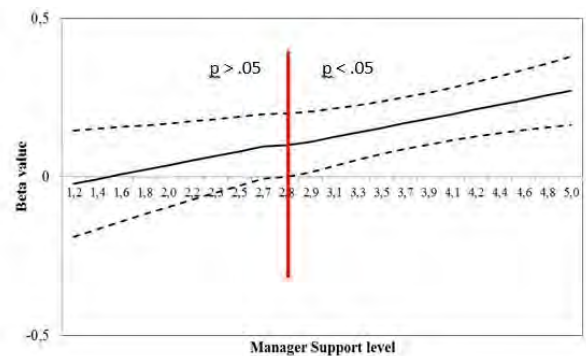Source: own elaboration .

Figure 5. Averages of the factors of motivation and organizational support.
Source: own elaboration.

Figure 6. Moderating effect of the leader's influence on Generation Y's intrinsic motivation.
Source: own elaboration.

manager and employee has an influence on the motivation and engagement of the latter towards the institution (Nunes & Gaspar, 2017) and positive personal interactions with leaders, provided that management is not authoritarian (Falaster et al., 2015). Likewise, the study reinforces the conclusions of Meleiro and Siqueira (2005), Sant'Anna, Paschoal and Gosendo (2012), Seidl and Tróccoli (2006) that the relationship with management is a variable that substantially influences motivation, nurturing the well-being of employees.

Briefly put, the results follow trends identified in Latin American studies on the expectations and characteristics of the work sought by Generation Y (Zavala-Villalón & Frías Castro, 2018; Silva et al., 2015; Twenge & Campbell, 2012; García et al., 2019; Veloso et al., 2016; Reis & Braga, 2016), the influence of organizational support (Madero-Gómez & Olivas-Luján, 2016) and the influence of leader relationships on Generation Y employee motivation (Hannus, 2016; Allen, 2005). The additional contribution of this study was to show how manager support moderates this relationship between organizational support and intrinsic motivation. Therefore, the results of this study suggest the need of a more complex model to understand the behavior of Generation Y in work environments.

The quality of the relationship with the manager is a decisive element of Generation Y's work motivation, and it may even change their perception of OS, also affecting their work motivation.

5. Conclusions

The present study describes the influence of OS on the motivation of Generation Y employees, in order to understand why this generation can have difficulties establishing long-lasting bonds in the companies where they work. The confirmation of (H1) served as the foundation for the moderation analysis (H2), indicating the moderating effect of manager support on the relationship between the perceived support of the organization and motivation to work.

The study indicates that, according to Generation Y, the work environment is decisive for their perceptions of OS. Future prospects, pleasure obtained from work, self-development, enjoying what one does and the need to feel competent and part of the work environment is crucial to the motivation of Generation Y.

Social exchanges between manager and employee are also a factor that influences OS perception. This means that the manager is a key actor, since they moderate the relationship between the perception of OS and the motivation of the Y in the organization.

Among the main theoretical implications, the present study provides an integrative model between three theoretical perspectives, which are important for understanding human behavior in organizations: SDT, OS and LMX. The findings suggest that the manager's acknowledgment of potential, trust and consideration for what employees do are essential factors to stimulate motivation of Generation Y in the organization's environment, and may create more lasting ties.

From a managerial standpoint, the results emphasize the importance of training managers, especially the line managers, to improve their relationship with individuals of Generation Y. Providing constant feedback and stimulating creativity and innovation, while also providing support for personal needs, are positive strategies for motivation and perception of organizational support.

To address some of the limitations identified in the course of this study, future scholars may consider conducting research on the effectiveness of this theoretical model when applied to a specific analysis of the bonds between Generation Y workers and their organizations, including the intensity and the expected duration of the relationship between individuals of Generation Y and the organizations in which they work.

Conflict of interest

The authors declare no conflict of interest.

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Artigo de pesquisa

Influência da folga financeira no desempenho econômico de empresas industriais brasileiras e mexicanas

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Resumo

Este estudo objetiva verificar a influência da folga financeira no desempenho econômico de empresas industriais brasileiras e mexicanas. Realizou-se pesquisa descritiva, documental e quantitativa, com amostra de 152 empresas, sendo 107 brasileiras e 45 mexicanas, investigadas entre 1996 e 2014. Os resultados encontrados através de regressões lineares direcionam que a folga proporciona melhora (relação positiva) na *performance* corporativa. Todavia, as regressões quadráticas apontam, em ambos os contextos estudados, com poder explicativo superior, que a relação entre folga e desempenho é não linear. Tal fato confirma que há um ponto ótimo de folga financeira que maximiza os resultados corporativos, sendo diferente para empresas brasileiras e mexicanas. Tais achados devem ser observados por gestores visando a melhor gestão dos recursos disponíveis nas organizações.

Palavras-chave: folga financeira, desempenho econômico, empresas industriais.

Influence of financial slack in the economic performance of Brazilian and Mexican companies

Abstract

This study aims to verify the influence of the financial slack on the economic performance of Brazilian and Mexican industrial companies. We conducted a descriptive, documentary, and quantitative research. The sample included 152 companies, 107 Brazilian and 45 Mexican, studied from 1996 to 2014. The findings suggest, through linear regressions, that the slack provides an improvement (positive relation) in corporate performance. However, quadratic regressions point out in both contexts studied, with superior explanatory power, that the relation between slack and performance is nonlinear. This fact confirms there is an optimal point of financial slack that maximizes the corporate results, being different for Brazilian and Mexican companies. These findings should be noticed by managers in order to better manage the resources available in organizations.

Keywords: financial slack, economic performance, industrial companies.

Influencia de la holgura financiera en el rendimiento económico de empresas brasileñas y mexicanas

Resumen

Este estudio busca verificar la influencia de la holgura financiera en el rendimiento económico de empresas industriales brasileñas y mexicanas. Se realizó una investigación descriptiva, documental y cuantitativa que incluyó una muestra de 152 empresas, 107 brasileñas y 45 mexicanas que fueron estudiadas entre 1996 y 2014. Los hallazgos indican, a través de regresiones lineales, que la holgura proporciona una mejora (relación positiva) en el rendimiento corporativo. Sin embargo, regresiones cuadráticas señalan en los dos contextos estudiados, con poder explicativo superior, que la relación entre holgura y rendimiento no es lineal. Este hecho confirma que hay un punto óptimo de holgura financiera que maximiza los resultados corporativos, el cual es diferente para las empresas brasileñas y las mexicanas. Estos hallazgos deberían ser tenidos en cuenta por los administradores con el fin de administrar mejor los recursos disponibles en las organizaciones.

Palabras clave: holgura financiera, rendimiento económico, empresa industrial.

UNIVERSIDAD ICESI

1. Introdução

Os dois principais objetivos de uma organização são maximizar o valor da empresa para acionistas e credores e sobreviver a choques internos e externos. Neste sentido, pode-se compreender que o desempenho empresarial está diretamente ligado a ambos os objetivos, pois resultados satisfatórios maximizam o valor corporativo e proporcionam estabilidade no mercado (Campos e Nakamura, 2013).

Firer e Willians (2003) relatam que o conceito preciso de desempenho empresarial está vinculado a uma variedade de facetas ligadas ao bem-estar de uma organização. Historicamente, diante de sua importância e complexibilidade, Christensen e Montgomery (1981) e Silva, Rohenkohl e Bizatto (2018) relataram que diversas disciplinas têm procurado identificar os aspectos que influenciam o desempenho econômico das empresas, sendo que, dentre tais fatores, pode-se citar a folga financeira, que corresponde a uma das formas de se criar folga organizacional.

A folga organizacional foi observada por Cyert e March (1963) como sendo a diferença entre os recursos totais de uma organização e os pagamentos necessários para mantê-la, ou seja, recursos em excesso existentes na empresa. Sob o ponto específico das finanças, Miner (2006) destaca que organizações com menor folga financeira possuem, por consequência, menos excesso de capacidade de pagamentos e, portanto, são mais vulneráveis a incertezas em ambientes que passam por processos de mudanças.

Apesar de inúmeras facetas existentes na literatura, a relação entre folga financeira e desempenho é mais complexa do que conota. De acordo com Argilés-Bosch, Garcia-Blandón, Ravenda e Martínez-Blasco (2018), é desejo atual de diversas partes, como gestores, acionistas e acadêmicos, investigar o dilema da relação positiva, negativa ou de um nível desejável de folga para maximizar o desempenho (Argilés-Bosch et al., 2018), o que traz questionamentos acerca do tema.

Historicamente, Cyert e March (1963) já questionavam "qual a função e consequência da folga organizacional?". Numa perspectiva mais atual, a questão ainda não está definida, como observa Daniel, Lohrke, Fornaciari e Turner Jr. (2004), inferindo que, embora exista a postulação de várias relações entre a folga de uma firma e o desempenho, os resultados empíricos são ambíguos, fato tal corroborado por Zhong (2011) que questiona "como a folga de recursos afeta o desempenho da empresa?" e Deb, David e O´Brien (2017) com "o dinheiro é bom ou ruim para o desempenho da empresa?". Logo, nota-se que os questionamentos de Cyert e March (1963), Zhong (2011) e Deb et al., (2017) são semelhantes, mesmo havendo mais de meio século de pesquisas entre o primeiro e o último, não estando definido qual a influência exercida pela folga financeira no desempenho econômico.

No cerne de tantas questões, apontamentos e direções possíveis, esta pesquisa baseia-se no entendimento de que existe um nível ótimo de folga a fim de maximizar o desempenho corporativo. Esta abordagem é similar à de estudos recentes, como de Gruener e Raastad (2018), que consideram associações curvilíneas da folga com o desempenho das empresas (Gruener e Raastad, 2018).

De fato, o processo evolutivo de conhecimento direciona à existência de relações não lineares do fenômeno em questão. Além disso, pautados em levantamento, Argilés-Bosch et al. (2018) defendem que pesquisas futuras devem considerar uma variedade maior de ambientes (Argilés-Bosch et al., 2018), visto que condições econômicas e sociais podem afetar a relação de interesse, sobretudo quanto ao nível ideal de folga a se manter.

Dessa forma, buscando contribuir para com a literatura sobre o tema, que ainda carece de evidências empíricas mais robustas em contextos diversificados, emerge-se a seguinte questão de pesquisa: Qual a influência da folga financeira no desempenho econômico de empresas industriais brasileiras e mexicanas? Por consequência, a fim de responder o problema da pesquisa, tem-se por objetivo verificar a influência da folga financeira no desempenho econômico de empresas industriais brasileiras e mexicanas.

Conforme Bradley, Shepherd e Wiklund (2011), modelos estratégicos sobre gestão de recursos são valiosos a fim de aproveitar as oportunidades de mercado. Contudo, até o momento, o papel da folga financeira no processo de desempenho e consequente geração de valor das empresas tem sido insuficientemente explorado. De fato, conforme Altaf e Shah (2017), nos últimos anos, gerentes e pesquisadores vêm dedicando esforços consideráveis no desenvolvimento de estratégias que impulsionam as organizações a sobressaírem aos ambientes de constante mudança (Altaf e Shah, 2017), como é o caso brasileiro e mexicano, por se tratarem de nações em desenvolvimento.

Dessa forma, estudos desta natureza, elaborados em contextos diferentes, possuem potencial de contribuir para com a evolução da literatura. Especificamente, por meio da lacuna de pesquisa existente entre folga e desempenho apontada por Zhong (2011) e Deb et al. (2017) de que a litera-tura existente ainda não fornece respostas convincentes se a folga financeira facilita ou inibe a performance corporativa, busca-se contribuir para o melhor gerenciamento dos recursos corporativos e consequente fortalecimento das organizações.

Ressalta-se que a escolha dos países em estudo é justificada mediante a importância desses para a América Latina. Segundo dados do Banco Mundial (World Bank), Brasil e México possuem os maiores Produto Interno Bruto (PIB) da América Latina, sendo que, mais especificamente, contribuem sozinhos com aproximadamente metade do PIB gerado na região. Apesar disso, ao longo do período longitudinal estudado, tais países apresentaram características ambientais diversificadas, sobretudo de cunho econômico, como é o caso da taxa de juros aplicada, podendo estes fatores interferir no nível ótimo de folga para alavancar o desempenho das empresas.

Assim, esta pesquisa tem por diferencial o estudo do fenômeno em questão em países emergentes, geralmente negligenciados pela literatura. Além disso, pesquisas que visam identificar a existência do nível ótimo de folga financeira para a performance corporativa são essenciais. Mais importante ainda, os avanços da literatura devem vir da compreensão das condições ambientais (Argilés-Bosch et al.,

2018), sendo que o estudo comparativo de dois países pode trazer insights importantes acerca do apetite de manutenção de folga financeira por parte dos gestores visando maximizar a empresa.

Com relação à estrutura da pesquisa, destaca-se que além desta introdução, este artigo apresenta, sequencialmente, as seções de fundamentação teórica, metodologia, descrição e análise dos resultados e, por fim, as considerações finais.

2. Fundamentação teórica

2.1. Folga financeira

A folga financeira é compreendida como uma das formas de se criar folga organizacional (Campos e Nakamura, 2013; Campos e Nakamura, 2015), que pode também perpassar por folga de recursos humanos, folga de recursos físicos, etc. Num sentido mais amplo, um dos primeiros conceitos acerca do assunto foi dado por Cyert e March (1963), que entendem por folga organizacional a diferença entre os recursos disponíveis na organização e os pagamentos necessários para mantê-la solvente, ou seja, aqueles recursos que não estão comprometidos com determinado gasto futuro.

Numa perspectiva recente, Geiger, Marlin e Segrest (2019) enfatizaram que a folga pode ser vista como um conjunto de recursos disponíveis na empresa acima do mínimo necessário para operar (Geiger et al., 2019), podendo ser financeira ou de outros tipos. Especificamente sobre a folga financeira, quando observada pelas reservas de caixa e/ou capacidade de endividamento, esta proporciona flexibilidade financeira às empresas, tendendo a influenciar o desempenho econômico e de mercado corporativo (Gruener e Raastad, 2018). Assim, o ideal é dimensionar a folga para construir capacidades, visando alcançar uma posição competitiva vantajosa às empresas (Argilés-Bosh et al., 2018).

De forma conceitual mais específica, Campos e Nakamura (2015) defendem que a folga financeira é uma das formas de se criar folga organizacional, podendo ser subdividida primordialmente em dois fatores: liquidez e poder de empréstimo. Para melhor compreensão de tais aspectos, tem-se, na sequência, a explicação de ambas as perspectivas:

• Liquidez: geralmente entendida como folga financeira de curto prazo. Tal folga está atrelada principalmente ao caixa, aplicações financeiras, assim como demais ativos circulantes existentes na empresa. Os tipos de liquidez existentes consideram a capacidade de converter ativos em recursos monetários com o menor desconto possível em função ao seu valor intrínseco (Campos e Nakamura, 2015).
• Poder de empréstimo: classificada como folga financeira de longo prazo, referindo-se basicamente à capacidade de emitir dívida quando necessário. De forma mais específica, a "folga financeira de longo prazo é gerenciada, mantendo-se a alavancagem atual em um patamar que a organização considere possível aumentar ainda mais seu endividamento sem incorrer demasiadamente com risco de falência" (Campos e Nakamura, 2015).

Cabe destacar, adicionalmente, que a folga financeira advinda da liquidez, foco deste estudo, é também denominada de folga financeira disponível (Daniel et al., 2004). Assim, numa perspectiva de evolução do conhecimento, no início da década de 1980, inúmeros estudos empíricos passaram a ser desenvolvidos, buscando relacionar a folga financeira com múltiplas dimensões da performance econômica. Todavia, até os dias atuais, a relação entre tais dimensões é ainda motivo de intenso debate entre pesquisadores do mundo todo. Nesse sentido, para melhor compreensão, na sequência, apresentam-se os argumentos que embasam cada uma das três posições existentes acerca da temática estudada.

2.1.1 Relação positiva entre folga financeira e desempenho econômico

Pesquisadores teóricos organizacionais que propõem relação positiva entre folga e desempenho, apesar de reconhecerem que a existência de recursos de folga possuem um custo adicional para a organização, acreditam que dadas as complexas soluções de compromisso, os benefícios gerados pela folga compensam seu custo e, assim, jamais será viável uma organização operar com folga zero (Tan e Peng, 2003).

Ademais, Daniel et al. (2004) relatam que a tradicional proposição positiva entre tais variáveis está fundamentada no entendimento de que a folga de recursos proporciona segurança relativa contra as ameaças do ambiente e/ou facilita iniciativas estratégicas pró-ativas. Como exemplo, tem-se a visão baseada em recursos, sugerindo que gestores podem precisar de folga para aumentar o tamanho da organização e/ou inovar, respectivamente (Daniel et al., 2004).

De forma mais abrangente, para a Teoria Baseada em Recursos, folga financeira representa recursos não utilizados que podem ser fontes de vantagens competitivas quando usufruídos de forma eficiente. Logo, defende-se que empresas necessitam de recursos disponíveis para alcançar diferenciais de mercado, tornando tais recursos não apenas um excedente inútil, mas essenciais para o crescimento sólido empresarial (Lee, 2011). Dessa forma, a quantidade de recursos de folga influencia diretamente na taxa de crescimento da empresa (Bradley et al., 2011), sendo o crescimento essencial para que a organização maximize seu desempenho constantemente.

Ademais, a Teoria Comportamental da Empresa analisa processos de decisões no âmago da organização. Nesta abordagem, pressupõe-se que a firma é composta por inúmeras partes que detém interesses e objetivos conflitantes. Assim, a folga é empregada para mitigar conflitos de interesses por meio de pagamentos concretizados aos mais diversos interessados, buscando um acordo comum que atenda a todas as partes e as mantenha na companhia. Em suma, a folga facilita a política interna da empresa, reduzindo conflitos de meta entre coligações concorrentes no contexto organizacional (Laffranchini e Braun, 2014).

Complementarmente, George (2005) relata que recursos de folga são implantados visando construir capacidades

que tornam as empresas competitivas, mantém coalizões que garantem a convergência de objetivos pessoais e organizacionais e atuam como defesa em períodos de recessão econômica. Dessa forma, diversos pesquisadores utilizam desses argumentos para explicar seus achados empíricos quando da influência positiva da folga financeira no desempenho econômico das empresas.

2.1.2 Relação negativa entre folga financeira e desempenho econômico

Os defensores do entendimento de que a folga influencia negativamente no desempenho econômico estão embasados no juízo que recursos ociosos são potenciais atrativos para a ineficiência. Assim, tal perspectiva de ineficiência postula que a folga pode incentivar comportamentos gerenciais que prejudicam a performance como, por exemplo, a facilidade que gestores terão para prosseguir em projetos que contém atrelado benefícios próprios (gestores que atuam como agentes) e, portanto, a folga deve ser eliminada para minimizar a referida possibilidade (Daniel et al., 2004).

Nesse sentido, os entendimentos de "folga como ineficiência" baseiam-se predominantemente nos pressupostos da Teoria da Agência de Jensen e Meckling (1976), refletindo a folga como propulsora da inépcia gerencial e de auto interesse. A folga motiva gerentes a procurar opções estratégicas de menor risco que, por consequência, proporcionam baixo retorno (desempenho), se contentando com estratégicas que são suficientes para contemplar seus objetivos pessoais (Laffranchini e Braun, 2014).

Complementarmente, conforme Lee e Wu (2015), perspectivas da Teoria da Agência enfatizam que os gerentes podem utilizar os recursos de folga para se envolver em diversificação excessiva, orçamentos mal elaborados e desperdícios em pesquisa e desenvolvimento (Lee e Wu, 2015). Em suma, folga prejudica o desempenho da empresa uma vez que fornece aos gerentes o poder discricionário para perseguir seus próprios objetivos (Lee, 2011).

Ademais, conforme Tan e Peng (2003), os recursos excedentes (folga) também podem representar custo adicional para as empresas, sendo que para pesquisadores dessa linha, a folga é vista apenas como custos desnecessários para as organizações. Muitas teorias de governança corporativa afirmam que a eliminação de folga auxilia as empresas a reduzirem seus custos desnecessários e melhorarem a eficiência (Lee, 2011).

De forma mais específica, de acordo com Lecuona e Reitzig (2014), a literatura sobre economia e finanças tem incidido sobre a ineficiência de manter recursos em excesso, pois estes geram custos para as organizações. Uma empresa, quando mantém excesso de liquidez, por exemplo, está com recursos ociosos, que não estão agregando nenhum valor presente para a empresa e, assim, por terem custo atrelado a sua capitação e manutenção, seja derivado de terceiros ou próprios, incorrem pagamentos para mantê-los que, por consequência, reduzem o desempenho econômico e explicam a relação negativa pautada por diversos pesquisadores.

2.1.3 Relação curvilínea entre folga financeira e desempenho econômico

Numa perspectiva mais recente, pesquisadores têm defendido o entendimento que a relação entre folga e desempenho é curvilínea. Tan e Peng (2003) e Zhong (2011) relatam que existe pouca razão para acreditar que o efeito da folga a fim de auxiliar o desempenho é linear, devendo haver, portanto, um limite além do qual mais acumulações de recursos prejudicam a performance econômica.

Dessa forma, espera-se nesta perspectiva que a relação entre folga e desempenho seja uma parábola negativa, ou seja, em forma de "U" invertido (Tan e Peng, 2003). Tal fato seria pensar que o baixo nível de recursos de folga está negativamente relacionado com o desempenho; recursos moderados de folga influenciam positivamente no desempenho; e, o alto nível de folga de recursos afeta negativamente o desempenho, tendo-se, assim, relação curvilínea (não linear) entre ambas as dimensões.

De forma geral, a ideia de tal relação está ligada ao mérito consolidado de ambos os entendimentos citados anteriormente, ou seja, é uma espécie de "fusão" do pensamento daqueles que relatam haver influência positiva da folga no desempenho e de outros que postulam relação negativa entre ambas as variáveis. Dessa forma, espera-se a melhora no desempenho dentro de um determinado intervalo que é dado pela razão de existirem recursos excedentes para lidar com as ameaças e/ou usufruir das oportunidades, mas limitados o suficiente para prevenir o comportamento irresponsável dos gestores (Daniel et al., 2004), além de não estarem expostos demasiadamente ao custo de capital derivado da folga em excesso.

As tentativas de conciliar os pontos de vistas concorrentes têm sido constantes, mas os resultados permanecem em grandes partes conflitantes. Assim, estudiosos têm expandido as investigações acerca da ligação de folga e desempenho, notadamente considerando que a relação entre ambos pode não ser linear (Laffranchini e Braun, 2014). Em outras palavras, pesquisadores têm partido do princípio que tanto pouca folga como muita folga podem ser problemáticas e, assim, as empresas necessitam manter um nível ótimo de recursos em excesso (Stan, Peng e Bruton, 2014).

2.2. Estudos anteriores e construção das hipóteses

Dos três posicionamentos teóricos acerca do fenômeno entre folga financeira e desempenho corporativo apontados anteriormente, posiciona-se pela relação curvilínea. Essa abordagem tem atraído a atenção de pesquisadores recentes que fazem uso dela visando aprofundar o conhecimento acerca do tema, não solucionado com relações lineares. De fato, conforme Argilés-Bosh et al. (2018), a identificação de um nível ótimo de folga seria um mecanismo inestimável para melhorar a eficiência das empresas no que concerne ao uso de recursos (Argilés-Bosh et al., 2018), conciliando ainda as perspectivas positivas e negativas da folga, que até então não solucionaram o fenômeno.

Empiricamente, Paeleman e Vanacker (2015) afirmaram que até o momento, estudos desenvolvidos são insuficientes para esclarecer como os recursos de folga afetam os resultados das empresas. Com base nessa limitação, investigaram como a folga de recursos financeiros influencia a performance e a sobrevivência corporativa. A amostra da pesquisa foi composta por 4.715 empresas de tecnologia da informação e comunicação europeias com dados de 1994 a 2009. Os resultados apontam que tanto a abundância de recursos de folga como a restrição excessiva destes não são ideais para o desempenho e a sobrevivência das empresas, havendo, portanto, relação curvilínea entre folga financeira e performance corporativa.

Guo, Zhou, Zhang, Hu e Song (2018) observaram a folga organizacional, refletindo os recursos em excesso, no desempenho das empresas. A amostra de pesquisa abrangeu 183 empresas norte-americanas dos setores de tecnologia da informação, eletrodomésticos e eletroeletrônicos. Dentre os resultados, tem-se que a relação entre folga e desempenho é em forma de U invertido, primordialmente para organizações que apresentam níveis elevados de planejamento estratégico. A conclusão é de que a Teoria Organizacional e a Teoria da Agência, de forma concomitante, podem explicar as duas funções latentes da folga no desempenho. Especificamente, a função de benefício entra em vigor por intermédio da exploração dos recursos para inovação, e a função de custos por meio dos problemas de agência.

Tendo por objetivo maior contribuir para com a literatura de gestão dos recursos, que ainda carece de resultados mais robustos, Geiger et al. (2019) investigaram a folga e o desempenho na indústria hospitalar. A amostra foi composta por 156 organizações localizadas nos Estados Unidos. Os resultados apontaram que as configurações de recursos de folga resultam em diferentes patamares de desempenho. Dessa forma, dentre outros aspectos, assevera-se a importância de se observar os níveis de folga para maximizar o desempenho corporativo. Logo, mediante conceitos teóricos e amplitude dos estudos empíricos recentes apresentados, emergem-se as seguintes hipóteses para esta pesquisa:

- H$_1$: a influência da folga financeira no desempenho econômico de empresas industriais brasileiras é não linear (curvilínea).
- H$_2$: a influência da folga financeira no desempenho econômico de empresas industriais mexicanas é não linear (curvilínea).

A influência não linear que se busca encontrar é em forma de "U invertido", ou seja, a manutenção de folga possui vantagens e desvantagens e, assim, as empresas necessitam ponderar ambas perspectivas a fim de, conforme Stan et al. (2014), manter um nível ótimo de recursos em excesso. Além disso, Geiger et al. (2019) asseveram, neste ínterim, que as relações variadas entre folga e desempenho podem variar por inúmeros fatores, havendo entre eles, a situação do ambiente pesquisado. Portanto, aglutinando os conhecimentos mencionados, elabora-se a seguinte hipótese de pesquisa:

- H$_3$: a influência não linear (curvilínea) da folga financeira no desempenho econômico de empresas industriais brasileiras e mexicanas é diferente mediante ambiente estudado.

3. Metodologia

Com o objetivo de verificar a influência da folga financeira no desempenho econômico de empresas industriais brasileiras e mexicanas, a presente pesquisa é delineada quanto aos objetivos como descritiva, pois observa variáveis sem manipulá-las. Ademais, o estudo caracteriza-se como análise documental, uma vez que os dados utilizados para cálculo das variáveis foram obtidos por meio da base de dados Thomson®. Por fim, a abordagem do problema é de caráter quantitativo, já que identifica a influência das variáveis com o uso de procedimentos estatísticos.

A população da pesquisa foi composta por todas as empresas manufatureiras (industriais) brasileiras listadas na Brasil, Bolsa, Balcão (B3) e mexicanas listadas na Bolsa Mexicana de Valores (BMV) conforme classificação North American Industry Classification System (NAICS) da base de dados Thomson®. Para definir a amostra de pesquisa, inicialmente foram excluídas as companhias que não dispunham de informações para cálculo de todas as variáveis em estudo para ao menos um dos períodos em análise. Foram ainda excluídas as empresas cujos dados financeiros são considerados outliers por estarem mais de dois desvios-padrão distantes da média geral, além de firmas cujo patrimônio líquido é negativo, uma vez que os dados contábeis dessas organizações inviabilizam a operacionalização do indicador retorno sobre o patrimônio líquido (ROE). Dessa forma, ao final, a amostra de pesquisa foi composta por 152 empresas que geraram 1.760 observações, sendo 107 brasileiras (1.185 observações) e 45 mexicanas (575 observações) entre os anos de 1996 e 2014.

Para análise dos dados, primeiramente foi realizada a estatística descritiva das variáveis da pesquisa, sendo de desempenho econômico e de folga financeira. Concomitantemente, foi realizado teste de médias (t de student) a fim de verificar se existem diferenças significativas entre os dois grupos pesquisados (no caso, empresas industriais brasileiras e mexicanas). Finalmente, foram operacionalizados os modelos de regressões lineares e quadráticos, sendo representados graficamente para melhor compreensão dos resultados. Na sequência, apresenta-se a Tabela 1, que contém as variáveis relacionadas ao presente estudo.

Fazendo uso das variáveis relacionadas na Tabela 1, foi elaborado os modelos de regressões, técnica estatística principal adotada na pesquisa. Assim, segue abaixo as equações (lineares e quadráticas, respectivamente) que serão utilizadas a fim de verificar os pressupostos da análise relacionada às hipóteses de pesquisa e, por consequência, ao objetivo de estudo. Além disso, precedentemente, apresenta-se modelo de regressão teórico com seus parâmetros para compreensão.

$$Y_{it} = \alpha + \beta_1 X_{it} + \varepsilon \qquad (1)$$

Tabela 1. Variáveis dependentes e independentes

Variável	Fórmula	Autores
Variáveis dependentes - indicadores de desempenho econômico		
Retorno sobre ativo (ROA)	$\dfrac{EBIT}{(Ativo\ Total)}$	Laffranchini e Braun (2014); Argilés-Bosch et al. (2018); Gruener e Raastad (2018)
Retorno sobre PL (ROE)	$\dfrac{(Lucro\ Líquido)}{(Patrimônio\ Líquido)}$	Argilés-Bosch et al. (2018); Silva et al. (2018)
Retorno sobre vendas (ROS)	$\dfrac{(Lucro\ Líquido)}{(Vendas\ Líquidas)}$	Gruener e Raastad (2018); Silva et al. (2018)
Variáveis independentes - indicadores de folga financeira		
Liquidez imediata (LI)	$\dfrac{Disponível}{(Passivo\ Circulante)}$	Bradley et al. (2011); Paeleman e Vanacker (2015)
Liquidez seca (LS)	$\dfrac{(Ativo\ Circulante-Estoques)}{(Passivo\ Circulante)}$	Campos e Nakamura (2015); Geiger et al. (2019)
Liquidez corrente (LC)	$\dfrac{(Ativo\ Circulante)}{(Passivo\ Circulante)}$	Laffranchini e Braun (2014); Gruener e Raastad (2018); Geiger et al. (2019)
Liquidez geral (LG)	$\dfrac{(Ativo\ Circulante+ARLP)}{(Passivo\ Circulante+PNC)}$	*Proposta pelos autores

ARLP – Ativo realizável a longo prazo; PNC – Passivo não circulante.
*Proposta pelos autores: esta variável é proposta no cerne da metodologia adotada nesta pesquisa. Sua fórmula é amplamente utilizada em estudos de finanças corporativas com outros arranjos. Ressalta-se ainda que medidas de folga que consideram aspectos de longo prazo são utilizadas adicionalmente em outras pesquisas, como de Geiger et al. (2019), mas não sob esta configuração específica.
Fonte: dados da pesquisa.

Tabela 2. Estatística descritiva e teste de média das variáveis

	Estatística descritiva								Teste de média (t de student)	
	Empresas industriais brasileiras				Empresas industriais mexicanas					
	Média	DP	Mín.	Máx.	Média	DP	Mín.	Máx.	T	Sig.
ROA	0,063	0,065	-0,097	0,253	0,088	0,059	-0,068	0,247	-7,702	0,000*
ROE	0,093	0,144	-0,387	0,552	0,100	0,127	-0,337	0,550	-0,916	0,180
ROS	0,050	0,073	-0,159	0,338	0,056	0,069	-0,131	0,256	-1,581	0,057**
LI	0,475	0,408	0,0003	2,036	0,338	0,346	0,0022	2,012	6,971	0,000*
LS	1,219	0,542	0,231	2,929	1,131	0,569	0,222	2,992	3,155	0,001*
LC	1,753	0,707	0,435	4,296	1,767	0,869	0,416	4,331	-0,359	0,360
LG	1,124	0,496	0,245	2,873	0,941	0,481	0,273	3,004	7,340	0,000*

*Significância ao nível de 5%; ** Significância ao nível de 10%.
Fonte: dados da pesquisa.

Onde Y é a variável dependente ou regressando; X é a variável independente ou regressor; α é o intercepto ou constante do modelo; β é o coeficiente angular do modelo; ε é o erro do modelo; e it é a informação da empresa "i" no período "t".

$$ROA_{it}= \alpha+B_1 LI_{it}+ \varepsilon \tag{2}$$

$$ROA_{it}= \alpha+\beta_1 LI_{it}+\beta_2 LI^2_{it}+ \varepsilon \tag{3}$$

Conforme equações testáveis acima mencionadas (equação 2 e equação 3), o estudo terá ainda os modelos vinculados às variáveis dependentes ROE e ROS e às variáveis independentes LS, LC e LG, sendo sempre operacionalizadas em separado para empresas brasileiras e empresas mexicanas. É importante destacar, por último, que os dados foram tabulados em planilhas eletrônicas e os modelos econométricos foram concretizados com apoio do software especializado SPSS versão 21, observando seus pressupostos básicos.

4. Descrição e análise dos resultados

Num primeiro momento apresenta-se, conforme Tabela 2, a estatística descritiva das variáveis da pesquisa, assim como o teste t de student, com o intuito de verificar se há diferenças significativas de médias entre as variáveis de folga financeira e desempenho econômico de empresas industriais brasileiras e mexicanas.

Conforme a Tabela 2, é possível verificar que as empresas industriais mexicanas apresentam desempenho econômico superior às empresas industriais brasileiras para os três indicadores, sendo que, em dois deles, ROA e ROS, o teste de médias (t de student) confirma que há diferenças significativas entre os dois grupos de empresas, com significância estatística de 5% e 10%, respectivamente. Nesse caso, como

os dados comparados são derivados de empresas de nações diferentes, possíveis explicações podem estar atreladas a fatores macroeconômicos. Sendo assim, segue a Tabela 3, que apresenta o histórico de taxas cambiais entre o real e o dólar e entre o peso mexicano e o dólar para comparação entre as nações foco de análise, ou seja, Brasil e México.

Mediante os dados da Tabela 3, é possível observar que, no geral, a moeda brasileira depreciou em maior magnitude comparativamente à moeda mexicana perante o dólar, no período em estudo. Especificamente, a cotação média do dólar frente ao real em 1996 era de 1,0049 e, em 2014, de 2,3529 (valorização de 134,13%). Para o contexto do México, percebe-se que apesar do peso mexicano também ter depreciado ao longo do período estudado, houve menor desvalorização. O dólar estava cotado em 1996 a 7,5996 pesos mexicanos e, em 2014, a cotação era de 13,3078 (acréscimo de 75,11%).

Tais evidências são importantes, pois possuem potencial para justificar o menor desempenho econômico de empresas industriais brasileiras comparativamente às organizações industriais mexicanas. Conforme Pereira e Carvalho (2000),

a variação cambial desperta elevação direta dos custos nos setores que necessitam importar insumos. Logo, os custos passam a ser pressionados, também, pelo efeito da taxa de câmbio sobre os preços dos fornecedores domésticos que demandam insumos importados, espalhando-se o resultado por toda a economia.

Empiricamente, no contexto brasileiro, Bittencourt e Campos (2014) objetivaram verificar como a inconstância cambial interfere nas movimentações de exportações e importações setoriais do país diante de seus parceiros basais entre 1989 e 2011. Os achados revelaram que a instabilidade cambial é prejudicial para os setores em geral, demonstrando que as movimentações de comércio (entradas/saídas) entre Brasil e seus aliados são negativamente afetadas pela referida inconstância cambial (Bittencourt e Campos, 2014), acarretando, portanto, em resultados corporativos mais baixos.

Ademais, quanto à folga financeira, observa-se que em três das quatro variáveis estudadas, empresas industriais brasileiras operam com níveis mais elevados de recursos em excesso comparativamente às empresas industriais mexicanas, sendo comprovado tais diferenças estatisticamente ao nível de 5% pelo teste de médias (t de student). Possível explicação para tal achado pode estar estritamente vinculada à análise anteriormente realizada. Como empresas brasileiras operam em uma economia mais instável para o período em estudo, a folga financeira pode se tornar essencial contra as ameaças que as organizações possam sofrer (Daniel et al., 2004).

Analisado os achados da estatística descritiva em conjunto com o teste de médias (t de student), têm-se, na sequência, os resultados da influência da folga financeira no desempenho econômico de empresas industriais brasileiras e mexicanas expressos graficamente em regressões lineares e quadráticas. Dessa forma, segue inicialmente a Figura 1, que contempla a influência da folga financeira no ROA de empresas industriais brasileiras.

Na sequência, para posterior análise consolidada com a Figura 1, apresenta-se a Figura 2, que contém os resultados da pesquisa para a influência da folga financeira no ROA de empresas industriais mexicanas.

Conforme Figura 1 e 2, percebe-se que a relação da folga com o indicador de desempenho ROA tanto para empresas industriais brasileiras como mexicanas é majoritariamente em formato de parábola com concavidade para baixo, corroborando, portanto, com os pressupostos de Tan (2003) de que existe relação curvilínea (não linear) entre folga e desempenho. A seguir, apresenta-se, conforme Figura 3, a relação da folga financeira com o ROE de empresas industriais brasileiras.

Apresentado a influência da folga financeira no ROE de empresas industriais brasileiras, tem-se, na sequência, a Figura 4, que contém a relação de tais variáveis para empresas industriais mexicanas, para posterior análise conjunta.

De acordo com as Figuras 3 e 4, percebe-se que apenas um dos modelos de regressões quadráticas não foi significativo ao nível de 5% (entre ROE e liquidez geral para empresas

**Tabela 3.** Estatística descritiva e teste de média das variáveis

	Brasil			México		
Ano	Taxa	Variação t/t-1	Variação – base 1996	Taxa	Variação t/t-1	Variação – base 1996
1996	1,0049	-	-	7,5996	-	-
1997	1,0780	7,27%	7,27%	7,9203	4,22%	4,22%
1998	1,1605	7,65%	15,48%	9,1534	15,57%	20,45%
1999	1,8144	56,35%	80,55%	9,5489	4,32%	25,65%
2000	1,8301	0,87%	82,11%	9,4597	-0,93%	24,48%
2001	2,3543	28,64%	134,27%	9,3363	-1,30%	22,85%
2002	2,9231	24,16%	190,87%	9,6692	3,57%	27,83%
2003	3,0756	5,22%	206,05%	10,7935	11,63%	42,03%
2004	2,9245	-4,91%	191,02%	11,2880	4,58%	48,53%
2005	2,4326	-16,82%	142,06%	10,8912	-3,52%	43,31%
2006	2,1754	-10,57%	116,47%	10,9039	0,12%	43,48%
2007	1,9472	-10,49%	93,77%	10,9279	0,22%	43,80%
2008	1,8361	-5,71%	82,71%	11,1572	2,10%	46,81%
2009	1,9988	8,86%	98,90%	13,4993	20,99%	77,63%
2010	1,7602	-11,94%	75,16%	12,6332	-6,42%	66,24%
2011	1,6731	-4,95%	66,49%	12,4360	-1,56%	63,64%
2012	1,9541	16,80%	94,45%	13,1550	5,78%	73,10%
2013	2,1593	10,50%	114,87%	12,7595	-3,01%	67,90%
2014	2,3529	8,97%	134,13%	13,3078	4,30%	75,11%
Média		2,0240			10,8653	
Mínimo		1,0049			7,5996	
Máximo		3,0756			13,4993	

Obs.: a taxa de cada ano é derivada da cotação média anual. Além disso, a cotação é ponderada entre o preço de compra e o preço de venda.

Fonte: Online Forex Trading & Forex Broker - OANDA Corporation.
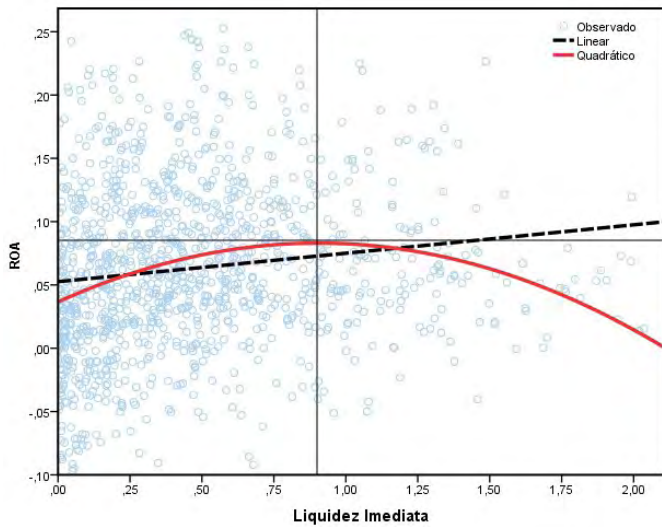
Linear

		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,020	R²:	0,058
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Imed.	0,022*	Liq. Imed.	0,103*
(Const.)	0,053*	Lq. Imed.²	-0,057*
-	-	(Const.)	0,037*
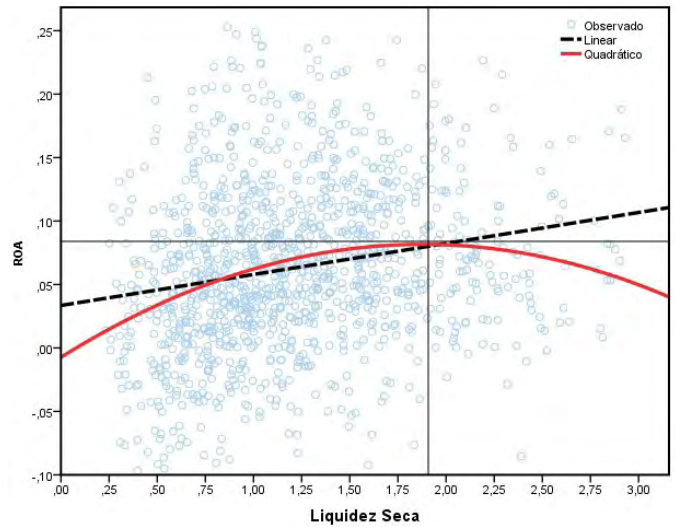
Linear

		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,042	R²:	0,063
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Seca	0,024*	Liq. Seca	0,095*
(Const.)	0,033*	Lq. Seca²	-0,025*
-	-	(Const.)	-0,007
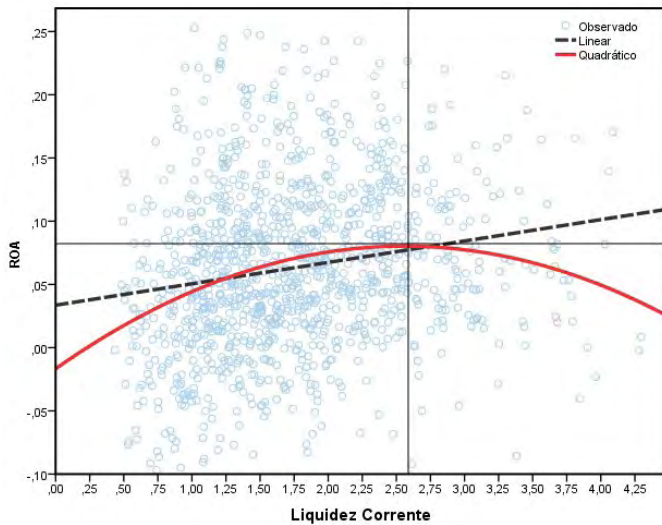
Linear

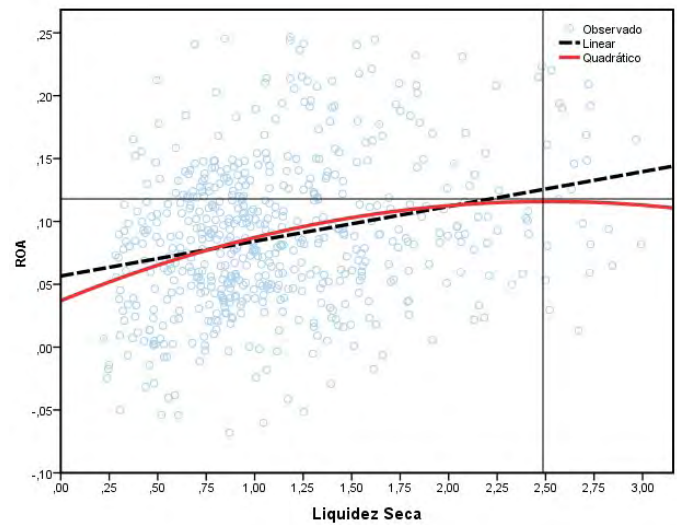|		**Quadrático**	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,034	R²:	0,057
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Corr.	0,017*	Liq. Corr.	0,076*
(Const.)	0,034*	Lq. Corr.²	-0,015*
-	-	(Const.)	-0,017
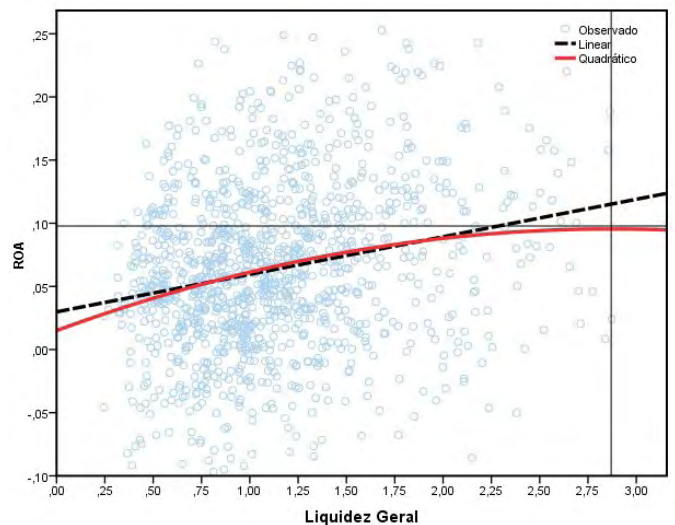
Linear

		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,052	R²:	0,055
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Geral	0,030*	Liq. Geral	0,056*
(Const.)	0,030*	Lq. Geral²	-0,010**
-	-	(Const.)	0,015

Figura 1. Influência da folga financeira (índices de liquidez) no ROA de empresas industriais Brasileiras listadas na B3 entre 1996 e 2014
*Significância ao Nível de 5%; ** significância ao nível de 10%.
Fonte: dados da pesquisa.

Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,070	R²:	0,088
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Imed.	0,045*	Liq. Imed.	0,103*
(Const.)	0,073*	Lq. Imed.²	-0,043*
-	-	(Const.)	0,063*

Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,071	R²:	0,079
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Seca	0,028*	Liq. Seca	0,063*
(Const.)	0,057*	Lq. Seca²	-0,012*
-	-	(Const.)	0,037*

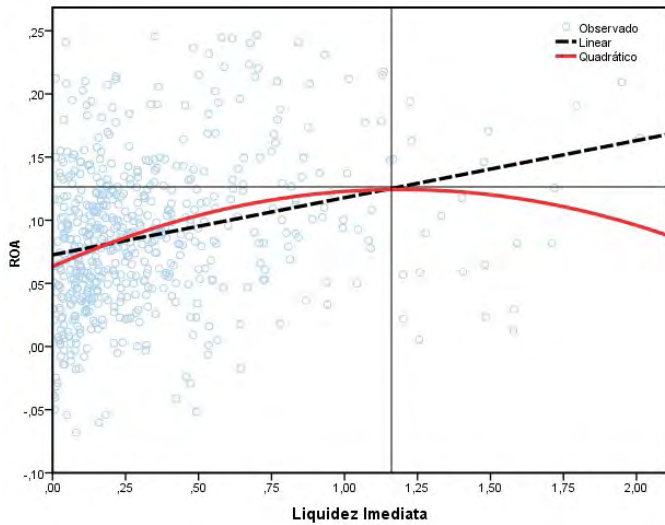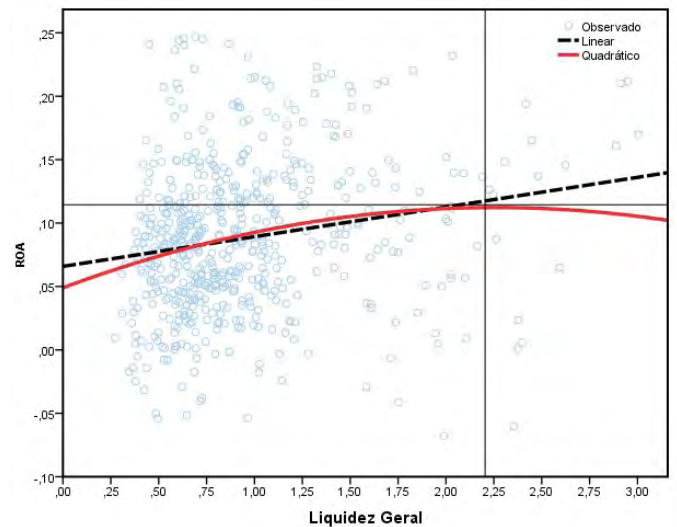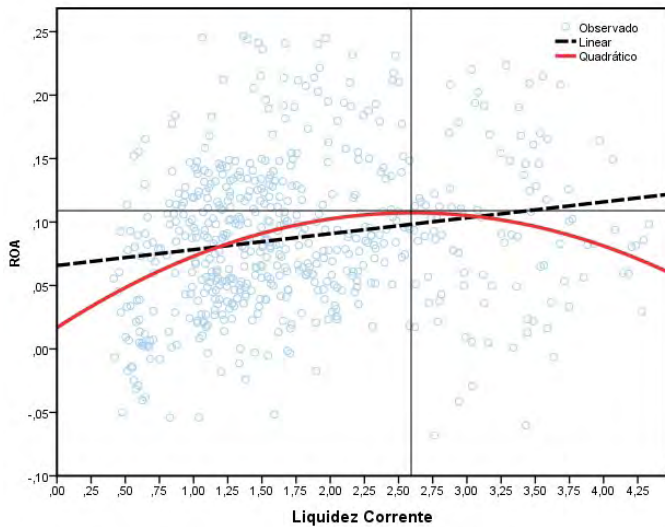| Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,034	R²:	0,074
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Corr.	0,013*	Liq. Corr.	0,070*
(Const.)	0,066*	Lq. Corr.²	-0,013*
-	-	(Const.)	0,017

Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,036	R²:	0,041
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Geral	0,023*	Liq. Geral	0,056*
(Const.)	0,066*	Lq. Geral²	-0,012**
-	-	(Const.)	0,049*

Figura 2. Influência da folga financeira (índices de liquidez) no ROA de empresas industriais Mexicanas listadas na BMV entre 1996 e 2014
*Significância ao nível de 5%; ** significância ao nível de 10%.
Fonte: dados da pesquisa.

Linear		Quadrático	
VSig. Mod.:	0,000*	Sig. Model.:	0,000*
R²:	0,024	R²:	0,052
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Imed.	0,055*	Liq. Imed.	0,208*
(Const.)	0,067*	Lq. Imed.²	-0,109*
-	-	(Const.)	0,036*

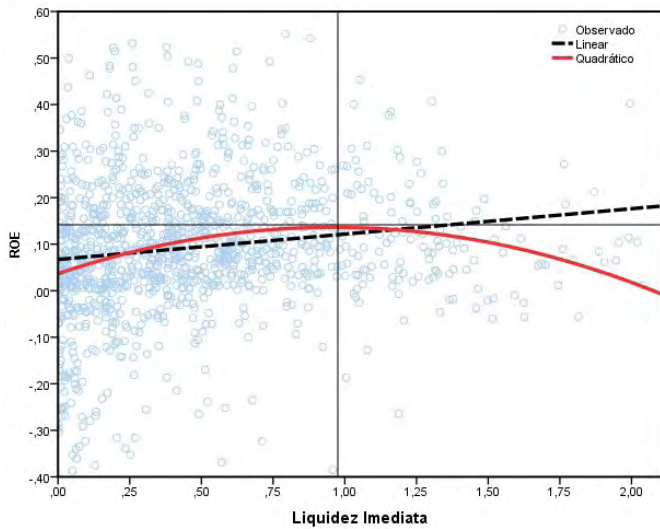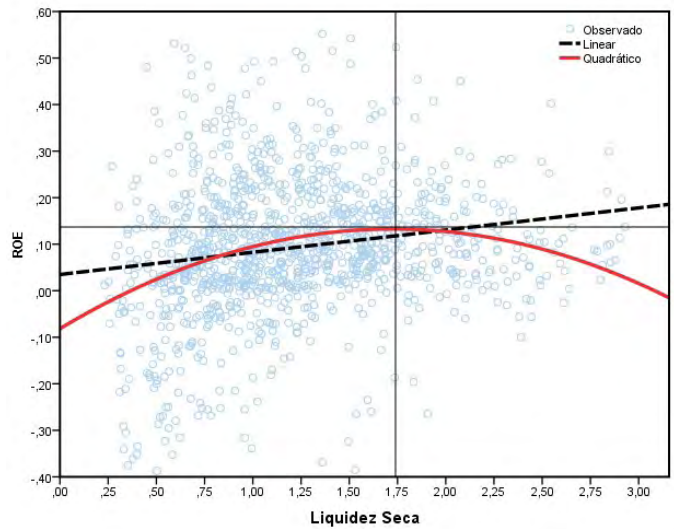| Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Model.:	0,000*
R²:	0,032	R²:	0,067
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Seca	0,048*	Liq. Seca	0,248*
(Const.)	0,035*	Lq. Seca²	-0,072*
-	-	(Const.)	-0,082*
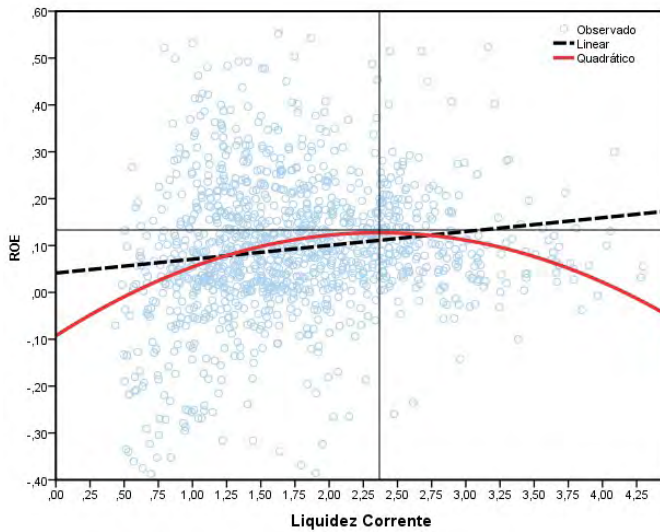
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,021	R²:	0,054
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Corr.	0,030*	Liq. Corr.	0,186*
(Const.)	0,041*	Lq. Corr.²	-0,039*
-	-	(Const.)	0,036*
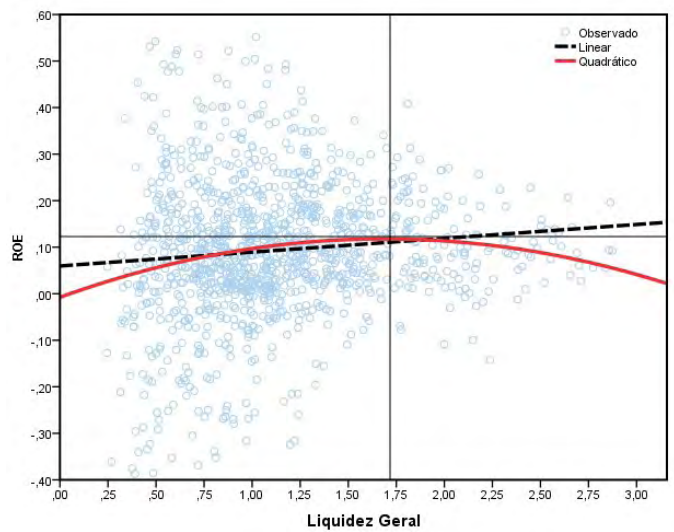
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,011	R²:	0,021
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Geral	0,030*	Liq. Geral	0,149*
(Const.)	0,060*	Lq. Geral²	-0,044*
-	-	(Const.)	-0,008

Figura 3. Influência da folga financeira (índices de liquidez) no ROE de empresas industriais Brasileiras listadas na B3 entre 1996 e 2014
*Significância ao nível de 5%; ** significância ao nível de 10%.
Fonte: dados da pesquisa.
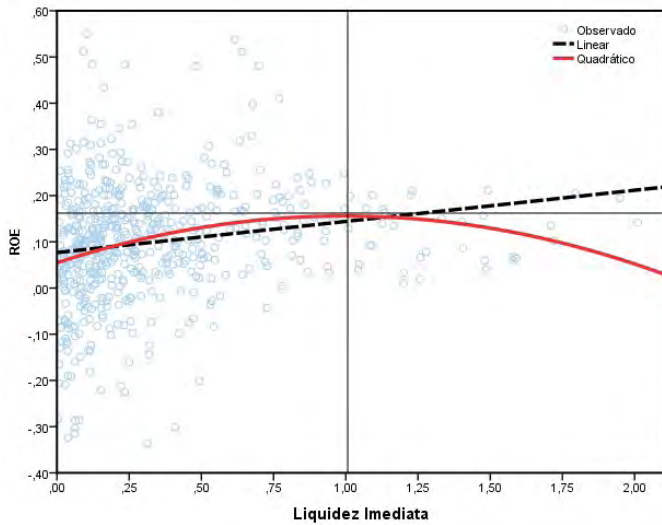
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,033	R²:	0,055
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Imed.	0,067*	Liq. Imed.	0,204*
(Const.)	0,077*	Lq. Imed.²	-0,103*
-	-	(Const.)	0,055*
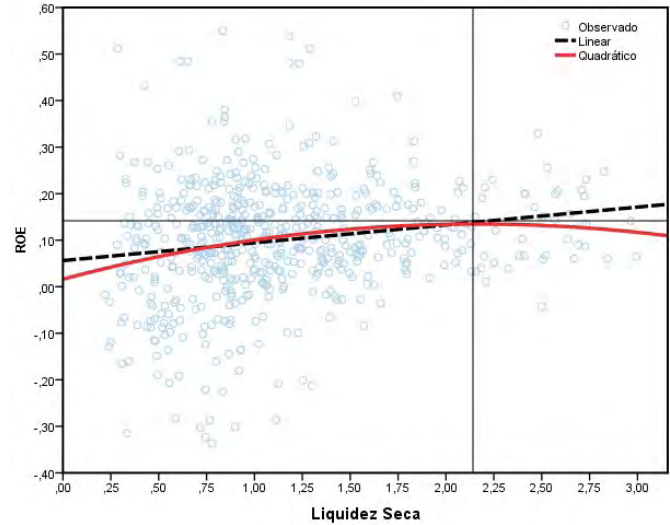
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,029	R²:	0,036
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Seca	0,038*	Liq. Seca	0,110*
(Const.)	0,056*	Lq. Seca²	-0,025*
-	-	(Const.)	0,016
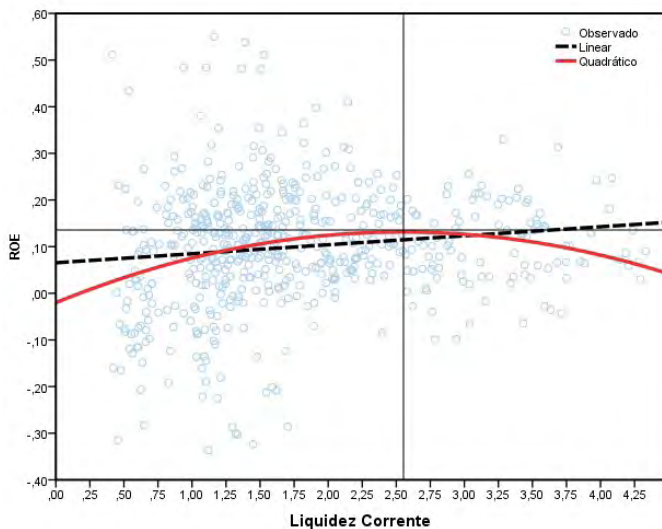
Linear		Quadrático	
Sig. Mod.:	0,002*	Sig. Mod.:	0,000*
R²:	0,017	R²:	0,044
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Corr.	0,019*	Liq. Corr.	0,119*
(Const.)	0,065*	Lq. Corr.²	-0,023*
-	-	(Const.)	-0,020

Linear		Quadrático	
Sig. Mod.:	0,098**	Sig. Mod.:	0,141
R²:	0,005	R²:	0,007
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Geral	0,018**	Liq. Geral	0,063
(Const.)	0,082*	Lq. Geral²	-0,017
-	-	(Const.)	0,059*

Figura 4. Influência da folga financeira (índices de liquidez) no ROE de empresas industriais Mexicanas listadas na BMV entre 1996 e 2014
*Significância ao nível de 5%; ** significância ao nível de 10%.
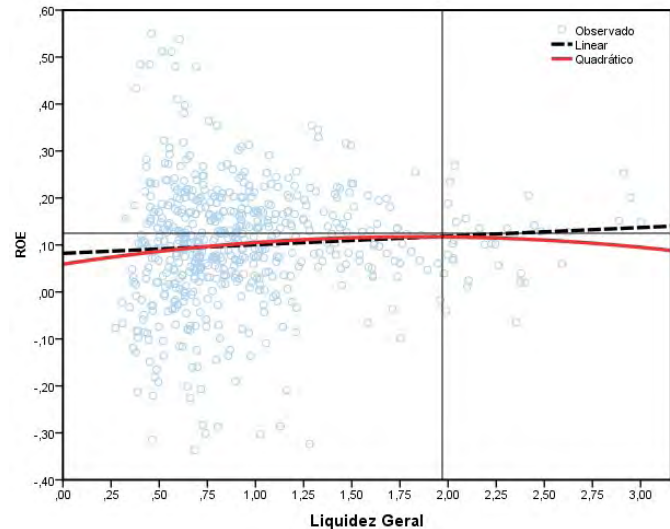Fonte: dados da pesquisa.

industriais mexicanas), demonstrando, dessa forma, a supremacia da relação não linear nos ambientes estudados. Na sequência, tem-se, conforme constructo de variáveis, a influência da folga financeira no ROS de empresas industriais brasileiras.

Por fim, apresenta-se a Figura 6, que contém a relação da folga financeira com o indicador de desempenho ROS de empresas industriais mexicanas que, posteriormente, será foco de análise comparativa aos achados da Figura 5, anteriormente expressa.

Assim como para os outros indicadores de desempenho vistos anteriormente, a folga financeira influencia majoritariamente o ROS de empresas industriais brasileiras e mexicanas de forma não linear, sendo a relação curvilínea com concavidade para baixo. Tal fato corrobora com o entendimento de Stan et al. (2014) de que tanto a escassa folga como a excessiva folga podem trazer problemas às organizações, uma vez que tendem a prejudicar o desempenho corporativo.

Em todos os gráficos exibidos anteriormente (Figuras 1 a 6), foi traçado duas retas (horizontal e vertical) com o objetivo de verificar em qual grau de folga financeira as organizações maximizam seu desempenho, sendo a folga dividida sempre em frações de 0,25 (metodologia adotada). Dessa forma, para compreensão resumida dos achados de pesquisa, apresenta-se na Tabela 4 os intervalos de folga que maximizam a performance das organizações industriais brasileiras e mexicanas foco de análise.

Mediante a Tabela 4, tem-se que, em todos os vinte e quatro casos, a função quadrática apontou o grau de folga financeira necessária a fim de maximizar o desempenho econômico. Esses achados devem-se primordialmente ao fato de que, nas regressões lineares, a relação positiva entre folga e desempenho foi evidenciada em maior representatividade. Assim, a Teoria Baseada em Recursos que preconiza a folga financeira como precursora de vantagem competitiva e crescimento organizacional (Lee, 2011; Bradley et al., 2011) e a Teoria Comportamental da Empresa que aponta a folga como mitigadora de conflitos de interesses e propulsora da inovação (Daniel et al., 2004; Lee, 2011) melhor estabelecem a relação entre folga financeira e desempenho econômico em empresas industriais brasileiras e mexicanas.

Em contrapartida, a relação negativa, que postula recursos excedentes (de folga) apenas como geradores de custos desnecessários para as firmas (Tan e Peng, 2003), e a Teoria da Agência, que defende recursos demasiados como potenciais ao desperdício e refúgio de erros estratégicos (Laffranchini e Braun, 2014), primordialmente levando em

consideração que gestores farão uso da folga buscando benefícios próprios (Jensen e Meckling, 1976), a priori, não parecem fatores essenciais para explicar a relação entre folga e desempenho em ambos os contextos investigados.

Contudo, cabe destacar que as regressões quadráticas, que trabalham uma perspectiva mais recente acerca da influência da folga financeira no desempenho econômico das empresas, buscando uma condição de "fusão" do conhecimento daqueles que relatam haver influência positiva da folga no desempenho e de outros que postulam relação negativa entre tais variáveis, parece prevalecer empiricamente para empresas industriais brasileiras e mexicanas. Assim sendo, acredita-se que a maximização do desempenho dentro de um determinado intervalo é dada pela razão de terem-se recursos excedentes para lidar com as ameaças e/ou usufruir das oportunidades, mas limitado o suficiente para inibir o comportamento irresponsável dos gestores (Daniel et al., 2004), além de não estar exposto ao custo de capital exagerado derivado da folga em excesso.

Com base no exposto, a perspectiva recente debatida por Rafailov (2017), de que dimensionar o tamanho (nível) da folga é primordial para maximizar o desempenho da empresa, é aceita nesta pesquisa. Os resultados convergem, portanto, com estudos empíricos recentes de Paeleman e Vanacker (2015), Guo et al. (2018) e Geiger et al. (2019) que asseveram a função de vantagem da folga como um balanceamento entre a exploração para inovação e os custos causados pelos problemas de agência. Dessa forma, aceita-se as hipóteses 1 e 2 de pesquisa de que a influência da folga financeira no desempenho econômico de empresas industriais brasileiras (H_1) e mexicanas (H_2) é não linear (curvilínea).

Ademais, observa-se conforme Tabela 4 que em oito dos doze modelos operacionalizados para as organizações de cada um dos países em estudo, que empresas industriais mexicanas atingem seu máximo de desempenho operando com níveis mais elevados de folga do que empresas industriais brasileiras. Em contrapartida, empresas brasileiras maximizam seu desempenho mantendo patamares mais altos de folga do que empresas mexicanas em apenas dois casos, sendo ambos vinculados à liquidez geral (com ROA e ROS), tendo-se ainda dois modelos em que os melhores níveis de folga, a fim de auxiliar no desempenho das empresas, se equivalem em ambos os países (liquidez imediata e ROS e liquidez corrente e ROA).

Nesse sentido, tem-se que os benefícios da folga se perduram por mais tempo majoritariamente em empresas mexicanas do que em brasileiras, sendo que a explicação plausível para tal perspectiva pode estar vinculada à taxa

Tabela 4. Resumo dos intervalos de folga que maximizam o desempenho de empresa industriais Brasileiras e Mexicanas listadas na B3 e BMV, respectivamente, entre 1996 e 2014

Variável Dep./Indep.	Liquidez imediata		Liquidez seca		Liquidez corrente		Liquidez geral	
	Brasil	México	Brasil	México	Brasil	México	Brasil	México
ROA	0,75-1,00	1,00-1,25	1,75-2,00	2,25-2,50	2,50-2,75	2,50-2,75	2,75-3,00	2,00-2,25
ROE	0,75-1,00	1,00-1,25	1,50-1,75	2,00-2,25	2,25-2,50	2,50-2,75	1,50-1,75	1,75-2,00
ROS	1,25-1,50	1,25-1,50	2,25-2,50	2,75-3,00	2,75-3,00	3,00-3,25	2,75-3,00	2,00-2,25

Fonte: dados da pesquisa.

Liquidez Imediata
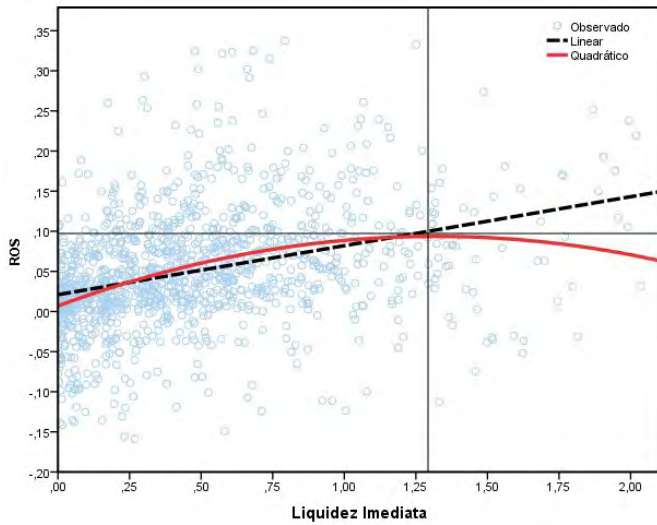
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,115	R²:	0,138
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Imed.	0,061*	Liq. Imed.	0,131*
(Const.)	0,021*	Lq. Imed.²	-0,050*
-	-	(Const.)	0,007**

Liquidez Seca
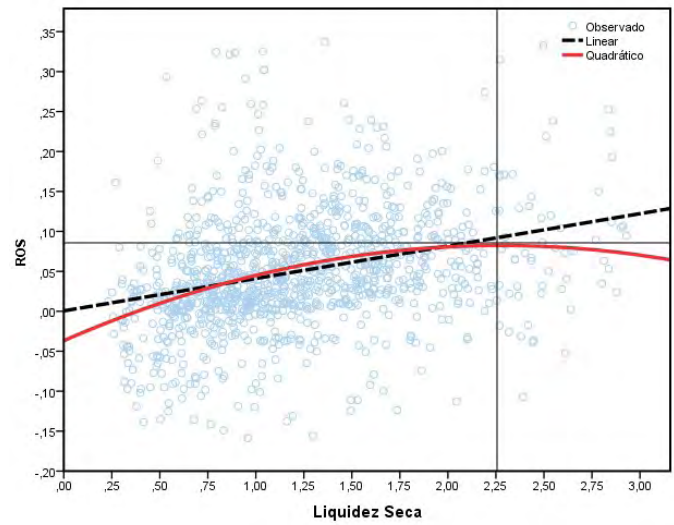
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,091	R²:	0,105
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Seca	0,041*	Liq. Seca	0,105*
(Const.)	0,001	Lq. Seca²	-0,023*
-	-	(Const.)	-0,037*

Liquidez Corrente
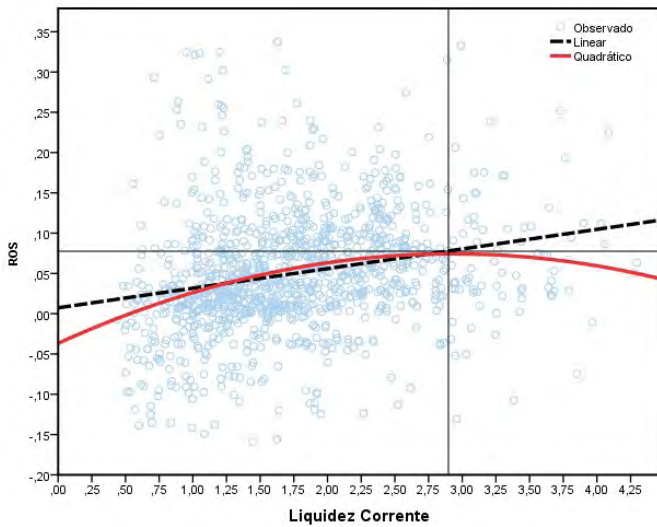
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,056	R²:	0,070
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Corr.	0,024*	Liq. Corr.	0,076*
(Const.)	0,007	Lq. Corr.²	-0,013*
-	-	(Const.)	-0,037*
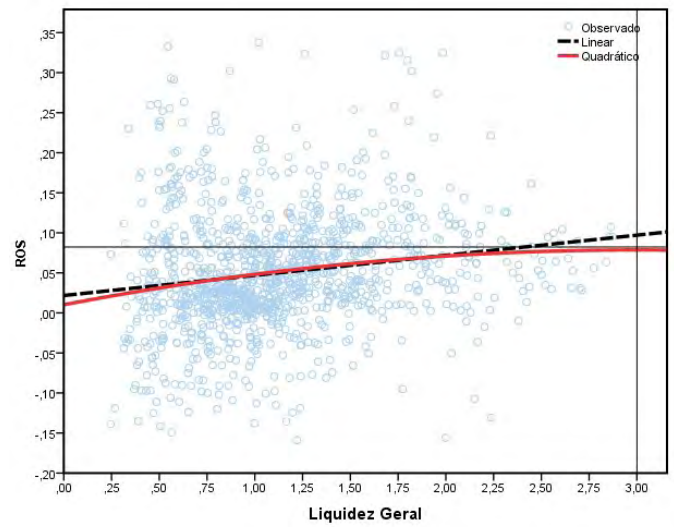
Liquidez Geral

Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,029	R²:	0,030
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Geral	0,025*	Liq. Geral	0,046*
(Const.)	0,022*	Lq. Geral²	-0,008
-	-	(Const.)	0,010

Figura 5. Influência da folga financeira (índices de liquidez) no ROS de empresas industriais Brasileiras listadas na B3 entre 1996 e 2014
*Significância ao nível de 5%; ** significância ao nível de 10%.
Fonte: dados da pesquisa.
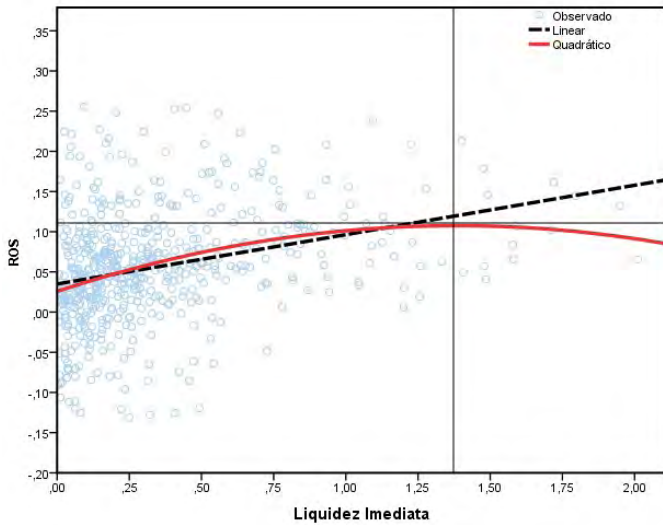
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,094	R²:	0,107
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Imed.	0,061*	Liq. Imed.	0,118*
(Const.)	0,035*	Lq. Imed.²	-0,043*
-	-	(Const.)	0,026*
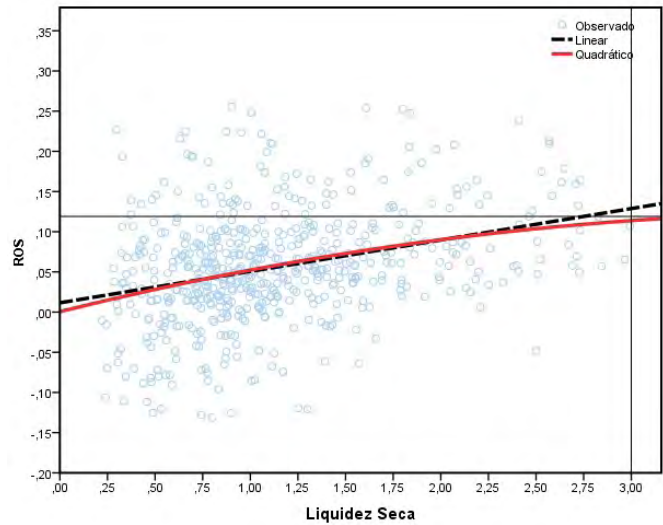
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,104	R²:	0,106
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Seca	0,039*	Liq. Seca	0,059*
(Const.)	0,012**	Lq. Seca²	-0,007
-	-	(Const.)	0,000
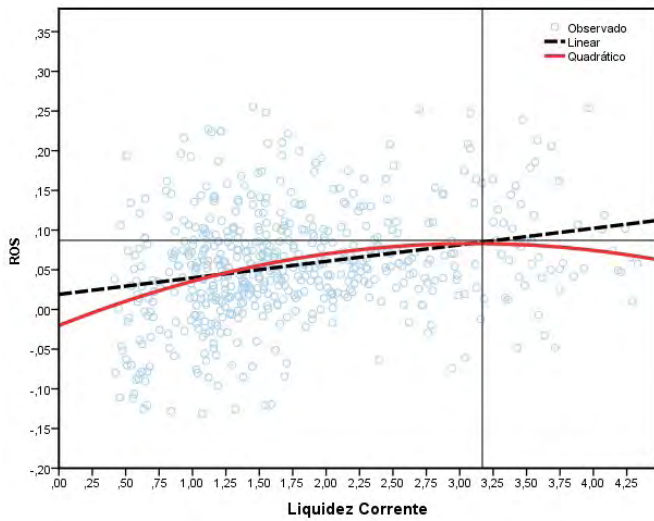
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,069	R²:	0,088
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Corr.	0,021*	Liq. Corr.	0,067*
(Const.)	0,019*	Lq. Corr.²	-0,011*
-	-	(Const.)	-0,020
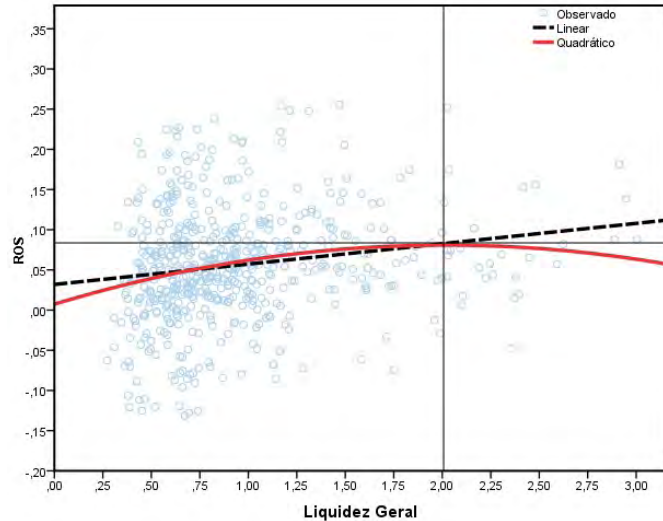
Linear		Quadrático	
Sig. Mod.:	0,000*	Sig. Mod.:	0,000*
R²:	0,031	R²:	0,039
ANOVA			
Variáveis	Coef.	Variáveis	Coef.
Liq. Geral	0,025*	Liq. Geral	0,073*
(Const.)	0,032*	Lq. Geral²	-0,018*
-	-	(Const.)	0,007

Figura 6. Influência da folga financeira (índices de liquidez) no ROS de empresas industriais Mexicanas listadas na BMV entre 1996 e 2014
*Significância ao nível de 5%; ** significância ao nível de 10%.
Fonte: dados da pesquisa.

de juros aplicada nos países em análise. Sabe-se que uma importante forma de criar folga financeira para as organizações é por intermédio de recursos de terceiros. Tais recursos advêm, em diversas oportunidades, de empréstimos e financiamentos junto a instituições financeiras. Dessa forma, a taxa de juros apresenta-se como fator fundamental, visto que o excesso de recursos ociosos pode prejudicar a performance empresarial, primordialmente quando a taxa de manutenção (custo do capital) é elevada. Nesse sentido, a seguir, tem-se a Tabela 5, que contém as taxas de juros de Brasil e México dados pelo Banco Central do Brasil (BACEN) e pelo Banco do México (BANXICO), respectivamente, nos últimos anos.

Conforme a Tabela 5, é possível observar que de 2008 a início de 2016 o Banco do México vem adotando taxas relevantemente inferiores de juros comparado ao Banco Central do Brasil. Nesse sentido, conforme Brito, Corrar e Batistella (2007), elevadas taxas de juros tornam os custos de financiamentos bastante significativos. Além disso, numa visão econômica técnica, Garcia e Didier (2003) relatam que calibrar a taxa de juros é tarefa de essencial importância, visto que a referida taxa possui papel fundamental na determinação do nível de atividade empresarial, do emprego e de outras variáveis econômicas.

Nesse sentido, partindo do entendimento de Stan et al. (2014) de que tanto baixa folga como alta folga podem ser problemáticas e, assim, as organizações necessitam manter um nível ótimo de recursos excedentes que visam, de acordo com Daniel et al. (2004), conciliar os benefícios da folga (lidar com as ameaças e usufruir das oportunidades) e seus malefícios (comportamento irresponsável dos gestores e exposição exagerada ao custo de capital), a relação em forma de "U" invertido (Tan e Peng, 2003) ocorre em níveis de folga financeira inferiores no cenário brasileiro comparativamente ao mexicano devido ao custo de capital (vinculado as taxas de juros) serem maiores no Brasil, fazendo com que os benefícios da folga cessem antes. Em contrapartida, organizações mexicanas podem acumular mais recursos a fim de maximizar sua performance, uma vez que o custo da dívida é menor, fazendo com que os benefícios da folga financeira persistam em patamares mais elevados.

Nos cenários observados, torna-se plausível a aceitação da hipótese 3 de pesquisa de que a influência não linear (curvilínea) da folga financeira no desempenho econômico de empresas industriais brasileiras e mexicanas é diferente mediante ambiente estudado. Esse estudo contribui com a recente expectativa de Argilés-Bosch et al. (2018) de que pesquisas futuras devem se pautar em uma variedade maior de ambientes, visando o fomento do conhecimento acerca do tema, agrupado neste estudo como um comparativo entre organizações de países diferentes sobretudo sob a ótica macroeconômica.

5. Considerações finais

A presente pesquisa teve como objetivo verificar a influência da folga financeira no desempenho econômico de empresas industriais Brasileiras e Mexicanas. Verificou-se, num primeiro momento, por intermédio de estatística descritiva e teste de médias, que empresas industriais mexicanas possuem desempenho econômico superior a empresas industriais brasileiras para o período longitudinal analisado. Em contrapartida, empresas industriais brasileiras operam, em média, com níveis mais elevados de folga financeira. Assim sendo, infere-se que as organizações brasileiras tendem a manter maior nível de recursos em excesso a fim de minimizar os impactos externos advindos da instabilidade econômica do país que é superior à evidenciada no contexto mexicano, sendo tal entendimento respaldado por Daniel et al. (2004) de que folga financeira é essencial contra ameaças que as organizações possam sofrer.

Ademais, mediante as regressões lineares, verificou-se que, em todos os vinte e quatro modelos operacionalizados, a folga demonstrou-se positivamente relacionada ao desempenho econômico, corroborando com os entendimentos da Teoria Baseada em Recursos (Bradley et al., 2011) e da Teoria Comportamental da Empresa (Laffranchini e Braun, 2014). Logo, tem-se que o excesso de recursos facilita o desempenho econômico mediante a consecução de novos investimentos, segurança da empresa no mercado e auxilia a política interna organizacional.

Todavia, regressões quadráticas apontam, com poder explicativo superior, que de fato a relação entre folga financeira e desempenho econômico não é linear, corroborando com entendimentos recentes de autores como Stan et al. (2014), Laffranchini e Braun (2014), Guo et al. (2018) e Geiger et al. (2019). Logo, tem-se a confirmação empírica dos pressupostos de Tan (2003) de que deve haver um limite para o nível de folga financeira que uma organização necessita de reserva.

Tabela 5. Taxa de juros Brasileira e Mexicana conforme BACEN e BANXICO nos anos de 2008 a início de 2016

Brasil		México	
Data	Taxa Meta (a.a.)	Data	Taxa Meta (a.a.)
01/2008	11,25%	01/2008	7,50%
12/2008	13,75%	12/2008	8,25%
03/2009	11,25%	03/2009	7,50%
07/2009	8,75%	07/2009	4,50%
04/2010	9,50%	04/2010	4,50%
12/2010	10,75%	12/2010	4,50%
04/2011	12,00%	04/2011	4,50%
10/2011	11,50%	10/2011	4,50%
05/2012	8,50%	05/2012	4,50%
11/2012	7,25%	11/2012	4,50%
04/2013	7,50%	04/2013	4,00%
11/2013	10,00%	11/2013	3,50%
05/2014	11,00%	05/2014	3,50%
12/2014	11,75%	12/2014	3,00%
04/2015	13,25%	04/2015	3,00%
10/2015	14,25%	10/2015	3,00%
03/2016	14,25%	03/2016	3,75%
Média	10,97%	Média	4,62%

Fonte: Banco Central do Brasil (BACEN) e Banco do México (BANXICO).

As contribuições teóricas e práticas se estabelecem por inúmeros fatores. De acordo com o recente estudo de Argilés-Bosch et al. (2018), visando a ampliação de conhecimento acerca do tema, pesquisas futuras devem considerar uma variedade maior de ambientes (Argilés-Bosch et al., 2018). Nesse sentido, esta pesquisa contribui fornecendo subsídios de que o nível ótimo (ideal) de folga financeira, a fim de maximizar o desempenho corporativo, é sumariamente diferente considerando ambientes diversos. Diante da importância da folga financeira, reguladores do ambiente econômico (sobretudo governamentais) podem estabelecer padrões mais assertivos para que as organizações do país se fortaleçam no atual mercado competitivo global. Além disso, gestores devem observar o cenário econômico com objetivo de controlar os recursos em excesso mantidos, bem como investidores e potenciais investidores, a fim de realizar suas decisões de investimentos (compra e venda de ações, por exemplo).

Além disso, este estudo traz evidências adicionais de que a relação entre folga financeira e desempenho corporativo é não linear, mais precisamente em forma de "U invertido". Durante muitas décadas, pesquisadores buscaram compreender o fenômeno em questão por meio de regressões lineares, que apontavam por vezes sinal negativo e outras positivo, fazendo com que o conhecimento se estagnasse. A utilização de modelos não lineares tornou o fenômeno alvo de constantes estudos recentes, trazendo novos insights teóricos e práticos que se enquadram em conciliar as visões anteriores conflitantes. Assim, este estudo traz novas evidências em dois ambientes emergentes, direcionando ainda mais pesquisas futuras para esta metodologia adotada.

Dessa forma, as contribuições desta pesquisa perpassam por incentivar ainda mais estudos que utilizam modelos não lineares para compreensão do fenômeno. Acima disso, ainda, traz à tona que mais do que identificar o nível ótimo de folga financeira para com o desempenho econômico das empresas, pesquisadores agora devem considerar quais aspectos influenciam esse nível ótimo. Este estudo partiu de um viés de aspectos externos, sobretudo macroeconômicos (variação cambial e taxa de juros) a fim de compreender as diferenças encontradas para empresas industriais brasileiras e mexicanas. Isso impulsiona novas descobertas considerando outros fatores, inclusive do ambiente interno das organizações.

Por mais que os arranjos metodológicos adotados nesta pesquisa estejam embasados em literatura prévia e, ainda, os achados sejam majoritariamente significativos, destaca-se que não se pretende esgotar o assunto, visto sua complexidade. Além disso, como limitação, destaca-se a escolha de medidas de liquidez em detrimento de outras operacionalizações possíveis de folga financeira para avaliar o fenômeno pretendido.

Nesse sentido, surgem alternativas para a consecução de estudos futuros acerca do tema. A comparação entre países do efeito da folga financeira no desempenho econômico das empresas por intermédio de medidas de folga diversificadas é primordial como, por exemplo, da folga potencial (poder de empréstimos). Variações econômicas podem justificar níveis ideais distintos também neste tipo de folga financeira. Além disso, pesquisas futuras necessitam focar no entendimento de fatores internos das organizações como responsáveis por mudanças no nível ótimo de folga de determinadas empresas, como questões de governança corporativa, planejamento estratégico, etc., podendo, portanto, serem explorados no cerne do conhecimento da temática em questão.

Conflito de interesses

Os autores declaram não haver conflito de interesses

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Research article

Effects of foreign ownership and International Financial Reporting Standards on debt maturity in Chilean firms

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Abstract
The objective of this article is to determine the effects of foreign ownership and International Financial Reporting Standards (IFRS) on debt maturity in Chilean companies. The study uses a fractional response model (FRM) on 20,586 companies. The results show foreign ownership has a negative and non-linear effect. Foreign ownership in Chilean firms is a substitute control means in relation to long-term debt. IFRS reduces maturity in large companies and extends them in small and medium enterprises (SMEs). These results suggest it is more important for large firms to control agency conflicts, while it is more important for SMEs to reduce information asymmetry.

Keywords: maturity, foreign ownership, firm quality.

Efectos de la propiedad extranjera y Normas Internacionales de Información Financiera sobre la madurez de la deuda en firmas chilenas

Resumen
El objetivo de este artículo es determinar los efectos de la propiedad extranjera y de las Normas Internacionales de Información Financiera (NIIF) sobre la madurez de la deuda en las empresas chilenas. En el estudio se utiliza un modelo de respuesta fraccional (MRF) sobre 20.586 empresas. Los resultados demuestran que la propiedad extranjera tiene un efecto negativo y no lineal, transformándose en un medio de control sustituto en relación con la deuda de largo plazo. Las NIIF reducen la madurez en empresas grandes y la extiende en las pequeñas y medianas empresas (Pymes). Estos resultados sugieren que para las firmas grandes es más importante controlar conflictos de agencia, mientras que para las Pymes es más importante reducir las asimetrías de información.

Palabras clave: madurez, propiedad extranjera, calidad crediticia.

Efeitos da propriedade estrangeira e das Normas Internacionais de Relato Financeiro no vencimento da dívida em empresas chilenas

Resumo
O objetivo deste artigo é determinar os efeitos da propriedade estrangeira e das Normas Internacionais de Relato Financeiro (IFRS) no vencimento da dívida em empresas chilenas. O estudo utiliza um Modelo de Resposta Fracionária (MRF) em 20.586 empresas. Os resultados mostram que a propriedade estrangeira tem efeito negativo e não linear, tornando-se um meio de controle substituto em relação à dívida de longo prazo. O IFRS reduz a maturidade em grandes empresas e as estende em Pequenas e Médias Empresas (PMEs). Esses resultados sugerem que, para grandes empresas, é mais importante controlar conflitos entre agências, enquanto para as PMEs é mais importante reduzir as assimetrias de informações.

Palavras-chave: maturidade, propriedade estrangeira, qualidade de crédito.

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1. Introduction

Debt maturity has been a widely studied subject in corporate finance. A large part of specialized literature has found that company characteristics, such as size, credit quality, asset tangibility, debt level, ownership structure and agency costs, are factors which determine corporate debt maturity.

Recently, a topic that has attracted the interest of researchers is the presence of foreign investors in companies' ownership structure. This presence may have important effects on debt maturity, although limited international evidence has not been able to determine this relationship in a consistent manner. Some studies highlight that greater participation by foreign investors in corporate ownership leads to greater debt maturities (Ezeoha, Ogamba & Onyiuke, 2008; Li, Yue & Zhao, 2009; Tanaka, 2015). These studies argue that foreign ownership exercises a complementary supervisory role on long-term debt and that such monitoring can constitute great advantages and improvements to corporate management. On the contrary, other studies argue that the negative relationship between foreign ownership and debt maturity reflects the convergence of interest between managers and external shareholders. This convergence makes foreign ownership play a substitute monitoring role with long-term debt (Choi & Choi, 2013). Although there are several studies in Chile that analyze corporate debt maturity determinants, none have analyzed the potential effects of foreign ownership and its implications.

In Chile, the growth of opening trade and investor confidence in the country's institutions have led to increased foreign ownership of companies. According to World Bank data, between 2007 and 2015, foreign direct investments increased from 7.81% to 8.44%. Along the same lines, the presence of foreign investors in the ownership structure of Chilean companies also increased for the same period. This figure increased from 18.40% to 19.15% for large firms, while for small firms this rise was much more pronounced, increasing foreign investments from 2.35% to 8.12% (Table 1).

Changes in ownership structure have also coincided with the mandatory adoption of International Financial Reporting Standards (IFRS) by Chilean companies. The objective of converging financial reports with IFRS standards is to allow domestic and foreign investors to standardize accounting rules and international financial statement comparability (Bae, Tan & Welker, 2008; Bhat, Callen & Segal, 2016). Although there is a wide range of literature to support the significant advantages of IFRS adoption in reducing information asymmetries affecting investors, its effects on debt maturity have been scarcely discussed. Currently, the literature has not reached a clear conclusion. The positive

effect on long-term debt generated by lower information asymmetry (Sengupta, 1998; Florou & Kosi, 2008; Kim, Tsui & Yi, 2011; Simmer de Lima, Sampaio & Gotti, 2018) is opposed to the negative effect with which IFRS mitigates agency conflicts through short-term debt (Zhang, 2008; Kosi & Florou, 2009; Chen & Zhu, 2013). In Chile, this matter has not yet been addressed. Moreover, differentiated adoption between large firms (since 2009) and small and medium enterprises (since 2013) may impose a differentiated effect of IFRS on the debt maturity of these firms. Given that small and medium enterprises (SMEs) are not obliged to report financial information, the degree of information asymmetry that characterizes them is greater when compared to large companies.

The general objective of our study is to determine the effects of foreign ownership and mandatory IFRS adoption on the debt maturity of Chilean companies. Our work contributes to national empirical literature and that of emerging markets in three aspects. First, we evaluate the effects of foreign ownership on debt maturity. Second, we evaluate the impact of mandatory IFRS adoption in both large companies and SMEs. It should be considered that adoption periods differ according to size. Third, we evaluate the interactive effects of foreign ownership and IFRS implementation according to firm size and credit quality. This point is to determine if these variables have conditional and interactive effects on debt maturity.

A grouped data set composed of 20,586 companies was used. This information was obtained from the Longitudinal Business Survey (LBS) for the 2007, 2009, 2013 and 2015 periods. Our results show that foreign ownership reduces debt maturity, which is consistent with the idea that investors use debt maturity to control agency costs. The effects of IFRS adoption differ according to firm size. In large firms, the adoption of this regulation reduces debt maturity, while in SMEs it increases it significantly. This effect is related to changes in information asymmetries since IFRS adoption by a firm. In any case, debt maturity increases when adoption occurs in firms with high credit quality. These results are relevant for firms, investors and policymakers. For firms and investors, our results help them to know the effects of foreign ownership on debt maturity as well as its control implications on corporate governance. It even allows them to know the relevance of IFRS in controlling information asymmetries, promoting foreign participation in corporate ownership and its impact on debt maturity decisions. In addition, regulators and policymakers can quantify the differentiated effect of IFRS according to firm size, and thereby strengthen policies aimed at facilitating firms' access to debt with more favorable terms.

This article is structured as follows. Following the introduction, section 2 reviews the literature related to the effects of foreign ownership and the adoption of IFRS on debt maturity. This section also states the research hypotheses. Section 3 presents the data and analysis methodologies. Section 4 shows the results obtained. Finally, section 5 groups the conclusions of this article.

Table 1. Foreign ownership and direct foreign investment in Chile (average).

Item	2007	2009	2013	2015
Large firms (%)	18.40	11.54	15.45	19.15
Small firms (%)	2.35	2.47	7.52	8.12
Direct foreign investment (% of GDP)	7.81	8.10	7.57	8.44

Source: Longitudinal Business Survey and World Bank.

2. Theoretical framework and hypothesis

This section presents a literature review and research hypothesis derived from its analysis. This section has been divided into two parts. The first part details the theoretical and empirical evidence at an international level and analyzes the effect of foreign ownership on debt maturity. The second part focuses attention on studies, which analyze the impact of IFRS on debt maturity.

2.1. Effects of foreign ownership on debt maturity

Ownership structure is a fundamental determinant of the corporate debt maturity decision and its effects can hardly be separated from the agency problem. The degree of ownership concentration, either by controlling shareholders or by managerial participation in corporate ownership, can have positive or negative effects on debt maturity. Some studies argue that ownership concentration has a negative effect on debt maturity. This fact could be explained by the controlling effect of ownership concentration on company management being met through the issuance of short-term debt. This decision would inhibit the use of investment policies to expropriate wealth from various *stakeholders* (Ozkan, 2000; Guney & Ozkan, 2005; Jiraporn & Tong, 2008). On the contrary, other studies have argued that an increase in managerial or controlling shareholder ownership would lead companies to issue long-term debt as a way of entrenching corporate management (Shleifer & Vishny, 1986; Berger, Ofek & Yermack, 1997; Gompers, Ishii & Metrick, 2003; Datta, Iskandar-Datta, & Raman, 2005; Arslan & Karan, 2006; Benmelech, 2006; Harford, Li & Zhao, 2008; Tanaka, 2015). Despite the contradictory nature of this research, ownership structure continues to be relevant to debt maturity.

The effect of foreign ownership arouses investigative interest due to its increased relevance in recent years of growing globalization (Schmukler & Vesperoni, 2006). Empirically, some works have highlighted that foreign investors participating in corporate ownership can assume the role of a relevant institutional investor capable of influencing corporate policies (Shleifer & Vishny, 1986; Gillan & Starks, 2003; Cronqvist & Fahlenbrach, 2009). In fact, several studies show that foreign ownership can have an important effect on various business areas such as corporate performance, dividend policy and firm value (Dahlquist & Robertsson, 2001; Chevalier, Prasetyantoko & Rokhim, 2006; Baba, 2009; Kimura & Kiyota, 2007; Jeon, Lee & Moffett, 2011; Cao, Du & Hansen, 2017).

Schmukler and Vesperoni (2006) point out that company access to international capital markets and national financial liberalization can have significant effects on the debt term decision. However, international evidence analyzing the effects of foreign ownership on debt maturity is still scarce and no consensus has been reached regarding this relationship. Some studies argue that foreign ownership has a positive effect on debt maturity, which is known as the foreign ownership monitoring hypothesis. Tanaka (2015) corroborates this relationship in a study of Japanese companies between 2005 and 2009. The author argues that foreign ownership is a means of control which disciplines corporate management, allowing them to access longer term debt and lower costs. In this case, foreign ownership prolongs its supervising function with the issuance of long-term debt. Although Jones (2006) warns that there may be conflicts between foreign and national owners, Li et al. (2009) argue that the described supervision effect has greater advantages, such as the attraction of new capital, technological improvements and corporate management. This view is also supported by Ezeoha et al. (2008).

Other studies indicate that foreign ownership has a negative impact on debt maturity, which supports the risk modification hypothesis. Relying on the theory of agency, these researchers have indicated that company administrators can expropriate wealth from bondholders through asset substitution. Nguyen (2012) states that, to mitigate this practice, bondholders shorten debt terms and foreign investors press firm managers to act in accordance with maximizing firm value. Choi and Choi (2013) developed a study for Korean companies that corroborated this negative relationship between foreign ownership and debt maturity. The authors add that foreign ownership promotes the convergence between managerial and external shareholder interests, replacing their oversight role with long-term debt.

Results are contradictory according to scarce literature available. However, according to Datta et al. (2005), ownership structure may have a non-linear effect on debt maturity. In our case, the percentage of existing foreign ownership could determine a specific effect on debt maturity. Ezeoha et al. (2008) and Tanaka (2015) argue that foreign ownership has a positive effect on debt maturity, in a study indicating that the percentage of foreign ownership in Nigerian and Japanese firms is 27.80% and 22.30%, respectively. On the contrary, Choi and Choi (2013) point out that foreign participation in Korean firms reaches only 9.07%. In Chile, according to the LBS, foreign ownership in companies reaches 6.87%. These facts lead us to propose the following hypotheses:

- H1: foreign ownership has a negative effect on debt maturity.
- H2: the effect of foreign ownership on debt maturity is non-linear.

2.2. Effects of IFRS adoption on debt maturity

IFRS adoption can have significant effects on capital markets and participants. Decreased levels of information asymmetry and improvements in company transparency are usually attributed to IFRS adoption (Li, 2010; Daske, Hail, Leuz & Verdi, 2008, 2013). IFRS adoption has been more important for external investors than for companies themselves, since it affects their decisions and those of various financial system actors (Bhat et al., 2016). This relevance of IFRS is usually quantified, based on differences that separate it from local accounting criteria in terms of benefits and transparency policies on financial information disclosure (Chaplinsky & Ramchand, 2004; Ding, Hope, Jeanjean & Stolowy, 2007; Bae et al., 2008). Thus, the effects of implementing IFRS would be systemically more relevant for investors as differences

are greater (Sengupta, 1998; Leuz & Verrecchia, 2000; Chen, Chen, Wang & Yao, 2015; Florou & Kosi, 2015).

Barth, Landsman and Lang (2008) and Hail, Leuz and Wysocki (2010) point out that mandatory IFRS adoption provides more detailed and internationally comparable financial information. This quality of regulation is a key factor in assessing investor risks (Dye, 1990; Verrecchia, 2001; Easley & O'Hara, 2004; Frost, 2007; Lambert, Leuz & Verrecchia, 2007; Ball, Bushman & Vasvari, 2008; De Franco, Vasvari & Wittenberg-Moerman, 2009; DeFond, Hu, Hung & Li, 2011). Leuz and Verrecchia (2000) and Chaplinsky and Ramchand (2004) add that these elements have important effects on the debt term contracts, such as cost and maturity, and that they are used to mitigate agency costs between firms and bondholders. International evidence is scarce and has not shown robust results regarding IFRS effects on debt maturity. The complexities imposed by institutional differences of the countries analyzed and the way in which they adopted IFRS could explain the discrepancy in the results.

Some literature has shown that the mandatory adoption of IFRS has a positive effect on debt maturity. Sengupta (1998) and Leuz and Verrecchia (2000) support this result, arguing that the reduction of information asymmetry reduces debt costs, encouraging the issuance of longer-term debt. Florou and Kosi (2008) find a similar result for firms in the United Kingdom, although their results lack significance. Kim et al. (2011), in a study carried out with companies from 40 countries with different legal origins between 1997 and 2005, show that IFRS are positively associated with long-term debt, although adoption has been voluntary. Simmer de Lima et al. (2018) analyzed 122 Brazilian firms, of which 93 adopted IFRS on a mandatory basis and 29 did so voluntarily. Their results show that the positive relationship between mandatory IFRS adoption and debt maturity is due to reductions in information asymmetry reducing investor risks through long-term debt. When adoption is voluntary, similar though more limited effects are found. On this point, the authors argue that mandatory IFRS adoption would have more relevant effects systemically than voluntary adoption, since the latter would be guided only by the willingness of companies to differentiate their quality from those who do not adopt those standards.

Other investigations have found contrary results to those described. Zhang (2008) points out that IFRS adoption imposes a more conservative accounting criterion and discourages discretionary policies aimed at wealth expropriation, which would be negatively correlated with debt maturity. This is supported by other empirical studies as well (Kosi & Florou, 2009; Ball, Xi & Shivakumar, 2014). Chen and Zhu (2013) corroborate this vision and add that IFRS are an effective means to mitigate the effects of the agency problem between firms and the bondholders. This effect may be more pronounced in countries with reduced legal protection for investors (Beneish, Miller & Yohn, 2015) or where IFRS show greater differences in relation to local accounting criteria (Chen et al., 2015).

In Chile there are no studies that have analyzed the relationship between IFRS adoption and debt maturity. Chile is a country governed by civil law, where the limited legal protection offered to investors can mean greater conflicts of interest between firms and debt holders, and have significant effects on debt contract terms. In addition, the fact that regulations are adopted differently by large companies and SMEs requires separating analyses for various reasons, which contrasts the need to reduce information asymmetry and control agency costs. First, the Commission for Financial Markets (CFM) requires large companies to disclose their financial statements on a quarterly basis. In line with Chen and Zhu (2013), this would make the asymmetry of information in large firms less than in SMEs. In addition, its diluted ownership structures and the presence of controlling shareholder would generate higher agency costs. In this case, IFRS could mitigate these costs by promoting a reduction on debt maturity for large companies. Thus, the following hypothesis was formulated:

• H3: mandatory IFRS adoption has a negative effect on the debt maturity of large companies.

Second, SMEs are characterized by more concentrated ownership structures that suggest a more limited effect of agency costs. However, since they are not required to report their financial statements, the degree of information asymmetry that characterizes them is greater. According to Sengupta (1998) and Leuz and Verrecchia (2000), if IFRS adoption helps reduce this information asymmetry, SMEs could access debts with lower financing costs and greater maturity. Therefore, we formulated the following hypothesis:

• H4: mandatory IFRS adoption has a positive effect on SME debt maturity.

Since mandatory IFRS adoption provides more detailed and comparable financial information, the process of assessing risks and firm quality by investors is facilitated (Verrecchia, 2001; Easley & O'Hara, 2004; Lambert et al., 2007; Barth et al., 2008; Hail, 2010). If investors can assess firm quality with greater precision, then this means that information asymmetry is lower as well as the risk of their investment. This translates into a relaxation of debt contract terms, such as cost and maturity (Leuz & Verrecchia, 2000). This could be reinforced if foreign investors become a means of control, disciplining corporate management and allowing firms to access debt in more flexible terms (Tanaka, 2015). This leads us to formulate the following hypotheses:

• H5: mandatory IFRS adoption has a positive effect on debt maturities of companies with high credit quality.
• H6: foreign ownership has a positive effect on debt maturities of high quality companies following IFRS adoption.

3. Methodology

This section presents the data and econometric models used in this research. It has been divided into two parts. The first part details the firm sample and conceptual description of the variables according to empirical evidence. The second

part presents the econometric methodology based on Fractional Response Model.

3.1. Data sample

The data used in this investigation were obtained from the Longitudinal Business Survey (LBS). The information corresponds to the four versions of the database, LBS1, LBS2, LBS3 and LBS4, which report data corresponding to the 2007, 2009, 2013 and 2015 periods, respectively. This survey is prepared by the Ministry of Economy, Development and Tourism in Chile and only reports accounting and business information, but not information related to the stock exchange. The total sample is made up of 20,586 companies. This sample was obtained after eliminating companies with incomplete records from the financial sector. The data were grouped in a cross section of all the surveys because the companies can not be identified (the information was anonymous). The variables are presented in Table 2.

The dependent variable in the investigation is debt maturity (DM) measured by long-term debt to total debt ratio.

Table 2. Variables

Variable		Definition
A. Dependent variable		
DM	Debt maturity	Long-term debt to total debt ratio
B. Ownership structure (OS)		
OS1	Owner/manager	Dummy 1 if the manager is the complete owner and 0 otherwise
OS2	Partner manager	Dummy 1 if the manager is an associate manager and 0 otherwise
MO	Managerial ownership	Equity share of business associate manager
OS3	Outside manager	Dummy 1 if the manager is outsider (non-owner) and 0 otherwise
FOS	Foreign ownership	Percentage of foreign ownership
C. IFRS mandatory adoption		
IFRS$_S$	IFRS SMEs	Dummy equal to 1 since 2013 and 0 otherwise
IFRS$_L$	IFRS Large firms	Dummy equal to 1 since 2009 and 0 otherwise
D. Other control variables		
FQ	Firm quality	Z-Score index
LEV	Leverage	Total debt to equity ratio.
AC	Agency costs	Annual operating expenses to sales ratio
EM	External monitoring	Years extension of relationship with external funders
FP	Firm profitability	Return on assets ratio
GO	Growth opportunities	Annual sales growth
SIZE	Firm size	Natural logarithm of total assets in millions of pesos
ATN	Asset tangibility	Long-term assets to total assets ratio
HD	Holding	Dummy 1 if the firm belongs to business holding and 0 otherwise

Source: own elaboration.

This measurement has been widely suggested by various national and international empirical works (Stohs & Mauer, 1996; Ozkan, 2000, 2002; Azofra, Saona & Vallelado, 2004; Dang, 2011; Muñoz & Sepúlveda, 2016).

Debt maturity is controlled through various measures of ownership structure (OS). Table 2 includes the dummy variables owner/manager ($OS1$), partner/manager ($OS2$), outside/manager ($OS3$) and the percentage of managerial ownership (MO). These variables have been used by several empirical works that attempted to quantify the effects of the separation of control and corporate ownership on debt maturity (Jensen & Meckling, 1976; Ozkan, 2000; Fleming, Heaney & McCosker, 2005; Guney & Ozkan, 2005; Datta et al., 2005; Benmelech, 2006; Harford et al., 2008). In these types of variables we also include the percentage of foreign ownership (FOS) to quantify the potential controlling role of these investors in business management through debt terms (Ezeoha et al., 2008; Choi & Choi, 2013; Tanaka, 2015).

Two dummy variables were used, which consider the differentiated implementation between SMEs and large companies, to control the effects of mandatory IFRS adoption on debt maturity. We defined $IFRS_S$ as a dummy variable with a value of 1 since 2013 and 0 otherwise; while $IFRS_L$ is a dummy variable that takes a value of 1 since 2009 and 0 otherwise. These years mark the periods in which both SMEs and large companies obligatorily adopted the IFRS.

Other control variables suggested by international evidence are also included. Firm credit quality (FQ) is quantified through the Z-Score indicator (Flannery, 1986; Diamond, 1991); leverage (LEV) is used to corroborate whether debt maturity is related to liquidity or underinvestment problems (Johnson, 2003; Barclay, Marx & Smith, 2003; Billet, King & Mauer, 2007; Alcock, Finn & Keng, 2012); agency costs (AC) are used to measure the effect of managerial discretion on the principal-agent conflict (Leland, 1998; Lasfer, 1999; Ang, Cole & Lin, 2000; Fleming et al., 2005). Monitoring by external funders (EM) is used as an external control mechanism for debt maturity (Muñoz and Sepúlveda, 2016); firm profitability (FP) is measured through return on assets (Barclay & Smith, 1995); the annual growth of sales is used to quantify the role of firm growth opportunities (GO) according to several studies (Myers, 1977; Myers & Majluf, 1984; Barclay & Smith, 1995). We also include firm size ($SIZE$), asset tangibility (ATN) and holding company (HD) ownership.

3.2. Econometric method

The fractional response model (FRM) proposed by Papke and Wooldridge (1996) was used to estimate the effects of foreign ownership and IFRS adoption on debt maturity. This model is used both to estimate probabilities and any type of continuous variable that can be represented as a ratio between 0 and 1, as in the case of debt maturity. The model for pooled data considers that this variable is restricted by a logistic distribution estimated by pseudo-likelihood. The empirical model is the following:

$$DM_i = \beta_0 + \beta_1 OS_i + \beta_2(MO_i \times OS2_i) + \beta_3(MO_i^2 \times OS2_i)$$
$$+ \beta_4(FOS_i \times DSIZE_i) + \beta_5(FOS_i^2 \times DSIZE_i) + \beta_6 IFRS_f$$
$$+ \beta_7 FQ_i + \beta_8 FO_i^2 + \beta_9 LEV_i + \beta_{10} AC_i + \beta_{11} EM_i + \beta_{12} FP_i \qquad (1)$$
$$+ \beta_{13} GO_i + \beta_{14} SIZE_i + \beta_{15} ATN_i + \beta_{16} HD_i + \beta_{17} Dyear$$
$$+ \beta_{18} DSector + \varepsilon_i$$

The dependent variable DM_i indicates the debt maturity of firm i. The ownership structure dummy variables (OS_i) are defined according to what is indicated in Table 2. In addition, we include the managerial ownership (MO_i) and foreign ownership (FOS_i), as well as their quadratic level MO_i^2 and FOS_i^2 to evaluate a possible non-monotonous effect of these variables on debt maturity. We use the dummy variable DSIZE, defined in two parallel ways, depending on whether the firm is large or SME. In this way, we control the observable heterogeneity between both types of companies. Note that managerial ownership is incorporated as a control variable only when the manager is a partner (OS2).

The $IFRS_f$ variable has a value of 1 since the year in which companies of size f = (L,S)[1] adopted the regulations and 0 otherwise, according to Table 2. These variables capture the contemporary, systematic and absorbing effect of this regulation on debt terms.

Other control variables based on specific company qualities are also included in the econometric analysis. The firm credit quality (FQ_i) and its square (FQ_i^2), leverage (LEV_i), agency costs (AC_i), monitoring of external financiers (EM_i), firm profitability (FP_i), firm growth opportunities (GO_i), firm size $(SIZE_i)$, asset tangibility (ATN_i) and business holding company ownership (HD_i) constitute these control variables. The estimated model is also controlled by economic sectors (DSector) and temporal variations (Dyear), using dummy variables. Finally, ε_i is a random disturbance.

A second model was constructed to evaluate the effects of foreign ownership and firms with high credit quality since IFRS adoption. The following model was used:

$$DM_i = \beta_0 + \beta_1 OS_i + \beta_2(MO_i \times OS2_i) + \beta_3(MO_i^2 \times OS2_i)$$
$$+ \beta_4(FOS_i \times IFRS_f) + \beta_5(HQ_i \times IFRS_f) + \beta_6 FQ_i$$
$$+ \beta_7 FQ_i^2 + \beta_8 LEV_i + \beta_9 AC_i + \beta_{10} EM_i + \beta_{11} FP_i + \beta_{12} GO_i \qquad (2)$$
$$+ \beta_{13} SIZE_i + \beta_{14} ATN_i + \beta_{15} HD_i + \beta_{16} Dyear$$
$$+ \beta_{17} DSector + \varepsilon_i$$

The model (2) includes several interactive variables of interest for research. The variable $(FOS_i \times IFRS_f)$ measures the effect of foreign ownership on debt maturity since size f = (L,S) firms obligatorily adopted IFRS, while the variable $(HQ_i \times IFRS_f)$ measures the interactive effect of IFRS on firms with high credit quality, HQ_i being a dummy variable which adopts the value 1 when the Z-Score of firm i is above the average of its sector and of its respective survey. The other control variables are defined identically to model 1.

A third model was developed to assess the effects of foreign ownership on debt maturity in firms with high credit quality, which adopted $IFRS$:

$$DM_i = \beta_0 + \beta_1 OS_i + \beta_2(MO_i \times OS2_i) + \beta_3(MO_i^2 \times OS2_i)$$
$$+ \beta_4(HQ_i \times FOS_i \times IFRS_f) + \beta_5 FQ_i + \beta_6 FQ_i^2$$
$$+ \beta_7 LEV_i + \beta_8 AC_i + \beta_9 EM_i + \beta_{10} FP_i + \beta_{11} GO_i \qquad (3)$$
$$+ \beta_{12} SIZE_i + \beta_{13} ATN_i + \beta_{14} HD_i + \beta_{15} Dyear$$
$$+ \beta_{16} DSector + \varepsilon_i$$

Where $(HQ_i \times FOS_i \times IFRS_f)$ is an interactive variable that measures the effect of foreign ownership on debt maturity since firms of size f = (L,S) and with high credit quality adopted IFRS. The other control variables are defined as in models (1) and (2).

4. Results

This section presents the empirical results of this research. It has also been divided into two parts. The first part presents the statistical analysis of the sample. The second part shows the effects of foreign ownership and IFRS adoption on debt maturity according to econometric model results.

4.1. Sample description

Table 3 presents the descriptive statistics of the sample. It is important to note that the results of each period are not strictly comparable due to differences in firm sizes used in the sample frame of each survey, and the fact that firms do not necessarily repeat from one sample to another.

It can be seen that the debt maturities of the companies included in the sample increased between 2007 and 2015. Long-term financing increased from 16.63% in 2007 to 22.72% of the total corporate debt in 2015. In any case, and despite the increase in debt maturity, short-term financing continues to be the most relevant in debt composition. Moreover, we observed that the debt-to-equity ratio also increased, evidencing the predominance of debt over the issuance of capital as a source of financing. In addition, the increase in years of commercial relationships with external funders, from 12.82 years in 2007 to 18.17 years in 2015, is consistent with the debt term structure.

The longer term of the observed debt also correlates with asset maturity. In 2007, 28.56% of company assets corresponded to long-term investments, increasing to 35.15% in 2015. This reveals that companies match financing maturities and those of their investments. Another fact that is interesting and common in countries governed by civil law (such as Chile), is the growing proportion of companies belonging to business holdings, increasing from 13.57% to 31.69% in the same period.

Information concerning ownership structure shows results that agree with the growing use of long-term debt. The reduction observed in the percentage of companies managed by their owner between 2007 and 2015 is proportional to the increase in the number of companies managed by an external manager and the reduction of managerial ownership. In addition, it can be seen that in the same comparative period, foreign ownership in Chilean companies increased from 3.75% to 9.20%.

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[1] L and S refer to large and SMEs firms, respectively.

Finally, we observe that, on average, Chilean firms have a low probability of bankruptcy given the figures from the Z-Score indicator. However, the growing evolution of agency costs and progressive reduction of growth opportunities are consistent with the greater long-term debt use and ownership dilution observed in the sample over the periods studied.

4.2. Effects of foreign ownership and IFRS adoption

IFRS adoption may not only affect the debt maturity of Chilean companies, but may also condition the role of foreign ownership and credit quality. Table 4 shows the results of the Wilcoxon test applied to large companies and SMEs, comparing the situation based on IFRS adoption. As seen for large firms, after the mandatory IFRS adoption long-term debt was reduced from 28.50% to 25.89%. In addition, there were significant decreases in foreign investor participation in corporate ownership and company credit quality. The opposite occurred for SMEs. Debt maturity, foreign owner-ship and credit quality of these companies increased after IFRS adoption. This result indicates that IFRS adoption corrects information asymmetries associated with firm quality. This correction also modifies the presence of foreign

investors in company ownership. These results initially support the view that IFRS adoption can help differentiate firm quality and allows foreign investors to make better investment decisions.

Tables 5 and 6 show the three specifications of the fractional response model and their marginal effects. Dummy variables *DSIZE* and *IFRS* are defined for SMEs in table 5, while table 6 defines these variables for large firms. In both tables it can be seen that some control variables show expected effects according to empirical evidence. Firm characteristics such as credit quality (Flannery, 1986; Diamond, 1991), profitability (Barclay & Smith, 1995), external monitoring (Muñoz & Sepúlveda, 2016) and corporate holdings are factors that have a negative and significant impact on debt maturity. Therefore, firms with high credit quality (low risk) and greater profitability issue short-term debt. External monitoring and the creation of internal capital markets through corporate holdings also promote shorter term financing. This is relevant to the effects of firm credit quality. Although there is a negative effect on debt maturity, the observed nonlinearity suggests that firms with high credit quality prefer long-term debt. Other common results in both tables show that firm size (Benmelech, 2006; Alcock

Table 3. Descriptive statistics

Variable		2007		2009		2013		2015	
		Mean	S.D.	Mean	S.D.	Mean	S.D.	Mean	S.D.
A. Dependent variable									
DM	Debt maturity (%)	16.63	28.81	17.01	28.16	19.72	28.96	22.72	30.25
B. Ownership structure (OS)									
OS1	Owner/manager (%)	35.71	49.60	21.64	41.21	18.15	38.54	12.51	33.09
OS2	Business associated manager (%)	38.04	48.66	41.05	49.29	36.63	48.18	29.67	45.68
MO	Managerial ownership (%)	52.58	28.29	50.80	27.94	35.45	41.43	26.47	38.46
OS3	Outside manager (%)	27.23	45.85	38.29	47.47	45.19	49.77	57.80	49.39
FOS	Foreign ownership (%)	3.75	18.40	5.98	22.95	8.54	27.07	9.20	27.96
C. Other control variables									
FQ	Firm quality (value)	5.74	5.21	3.59	3.25	3.74	4.19	6.90	3.97
LEV	Leverage (ratio)	1.45	2.14	1.52	2.13	2.09	2.56	3.88	4.06
AC	Agency costs (%)	11.38	15.74	24.50	21.12	17.75	18.30	20.15	20.81
EM	External monitoring (years)	12.82	12.54	12.65	10.16	16.34	11.56	18.17	13.98
FP	Firm profitability (%)	13.15	21.11	11.91	8.18	9.29	10.40	12.86	6.71
GO	Growth opportunities (%)	22.83	30.68	14.90	33.86	16.78	31.49	11.06	32.47
SIZE	Firm size	20.44	338.40	150.15	816.12	168.40	683.46	177.83	646.02
ATN	Asset tangibility (%)	28.56	27.62	29.31	26.67	22.65	26.05	35.15	39.94
HD	Holding (%)	13.57	34.25	21.52	41.10	29.37	45.55	31.69	46.53

Source: own elaboration.

Table 4. Wilcoxon test across mandatory IFRS adoption.

Variable	IFRS adoption in large firms			IFRS adoption in SMEs		
	Before	After	z-statistics	Before	After	z-statistics
Debt maturity (%)	28.50	25.89	(-2.32)***	13.74	20.14	(16.67)***
Foreign ownership share (%)	18.40	13.71	(-3.47)***	2.39	7.84	(21.24)***
Firm quality	3.17	2.30	(-7.12)***	5.71	8.43	(2.04)***

***, **, * indicate statistical significance at 1%, 5% and 10%, respectively.

Source: own elaboration

Table 5. FRM for debt maturity in Chilean SMEs, marginal effects.

Variable	Dependent variable: debt maturity measured by long-term debt to total debt ratio								
	Model (1)			Model (2)			Model (3)		
Ownership structure variables									
OS1	-0.0121			-0.0113			-0.0117		
	(-2.29)**			(-2.17)**			(-2.23)**		
OS2		0.0097			0.0091			0.0106	
		(1.76)*			(1.94)*			(1.75)*	
MO		0.0989			0.0992			0.0999	
		(2.58)***			(2.57)***			(2.68)***	
MO^2		-0.0798			-0.0803			-0.0802	
		(-2.16)**			(-2.22)**			(-2.18)**	
OS3			0.0108			0.0094			0.0114
			(2.08)**			(1.81)*			(2.20)**
Foreign ownership and IFRS mandatory adoption in SMEs									
FOS × SMEs	-0.1528	-0.1447	-0.1495						
	(-1.67)*	(-2.18)**	(-1.83)*						
FOS^2 × SMEs	0.1483	0.1447	0.1474						
	(1.77)*	(1.84)*	(1.97)**						
FOS critical value	51.52%	50.01%	50.71%						
IFRSS	0.0223	0.0259	0.0246						
	(2.54)**	(2.63)***	(3.16)***						
FOS×IFRSS				-0.0395	-0.0361	-0.0371			
				(-3.23)***	(-2.93)***	(-3.01)***			
HQ×IFRSS				0.0170	0.0185	0.0172			
				(1.98)**	(2.02)**	(2.88)***			
HQ× FOS×IFRSS							0.0116	0.0181	0.0151
							(2.48)**	(2.75)***	(2.63)***
Other control variables									
FQ	-0.0054	-0.0053	-0.0055	-0.0057	-0.0059	-0.0061	-0.0055	-0.0056	-0.0058
	(-3.75)***	(-3.74)***	(-3.74)***	(-3.79)***	(-3.78)***	(-3.78)***	(-3.77)***	(-3.77)***	(-3.76)***
FQ^2	0.0001	0.0001	0.0001	0.0001	0.0002	0.0001	0.0002	0.0001	0.0001
	(2.07)**	(2.11)**	(2.07)**	(2.18)**	(2.20)**	(2.18)**	(2.10)**	(2.13)**	(2.10)**
LEV	0.0030	0.0031	0.0030	0.0029	0.0030	0.0030	0.0030	0.0032	0.0031
	(0.50)	(0.50)	(0.50)	(0.49)	(0.49)	(0.49)	(0.50)	(0.50)	(0.50)
AC	-0.0082	-0.0068	-0.0073	-0.0060	-0.0047	-0.0053	-0.0085	-0.0069	-0.0075
	(-0.63)	(-0.53)	(-0.57)	(-0.47)	(-0.37)	(-0.41)	(-0.65)	(-0.53)	(-0.57)
EM	-0.0009	-0.0009	-0.0011	-0.0008	-0.0007	-0.0008	-0.0011	-0.0009	-0.0010
	(-3.23)***	(-3.23)***	(-3.24)***	(-3.25)***	(-3.26)***	(-3.25)***	(-3.21)***	(-3.22)***	(-3.22)***
FP	-0.0809	-0.0847	-0.0832	-0.0815	-0.0854	-0.0835	-0.0804	-0.0845	-0.0828
	(-4.79)***	(-5.02)***	(-4.94)***	(-4.84)***	(-5.07)***	(-4.96)***	(-4.77)***	(-5.02)***	(-4.93)***
GO	-0.0002	-0.0003	-0.0001	-0.0001	-0.0002	-0.0002	-0.0001	-0.0001	-0.0002
	(-0.77)	(-0.75)	(-0.75)	(-0.79)	(-0.74)	(-0.81)	(-0.76)	(-0.79)	(-0.74)
SIZE	0.0220	0.0237	0.0229	0.0224	0.0240	0.0231	0.0223	0.0239	0.0234
	(16.84)***	(17.80)***	(17.73)***	(17.09)***	(18.00)***	(17.87)***	(16.85)***	(17.81)***	(17.71)***
ATN	0.2389	0.2380	0.2386	0.2375	0.2366	0.2373	0.2393	0.2383	0.2389
	(26.13)***	(26.10)***	(26.06)***	(26.04)***	(25.99)***	(25.97)***	(26.39)***	(26.33)***	(26.30)***
HD	-0.0178	-0.0128	-0.0149	-0.0170	-0.0124	-0.0144	-0.0183	-0.0130	-0.0151

Table 5. FRM for debt maturity in Chilean SMEs, marginal effects. (continuation)

	(-3.30)***	(-2.29)**	(-2.69)***	(-3.17)***	(-2.22)**	(-2.61)***	(-3.41)***	(-2.32)**	(-2.73)***
Observations	20586	20586	20586	20586	20586	20586	20586	20586	20586
Dummy sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***, **, * indicate statistical significance at 1%, 5% and 10%, respectively.

Source: own elaboration.

Table 6. FRM for debt maturity in Chilean Large firms, marginal effects.

Variable	Dependent variable: Debt maturity measured by long-term debt to total debt ratio								
	Model (1)			Model (2)			Model (3)		
Ownership structure variables									
OS1	-0.0009			-0.0013			-0.0017		
	(-0.13)			(-0.18)			(-0.23)		
OS2		0.0071			0.0073			0.0059	
		(1.94)*			(1.97)*			(1.78)*	
MO		0.0998			0.0989			0.0990	
		(2.60)***			(2.58)***			(2.64)***	
MO^2		-0.0804			-0.0811			-0.0797	
		(-2.17)**			(-2.26)**			(-2.15)**	
OS3			0.0099			0.0091			0.0109
			(1.92)*			(1.76)*			(2.11)**
Foreign ownership and IFRS mandatory adoption in large firms									
FOS × Large	-0.0910	-0.0892	-0.0903						
	(-2.39)**	(-2.40)**	(-2.47)**						
FOS^2 × Large	0.0749	0.0687	0.0729						
	(2.06)**	(2.02)**	(2.03)**						
FOS critical value	60.75%	64.91%	61.93%						
$IFRS_L$	-0.0302	-0.0273	-0.0234						
	(-2.52)**	(-2.61)***	(-2.77)***						
$FOS×IFRS_L$				-0.0349	-0.0313	-0.0325			
				(-3.50)***	(-3.10)***	(-3.22)***			
$HQ×IFRS_L$				0.0179	0.0184	0.0177			
				(1.77)*	(1.88)*	(1.81)*			
$HQ× FOS×IFRS_L$							-0.0201	-0.0164	-0.0175
							(-2.19)**	(-1.97)**	(-2.03)**
Other control variables									
FQ	-0.0053	-0.0052	-0.0052	-0.0052	-0.0051	-0.0051	-0.0054	-0.0053	-0.0053
	(-3.70)***	(-3.68)***	(-3.69)***	(-3.61)***	(-3.58)***	(-3.60)***	(-3.75)***	(-3.73)***	(-3.73)***
FQ^2	0.0001	0.0001	0.0001	0.0001	0.0001	0.0001	0.0003	0.0001	0.0003
	(2.05)**	(2.07)**	(2.05)**	(1.96)**	(1.96)**	(1.94)*	(2.08)**	(2.10)**	(2.07)**
LEV	0.0030	0.0030	0.0030	0.0029	0.0030	0.0030	0.0030	0.0030	0.0030
	(0.49)	(0.50)	(0.50)	(0.47)	(0.50)	(0.49)	(0.50)	(0.50)	(0.50)
AC	-0.0075	-0.0061	-0.0066	-0.0058	-0.0045	-0.0051	-0.0084	-0.0069	-0.0074
	(-0.58)	(-0.47)	(-0.51)	(-0.45)	(-0.35)	(-0.40)	(-0.65)	(-0.53)	(-0.57)
EM	-0.0009	-0.0012	-0.0008	-0.0011	-0.0007	-0.0010	-0.0009	-0.0009	-0.0009
	(-3.25)***	(-3.31)***	(-3.25)***	(-3.28)***	(-3.29)***	(-3.29)***	(-3.22)***	(-3.23)***	(-3.23)***
FP	-0.0803	-0.0843	-0.0823	-0.0801	-0.0838	-0.0819	-0.0808	-0.0848	-0.0831
	(-4.75)***	(-4.99)***	(-4.88)***	(-4.73)***	(-4.96)***	(-4.85)***	(-4.79)***	(-5.03)***	(-4.94)***

Table 6. FRM for debt maturity in Chilean Large firms, marginal effects. (continuation)

GO	-0.0003	-0.0001	-0.0001	-0.0002	-0.0001	-0.0001	-0.0003	-0.0002	-0.0000
	(-0.76)	(-0.81)	(-0.86)	(-0.79)	(-0.77)	(-0.77)	(-0.77)	(-0.75)	(-0.69)
SIZE	0.0227	0.0243	0.0234	0.0220	0.0235	0.0227	0.0221	0.0238	0.0230
	(16.96)***	(17.87)***	(18.17)***	(16.27)***	(17.16)***	(16.99)***	(16.85)***	(17.78)***	(17.69)***
ATN	0.2388	0.2377	0.2385	0.2372	0.2363	0.2370	0.2392	0.2381	0.2388
	(26.33)***	(26.26)***	(26.26)***	(26.02)***	(25.98)***	(25.96)***	(26.42)***	(26.35)***	(26.33)***
HD	-0.0171	-0.0123	-0.0144	-0.0166	-0.0121	-0.0141	-0.0178	-0.0127	-0.0148
	(-3.19)***	(-2.20)**	(-2.60)***	(-3.08)***	(-2.16)**	(-2.59)***	(-3.32)***	(-2.27)**	(-2.68)***
Observations	20586	20586	20586	20586	20586	20586	20586	20586	20586
Dummy sector	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes
Dummy year	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes	Yes

***, **, * indicate statistical significance at 1%, 5% and 10%, respectively.

Source: own elaboration.

et al., 2012) and asset tangibility (Stohs & Mauer, 1996) have a positive impact on debt maturity.

Foreign ownership is relevant to debt maturity. The variable *FOS* indicates a negative and significant effect, which validates hypothesis H1. This result initially agrees with Choi and Choi (2013), in that foreign ownership generates convergence between managerial and foreign shareholder interests. In addition, foreign ownership exercises a supervisory role that can be substituted with the issuance of long-term debt. However, this relationship is non-linear, which supports hypothesis H2. The U shaped relation indicates that when foreign ownership is high, the negative effect is reversed and the emission of long-term debt is promoted in its place. For this, foreign ownership should be over 50% and 60% in SMEs and large companies respectively (see tables 5 and 6). On this threshold value, foreign ownership constitutes a means of complementary long-term debt control (Ezeoha et al., 2008; Tanaka, 2015).

IFRS have significant effects on debt maturity. However, these effects vary according to firm size. Table 5 indicates that mandatory IFRS adoption increases SME debt maturities, validating hypothesis H4. This result is in line with several international studies (Leuz & Verrecchia, 2000; Florou & Kosi, 2008; Kim et al., 2011; Simmer de Lima et al., 2018). Given that SMEs are characterized by a greater degree of information asymmetry, IFRS adoption exerts an effect that would transform the dissipation of said asymmetries into lower financing costs, encouraging the use of long-term debt. Table 6 shows that IFRS adoption has the opposite effect on large companies. This result supports hypothesis H3 and agrees with other empirical evidence (Zhang, 2008; Kosi & Florou, 2009; Ball et al., 2014; Chen & Zhu, 2013). Although large firms disclose financial information to the market, potential firm agency problems with investors make IFRS adoption an effective means to control them through the issuance of short-term debt. This is relevant for Chilean companies, since weak legal protections for investors can be partially compensated with the adoption of these standards.

Tables 5 and 6 show that variable ($FOS_i \times IFRS_f$) has a negative and significant effect on debt maturity. This result shows that the substitute control effect of foreign ownership prevails over debt maturity, even when firms of size f = (L, S) have obligatorily adopted IFRS. Although IFRS adoption translates into the disclosure of more detailed, comparable and transparent financial information, foreign owners consider this regulation as a means to reinforce their control through the issuance of short-term debt. On the other hand, the variable ($HQ_i \times IFRS_f$) indicates a positive and significant effect on debt maturity, which validates hypothesis H5. IFRS adoption promotes long-term debt when firms of size f = (L,S) have a high credit quality. This is complemented by the non-linear effect of firm credit quality (*FQ*) on debt maturity. Thus, mandatory IFRS adoption has a mitigating effect on information asymmetry, which is more pronounced in firms with high credit quality.

Finally, table 5 shows that the variable ($HQ_i \times FOS_i \times IFRS_f$) has a positive and significant effect on SMEs, supporting hypothesis H6. This result indicates that when foreign ownership increases in high-quality companies that adopt IFRS, debt maturities increase significantly. Foreign investors associate firm quality and IFRS adoption with lower levels of information asymmetry in SMEs and issue longer-term debt as a monitoring mechanism. This is related to growing foreign ownership. On the other hand, table 6 shows that this variable has the opposite effect, in which the substitute control role of foreign ownership predominates. This last result in large firms contradicts hypothesis H6.

5. Conclusions

Debt maturity is a topic of recurrent analysis in corporate finance, mainly due to its scope on corporate control. Recently, new factors have influenced debt maturity decisions, opening new topics for debate and discussion.

Growing trade liberalization in Chile over the last two decades and the strengthening of its institutional framework and regulations have been fundamental pillars for increased foreign direct investments. In addition, recent mandatory IFRS adoption by large companies and SMEs in Chile has allowed the disclosure of more reliable, transparent and comparable financial information. These elements can have relevant effects on debt maturity decisions in Chilean

companies, establishing a new research focus for this market. Furthermore, such effects are vital for debt maturity decisions by various investors, as well as how to determine the companies in which they should invest.

We analyzed the effects of foreign ownership and mandatory IFRS adoption on the debt maturity of Chilean companies. The contributions of our work and its implications for discussion are summarized in three aspects. First, our results indicate that foreign ownership has a negative and non-linear (U-shaped) effect on debt maturity. The negative relationship is observable for low foreign ownership levels, in which this type of ownership could exercise a substitute control effect with long-term debt. Chilean firms are characterized by low foreign ownership levels, which open spaces for wealth expropriation. Therefore, this negative relationship helps to reduce such spaces and promotes the convergence of firm and foreign owner interests through short-term debt issuance. This result becomes more relevant if we consider that Chile offers limited legal protection to non-controlling investors. In any case, when foreign ownership exceeds 50% in SMEs and 60% in large companies, the previous effect is reversed and becomes positive. Based on these threshold values, foreign investors take control of companies, complementing and prolonging their monitoring role through the issuance of long-term debt.

Second, mandatory IFRS adoption has significant effects on debt maturity, although these effects vary according to firm size. Debt maturity is reduced in large firms due to mandatory IFRS adoption, while in SMEs it increases. Our results suggest that the benefits of IFRS adoption (reducing information asymmetry and mitigating agency problems between investors and firms) are valued differently by these types of companies. Adoption by SMEs, which do not disclose financial information, reduces information asymmetries, allowing them to access longer-term debt. For large firms, agency problems are proportionally more relevant than information asymmetry, and therefore IFRS adoption is a means to mitigate them through short-term debt.

Third, even when firms have adopted the IFRS, foreign ownership maintains a negative effect on debt maturity. This result suggests that the perception of potential agency conflicts is relevant. However, when firms are distinguished according to their credit quality, it is observed that IFRS adoption promotes long-term debt. This indicates that IFRS adoption and the possibility of distinguishing firm credit quality is a sign of lower information asymmetry. This is valued by foreign investors in SMEs and is positively related to long-term debt. These findings confirm that, since the mandatory adoption of IFRS, foreign owners facilitate long-term debt in SMEs with high credit quality. On the contrary, the largest agency conflicts perceived in large firms require issuing short-term debt, regardless of firm credit quality. These results contribute establishing parameters to investors regarding the type of firms in which to invest, and how they should influence corporate decisions.

Our research has important implications for investors and regulators. For investors and owners, our work provides an empirical base allowing them to identify firms' specific qualities for finance policy design, mainly in relation to size, credit quality and foreign ownership level. For regulators, it provides evidence of the relevance of the adoption of IFRS in debt maturity policy design, and how its application contributes differently to controlling risk factors such as agency costs and information asymmetry. Furthermore, our research provides evidence that supports policy design facilitating foreign investment in Chile, which may then establish or strengthen corporate control mechanisms.

Given the relevance of the IFRS and foreign ownership, it is important to extend this research into the potential effects of this standard on the corporate profit management of Chilean firms. The possibility of manipulating accounting information is a new focus of analysis and the role of foreign owners and the IFRS can be important regarding discretionary practices. Considering the weak legal protection offered by Chile's institutional environment, the authors of this paper consider this an excellent avenue for further studies to explore.

Conflict of interest

The authors declare no conflict of interest.

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Journal of Management and Economics for Iberoamerica

Artículo de investigación

Emprendimiento empresarial y crecimiento económico en Perú

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Resumen

Este artículo tiene como objetivo determinar la influencia del emprendimiento empresarial sobre el crecimiento económico en Perú. Para ello, con información correspondiente al período 2007-2017 y 24 departamentos peruanos existentes, se efectuaron regresiones múltiples de modelos econométricos irrestrictos y restrictos utilizando el método de los Mínimos Cuadrados Ordinarios. El resultado del modelo restricto, elegido como el mejor mediante el test estadístico del logaritmo de verosimilitud, indica que por cada incremento de 1% en el número de empresas, la tasa de crecimiento del Producto Interno Bruto per cápita departamental aumenta aproximadamente en 0,68%. Esta investigación proporciona una gran evidencia empírica sobre la importancia del emprendimiento de empresas para el logro de una mayor tasa y homogeneidad departamental en el crecimiento económico.

Palabras clave: crecimiento económico, emprendimiento empresarial, Perú.

Business entrepreneurship and economic growth in Peru

Abstract

This article aims to determine the influence of entrepreneurship on Peru's economic growth. Comprehensive data on the 24 Peruvian departments regarding the 2007-2017 period was used to develop restricted and unrestricted econometric models by using the Ordinary Least Squares multiple regression method. The result of the restricted model, chosen as the best according to likelihood-ratio tests, indicates that for every 1% increase in the number of companies, the growth rate of the departmental gross domestic product per capita increases approximately by 0.68%. This research provides great empirical evidence on the importance of business entrepreneurship in order to achieve higher rates of departmental economic growth and homogeneity.

Keywords: economic growth, business entrepreneurship, Peru.

Empreendedorismo e crescimento econômico no Peru

Resumo

Este artigo tem como objetivo determinar a influência do empreendedorismo no crescimento econômico do Peru. Para isso, com informações correspondentes ao período 2007-2017 e de 24 departamentos peruanos existentes, foram realizadas várias regressões de modelos econométricos irrestritos e restritos usando o método dos Mínimos Quadrados Ordinários. O resultado do modelo restrito, escolhido como o melhor por meio do teste estatístico do logaritmo de probabilidade, indica que, para cada aumento de 1% no número de empresas, a taxa de crescimento do Produto Interno Bruto por capita departamental aumenta aproximadamente 0,68 %. Esta pesquisa fornece grandes evidências empíricas sobre a importância do empreendedorismo empresarial para alcançar uma taxa mais alta e homogeneidade departamental no crescimento econômico.

Palavras-chave: crescimento econômico, empreendedorismo, Peru.

UNIVERSIDAD ICESI

1. Introducción

En el período 2009-2017, la tasa de crecimiento del Producto Interno Bruto (PIB) del Perú se ubicó por encima de la media de los países latinoamericanos (Comisión Económica para América Latina y el Caribe - CEPAL, 2018). Sin embargo, la evolución de la actividad productiva de los departamentos peruanos mostró grandes diferencias. Por ejemplo, según el Instituto Nacional de Estadística e Informática – INEI (2018a), en el citado período, la tasa de crecimiento acumulada del PIB fue de 248,1% en el departamento de Apurímac y de -2,8% en Pasco.

El comportamiento muy heterogéneo en el crecimiento del PIB por departamento se produjo en un escenario en el cual Perú se ubica entre los países con la más alta tasa de emprendimiento empresarial en el mundo y con tendencia a un mayor posicionamiento. Así, según el reporte anual de Global Entrepreneurship Monitor (GEM), en el año 2018, Perú ocupó el segundo lugar en la tasa de emprendedores nacientes y el tercero en la tasa de emprendimiento en etapa temprana (TEA). En el caso de la TEA, pasó del noveno lugar con 22,2% en el año 2015, al tercer lugar con 24,6% en el 2018 (GEM, 2018).

A su vez, este dinamismo de la creación empresarial muestra una gran heterogeneidad entre los departamentos. Por ejemplo, en el cuarto trimestre del año 2017, respecto al cuarto trimestre del 2016, el emprendimiento de nuevas empresas aumentó en 38,7% en el departamento de Apurímac, en tanto que cayó en 14,7% en Ayacucho (INEI, 2018b).

Lo anterior permite formular una interrogante de investigación sobre la posible asociación entre las grandes diferencias mostradas en el ritmo de creación de empresas y el crecimiento económico de los departamentos peruanos; es decir, si a una mayor tasa de emprendimiento empresarial corresponde una mayor tasa de crecimiento económico departamental.

En la literatura teórica internacional se pueden hallar estudios que indican la existencia de una relación causal entre el emprendimiento empresarial y el crecimiento económico. Así, Audretsch (2007) –al igual que Acs, Audretsch, Braunerhjelm y Carlsson (2012)- sostiene que el capital emprendedor es un factor muy importante que posibilita el crecimiento económico, en tanto que es un canal que permite propagar, comercializar y difundir los conocimientos. Galindo y Méndez (2011) consideran que la relación entre el emprendimiento y el crecimiento económico es muy obvia, debido a que, para tener un crecimiento sostenido, tiene que haber personas que arriesgando sus recursos estén dispuestos a producir bienes y servicios eficientemente, y así contribuir al incremento de la productividad. En la misma línea, Carree y Thurik (2010) puntualizan que los empresarios son agentes innovadores que perciben oportunidades y asumen riesgos en un contexto de incertidumbre.

El papel del emprendimiento en el crecimiento económico fue inicialmente explicitado y fundamentado por Schumpeter (1983), argumentando que el emprendedor innovador y disruptivo era el motor del crecimiento. Pero Schmitz (1989) señala que los empresarios imitadores también son claves para el crecimiento de la productividad y la producción en el largo plazo. De ahí que Minniti (2012) concluye que no es posible que haya crecimiento económico sostenido sino está basado en el emprendimiento empresarial. En este sentido, Toma, Grigore y Marinescu (2014) llegan a afirmar que el emprendimiento es un determinante importante no sólo del crecimiento económico, sino también del desarrollo económico.

Pese a que en el ámbito internacional abundan investigaciones empíricas que muestran de manera contundente que el emprendimiento empresarial tiene una gran influencia sobre el crecimiento económico (Smith, 2010; Berthold y Grundler, 2012; Raoofi, Afghah y Hoshyar, 2014; Lundin, 2015; Acs, Estrin, Mickiewicz y Szerb, 2018; entre otros), en Perú no existen estudios de ningún tipo al respecto. Por ello, el objetivo de este artículo consiste en determinar econométricamente la influencia del emprendimiento empresarial sobre el crecimiento económico de los departamentos peruanos. Se desea saber hasta qué punto el ritmo y las diferencias mostradas en las tasas de crecimiento departamentales son explicadas por la actividad emprendedora.

Para cumplir con el objetivo propuesto se efectuaron regresiones estadísticas múltiples de un modelo econométrico, en el que se consideró a la tasa de crecimiento anual del PIB per cápita departamental como variable dependiente, y a la tasa de crecimiento del número de empresas como variable explicativa. En la medida en que el crecimiento económico no depende sólo del emprendimiento empresarial, también se consideraron un conjunto de variables independientes relevantes en la condición de variables de control.

Con información de una versión simple de datos de panel con 48 observaciones, correspondiente a 24 departamentos y el promedio anual para los períodos 2007-2012 y 2013-2017, se efectuaron estimaciones estadísticas utilizando el método de los Mínimos Cuadrados Ordinarios. La regresión estadística del mejor modelo final (modelo restricto) permitió hallar un estimador –que mide el grado de influencia del emprendimiento empresarial sobre el crecimiento económico- robusto, insesgado y eficiente, debido a que no se encontraron problemas de autocorrelación, heterocedasticidad, multicolinealidad y no normalidad en la distribución de residuos.

La estructura del artículo comprende 5 secciones: la primera corresponde a la presente introducción; en la segunda sección se efectúa una revisión de la literatura empírica y se incluye la formulación de un modelo teórico que relaciona el emprendimiento empresarial con el crecimiento económico; en la tercera, se especifica el aspecto metodológico; en la cuarta, se presentan los resultados de las regresiones econométricas y el análisis correspondiente; y en la quinta, se exponen las conclusiones.

2. Revisión de literatura y modelo teórico

En este apartado, previa revisión de la literatura empírica relevante, se formula un modelo teórico que

especifica y fundamenta la relación causal existente entre el emprendimiento empresarial y el crecimiento económico.

2.1. Antecedentes empíricos

En el ámbito internacional, se cuenta con estudios empíricos tanto a nivel de grupos de países como también de las regiones de un país.

Por ejemplo, a nivel de grupo de países, Smith (2010), considerando una muestra de 77 países y utilizando como indicador del emprendimiento empresarial la tasa de entrada de negocios, halló que el emprendimiento tenía efectos positivos y muy significativos sobre el crecimiento económico. Resultados similares fueron encontrados por Acs et al. (2018) y Berthold y Grundler (2012) para una muestra de 46 y 188 países, respectivamente.

Asimismo, también para una muestra de un grupo de países, Raoofi et al. (2014) -controlando el efecto del gasto del gobierno, la inflación, la matrícula de estudiantes y la apertura comercial-, encontraron que el emprendimiento tenía una gran influencia sobre el crecimiento económico. Lundin (2015) halló que el emprendimiento influía de manera positiva sobre el crecimiento económico ya sea en términos tanto del PIB como del ingreso de los hogares. El estudio de Stam, Suddle, Hessels, Jolanda y Van-Stel (2007) concluyó que el impacto del emprendimiento empresarial sobre el crecimiento económico es mayor en tanto los empresarios son más ambiciosos. Amaghouss e Ibourk (2013) determinaron que el crecimiento económico está influenciado básicamente por aquella actividad emprendedora de alto nivel de innovación y en contextos institucionales favorables.

Suelen distinguirse dos tipos de emprendimiento: por necesidad y por oportunidad. En ese sentido, Peterson y Valliere (2008), en un estudio que comprendió 18 países europeos, China y Estados Unidos de Norteamérica, encontraron que ambos tipos de emprendimiento explicaban el crecimiento económico, pero el mayor impacto se debía al emprendimiento por oportunidad relacionado a la infraestructura de la comercialización y la innovación. Aparicio, Urbano y Audretsch (2016), en un trabajo con datos de panel que abarcó 43 países, también especificaron que la actividad de emprendimiento por oportunidad tenía un efecto positivo sobre el crecimiento económico, especialmente en los países latinoamericanos.

Ho, Wong y Autio (2005) estimaron la influencia de la actividad empresarial sobre el crecimiento económico para una muestra de 37 países considerando cuatro indicadores de emprendimiento: actividad empresarial total, por necesidad, por oportunidad y de alto potencial de crecimiento. La regresión econométrica efectuada arrojó que solo la actividad emprendedora de alto potencial de crecimiento mostraba significancia estadística, de modo que el crecimiento se debía fundamentalmente a la presencia de nuevas empresas de rápida expansión.

El impacto del emprendimiento sobre el crecimiento puede ser diferente según el estado de desarrollo de los países. Por ejemplo, Lepojevic, Djukic y Mladenovic (2016), en una investigación que incluyó 8 países en desarrollo y 14 países desarrollados, llegaron a la conclusión de que el emprendimiento empresarial tenía efectos solo sobre el crecimiento del PIB de los países desarrollados; así, de los indicadores de emprendimiento por necesidad, por oportunidad y de alta expectativa utilizados, los dos últimos mostraban el mayor impacto. En el mismo sentido, Valliere y Peterson (2009), considerando un grupo de 44 países, hallaron que los empresarios de altas expectativas contribuían de manera significativa al crecimiento económico de los países desarrollados, más no de los países emergentes. El estudio de Orozco y Arraut (2017) arrojó que la actividad de los empresarios ambiciosos o de altas expectativas de crecimiento (que se hallan en la etapa inicial de la creación de negocios) tenían una mayor influencia sobre el crecimiento de los países incluidos en la etapa de desarrollo impulsados por la innovación que de aquellos impulsados por la eficiencia.

El efecto del emprendimiento empresarial sobre el crecimiento puede diferir en función al nivel de ingreso de los países. Así, Stam y Van-Stel (2009), para una muestra de 36 países, hallaron que el espíritu empresarial no generaba impactos sobre el crecimiento de los países de bajos ingresos, en tanto que la contribución era significativa en el caso de los países de altos ingresos. Asimismo, Van-Stel, Carree y Thurik (2005) encontraron que el efecto positivo tendía a ser mayor en la medida en que los países mostraban mayores niveles de ingreso per cápita. Sin embargo, la relación no era lineal, ya que los países pobres presentaban una causalidad inversa, la misma que se explicaría, entre otros factores, por la relativa baja productividad de los empresarios.

De igual modo, la investigación de Plehn-Dujowich y Li (2008) arrojó como resultado que la relación entre el emprendimiento y el crecimiento económico no es necesariamente lineal. En un estudio efectuado para Estados Unidos de Norteamérica, y utilizando como indicador de emprendimiento la tasa de autoempleo en el sector manufacturero, se halló que la relación tenía la forma de la letra U invertida: inicialmente, a medida en que la tasa de emprendimiento aumentaba, se alcanzaban mayores tasas de crecimiento; luego, dicha tasa decrecía, debido a que el emprendimiento también estaba sujeto a los rendimientos decrecientes.

Los estudios de corte regional también tienden a confirmar la influencia del emprendimiento empresarial sobre el crecimiento económico. Por ejemplo, Chen, Fu, Wang, Tsai y Su (2018) hallaron que el espíritu empresarial y el capital social coadyuvaron al crecimiento económico regional en China. En el mismo sentido Yanya, Abdul-Hakim y Abdul-Razak (2011) especificaron que el establecimiento de nuevas empresas habría contribuido al crecimiento económico de las provincias de Tailandia. Asimismo, Matejovsky, Mohapatra y Steiner (2014), utilizando la tasa de autoempleo como indicador de emprendimiento, encontraron una relación en sentido directo entre el emprendimiento y el crecimiento económico regional en Canadá.

Vazquez-Rozas, Gomes y Vieira (2010), en una investigación efectuada a nivel de las regiones de España y Portugal, arribaron a la conclusión de que el índice de creación de empresas tenía un efecto positivo sobre el

crecimiento económico regional, tanto en términos del PIB per cápita como en términos absolutos.

Mueller (2007) encontró que, en el crecimiento económico regional de Alemania, la puesta en marcha de nuevas empresas fue más eficaz que el incremento en el espíritu empresarial. Del mismo modo, en un estudio desarrollado para Taiwan, Chih (2014) llegó a determinar que el emprendimiento empresarial tenía una influencia positiva tanto sobre el crecimiento económico como sobre el nivel de empleo en el mercado laboral, pero con cierto rezago de tiempo.

Si bien la actividad del emprendimiento empresarial tiende a afectar de modo favorable al crecimiento económico, su eficacia podría ser relativizada por aspectos institucionales. Así, Bruns, Bosma, Sanders y Schramm (2015), en una investigación que incluyó 90 regiones correspondientes a 13 países europeos, encontraron que la calidad institucional moderaba el impacto del emprendimiento sobre el crecimiento regional, de modo que dicho aspecto institucional era inclusive más importante que la actividad empresarial.

El emprendimiento empresarial también condiciona el crecimiento de sectores económicos específicos. Dejarín (2011), en un estudio regional efectuado para Bélgica, determinó que el ritmo de entrada de nuevas empresas habría influenciado en el crecimiento de la industria manufacturera y de la industria de servicios.

La importancia explicativa de la actividad empresarial para el crecimiento económico resalta no solo en los estudios a nivel de países, regiones y sectores económicos, sino también de las ciudades. Por ejemplo, Udih y Odibo (2016), en una investigación realizada para dos ciudades de Nigeria, encontraron que el aumento en la creación de empresas habría coadyuvado a elevar la tasa de crecimiento del PIB de ambas ciudades. Audretsch, Belitski y Desai (2015) también hallaron resultados similares en un estudio que comprendió a 127 ciudades europeas.

Las investigaciones empíricas usualmente muestran que el emprendimiento tiene efectos positivos sobre el crecimiento económico. Sin embargo, hay trabajos que llegan a especificar la existencia de una relación inversa entre estas dos variables, como es el caso del estudio efectuado por Moheb y Hassan (2016), para una muestra de 7 países emergentes (Egipto, Hungría, India, México, Indonesia, Turquía y Romania).

2.2. Modelo teórico

En la línea del modelo formulado por Solow (1956), se plantea que la producción de bienes y servicios finales (Y) depende del capital físico (K), la mano de obra (L) y el nivel de la tecnología (A):

$$Y = AK^{\alpha}L^{1-\alpha} \tag{1}$$

Donde, α y $1-\alpha$, representan las participaciones del capital físico y la mano de obra en la generación de la producción respectivamente.

El cambio del nivel tecnológico está condicionado de manera decisiva por la actividad empresarial relacionada a la investigación y desarrollo (I+D) y la innovación. Así, Schumpeter (1966) considera que los empresarios emprendedores son los principales impulsores o promotores del progreso tecnológico, a través de la introducción de posibilidades técnicas no probadas e innovadoras para producir nuevas mercancías o producir las existentes de otra forma. En el mismo sentido, Romer (1990) postula que el progreso tecnológico es generado fundamentalmente por el sector empresarial dedicado a la actividad de la investigación y desarrollo. Por ello, con base en estas posturas, de forma similar que Doran, McCarthy y O´Connor (2018), se asume formalmente que la determinación del nivel tecnológico depende de la cantidad de empresarios emprendedores (E) y de otros factores (ϕ):

$$A = \phi + \psi E \tag{2}$$

Donde, el parámetro ψ captura el grado de influencia del cambio en la dotación de empresarios emprendedores sobre el nivel tecnológico.

Reemplazando (2) en (1), y dividiendo entre L, se obtiene la función de producción en términos per cápita, donde el producto per cápita (y) depende del capital de emprendimiento (E) y del capital físico per cápita (k):

$$y = (\phi + \psi E)\ k^a \tag{3}$$

Se asume que el ahorro (S) depende de la producción o ingreso agregado, ponderado por la tasa de ahorro (s):

$$S = sY \tag{4}$$

El ahorro financia la inversión bruta en capital físico (I), de modo que en situación de equilibrio ambos son iguales (I=S). A su vez, la inversión restada por la magnitud de la depreciación (dK), determina el monto de la variación del capital físico en el tiempo ($\dot{K}$):

$$\dot{K} = I - dK \tag{5}$$

Donde, d representa la tasa de depreciación.

Efectuando los reemplazos correspondientes en (5), se deriva la siguiente ecuación de la tasa de crecimiento del capital físico per cápita en el tiempo:

$$\frac{\dot{k}}{k} = \frac{s(\phi + \psi E)}{k^{1-\alpha}} - (n+d) \tag{6}$$

Donde, n es la tasa de crecimiento de la población.

La ecuación (6) indica que la tasa de crecimiento del capital físico per cápita, por ende la tasa de crecimiento del producto per cápita, depende en sentido directo del capital de emprendimiento (E), de modo que a un mayor número de empresarios emprendedores, se tendrá una mayor tasa de crecimiento económico.

Haciendo que la tasa de crecimiento de la ecuación (6) sea igual a cero, es decir, asumiendo una situación de equilibrio

estacionario del capital físico per cápita, y efectuando el reemplazo correspondiente en (3), se obtiene el nivel del producto per cápita de largo plazo:

$$y = \left[\frac{s(\phi + \psi E)^{\frac{1}{\alpha}}}{(n+d)} \right]^{\frac{\alpha}{1-\alpha}} \tag{7}$$

La ecuación (7) especifica que el nivel del producto per cápita depende en sentido directo del capital de emprendimiento, de manera que el incremento en la dotación de empresarios en la economía se traducirá en un mayor nivel del PIB per cápita en el largo plazo. De esta forma queda establecida formalmente la existencia de una causalidad teórica entre el emprendimiento empresarial y el crecimiento económico.

3. Metodología

En el presente artículo la metodología que se emplea es de tipo cuantitativo correlacional. Por ello, utilizando el método de los Mínimos Cuadrados Ordinarios se efectúa la regresión estadística de la variable que representa al crecimiento económico contra un conjunto de variables independientes, dentro de las cuales se incluye al emprendimiento empresarial.

3.1. Especificación de las variables

En la tabla 1 se especifican las variables consideradas en el modelo econométrico a estimar, las cuales son:

• Y= crecimiento económico. Variable dependiente, definida y medida como la tasa de crecimiento anual del PIB per cápita de cada departamento. Barro y Sala-i-Martín (2009) señalan que este es el indicador más apropiado que se debe utilizar en el análisis del crecimiento económico.
• X_1= emprendimiento empresarial. Variable explicativa o independiente que se aproxima mediante la tasa de crecimiento promedio anual del número de empresas en cada departamento. Se contabiliza la variación neta de empresas al final del año, restando de la cantidad creada o reactivada, aquellos que dejaron de operar. Se utiliza este tipo de indicador del emprendimiento en la línea de lo efectuado por Audretsch, Acs, Braunerhjelm y Carlsson (2006), Vazquez-Rozas et al. (2010) y Dejarín (2011).

Dado que el crecimiento económico no depende sólo del emprendimiento empresarial, también se consideran algunas variables explicativas relevantes en la condición de variables de control, estas son:

• X_2= competitividad. El nivel de la competitividad departamental se mide a través de un índice de competitividad, el mismo que incluye 90 indicadores relacionados a los aspectos de la economía, gobierno, infraestructura, empresa y las personas. Esta variable también es considerada en los estudios sobre crecimiento económico por Traverso, Baño y Samaniego (2017), Kordalska y Olczyk (2016), entre otros.
• X_3= crédito financiero. Esta variable representa la tasa de crecimiento promedio anual del crédito directo otorgado por el sistema financiero al sector privado en cada departamento. Se espera que a una mayor tasa de crecimiento del crédito se tenga un mayor crecimiento del PIB departamental (Korkmaz, 2015; Ananzeh, 2016).
• X_4= gasto de gobierno. Es el logaritmo de la sumatoria del gasto corriente y de capital per cápita ejecutado por el gobierno central, regional y local, en cada departamento. Gunalp y Gur (2002) y Dudzeviciuté, Simelyté y Liucvaitiené (2018) consideran que la influencia del gasto de gobierno sobre el crecimiento económico es muy significativa.
• X_5= apertura comercial. El grado de apertura comercial se mide dividiendo el valor de las exportaciones de bienes al mercado internacional entre el correspondiente PIB departamental. Estudios efectuados por Ocegueda (2007) y Sun y Heshmati (2010) muestran que la apertura comercial tiene efectos favorables, aunque heterogéneos, sobre la productividad y el crecimiento económico de las regiones de un país.
• X_6= desigualdad de ingresos. Consiste en el grado de desigualdad en la distribución de ingresos en cada departamento. Delbianco, Dabús y Caraballo (2014) hallan que la desigualdad afecta de manera negativa al crecimiento económico; y en forma similar que estos autores y Sánchez-Robles y Bengoa (2001), el grado de desigualdad se aproxima mediante el coeficiente de Gini.
• X_7= pobreza. Es el porcentaje de la población con al menos una necesidad básica insatisfecha en cada departamento. El Banco Mundial señala que, en los países de América Latina, la pobreza limita al crecimiento económico en la lógica de un círculo vicioso (Perry, Arias, López, Maloney y Servén, 2006). En este escenario, Perú muestra altos niveles de pobreza, con departamentos - como Cajamarca y Huancavelica - donde el porcentaje de la población en esta condición llega hasta el 50,9% (INEI, 2018c).

Tabla 1. Especificación de las variables departamentales

Variables	Descripción
Variable dependiente:	
Y = Crecimiento económico	Tasa de crecimiento del PIB per cápita
Variable explicativa:	
X_1 = Emprendimiento empresarial	Tasa de crecimiento del número de empresas
Variables de control:	
X_2 = Competitividad	Índice de competitividad
X_3 = Crédito financiero	Tasa de crecimiento del crédito financiero
X_4 = Gasto de gobierno	Logaritmo del gasto de gobierno per cápita
X_5 = Apertura comercial	Porcentaje del PIB destinado a la exportación
X_6 = Desigualdad de ingresos	Coeficiente de Gini
X_7 = Pobreza	Porcentaje de la población en situación de pobreza

Fuente: elaboración propia.

3.2. Tipo y fuente de datos

La información utilizada en la regresión es la versión más simple de datos de panel, que comprende los 24 departamentos existentes y dos sub períodos temporales, generándose un total de 48 observaciones.

Si bien el análisis abarca el período 2007-2017, la serie temporal utilizada es el promedio anual de dos sub períodos: 2007-2012 y 2013-2017. Esta división se efectuó por dos motivos: a) en el primer sub período hubo una mayor dinámica y variabilidad en la tasa de crecimiento del PIB, en tanto que en el segundo se produjo una desaceleración; b) por falta de información sobre el índice de competitividad para todos los años[1], y por las altas fluctuaciones en el tiempo mostradas por el crédito, las exportaciones y el gasto de gobierno. Dado lo anterior, se elaboraron las tasas de crecimiento anual del PIB per cápita, de la cantidad de empresas y del crédito para ambos sub períodos; y se construyeron valores promedio para cada sub período en los casos del índice de competitividad, el gasto de gobierno per cápita, el grado de apertura comercial, el coeficiente de Gini y la tasa de pobreza.

La información departamental sobre el PIB, el número de empresas, el coeficiente de Gini y la pobreza fueron recabadas del INEI. El dato sobre el crédito del sistema financiero se recopiló de los reportes estadísticos del Banco Central de Reserva del Perú (BCRP). Para el cálculo del grado de apertura comercial, la serie sobre las exportaciones fueron tomadas de los Boletines de Exportaciones Regionales publicados por la Asociación de Exportadores (ADEX). El valor del gasto de gobierno se extrajo del reporte sobre la ejecución presupuestal del Ministerio de Economía y Finanzas (MEF). El indicador del índice de competitividad departamental fue tomado de CENTRUM Católica (2018).

3.3. Método de estimación estadística

El grado de influencia del emprendimiento empresarial sobre el crecimiento económico departamental se estima mediante la regresión estadística del siguiente modelo econométrico:

$$Y = \beta_o + \beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + \beta_6 X_6 + \beta_7 X_7 + u \quad (8)$$

Donde Y es la tasa de crecimiento del PIB per cápita departamental; X_k son las variables independientes o explicativas; β_o es el intercepto; β_k son los parámetros o estimadores asociados a cada una de las 7 variables independientes especificadas en la tabla 1; y u es el término de error o perturbación.

El parámetro β_1 captura el efecto individual o parcial del emprendimiento empresarial (X_1) sobre el crecimiento económico. Los parámetros β_2, β_3, β_4, β_5, β_6 y β_7 corresponden a las variables de control consideradas en el modelo (competitividad, crédito financiero, gasto de gobierno, apertura comercial, desigualdad en la distribución de ingresos y la pobreza, respectivamente).

[1] CENTRUM Católica (2018) ha elaborado el índice de competitividad por departamentos con base en 90 indicadores, y lo tiene solo para los años 2008, 2010, 2011, 2014, 2015, 2016 y 2018.

El término de error u capta la influencia de otras variables independientes que no fueron incluidas explícitamente en el modelo econométrico. Se asume que dicho error es pequeño y aleatorio.

β_0 y β_k, son parámetros cuyos valores no son conocidos, en tanto que Y y X_k sí son conocidos. Por ello, la regresión econométrica consiste en hallar los valores de dichos parámetros, con base en los valores observados de la variable dependiente y de las variables independientes.

Una buena regresión debe permitir estimar el valor de β_1 cercano a su verdadero valor, de modo que los errores u sean mínimos o pequeños (Wooldridge, 2015). Eso se puede alcanzar con el método de los Mínimos Cuadrados Ordinarios (MCO) bajo el cumplimiento de ciertos supuestos.

Dado que esta investigación trabaja con una cantidad relativamente pequeña de observaciones (48) - con predominancia de información transversal (24 departamentos) sobre la información temporal (dos sub períodos) -, se torna pertinente emplear el método de los MCO, debido a que, según Gujarati y Porter (2010), estudios con muestras pequeñas pueden utilizar el MCO y hallar estimadores más eficientes que otros métodos alternativos. Además, según Wooldridge (2015), con datos de panel de dos períodos, los estimadores por MCO no defieren de manera sustancial de aquellos calculados solo con información transversal.

El método de MCO busca los estimadores $\hat{\beta}_0$ y $\hat{\beta}_k$ en la ecuación:

$$\hat{Y} = \hat{\beta}_0 + \hat{\beta}_1 X_1 + \hat{\beta}_2 X_2 + \hat{\beta}_3 X_3 + \hat{\beta}_4 X_4 + \hat{\beta}_5 X_5 + \hat{\beta}_6 X_6 + \hat{\beta}_7 X_7 \quad (9)$$

De manera que se minimice la suma de los residuos al cuadrado:

$$\sum_{i=1}^{48} (u_i)^2 = \sum_{i=1}^{48} (Y_i - \hat{Y})^2 = \sum_{i=1}^{48} (Y_i - \hat{\beta}_1 X_{11} - \hat{\beta}_2 X_{i2} - \ldots - \hat{\beta}_7 X_{i7}) = 0 \quad (10)$$

Donde, $\hat{\beta}_1$ es el estimador del parámetro correspondiente al emprendimiento. Derivando (10) respecto a $\hat{\beta}_1$, e igualando a cero:

$$2 \sum_{i=1}^{48} (Y_i - \hat{\beta}_1 X_{11} - \hat{\beta}_2 X_{i2} - \ldots - \hat{\beta}_7 X_{i7})(-X_{11}) = 0 \quad (11)$$

La resolución de (11) permite hallar la siguiente expresión para el estimador $\hat{\beta}_1$:

$$\hat{\beta}_1 = \frac{S_{xy}}{S_x^2} = \frac{\sum (X_{i1} - \bar{X})(Y_i - \bar{Y})}{\sum (X_{i1} - \bar{X})^2} \quad (12)$$

Donde S_{XY} es la covarianza muestral; S_x^2 es la varianza muestral de X_{11}; $\bar{X}$ e $\bar{Y}$ son las medias de X_{11} e Y_i, respectivamente.

Sin embargo, para que el estimador $\hat{\beta}_1$ esté cercano a su verdadero valor poblacional, la regresión efectuada mediante el proceso de minimización de los residuos debe cumplir con los supuestos de que tales residuos tienen media cero y una distribución normal, además de que hay ausencias de

problemas de: heterocedasticidad (residuos con varianza constante), autocorrelación (los residuos de los dos sub períodos considerados no están correlacionadas entre sí) y muticolinealidad (no existen relaciones lineales exactas entre las variables independientes).

El cumplimiento de estos supuestos hace que el valor estimado del parámetro que mide el impacto del emprendimiento empresarial sobre el crecimiento económico ($\hat{\beta}_1$) sea robusto, insesgado y eficiente; es decir, que tenga una varianza mínima y que no sea posible obtener otro estimador de menor varianza.

Las regresiones estadísticas son ejecutadas con el programa estadístico Eviews.

4. Análisis de los resultados

Antes de efectuar las estimaciones econométricas correspondientes, a continuación, se desarrolla un análisis descriptivo sobre la relación entre el emprendimiento y el crecimiento económico departamental peruano.

4.1. Análisis descriptivo

En principio, el ritmo de creación de empresas se puede determinar mediante la densidad empresarial. Al respecto, en la tabla 2 se observa que, aparte del departamento de Madre de Dios, Lima presenta la mayor densidad empresarial con 822 empresas por cada 10.000 habitantes. Por regiones naturales, la región de la Costa tiende a presentar la mayor densidad empresarial, en tanto que la menor densidad corresponde a la Sierra: de los cinco departamentos con mayor densidad, cuatro están ubicados en la Costa o limitan con el litoral marítimo (Lima, Tacna, Arequipa y Moquegua); en tanto que, entre los cinco departamentos con la menor densidad, todos ellos están ubicados en la Sierra (Huancavelica, Amazonas, Cajamarca, Puno y Huánuco).

La tabla 2 también muestra la información sobre las tasas de crecimiento acumulado en el número de empresas y el PIB en el año 2017 respecto al 2007. En esta tabla se observa la existencia de una asociación, en sentido directo, entre estos dos indicadores. Así, por un lado, entre los cinco departamentos con mayor crecimiento en el número de empresas (Apurímac, Huancavelica, Ayacucho, San Martín y Cuzco), cuatro se ubican entre los de mayor crecimiento en el PIB (Apurímac, Cuzco, Ayacucho y San Martín); por otro lado, de los cinco departamentos con menor tasa de crecimiento en la cantidad de empresas (Moquegua, Ancash, Tacna, Lima y Loreto), tres son los de menor tasa de crecimiento en la producción (Moquegua, Loreto y Ancash). Adicionalmente, Apurímac es el departamento con la mayor tasa de crecimiento tanto en el número de empresas como en el PIB.

Se debe destacar un hecho interesante: los departamentos que ocupan los cinco primeros lugares en las tasas de crecimiento del número de empresas y el PIB están ubicados en la región de la Sierra. Si se tiene en cuenta que los cinco departamentos con la menor densidad empresarial también están localizados en esta región, ello

pareciera indicar que en el período 2007 y 2017, la Sierra lideró el proceso de emprendimiento empresarial y el crecimiento económico partiendo desde una relativa baja dotación de empresas.

En concordancia con lo expuesto en la tabla 2, los puntos de dispersión - de pendiente positiva - observados en la figura 1 muestran de alguna manera la existencia de una relación, en sentido directo, entre el emprendimiento empresarial y el crecimiento económico departamental en el período 2007-2017. De esta forma, para una mayor tasa de crecimiento en el número de empresas, tiende a corresponder una mayor tasa de crecimiento en el PIB per cápita.

4.2. Análisis econométrico

Con la finalidad de conocer el rango de variación y el valor promedio de las variables departamentales consideradas en el estudio, en la tabla 3 se expone la estadística descriptiva correspondiente. En ella se observa que existen departamentos que arrojaron tasas de crecimiento anual del PIB per cápita de hasta 8%, así como otros que

Tabla 2. Densidad empresarial, crecimiento del número de empresas y del PIB

Departamentos	Cantidad de empresas por cada 10.000 habitantes (2017)	Crecimiento acumulado del número de empresas, 2007-2017 (%)	Crecimiento acumulado del PIB, 2007-2017 (%)
Amazonas	240	81,17	66,75
Ancash	417	69,54	23,41
Apurímac	323	170,92	355,5
Arequipa	751	79,36	82,84
Ayacucho	310	140,86	86,65
Cajamarca	246	104,47	32,55
Cusco	538	132,71	97,78
Huancavelica	150	145,91	36,18
Huánuco	291	126,23	83,88
Ica	567	88,67	79,53
Junín	453	91,31	60,89
La Libertad	479	80,46	41,14
Lambayeque	458	82,09	63,57
Lima	822	74,83	63,87
Loreto	289	76,15	21,78
Madre de Dios	860	131,91	32,77
Moquegua	616	62,17	14,32
Pasco	355	80,39	-3,86
Piura	363	99,33	46,73
Puno	268	126,67	58,5
San Martin	414	138,79	82,91
Tacna	801	71,31	27,9
Tumbes	529	94,2	54,9
Ucayali	522	108,25	39,53

Fuente: elaboración propia con base en la información del INEI (2018a, 2018d).

experimentaron retrocesos absolutos con tasas de -2,6%. Con respecto al número de empresas, hay departamentos que alcanzaron tasas de crecimiento de hasta 10,4% anuales y otros que obtuvieron tasas relativamente bajas de 3,3%.

La tabla 4 muestra los resultados de las regresiones econométricas efectuadas. Se hicieron dos regresiones: la primera, considerando todas las variables especificadas en la tabla 1 (modelo irrestricto), y la segunda (modelo restricto), incluyendo sólo las variables que resultaron estadísticamente significativas en el modelo irrestricto.

En el modelo irrestricto, el parámetro estimado para el crédito financiero arroja un signo positivo, en tanto que negativo para la desigualdad en la distribución de ingresos. Esto indica que a mayor crédito financiero y menor desigualdad en la distribución de ingresos, se tendría un mayor crecimiento en el PIB per cápita departamental. Sin embargo, dado que estas dos variables no son estadísticamente significativas, se efectúa una segunda regresión sin considerarlas (modelo restricto).

Con la finalidad de elegir el mejor modelo, se aplica el test de las variables redundantes. El resumen de dicha prueba estadística señala que el modelo restricto o específico es mejor que el modelo irrestricto o general, debido a que el valor del logaritmo de verosimilitud estimado para el primer modelo es 119,7815; menor que para el segundo (120,8541).

Según el resultado de la regresión definitiva correspondiente al modelo restricto, el parámetro estimado del emprendimiento empresarial muestra un signo positivo y una alta significancia estadística. Esto quiere decir que el emprendimiento empresarial influye en sentido directo sobre el crecimiento económico: por cada 1% en que aumenta el número de empresas, el PIB per cápita departamental se incrementa aproximadamente en 0,68%, de tal forma que los departamentos con mayor crecimiento en la producción son aquellos en los que hay mayor dinámica en el ritmo de creación de empresas.

El estadístico F estimado arroja el valor de 4,94 con una probabilidad de 0,00120 (menor a 0,05), lo cual indica que el conjunto de los parámetros estimados también es estadísticamente significativo.

Se debe destacar que el parámetro del emprendimiento empresarial presenta un valor mayor que aquellos correspondientes a las otras variables de control estadísticamente significativas. Esto pone de manifiesto la importancia explicativa de la creación neta de empresas en el proceso de crecimiento económico departamental peruano.

Entre las variables de control estadísticamente significativas, la competitividad y el gasto de gobierno muestran una alta significancia, mientras que la apertura comercial y la pobreza presentan una baja significancia. La competitividad coadyuva al crecimiento económico departamental, y un mayor gasto de gobierno provoca el efecto opuesto. La apertura al comercio exterior impacta de modo favorable al crecimiento económico, en tanto que la pobreza tiende a ser un obstáculo. Los departamentos con menor tasa de crecimiento son aquellos que muestran una mayor pobreza, lo que podría estar reflejando la presencia del problema del círculo vicioso de la pobreza, en el sentido señalado por Perry et al. (2006).

Con la finalidad de evaluar el grado de precisión y consistencia del parámetro estimado $\hat{\beta}_1$= 0,679386 - que mide el efecto del emprendimiento empresarial sobre el crecimiento económico -, a continuación, se verifica si
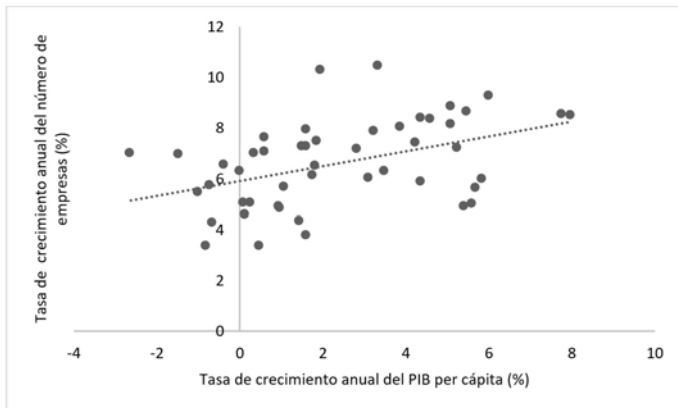

Figura 1. Relación entre el emprendimiento empresarial y el crecimiento económico departamental (2007-2017).
Fuente: elaboración del autor con base en la información del INEI (2018a, 2018d).

Tabla 3. Estadística descriptiva

Variable	Media	Máximo	Mínimo
Crecimiento económico (%)	0,024	0,080	-0,026
Emprendimiento empresarial (%)	0,066	0,104	0,033
Competitividad	0,337	0,74	0,180
Crédito financiero (%)	0,095	0,254	-0,006
Gasto de gobierno (en soles)	2562.9	4942.8	1289.8
Apertura comercial (%)	0,183	0,388	0,053
Desigualdad de ingresos	0,450	0,540	0,292
Pobreza (%)	0,314	0,685	0,096

Fuente: elaboración propia con base en la información del INEI (2017, 2018a, 2018b, 2018d), BCRP (2018), ADEX (2018), MEF (2018), CENTRUM Católica (2018).

Tabla 4. Efecto del emprendimiento sobre el crecimiento económico

Variables	Modelo irrestricto	Modelo restricto
Emprendimiento empresarial	0,632579**	0,679386***
Competitividad	0,084414**	0,088209**
Crédito financiero	0,055887	
Gasto de gobierno	-0,024856**	-0,121285***
Apertura comercial	0,135186**	0,124352*
Desigualdad de ingresos	-0,074075	
Pobreza	-0,063909**	-0,058072*
Constante	0,170689**	0,140196*
R-cuadrado	39,79	37,04
R-cuadrado ajustado	29,26	29,55
Logaritmo de verosimilitud	120,85	119,78
F-estadístico	3,78	4,94

Estadísticamente significativo al 1%***, 5%**, 10%*.

Fuente: elaboración propia.

los resultados de la regresión efectuada cumplen con los supuestos del modelo MCO, es decir, se evalúa si existen o no problemas de autocorrelación, heterocedasticidad, multicolinealidad y distribución no normal de errores.

Si bien los datos utilizados en la regresión son tasas de crecimiento o valores promedio de sólo dos sub períodos (2007-2012 y 2013-2017), con la finalidad de determinar si hay algún grado de autocorrelación, se aplica el test de Breusch-Godfrey. Al respecto, en la tabla 5 se observa que la probabilidad del estadístico F es mayor a 0,05. Esto indica la ausencia del problema de autocorrelación, es decir, que los errores de ambos sub períodos no están correlacionados.

Dada la información de dos sub períodos, se evalúa la existencia del problema de heterocedasticidad, debido a que se trabaja con datos transversales correspondientes a 24 departamentos. La tabla 6 muestra que las cinco pruebas utilizadas presentan un estadístico F con una probabilidad mayor a 0,05, con lo que pone de manifiesto la inexistencia del problema de heterocedasticidad; es decir, se cumple con el supuesto de homocedasticidad (la varianza de los errores es constante) y, en consecuencia, los parámetros estimados son insesgados y eficientes.

La multicolinealidad se evalúa mediante el test de Variance Inflation Factors (VIF). Al respecto, en la tabla 7 se observa que los valores VIF centrados de todas las variables explicativas consideradas en la regresión están muy por debajo de 10. Dicho resultado señala que no existe el problema de multicolinealidad, es decir, no hay relaciones lineales exactas entre las variables independientes del modelo.

Tabla 5. Prueba de autocorrelación

Prueba	F-statistic	Prob. F(2,40)
Breusch-Godfrey	0,107475	0,8984

Fuente: elaboración propia.

Tabla 6. Prueba de heterocedasticidad

Prueba	F-statistic	Prob. F
Breusch-Pagan-Godfrey	0,665639	0,6515
Harvey	0,552021	0,7359
Glejser	0,570384	0,7222
Arch	0,441763	0,5097
White	1,781271	0,0807

Fuente: elaboración propia.

Tabla 7. Prueba de multicolinealidad

Variable	VIF centrados
Emprendimiento empresarial	1,838251
Competitividad	2,356201
Crédito financiero	1,732594
Gasto de gobierno	1,282130
Apertura comercial	3,636098
Desigualdad de ingresos	1,477978
Pobreza	2,276548

Fuente: elaboración propia.

Adicionalmente, se hizo la prueba de la normalidad de los residuos. Al respecto, el estadístico Jarque-Bera calculado arrojó un valor de 2,978640 (menor a 5,99) con una probabilidad de 0,225526 (mayor a 0,05), lo cual indica que el modelo estimado cumple con el supuesto de que los errores siguen una distribución normal.

Las pruebas estadísticas efectuadas dejan en claro que el modelo restricto estimado no viola ninguno de los supuestos sobre los que se fundamenta el método de los MCO, de modo que no existen problemas de autocorrelación, heterocedasticidad, multicolinealidad y los residuos siguen una distribución normal. Esto permite afirmar que el parámetro $\hat{\beta}1$= 0,679386 estimado es robusto, insesgado y eficiente.

5. Conclusiones

La investigación cumplió con el objetivo propuesto de determinar el grado de influencia del emprendimiento empresarial sobre el crecimiento económico peruano: un aumento de 1% en el número de empresas implica un incremento aproximado de 0,68% en la tasa de crecimiento del PIB per cápita departamental. Así, las regresiones estadísticas ejecutadas respaldan la hipótesis de que el emprendimiento empresarial es muy importante para el proceso de crecimiento económico, de tal manera que el buen ritmo de crecimiento del PIB peruano en el período 2007-2017 está asociado a la creciente actividad empresarial observada. A su vez, de los resultados hallados se puede concluir que las grandes diferencias observadas en las tasas de crecimiento del PIB por departamento son explicadas - en parte - por las grandes diferencias en las tasas de creación de empresas, tal que aquellos departamentos que mostraron mayores tasas de crecimiento en sus niveles de producción, son los que a su vez experimentaron las mayores tasas de expansión en la cantidad de empresas.

El resultado econométrico hallado guarda cierta concordancia con el hecho empírico de que el departamento de Apurímac, que muestra la mayor tasa de crecimiento en el PIB per cápita, sea también el que presenta la mayor tasa de crecimiento en el número de empresas, o que entre los cinco departamentos con las mayores (menores) tasas de crecimiento económico, predominen aquellos con las mayores (menores) tasas de crecimiento en la dotación de empresas.

En relación con las variables de control consideradas en el estudio, se puede concluir que el crecimiento económico fue mayor en aquellos departamentos que presentan un mayor grado de competitividad y que están más integrados al comercio internacional. En tanto que el gasto de gobierno y la pobreza son factores que han jugado en contra de ello.

Como aporte del presente estudio, se destaca el haber determinado econométricamente que el ritmo del crecimiento económico peruano y las diferencias departamentales observadas están influenciados significativamente por la tasa de emprendimiento de empresas; lo cual implica que, con la finalidad de alcanzar tasas de crecimiento económico más elevadas y homogéneas entre los departamentos, se

debería promover al máximo la creación de empresas, pero de manera equilibrada preferentemente.

Esta investigación tiene la limitante de no haber trabajado con una versión más amplia de datos de panel, de modo que no se hicieron las pruebas de estacionariedad temporal de las variables, ni se ejecutaron regresiones con el modelo de efectos fijos y de efectos aleatorios. Por esto, con la finalidad de incrementar el grado de precisión en la estimación de la influencia del emprendimiento empresarial sobre el crecimiento, se recomienda extender el período de investigación y efectuar el análisis con datos de panel balanceado. Con una serie estadística completa y de un período más amplio, inclusive se podrían simular ejercicios de cointegración y así evaluar la existencia o no de una relación de equilibrio en el largo plazo; asimismo, también se podrían realizar regresiones estadísticas utilizando el modelo multinivel.

Otra limitante de esta investigación radica en el hecho de que no se tomó en cuenta el sector informal en un escenario en que Perú es uno de los países con la mayor tasa de informalidad en América Latina (Tokman, 2011). En el estudio se utilizó sólo la información oficial referida a la cantidad de empresas formales. Por ello, se sugiere investigar la relación entre el emprendimiento empresarial y el crecimiento económico, incorporando también al sector informal.

Conflictos de intereses

El autor declara no tener ningún conflicto de intereses.

Fuente de financiación

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Artículo de investigación

El modelo de la economía del bien común: aproximación desde el enfoque organizativo y el análisis bibliométrico

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Resumen

El trabajo tuvo por objeto realizar una aproximación al modelo de la economía del bien común desde la organización de empresas, así como desde un análisis bibliométrico. Se realizó una comparación entre el enfoque empresarial de la economía del bien común y diferentes teorías organizativas: recursos y capacidades, *stakeholders* y creación de valor compartido. Mediante el análisis bibliométrico, se identificaron los trabajos publicados sobre la economía del bien común desde su surgimiento en 2010 hasta 2018, mediante búsqueda realizada en *Web of Science* y Dialnet. Se demuestra que su enfoque empresarial está relacionado con diferentes teorías de la organización de empresas y que aún existe una gran escasez de trabajos publicados en revistas de impacto, sobre todo de estudios empíricos.

Palabras clave: economía del bien común, economía basada en recursos, teoría de los *stakeholders*, valor compartido, análisis bibliométrico.

The economy for the common good model: an organizational approach and bibliometric analysis

Abstract

The aim of this paper is to make an approximation to the model of the Economy for the Common Good (ECG) from business organization, as well as a bibliometric analysis. A comparison between the ECG's business approach and different organizational theories has been made: resources and capacities, *stakeholders*, and creation of shared value. Through the bibliometric analysis, published works on the ECG have been identified since its emergence in 2010 until 2018 through a search in *Web of Science* and Dialnet. The results demonstrated that the ECG's business approach is related to different theories of business organization, and there is still a great shortage of papers published in impact journals, especially empirical studies.

Keywords: economy for the common good, resource-based economy, stakeholder theory, shared value, bibliometric analysis.

O modelo da economia do bem comum: abordagem a partir da abordagem organizacional e análise bibliométrica

Resumo

O objetivo do trabalho é fazer uma abordagem do modelo de Economia do Bem Comum (EBC) a partir da organização das empresas, bem como uma análise bibliométrica. Foi feita uma comparação entre a abordagem de negócios da EBC e diferentes teorias organizacionais: recursos e capacidades, *stakeholders* e criação de valor compartilhado. Através da análise bibliométrica, os trabalhos publicados na EBC desde o seu surgimento em 2010 até 2018 foram identificados por meio de pesquisas na Web of Science e Dialnet. Mostra-se que a abordagem comercial da EBC está relacionada a diferentes teorias da organização empresarial; e que ainda há uma grande escassez de trabalhos publicados em periódicos de impacto, especialmente estudos empíricos.

Palavras-chave: economia do bem comum, economia baseada em recursos, teoria dos *stakeholders*, valor compartilhado, análise bibliométrica.

UNIVERSIDAD ICESI

1. Introducción

El profesor austríaco de economía Christian Felber presentó en el 2008 el documento *Nuevos valores para la economía* (Felber, 2008), en el que propone la necesidad de cambiar los principios y valores que fundamentan la economía. Con la ayuda de un grupo de empresarios austríacos, plantea un nuevo modelo económico denominado *economía del bien común* (EBC), que se recoge en su libro publicado con el mismo nombre en el 2010[1]. El 5 de octubre de 2011 se presentaron los balances del bien común de las 100 primeras empresas. Actualmente, son unas dos mil empresas pertenecientes a unos 30 países de todo el mundo organizadas a través de asociaciones gestionadas por la sociedad civil[2].

Los principios legales de la EBC se basan en los textos constitucionales de los Estados, al resaltar que la actividad económica ha de servir a los intereses generales y el bien común o bien público, como también han señalado otros autores que proponen modelos alternativos, por ejemplo, el de la economía civil (Zadek, 2000; Zamagni, 2007).

El modelo de la EBC ha conseguido ser reconocido como un modelo alternativo por una parte importante de la sociedad, en relativamente poco espacio de tiempo. Sin llegar a rechazar el mercado como institución, cuestiona su comportamiento actual y una gran parte de sus reglas de juego, al ser incapaz de promover el bienestar general por centrarse en el interés individual y la concentración de la riqueza en unos pocos. El modelo propone sustituir el afán de lucro y la competencia por el bien común y la cooperación (Felber, 2012).

Aunque el movimiento y la filosofía de la EBC se están implantando con fuerza, también están surgiendo numerosas críticas sobre él, tanto desde la perspectiva neoliberal (Rallo, 2013) como desde enfoques sociales (que señalan que la EBC no es más que un nuevo enfoque de la responsabilidad social). Un punto en común en la mayoría de estas críticas hace referencia a la falta de rigor científico en los postulados del modelo de la EBC, por lo que en el presente trabajo se plantea como objetivo demostrar que el enfoque empresarial del modelo de la EBC se relaciona con diferentes teorías de la organización de empresas, como la teoría de recursos y capacidades, la teoría de los *stakeholders* y el enfoque de la creación de valor compartido (CVC); lo que le da una fundamentación académica. También se tiene como objetivo demostrar que, en ocho años desde su creación, ya existen algunas publicaciones que analizan sus características, para lo que se ha realizado un análisis bibliométrico. De esta manera, también se consigue realizar un aporte al área de organización de empresas, al incluir un nuevo modelo innovador dentro del ámbito de la sostenibilidad corporativa, como es el modelo de la EBC.

El método utilizado consistió en realizar un análisis comparativo entre el modelo empresarial de la EBC y las teorías de organización de empresas mencionadas, con el fin de demostrar su relación. Por otra parte, para la realización del análisis bibliométrico se efectuó una búsqueda de artículos científicos en *Web of Science* y Dialnet para el período 2010-2018, a través de una cadena de búsqueda, y se realizó un análisis descriptivo por revistas, autores y año de publicación.

El trabajo se estructuró en cuatro apartados, además de esta introducción. En el segundo apartado se realiza el análisis comparativo entre el modelo empresarial de la EBC y las diferentes teorías de la organización de empresas mencionadas anteriormente. En el tercer apartado se describe la metodología utilizada para la realización del análisis bibliométrico. En el cuarto apartado se presentan los resultados obtenidos de ese análisis. Y en el quinto y último apartado se presentan las conclusiones del trabajo.

2. Marco teórico: la EBC y su relación con la organización de empresas

El modelo de la EBC propone un conjunto de medidas bajo distintos enfoques: económico, social y político (Gómez, Morales y Rodríguez, 2017). Sin embargo, el mayor desarrollo de este modelo ha tenido lugar en el ámbito económico y especialmente en el campo empresarial (Sanchis y Amigo, 2018). En este sentido, a continuación, se relaciona el modelo empresarial de la EBC con diferentes teorías o enfoques de la organización de empresas, que pueden ayudar a su fundamentación académica desde esta área de conocimiento: enfoque de los recursos y capacidades, teoría de los *stakeholders* y enfoque de la CVC. No obstante, con anterioridad se destacan también algunos aspectos clave desde los enfoques social y político.

Los principios que miden la EBC son la dignidad humana, la solidaridad y justicia social, la sostenibilidad ecológica y la transparencia y participación democrática. El fin último ha de ser la felicidad de las personas y, por eso, los indicadores clásicos de la economía, el producto interno bruto (PIB) de los Estados y el balance financiero de las empresas ya no son suficientes. La EBC propone como indicadores el producto del bien común (PBC) y el balance del bien común (BBC). El PBC mide la riqueza de un país, incluyendo también "aspectos de carácter social y ambiental como la cohesión social, la solidaridad, la participación, la calidad de la democracia, la política medioambiental, el justo reparto de los beneficios, la igualdad de género o la igualdad salarial", entre otros (Sanchis y Campos, 2018a, p. 135). El BBC mide los impactos sociales y ambientales que producen las organizaciones y propone que las empresas que producen impactos positivos disfruten de ventajas fiscales y administrativas como compensación a su aportación a la sociedad (Felber, 2015).

Las críticas de los neoliberales a la EBC (Rallo, 2013) señalan que este modelo produce un empobrecimiento económico; sin embargo, estas son refutadas por el propio Felber (2018b) cuando señala que "La Economía del Bien Común, desde mi punto de vista, se caracteriza más bien por lo que Rallo adscribe a su orden nomocrático: permitir a los

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[1] La edición original en alemán data del año 2010, aunque su traducción a otras lenguas, entre ellas el castellano, es publicada en 2012 (Felber, 2012). Existe una versión actualizada de su libro de 2015.

[2] Esta información se puede consultar en la web de la Asociación Europea de la Economía del Bien Común. Disponible en https://www.ecogood.org/en/community/

distintos individuos y agrupaciones de individuos que persigan pacíficamente sus fines, pero, a diferencia del mundo de Rallo, con limitaciones, condiciones y responsabilidades para asegurar las mismas libertades para todos y para mantener un equilibrio entre la libertad y otros valores como la justicia, la solidaridad, la sostenibilidad o la democracia. La EBC aboga por un mercado libre, pero su concepto de libertad —las mismas libertades y los mismos derechos para todos— no da permiso a la desigualdad ilimitada, a la concentración de la riqueza sin frenos, a la explotación de la mano de obra, a la violación arbitraria de la dignidad humana, a la destrucción del medio ambiente o a la socavación de la democracia" (p. 5).

Por lo tanto, se puede deducir que el modelo de la EBC es un enfoque global e integral y ofrece tanto una visión macro como micro de la economía. Como señalan Compés y Asensio (2014), "Esto significa que la EBC tiene un alcance global, con aplicaciones micro y macro, tanto para las empresas como para los gobiernos y las instituciones, y que va más allá del tipo de empresa y las certificaciones al uso, ya que lo que ofrece es un modelo de conducta y desempeño empresarial al que se pueden acoger todo tipo de organizaciones" (p. 195).

Desde el punto de vista macroeconómico, el modelo de la EBC propone que el crecimiento económico no sea un fin en sí mismo, sino un medio para alcanzar los fines del bien común, que son reducir la huella ecológica y conseguir la sostenibilidad del territorio (Felber, 2012).

A nivel microeconómico, la EBC propone el BBC como el instrumento que mide la aportación al bien común de una empresa (Amigo y Ribera, 2018). En este sentido, el éxito empresarial ya no depende solo de la obtención de beneficios económicos y financieros, sino también de su impacto social y ambiental (Peters, 2005). La herramienta utilizada para la realización del BBC será la matriz del bien común (MBC), mediante la cual se establecen las relaciones entre los cuatro valores del modelo (dignidad humana, solidaridad y justicia social, sostenibilidad ecológica y transparencia y codecisión) con los cinco grupos de contacto (proveedores, financiadores y propietarios, empleados, clientes y entorno social); de donde surgen 20 temas diferentes que son medidos a través de indicadores y que permiten obtener una puntuación de la aportación realizada por la empresa al bien común[3].

El desarrollo e implementación del modelo de la EBC ha sido mucho más extenso en el campo de la microeconomía, por lo que a continuación se centrará la fundamentación teórica del modelo desde la perspectiva de la organización de empresas, analizando algunos de los enfoques y teorías que, procedentes de esta rama de la economía, permiten sostener de manera académica el modelo propuesto por Felber (Sanchis y Amigo, 2018).

El Comité Económico y Social Europeo (EESC, por sus siglas en inglés) aprobó el Dictamen en 2016 sobre "la Economía del Bien Común: un modelo económico sostenible orientado a la cohesión social", donde se reconoce el modelo de la EBC como un modelo económico basado en la sostenibilidad y la cohesión social. El Dictamen reconoce en su punto 1.2 que "la Economía del Bien Común es un

enfoque holístico cuyos conceptos están cerca de los valores fundamentales de la Economía Social, la Economía Circular, la Economía Participativa, la Economía de la Funcionalidad, la Economía Basada en los Recursos y la Economía Azul" (EESC, 2016, p. 26).

Dejando de lado su relación con visiones prácticas de la economía, como la economía social, circular, participativa y azul (Sajardo y Sanchis, 2018), se revisará la teoría de los recursos y capacidades, por ser este uno de los enfoques más relevantes dentro del área de la organización de empresas. También se analizará la relación de la EBC con la teoría de los stakeholders de Freeman (1984) y con el enfoque de la CVC de Porter y Kramer (2011). A continuación, se analizan cada uno de estos enfoques en tres subapartados diferentes.

2.1. El enfoque de los recursos y capacidades

El Dictamen del EESC de 2016 ya citado relaciona el enfoque de los recursos y capacidades con el modelo de la EBC por su intersección en dos de los valores fundamentales: la sostenibilidad ecológica y la justicia social. A lo anterior, también se añade la relación con un tercer valor, el de la solidaridad y la cooperación.

El enfoque de los recursos y capacidades centra el éxito empresarial en los atributos específicos de cada empresa (Peteraf, 1993), es decir, se centra en analizar el papel que los factores internos tienen en el éxito de las organizaciones (Wernerfelt, 1984). Una de las ideas básicas de la visión de la empresa basada en recursos es que no todos los recursos (y capacidades) son igual de importantes para la empresa, de manera que solo unos pocos se convierten en fuentes de ventajas competitivas (Barney, 1991). Entre el conjunto de recursos, las capacidades (uso de los recursos por parte de las personas) son las que con mayor facilidad pueden convertirse en fuentes de ventajas competitivas por su mayor complejidad, su alto componente tácito y su especificidad. Estas están asociadas al capital humano y más en concreto al capital intelectual y son numerosos los estudios que sugieren que son las que poseen mayor potencial para favorecer ventajas competitivas sostenibles (Barney y Wright, 1998).

El modelo de la EBC pone el énfasis en las personas sobre el capital y destaca el papel de la participación directa y de la cooperación como capacidades clave en el desarrollo de las organizaciones. Esto queda recogido en los valores de la EBC (Felber, 2012), cuando se destaca que la cooperación ha de primar el comportamiento de las empresas sobre la competencia[4] y cuando se incluye en la MBC la participación democrática como uno de los valores que se deben cuantificar. La democracia en las empresas del bien común se concreta en el análisis de las personas empleadas y de los clientes como dos de los stakeholders que aparecen en la MBC. En ambos casos, la democracia participativa se traduce en una participación activa y directa en la toma de decisiones, en la línea de uno de los principios cooperativos que rigen el

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[3] Estos indicadores se incluyen en la versión 5.0. de la Matriz.

[4] Esto no significa la desaparición absoluta de la competencia, dado que el modelo se plantea dentro de una economía de mercado, sino que esta ha de estar por debajo del bien común y el interés general, por lo que las empresas han de establecer la cooperación como patrón de conducta (Felber, 2015).

funcionamiento de las empresas de la economía social (Abad y Abad, 2014; Gómez y Gómez, 2016).

La intracooperación (cooperación dentro de la empresa entre personas) favorece la creación de capacidades intelectuales y relacionales, que son claves para el éxito de las organizaciones (Huggins, Prokop y Thompson, 2017). Por tanto, se puede afirmar que el modelo de la EBC se sustenta, en parte, en el enfoque de los recursos y capacidades. El estudio de la cadena de suministro, dentro del análisis de la relación de la empresa con sus proveedores, queda recogido en los primeros temas de la MBC, y en él se especifica cómo la empresa puede obtener diferentes tipos de recursos y capacidades procedentes de sus proveedores. También el estudio de las personas empleadas dentro de la MBC, a través del análisis de las características de los puestos y contratos de trabajo, pone el énfasis en los recursos y capacidades procedentes de sus trabajadores y trabajadoras: dignidad humana en el puesto de trabajo, cultura organizativa abierta y respetuosa, diversidad, mejora de las condiciones laborales, contratos de trabajo duraderos y de calidad, participación en la toma de decisiones, conciencia y responsabilidad ambiental de las personas empleadas, transparencia interna, trabajo en equipo, etc.

La justicia social es otro de los valores fundamentales del modelo de la EBC, que está basada en la justicia como equidad, siguiendo el modelo de igualdad de posiciones (Entrena y Martínez, 2013), a partir de la teoría de la justicia de Rawls (1971). La justicia social es posible cuando se realiza un reparto equitativo o distribución justa de todos los bienes básicos de la sociedad. El modelo de la EBC coincide también en este sentido y señala que esta solo se conseguirá con la educación y la formación. Además, para aprender a ser tolerantes con los demás se requiere de una dosis apropiada de empatía, lo que se consigue potenciando el *homo empathicus* a través del aprendizaje colaborativo (Rifkin, 2010). El BBC incluye aspectos concretos de justicia social en sus diferentes temas: justicia en la cadena de suministro (trato justo de los proveedores, corresponsabilidad y evitar los abusos de poder de la empresa), justicia y solidaridad en la gestión de los recursos financieros (reparto equitativo de los beneficios y dividendos entre propietarios y reparto justo de los recursos financieros), justicia social entre las personas empleadas (dignidad en el puesto de trabajo, contratos justos, salarios equitativos), cooperación y solidaridad con los clientes (relaciones cooperativas justas y equitativas) y contribución justa y equitativa a la comunidad o entorno social (aportaciones a la comunidad, pago justo y adecuado de los impuestos y evitar la elusión y evasión fiscal).

Se puede afirmar, por tanto, que el enfoque de recursos y capacidades da soporte teórico al modelo de la EBC al proporcionarle la base sobre la que apoyar el comportamiento de las empresas que lo implementan; un comportamiento que, al centrarse en las personas y sus relaciones sociales, les da continuidad a largo plazo y, por tanto, sostenibilidad.

La sostenibilidad es sin duda alguna el valor que da sentido a las empresas que aplican el modelo de la EBC y, por tanto, se relaciona con otro de los enfoques clave dentro de la economía de la empresa: el enfoque del desarrollo sostenible. El concepto de *desarrollo sostenible* se utiliza por primera vez en el Informe Brundtland de 1987 de la Comisión Mundial de Medioambiente y Desarrollo de Naciones Unidas y es asumido en el Principio 3.º de la Declaración de Río en 1992. Este enfoque señala que las empresas, para garantizar su sostenibilidad y la del entorno en el que realizan su actividad, han de contemplar una triple dimensión de su negocio: económica, social y ecológica o medioambiental (Panwar, Rinne, Hansen y Juslin, 2006). Con anterioridad, Carroll (1991) diseñó la pirámide que toma su nombre y en la que se recogen ya estas tres dimensiones. Posteriormente, Elkington (2004) definió el modelo *Triple Bottom Line* (TBL), conocido como triple balance o triple resultado y que actualmente utiliza el *Global Reporting Initiative* (GRI) como un modelo que deben seguir las empresas para diseñar sus informes o memorias de sostenibilidad. No obstante, el TBL ha sido criticado por diferentes autores cuando señalan que la dimensión económica ha de tener mayor peso que la social y ambiental (Gray y Milne, 2002). Por su parte, McDonough y Braungart (2002) critican el carácter *ex post* del TBL y proponen un modelo alternativo, el *Triple Top Line*, el cual permite una visión *ex ante* y *ex post* de la sostenibilidad, lo que permite no solo reducir los impactos negativos, sino su eliminación[5].

El enfoque del desarrollo sostenible se basa en el equilibrio de las tres dimensiones descritas y tiene como finalidad garantizar la supervivencia de las empresas a largo plazo, a la vez que se garantiza el futuro de las nuevas generaciones. Estas tres dimensiones quedan recogidas también en el modelo de la EBC, de manera que el modelo describe la sostenibilidad como la base del comportamiento de las empresas que lo aplican. La sostenibilidad y la responsabilidad social empresarial (RSE) son los elementos clave en el funcionamiento de las empresas que implementan el modelo de la EBC (Campos y Rodríguez, 2018).

Así, el BBC recoge aspectos e indicadores concretos de sostenibilidad, tanto social como ambiental, al igual que lo hace la TBL. Se destacan indicadores como los que se utilizan para medir la sostenibilidad de la cadena de suministro (análisis de los impactos ambientales negativos de cada producto/servicio, compra de las opciones más sostenibles y porcentaje de productos/servicios que son sostenibles), la sostenibilidad financiera (inversiones socialmente responsables y sostenibles), la promoción de la sostenibilidad entre las personas empleadas (medidas de promoción de la conciencia y formación ambiental, porcentaje de alimentación ecológica y uso de medios de transporte ecológicos), el uso y la gestión de residuos (medición de los impactos negativos y aplicación de medidas para reducirlos) y medición de impactos negativos sobre la sociedad (necesidades que se cubren, solución a problemas sociales y ambientales y grado de satisfacción de los productos/servicios).

Adicionalmente, el modelo se acopla perfectamente a un enfoque más avanzado de la teoría de los recursos y capacidades, que es el enfoque de las capacidades

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[5] Esta idea se desarrolla en el trabajo final de máster de Marta Avesani, en el que se presenta el modelo de la EBC como un modelo de negocio basado en la sostenibilidad (Ancos, 2016).

dinámicas, según el cual, las capacidades de la empresa han de adaptarse y reconfigurarse al mismo ritmo con que se producen los cambios en el entorno (Eisenhardt y Martin, 2000). Para conseguir esta adaptación, la empresa necesita mejorar el conocimiento a través de su absorción, su integración y su reconfiguración. El modelo de la EBC es, en el fondo, un proceso organizacional a través del cual las empresas pueden mejorar su situación, tanto interna como externa, contribuyendo al progreso económico y social, tanto propio como del territorio. Esto es posible porque el BBC le permite a la empresa diseñar un plan de mejora a través del cual se aplican medidas destinadas a mejorar aquellos aspectos de la empresa que han obtenido las valoraciones más bajas (Amigo y Ribera, 2018).

2.2. La teoría de los stakeholders

La teoría de los *stakeholders* tiene su origen en Freeman (1984) y señala lo importante que es para la empresa considerar el interés de cada uno de los diferentes agentes que mantienen alguna relación con ella para la fijación de objetivos e implementar las acciones necesarias para alcanzarlos (Kelly, Kelly y Gamble, 1997). De esta manera, el enfoque del objetivo único, generalmente el de la maximización del beneficio económico, es sustituido por un enfoque multiobjetivo, con el que se intenta satisfacer a todos los agentes que pueden estar influidos por la actividad que realiza la empresa (Carroll, 2004). El enfoque de los grupos de interés permite que la empresa actúe con una visión global e integrada, incorporando en sus acciones los intereses y los objetivos del resto de agentes (clientes, proveedores, trabajadores, sociedad en su conjunto). Con la aplicación de esta teoría, resulta más fácil implementar acciones de RSE (Harrison y Freeman, 1999), por lo que es un enfoque apropiado para la implementación del modelo de la EBC.

La MBC, herramienta clave para la implantación del BBC (Felber, Campos y Sanchis, 2019), está estructurada en torno a los diferentes *stakeholders* que mantienen alguna relación con la empresa (Gómez y Gómez, 2014; Mora, López y Hilliard, 2018). Los que se recogen en la MBC son cinco: proveedores, propietarios y socios financieros, empleados, clientes y otras empresas y el entorno social. A través de la metodología empleada en la MBC, lo que se hace es relacionar cada uno de los cinco grupos de *stakeholders* con los cuatro tipos de valores de la MBC. De esta manera, a través de la MBC lo que se hace es fijar unas variables determinadas para definir la relación entre cada valor y cada *stakeholder*[6]. Por tanto, se puede afirmar sin ninguna duda que el modelo de la EBC se basa en la teoría de los *stakeholders* para su implantación en el ámbito de las empresas. Como señala Campos (2016), "como en el caso de las B Corp, también se basa en el enfoque de los *stakeholders* para diseñar un sistema de auditoría del bien común. Con esta auditoría se pretende evaluar el grado de desempeño de los criterios sociales. El instrumento en el que se basa es la llamada MBC, en la que se definen una serie de variables ligadas a diferentes *stakeholders*" (p. 13).

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[6] Un análisis detallado sobre las metodologías que se pueden emplear para cuantificar el peso relativo de cada stakeholder en la organización se puede ver en Mora et al. (2018).

2.3. El enfoque de la creación de valor compartido

El enfoque de la RSE y de la ética empresarial han sido superados a nivel teórico, en la medida en que las empresas han ampliado su enfoque desde un punto de vista estratégico (Husted y Salazar, 2006). Así lo hace el modelo de la EBC, teniendo en cuenta que se fundamenta en el modelo teórico de Porter y Kramer (2006, 2011) de la creación del valor compartido, como ahora se comprobará. El modelo de la EBC pone el énfasis en los impactos sociales y ambientales de las organizaciones a través de la aplicación del BBC, que son medidos por indicadores que se cuantifican a través de la MBC (Amigo y Ribera, 2018). De esta manera, la empresa puede comparar el valor social y ambiental que genera en sus diferentes *stakeholders* (Mora et al., 2018) con el valor económico y financiero que crea y que cuantifica a través de su balance de situación y cuenta de pérdidas y ganancias. Cuando la empresa es capaz de incrementar su valor económico a través de la generación de valor social y ambiental, consigue lo que Porter y Kramer (2011) denominan valor compartido.

La creación de valor en las organizaciones presenta dos enfoques diferentes según la literatura: la perspectiva de los clientes y la perspectiva de la firma. La primera se centra en la percepción del valor para los clientes (internos y externos), mientras que la segunda se centra en la creación y apropiación del valor por parte de la organización (Martelo, Barroso y Cepeda, 2013). Por lo tanto, se puede decir que existen dos tipos de valor: 1) el valor económico, que hace referencia al valor que se apropia la empresa en forma de beneficios económicos y financieros; y 2) el valor social, que es el valor que la empresa genera en la sociedad o que la empresa transfiere a sus clientes y a otros *stakeholders*, tanto internos (empleados) como externos (sociedad). Según Porter y Kramer (2011), la intersección entre el valor económico y el valor social es lo que denominan valor compartido. Según esta perspectiva, la creación de valor social influye positivamente en la creación de valor económico y garantiza la sostenibilidad de la empresa.

De acuerdo con este nuevo enfoque, la visión de la RSE es ya insuficiente, pues se trata de acciones concretas que en la mayoría de los casos buscan un objetivo puramente económico o financiero o una mejora de la imagen de la empresa a través del *marketing*. Porter y Kramer (2011) consideran que el enfoque de la RSE estaría superado con el enfoque de la CVC, pues, con este nuevo enfoque, las acciones de tipo social y medioambiental que toma la empresa contribuyen directamente a crear valor económico. A las empresas que adoptan este enfoque, Porter y Kramer las denominan empresas híbridas, y serían aquellas que basan su sostenibilidad en la viabilidad económica garantizada a través de la creación de valor social. Por lo tanto, se trata de eliminar los límites entre las organizaciones sin fines de lucro y las que tienen fines de lucro. Las primeras son incapaces de garantizar su viabilidad económica, mientras que las segundas ponen en peligro su continuidad a largo plazo por no contribuir al progreso social.

Se entiende que existe una relación estrecha entre el

modelo de la EBC de Felber (2012) y el modelo CVC de Porter y Kramer (2011), por cuanto el primero pretende transformar la empresa (independientemente de su forma jurídica y de la existencia o no de ánimo de lucro) para garantizar su sostenibilidad, de la misma manera que lo hace el modelo CVC (generando valor compartido). El modelo de la EBC, a diferencia de otros modelos como el de la economía social (que solo es aplicable en empresas de unas características muy concretas que no son ni empresas públicas ni empresas privadas de capitales) o de las empresas B (que solo es aplicable a las empresas privadas de capitales), es un modelo que se propone para cualquier tipo de organización, pública o privada y de capitales o de economía social, aunque su referente siempre son las empresas de la economía social (Gómez y Gómez, 2016).

3. Metodología: análisis bibliométrico

Con la realización del análisis bibliométrico se pretende identificar las publicaciones científicas que existen sobre la EBC, así como determinar sus enfoques y aportaciones, relacionándolos con las teorías de organización de empresas expuestas en el apartado anterior y analizando las aportaciones dirigidas a la fundamentación académica del modelo.

El período seleccionado comprende los años 2010 a 2018. La elección del año 2010 como inicio del período se explica por ser el año en el que Felber expone por primera vez el modelo (Felber, 2012).

La revisión de la literatura se realizó siguiendo cinco etapas metodológicas (Tranfield, Denyer y Smart, 2003; Petticrew y Roberts, 2006; Johnson y Schaltegger, 2016; Zapkau, Schwens y Kabst, 2017): 1) identificación de las palabras clave y creación de cadenas de búsqueda basadas en las palabras clave identificadas; 2) selección de los estudios relevantes de investigación a través de una base de datos; 3) análisis de los documentos identificados, con base en criterios de inclusión y exclusión; 4) extracción de datos a partir de la base de datos utilizada (en este caso Excel); y 5) síntesis de los datos e informe final.

Todas las cadenas de búsqueda incluyen un grupo adicional de palabras que denotan una herramienta, incluyendo los términos *herramienta, instrumento, concepto y sistema*. La cadena de búsqueda que se ha seleccionado es *"Economy for the Common Good"* para recoger todos los trabajos que analizan el modelo.

La base de datos que se utilizó para la búsqueda fue *Web of Science*, aunque también se añadió la búsqueda en *Google Scholar*, para incluir todas aquellas revistas que no están incluidas en la primera (Johnson y Schaltegger, 2016). Con el objeto de reducir la gran cantidad de literatura disponible, se establecieron unos criterios de inclusión y de exclusión, con base en el proceso de revisión sistemática recogido en otros trabajos (Moustaghfir, 2008; Johnson y Schaltegger, 2016). En este sentido, se excluyeron de la búsqueda los trabajos correspondientes a *conference papers, working papers, technical reports* y *practical handbooks*. En cambio, sí se incluyeron en la búsqueda los artículos académicos revisa-

dos por pares (artículos científicos de revistas con evaluadores externos). La lista completa de criterios de inclusión y exclusión utilizados aparece en la tabla 1. Se seleccionaron artículos académicos publicados en inglés entre 2010 y 2018 sobre EBC desde el enfoque del *management*.

Dada la escasez de trabajos publicados en este campo, por lo corto del período analizado, se incluyeron también los trabajos publicados en castellano en revistas indexadas en la base de datos Dialnet de la Universidad de La Rioja. Con ello se pretende incluir también las publicaciones existentes sobre el modelo en España, dado que en este país existe un desarrollo desatacado del modelo empresarial de la EBC.

La búsqueda inicial de documentos a través de las cadenas de búsqueda en la *Web of Science* dio como resultado 25 documentos, de los cuales 15 están incluidos dentro del dominio de investigación en *Social Science*; el resto, que fue descartado, se incluyen en *Arts humanities* (6) y *Science Technology* (4). Se examinaron y relacionaron los títulos y los *abstracts* de los artículos con los criterios de inclusión y de exclusión como guía para identificar inicialmente las publicaciones. De esta primera selección, se eliminaron aquellos documentos que después de una revisión más exhaustiva se detectó que realmente no tenían nada que ver con el tema estudiado. Según tipos de documentos, se seleccionaron 12 publicaciones que correspondían a *review*; el resto eran *articles* (9), *books* (2), *editorials* (1) y *meetings* (1). De las 12 publicaciones en artículos científicos, 8 pertenecían al área de investigación en *Business Economics*; el resto eran de las áreas de *Educational Research* (1), *Mathematical Methods in Social Science* (1), *Mathematics* (1) y *Public Administration* (1). Los autores y títulos de estos documentos se importaron a un archivo de Excel y los documentos completos se descargaron. A partir de estos documentos, se realizó una búsqueda del texto completo para excluir aquellos documentos que mencionan algunas palabras clave, pero que no cubren el área temática de investigación; se excluyó uno. El resultado final dio un total de seis publicaciones.

La búsqueda en la base de datos Dialnet dio como resultado 12 publicaciones. En este caso, se aplicaron los criterios de búsqueda desde el primer momento, descartan-

Tabla 1. Criterios de inclusión y exclusión para la búsqueda

Criterios	Razones para la inclusión/exclusión
Criterios de inclusión: 1. Artículos publicados entre 2010 y 2018.	1. Año de inicio del planteamiento del modelo por Felber.
2. Artículos publicados en inglés.	2. La mayoría de los artículos son publicados en inglés.
3. Artículos académicos.	3. Proporcionan argumentos más rigurosos y son evaluados críticamente.
4. Artículos sobre *management* (Business Economics)	4. Garantizar el enfoque desde el cual se desea estudiar.
5. Trabajos enfocados a la EBC.	5. Reducir la investigación a estos temas en particular.
Criterios de exclusión: 1. Ponencias y comunicaciones, documentos de trabajo, informes técnicos y manuales prácticos.	1. Artículos revisados por pares para garantizar la calidad y consistencia en el análisis.

Fuente: elaboración propia.

do todos aquellos trabajos que no estuvieran relacionados directamente con la EBC, así como aquellos publicados en revistas no científicas o que no incluyeran la revisión por pares. De las 12 publicaciones, 7 corresponden a *Business Economics* y el resto a otras áreas: sociología (1), fiscalidad (1) y derecho (3). Se consideró oportuno incluir también los trabajos de estas tres áreas por estar relacionadas con la economía, y dada la escasez de trabajos encontrados.

Los 18 documentos (6 de la *Web of Science* y 12 de Dialnet) recogidos en la tabla 2 son los que se analizaron en profundidad para conseguir la información necesaria, en dos niveles diferentes: 1) un metaanálisis básico que indica las estadísticas cuantitativas del documento, incluyendo año de publicación, tipo de publicación y tipo de revista; y 2) un análisis temático para cada uno de los documentos, incluyendo a) marco teórico, b) comparativa con otros enfoques (como la RSE), c) análisis de casos prácticos y d) análisis estadísticos.

4. Resultados del análisis bibliométrico

A continuación, se analizan los resultados obtenidos referidos a las 18 publicaciones seleccionadas. La primera cuestión que conviene comentar es que se trata de un número de publicaciones muy escaso, lo que demuestra la existencia de un *gap* sobre estudios académicos en este campo, a pesar del enorme interés que el material suscita actualmente.

La tabla 3 muestra las publicaciones seleccionadas según categorías de revistas. Como se puede observar, se incluye un grupo de 9 publicaciones en 4 revistas diferentes especializadas en RSE y ética (50% del total de publicaciones), entre las cuales destaca con gran diferencia la revista *Ciriec-España*, *Revista de Economía Pública, Social y Cooperativa* con 6 publicaciones (33% del total). El resto de las publicaciones (9) se dispersan en 8 revistas diferentes, entre las que destaca la revista *Recerca: Revista de Pensament i Anàlisi* con 2 publicaciones. Los 18 artículos publicados se concentran en 12 revistas diferentes, de las cuales el 61% del total de las publicaciones corresponde a dos únicas revistas. Hay dos publicaciones que, aunque no hacen referencia explícita a la EBC, se han mantenido en el análisis por cuanto analizan empresas del bien común, al relacionar la economía social y solidaria con los bienes comunes (Abad y Abad, 2014) o al analizar las empresas de comunión y empresas B (Groppa y Sluga, 2015).

La figura 1 muestra el número de publicaciones por años. Como se puede observar, la mayor productividad se da en 2017, donde se concentra el 22% del total de las publicaciones (4 sobre 18). Es además el año en el que se registra el mayor

número de publicaciones procedentes de la *Web of Science* (artículos internacionales) junto con el 2016 con un 33% del total (2 de 6). Entre el período 2013-2016, la productividad es muy similar (entre 2 y 3 publicaciones por año). Los años 2010 a 2012 son totalmente improductivos en publicaciones sobre esta temática. En 2018 vuelven a publicarse 3 trabajos.

La segunda parte se refiere al análisis temático para cada uno de los documentos, incluyendo: a) marco teórico, b) comparativa con otros enfoques (como la RSE), c) análisis de casos prácticos y d) análisis estadísticos. En este caso se ha realizado una comparación con el estudio sobre las teorías de organización de empresas realizado en el apartado anterior del trabajo. Este queda recogido en la Tabla 4.
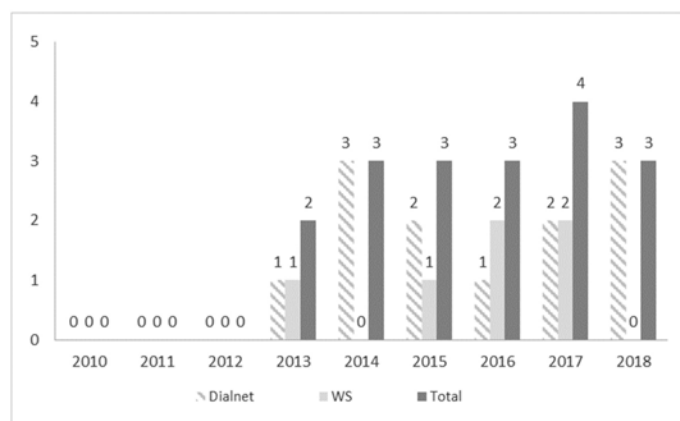

Figura 1. Evolución de las publicaciones en EBC 2010-2018.
Fuente: elaboración propia.

Tabla 3. Revistas con publicaciones de Economía del Bien Común 2010-2018

Categoría	Revista	Núm. de artículos	Suma artículos	Suma revistas
Revistas sobre RSE y Ética	*CIRIEC-España Revista de Economía Pública, Social y Cooperativa*	6	9	4
	Deusto Estudios Cooperativos	1		
	Boletín de Derecho Cooperativo	1		
	Cuadernos Latinoamericanos de Economía Humana	1		
Otras revistas	*Recerca: revista de pensament i anàlisi*	2	9	8
	Revista Española de Estudios Agrosociales y Pesqueros	1		
	Oikonomics	1		
	Cultura Económica	1		
	Quality-acces to Succes	1		
	Technological Studies	1		
	Economía, Sociedad y Territorio	1		
	Isegoria	1		
Total		18	18	12

Fuente: elaboración propia.

Tabla 2. Resultados de la busqueda

Base de datos	Búsqueda de ítems bases de datos	Documentos preliminares para revisión completa	Artículos incluidos
Web of Science	25	12	6
Dialnet	12	12	12
Total	37	24	18

Fuente: elaboración propia.

La mayor parte de las publicaciones se centra en el marco teórico o literatura sobre el tema (53% del total) y en menor medida en el análisis comparativo con otros enfoques (41%). Los trabajos sobre casos prácticos o análisis mediante técnicas cualitativas son realmente escasos (1 sobre 17) y no hay ningún trabajo publicado sobre análisis estadísticos mediante técnicas cuantitativas.

El estudio que utiliza el análisis cualitativo de casos prácticos es un trabajo publicado en la *Revista Española de Estudios Agrosociales y Pesqueros* sobre el sector agroalimentario y el caso concreto de la empresa Celler de la Montanya y Microviñas (Compes y Asensio, 2014). En este sentido, también conviene mencionar el trabajo de Sanchis y Amigo (2018), que no fue incluido en el análisis bibliométrico por tratarse de un manual, pero que recoge 14 casos de empresas que están implantando el BBC.

Los estudios sobre análisis comparativos se concentran principalmente en trabajos que comparan el modelo de la EBC con la economía social y solidaria (Martínez, 2013; Abad y Abad, 2014; Guadarrama, 2016; Campos, 2016; Gómez y Gómez, 2016) y en menor medida con las empresas B (Groppa y Sluga, 2015; Campos, 2016) y con la ecología (Villagran, 2017).

Por último, los estudios que se centran en el marco teórico explicando las características del modelo, que son la mayoría, se centran en el enfoque del *management* (Mora et al., 2018; Sanchis y Campos, 2018a), las finanzas (Sanchis y Campos, 2018b), la sostenibilidad (Foti, Scuderi y Timpanaro, 2017), en el ámbito local (Gómez et al., 2017), en los bienes democráticos (Campos y Rodíguez 2017), en los incentivos fiscales (García, 2015), en sus herramientas (Gómez y Gómez, 2017), en la economía (Jornada, 2013) y en el humanismo (Firme, 2015). También hay que destacar los tres libros publicados por Felber, en los que se recogen los fundamentos de su modelo: su primer libro sobre las bases teóricas de la EBC (Felber, 2012), su segundo libro sobre el dinero (Felber, 2014) y su tercer libro sobre el comercio mundial ético (Felber, 2018a); así como el manual de Sanchis y Amigo (2018), que recoge los fundamentos teóricos del modelo (Rodríguez, 2018).

Relacionando las publicaciones identificadas en el estudio empírico con las teorías analizadas en el apartado del marco teórico, se puede señalar que algunas de ellas sirven de ayuda para demostrar la relación de la EBC con las teorías de la organización de empresas y confirmar así su fundamentación académica.

En primer lugar, el trabajo de Foti et al. (2017) es especialmente relevante y demuestra que el modelo de la EBC es un modelo económico basado en la sostenibilidad, lo que lo relaciona con el desarrollo sostenible (Campos y Rodríguez, 2018).

Tres de los trabajos estudiados relacionan la EBC con la teoría de los *stakeholders* (Mohedano y Navarro, 2018). Primeramente, el trabajo de Mora et al. (2018) ofrece diferentes metodologías de trabajo para calcular la aportación al bien común de cada uno de los *stakeholders* de la MBC. En segundo lugar, el trabajo de Gómez y Gómez (2014) analiza los instrumentos de la EBC para la transformación económica, social y política, haciendo referencia al BBC, el cual incluye el análisis de los *stakeholders*. En tercer lugar, el trabajo de Sanchis y Campos (2018b) se centra en la relación de la empresa con sus financiadores, detallando las aportaciones del modelo a las finanzas éticas.

Uno de los trabajos, el de Sanchis y Campos (2018a), ofrece una primera aproximación al estudio de la EBC desde la perspectiva organizativa. En él se relaciona el modelo de la EBC con las tres teorías planteadas en este trabajo: la teoría de los recursos y capacidades, la teoría de los *stakeholders* y el enfoque de la CVC, además de analizar también el enfoque de la cooperación y del emprendimiento social (Mohedano y Navarro, 2018).

Las 18 aportaciones estudiadas en el análisis bibliométrico quedan recogidas en la tabla 5 a modo de resumen final.

5. Conclusiones

Los principios y valores de la EBC no son nuevos, pues se trata de valores mundialmente reconocidos y surgidos en épocas anteriores a través de modelos como los del cooperativismo y la economía social y solidaria. Sin embargo, el modelo de la EBC hace un planteamiento holístico, al considerar la aplicación de los valores éticos y humanos desde una perspectiva global e integrada. Esto es lo que le da ese valor añadido y diferenciado al de otros modelos de economías alternativas o transformadoras, surgidos también durante la última década (economía azul, economía verde, economía feminista, etc.). Comparte con ellos los valores, pero además los considera de manera global e integrada y propone herramientas prácticas para su aplicación en el ámbito de los Estados, las organizaciones y la sociedad civil.

No obstante, se trata de un modelo joven e incipiente, de apenas ocho años de vida, y de una implantación todavía muy limitada, lo que dificulta poder realizar aún una valoración real de su grado de aplicación y de su impacto. Su implementación en el ámbito de la macroeconomía es escasa, aunque plantea medidas concretas y la mejora de los indicadores de un sistema económico a través del producto del bien común. Su mayor implementación se está dando en el ámbito de la microeconomía, donde se ha convertido en un modelo organizativo que están implantando ya miles de empresas, tanto públicas como privadas y tanto con afán de lucro como sin él, a diferencia de otros modelos que son más exclusivos. Es ahí donde reside su mayor fuerza, por cuanto se sustenta en diferentes enfoques o teorías procedentes de la organización de empresas, refrendados por diferentes trabajos teóricos, como el enfoque de los recursos y capacidades, la teoría de los *stakeholders* y el

Tabla 4. Número publicaciones según temáticas en EBC

Temática	Núm. publicaciones
Marco teórico (literatura)	10
Comparativa con otros enfoques	7
Análisis de casos prácticos (cualitativos)	1
Análisis estadísticos (técnicas cuantitativas)	0
Total	18

Fuente: elaboración propia.

enfoque de la CVC. Por tanto, se puede concluir que se trata de un modelo organizativo con una base teórica sólida y con un enfoque holístico (global e integrado); lo que permite refutar aquellas críticas que lo consideran un modelo sin rigor académico y científico y aquellas otras que señalan que se trata de un simple enfoque basado en la Responsabilidad Social Corportativa (RSC) y la ética empresarial.

El análisis bibliométrico realizado en el trabajo demuestra la existencia de un *gap* en publicaciones sobre el modelo, sobre todo en lo que se refiere a estudios empíricos, especialmente de tipo cuantitativo. Ya existen trabajos que describen el marco teórico del modelo, pero apenas hay publicaciones sobre su aplicación práctica y sobre su contrastación empírica. Por este motivo, se trata de un campo con un enorme potencial investigador. Respecto al marco

Tabla 5. Aportaciones estudiadas en el análisis bibliométrico

Título	Autores	Revista	Año	Enfoque	Aportación
Economy for the common good	Jordana	*Isegoria*	2013	Economía	Caracterización
Cooperativismo y Economía del Bien Común	Martínez	*Boletín AIDC*	2013	Economía	Comparación con el cooperativismo
Herramientas de la EBC para la transformación, económica, social y política	Gómez y Gómez	*Deusto Estudios Cooperativos*	2014	Economía	Aplicación práctica de la EBC
EBC y minifundismo en el sector agroalimentario: el caso del Celler de la Montaña	Compes y Asensio	*REEAP*	2014	Agricultura	Análisis de un caso de empresa del bien común
La Economía social y solidaria como alternativa económica: bienes comunes y democracia	Abad y Abad	*Recerca*	2014	Economía	Comparación con Ec. social y solidaria
Notes of human economy for the common good	Firme	*Cuadernos del CLAEH*	2015	Humanismo	Visión humanística de la EBC
EBC: análisis y propuestas sobre la constitucionalidad de su incentivación fiscal	García	*Ciriec-España*	2015	Fiscalidad	Los incentivos fiscales en la EBC
Empresas y bien común. Caracterización de las empresas de economía y de comunión y empresas B en Argentina	Groppa y Sluga	*Cultura Económic.*	2015	Economía	Comparación con empresas de comunión y empresas B
La Economía social y solidaria en el Siglo XXI: un concepto en evolución. Cooperativas, Bcorp y EBC	Campos	*Oikono-mics*	2016	Economía	Comparación con empresas B y Ec. Social
Partnering for the common good. Third social economy sector and solidarity economy	Guadarrama	*Economía, Sociedad y Territorio*	2016	Sociedad y territorio	Comparación con Ec. Social y Solidaria
The economy for the common good and the social and solidarity economies, are they complementary?	Gómez y Gómez	*Ciriec-España*	2016	Economía	Comparación con Ec. Social y Solidaria
The ECG: the expression of a new sustainable economic model	Foti et al.	*Quality-Acces to Sucess*	2017	Sostenibilidad	Demuestra que EBC es modelo basado en la sostenibilidad
Common Goods: Economy, ecology and political theology	Villagran	*Theological Studies*	2017	Sociología	Comparación con teología y ecología
La Economía del Bien Común en el ámbito local	Gómez et al.	*Ciriec-España*	2017	Economía	Relación EBC con Desarrollo Local
Los bienes democráticos en la Economía del Bien Común	Campos y Rodríguez	*Ciriec-España*	2017	Sociología	Relación EBC con concepto bienes comunes
Fundamentación teórica del modelo EBC desde la perspectiva organizativa	Sanchis y Campos	*Recerca*	2018	Management	EBC y Teorías organizativas
Economía del Bien Común y finanzas éticas	Sanchis y Campos	*Ciriec-España*	2018	Finanzas	Las finanzas éticas y EBC
Evaluando los stakeholders de la EBC	Mora et al.	*Ciriec-España*	2018	Teoría stakeholders	Propuesta metodológica para el BBC

Fuente: elaboración propia.

teórico, sí existen publicaciones, tanto artículos científicos como capítulos de libros, que relacionan la EBC con algunas teorías y enfoques de la organización de empresas, lo que le da fundamentación académica al modelo. Aunque las publicaciones son escasas, estas se han incrementado durante los últimos tres años. Es de esperar que durante los próximos años se produzca un incremento en el número de publicaciones teóricas sobre este modelo, lo que le irá dando solidez académica y científica, como ha sucedido en otros momentos con otros enfoques (economía social y solidaria, por ejemplo).

Por otra parte, se hace necesario realizar estudios empíricos que muestren el grado de implantación y de repercusión del modelo y que den validez estadística a las herramientas y los indicadores utilizados en su aplicación. Aunque la MBC y el BBC se sustentan en modelos ya contrastados como el modelo CANVAS de triple capa, la *Triple Bottom Line* o las memorias de sostenibilidad del GRI, las variables y los indicadores que utiliza requieren de una mayor precisión. En este sentido, sería importante realizar un análisis metodológico con el fin de justificar las variables y los ítems utilizados para su medición a través de la literatura existente y demostrar así su validez metodológica y estadística (Felber et al., 2019).

También se pueden desarrollar investigaciones que relacionen el modelo de EBC con la sostenibilidad corporativa y el *management* sostenible, contribuyendo así a su consolidación como un instrumento al servicio de las empresas con un gran potencial de sostenibilidad, asegurando así su éxito a largo plazo.

Conflictos de intereses

Los autores declaran no tener ningún conflicto de intereses.

Nota

Una primera versión del trabajo se presentó en el XXXII Congreso Internacional AEDEM 2018 y forma parte de una investigación realizada en el ámbito europeo y financiada por *Humanistic Management Practices gGmbH* (HMP).

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Artículo de revisión

Responsabilidad Social Universitaria: una revisión sistemática y análisis bibliométrico

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Resumen

El propósito de este artículo es realizar una revisión sistemática y un análisis bibliométrico de la producción científica relacionada con la Responsabilidad Social Universitaria, a través de una revisión en las bases de datos *Web of Science* y *Scopus*. Los registros obtenidos fueron analizados empleando la teoría de grafos y herramientas como *bibliometrix, Sci² Tool* y *Gephi*; además, fueron presentados en tres categorías: hegemónicos, estructurales y recientes. Los resultados permitieron identificar tres perspectivas: medición, estratégico y conexión; también muestran que este campo de estudio es relativamente joven, en el cual el autor principal es Ricardo Gaete, mientras que François Vallaeys es el más citado. Adicionalmente, la región de mayor producción en el tema es Suramérica.

Palabras clave: Responsabilidad Social Universitaria, universidad, bibliometría, teoría de grafos.

University Social Responsibility: a systematic review and a bibliometric analysis

Abstract

The purpose of this article is to perform a systematic review and a bibliometric analysis of the scientific production related to University Social Responsibility, by means of a review in the *Web of Science* and *Scopus* databases. The records obtained were analyzed using the graph theory and tools such as *bibliometrix*, *Sci² Tool*, and *Gephi*. In addition, they were presented in three categories: hegemonic, structural, and recent. The results allowed to identify three perspectives: measurement, strategic, and connection. They also show that this field of study is relatively young, in which the principal author is Ricardo Gaete, while François Vallaeys is the most cited. Additionally, the region with the highest production in the subject is South America.

Keywords: University Social Responsibility, university, bibliometrics, graph theory.

Responsabilidade social universitária: revisão sistemática e análise bibliométrica

Resumo

O objetivo deste artigo é realizar uma revisão sistemática e uma análise bibliométrica da produção científica relacionada à Responsabilidade Social Universitária, através de uma revisão nas bases de dados Web of Science e Scopus. Os registros obtidos foram analisados utilizando a teoria dos grafos e ferramentas como bibliometrix, Sci² Tool e Gephi; Além disso, foram apresentados em três categorias: hegemônicos, estruturais e recentes. Os resultados permitiram identificar três perspectivas: mensuração, estratégica e conexão; Mostram também que esse campo de estudo é relativamente jovem, em que o autor principal é Ricardo Gaete, enquanto François Vallaeys é o mais citado. Além disso, a região com maior produção no assunto é a América do Sul.

Palavras-chave: Responsabilidade Social Universitária, universidade, bibliometria, teoria dos grafos.

1. Introducción

El dinamismo de la investigación y producción científica en las últimas décadas ha despertado la necesidad de crear indicadores que permitan analizar el crecimiento y desarrollo de una disciplina o área del conocimiento (Bretón Lópéz y Buela Casal, 2003; Gómez y Solana, 2005). Este comportamiento ha dado lugar a los estudios bibliométricos que, apoyados en indicadores, buscan evaluar la ciencia y la productividad de los científicos (Moravcsik, 1989). Estos estudios adquieren valor dentro de la literatura ya que permiten dar una orientación a la comunidad académica respecto a los diferentes enfoques y avances de un área del conocimiento, además de diferentes elementos como la colaboración entre autores, la actividad científica por país o región, análisis de citación, el factor de impacto de las publicaciones y revistas (Sancho, 1990).

Por ejemplo, De Bakker, Groenewegen y Den Hond (2005) realizaron un análisis bibliométrico sobre Responsabilidad Social Corporativa y desempeño social, para un periodo de 30 años, encontrando que el progreso de la literatura en torno a este tema ha sido limitado por la carencia de un constructo generalizado de este concepto. Esto demuestra la relevancia y pertinencia de emplear técnicas de bibliometría en las investigaciones actuales.

La Responsabilidad Social Universitaria (en adelante RSU) es una política de gestión universitaria, que según Vallaeys (2014) se constituye como una evolución del concepto de Responsabilidad Social. Este campo de estudio ha despertado el interés de los investigadores en los últimos años; sin embargo, a pesar de que existen diferentes revisiones sobre el tema (De la Calle y Giménez, 2011; Larrán-Jorge y Andrades-Peña, 2017; Mazzetti, 2014; Pacenza y Silva, 2013), no se ha realizado un estudio sistemático que muestre la evolución de este concepto, que permita identificar los documentos y autores principales, y que presente sus perspectivas.

En este sentido, De la Calle y Giménez (2011) efectuaron una aproximación al concepto, mediante la síntesis de la literatura asociada la RSU y la Responsabilidad Social del Universitario. Por un lado, Larrán-Jorge y Andrades-Peña (2017) revisaron las investigaciones asociadas al tema en 15 revistas académicas especializadas en educación superior. Por otro lado, Pacenza y Silva (2013) realizaron una revisión bibliométrica del tema; sin embargo, solo emplearon las bases de datos Scielo (Scientific Electronic Library Online) y Redalyc (Red de Revistas Científicas de América Latina y el Caribe). Por lo tanto, la presente investigación tiene como objetivo realizar una revisión sistemática basada en la teoría de grafos y efectuar un análisis bibliométrico de la producción científica relacionada con la RSU.

Para cumplir el objetivo en mención, inicialmente se realizó una búsqueda en las plataformas Web of Science (en adelante WoS) y Scopus del tema University Social Responsibility. De estas bases de datos, se exportaron las referencias (200 en total) y posteriormente se realizó su procesamiento mediante la herramienta Bibliometrix, permitiendo hacer el análisis de índices como la cantidad de artículos, redes de cocitaciones y coautorías, productividad por países y por autores e impacto de las revistas. Posteriormente, se

extraen todas las referencias de los artículos encontrados en las bases de datos (2.821 en total), esto se logra utilizando el aplicativo Sci^2 Tool (Sci2 Team, 2009). Por último, se procede a realizar el análisis de la red generada a partir de todas las referencias, para ello se utiliza el aplicativo Gephi (Bastian, Heymann y Jacomy, 2009), logrando identificar los artículos más importantes de acuerdo a su impacto (índice de citación). Para la presentación de estos documentos se empleó un esquema de árbol; en la raíz se encuentran los documentos o artículos clásicos, en el tronco aquellos artículos que se consideran como estructurales, por último, en las hojas están los artículos más recientes; este esquema facilita comprender la evolución de la RSU, la importancia de los documentos y sus perspectivas.

El artículo se estructura en tres secciones adicionales a la introducción, en la primera se presenta la metodología empleada para el búsqueda, selección y procesamiento de los artículos base de la investigación, a partir del uso de herramientas bibliométricas. En la segunda, se expone el desarrollo de la investigación y los hallazgos. Por último, en la tercera parte del documento se socializan las principales conclusiones y hallazgos, al igual que se señalan las limitaciones del estudio y se efectúan recomendaciones para posteriores investigaciones de este tipo.

2. Metodología

Para la elaboración del presente artículo se realizó un estudio bibliométrico de la producción científica asociada al tema de RSU, la búsqueda de las investigaciones se efectuó en las bases de datos Web of Science (Clarivate) la cual cuenta con 18.000 revistas indexadas y Scopus (Elsevier) que actualmente agrupa 39.647 revistas indexadas, durante el periodo comprendido entre enero de 2001 y el 20 de junio de 2019. Estas dos bases de datos son consideradas las principales, ya que abarcan un amplio número de revistas a nivel mundial, además involucran investigaciones científicas en diversos campos del saber (Bar-Ilan, 2008, 2010; Gavel y Iselid, 2008; Vieira y Gomes, 2009).

La ecuación de búsqueda empleada fue la misma en ambas bases de datos: "University Social Responsibility", se realizó la consulta involucrando los temas, títulos, resúmenes y palabras claves, de esta manera se obtuvieron 116 artículos en Scopus y 84 en WoS (tabla 1).

Las referencias obtenidas por la búsqueda mencionada anteriormente fueron exportadas de WoS y Scopus, incluyendo contenido como: autor, título, año, DOI, fuente y referencias, que luego se integraron en una red. Este procedimiento incorpora artículos de diversas fuentes y revistas (indexadas

Tabla 1. Búsqueda y criterios

Ecuación de búsqueda	Base de datos	Resultados	Total de artículos
University Social Responsibility"	Scopus	116	
Periodo de tiempo: Todos los años	Web of Science	84	200

Fuente: elaboración propia

y no indexadas), independientemente de la base de datos de donde se origina, al igual que su idioma, lo que ofrece una visión completa del campo de estudio y términos de producción académica más incluyente.

Para identificar los artículos más relevantes se empleó la metodología propuesta por Robledo, Osorio y López (2014) en la cual se ordenan los artículos en 3 categorías, la primera denominada la raíz, en la que se presentan los artículos con grado de entrada alto y salida cero; la segunda el tronco, allí se asocian los artículos con un grado de intermediación alto; la tercera y última las hojas, en la cual se localizan los artículos con alto grado de salida y un grado de entrada cero, también denominados las perspectivas (Robledo, Osorio y López, 2014). Es importante mencionar que diversas investigaciones dan soporte a esta metodología, empleada en múltiples trabajos (Cervantes, Botero y Finkl, 2018; Díez, 2018; Hernández-Leal, Duque-Méndez y Moreno-Cadavid, 2017; Toro y del Rodríguez, 2017; Trujillo Salazar, 2017; Zuluaga et al., 2016).

Para la generación del mapa que muestra los artículos y la forma en que estos interactúan se utilizó la teoría de grafos propuesta por Leonhard Euler en 1941, la cual ha sido aplicada de manera amplia en investigaciones en las ciencias sociales (Wasserman y Faust, 1994). Esta técnica permite extraer información relevante de la topología y características de la red. Para ello se emplearon dos herramientas, la primera Sci^2 Tool (Sci2 Team, 2009), en la cual se ingresa la lista de referencias y citas obtenidas de las bases de datos y se transforman en una red; la segunda herramienta es *Gephi*, la cual permite visualizar y analizar la red (Bastian et al., 2009). La metodología desarrollada se muestra en la figura 1.

Para el análisis bibliométrico se emplea la herramienta Bibliometrix, la cual es un código abierto que facilita el mapeo científico y se encuentra programado en el aplicativo "R" (Aria y Cuccurullo, 2017). Este código ha sido aplicado en diversas investigaciones y en diferentes disciplinas que requieren cartografía científica (Addor y Melsen, 2019; Almeida y de Paula, 2019; Alonso, Castiello y Mencar, 2018; Bond y Buntins, 2018).

Posterior a la generación de la red, se visualiza en la herramienta *Gephi* y se calculan los indicadores relacionados en la figura 1. El indicador *Indegree* hace referencia al número de veces que los artículos de la red han citado a uno en particular, el *Outdegree* hace referencia al número de veces que un artículo en particular cita a otros de la red, también se puede considerar como el número de enlaces que se desprenden de éste (Wallis, 2007). Dentro del aplicativo *Gephi* cada artículo está representado por un nodo y cada conexión por una arista.

Adicionalmente, se aplica el filtro de componente gigante, el cual busca aquellos nodos que están conectados entre sí de manera directa o indirecta, permitiendo eliminar nodos que no estén conectados con la comunidad principal (Bollobás, 1984). Finalmente, el último indicador en aplicarse es el *Betweenness*, éste permite calcular el número de rutas más cortas en el grafo que atraviesan un nodo (Freeman, 1977), el nodo resultante de este proceso contará con una centralidad e intermediación alta porque conecta varios nodos de la red (Ni, Sugimoto y Jiang, 2011), específicamente los artículos clásicos con los más recientes. En la figura 2 se visualizan la red inicial compuesta por 2821 nodos (referencias) y la red
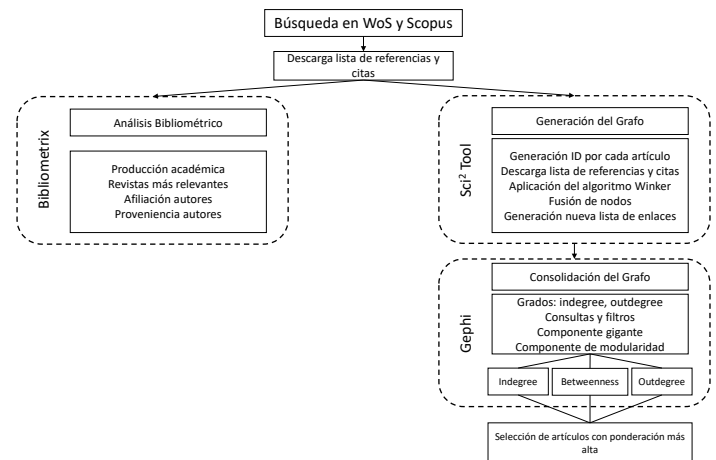
Figura 1. Procedimiento metodológico
Fuente: elaboración propia.

Red inicial | Red final

Nodos: 2.821
Aristas: 3.142

Nodos: 260
Aristas: 589
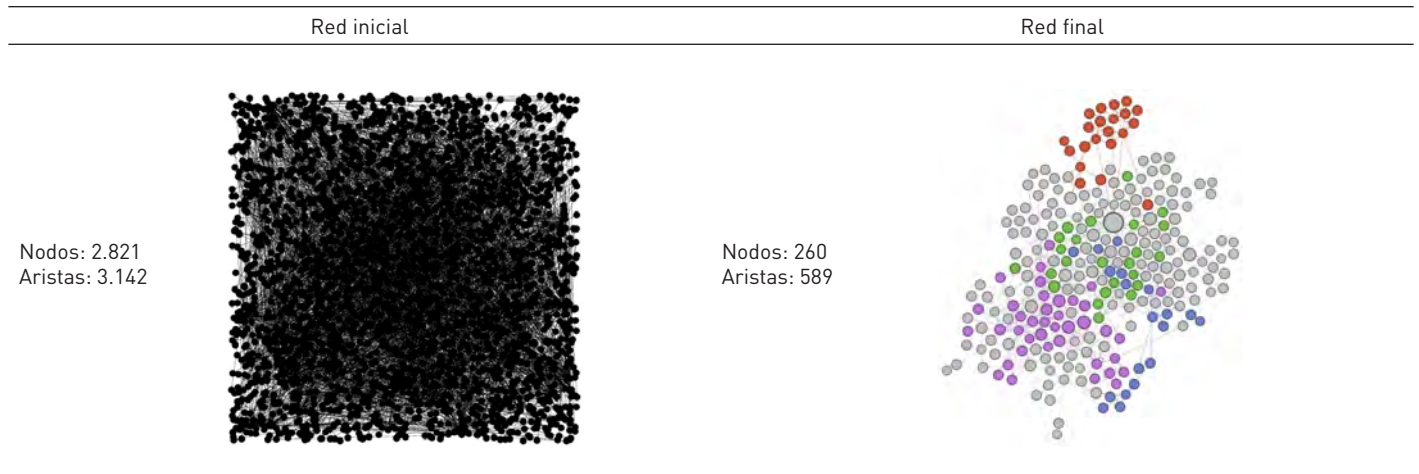
Figura 2. Extracción de la red
Fuente: elaboración propia.

final compuesta por 260 nodos (referencias), donde la última se obtiene después de aplicar los filtros mencionados.

3. Resultados

En el presente apartado se relacionan elementos bibliométricos de la RSU como la producción científica, la discriminación por países, los autores más relevantes en términos de producción e índice de citaciones, así como las revistas más importantes en el campo. También se presenta la red y el árbol de la RSU, además, se plantea las perspectivas del área.

3.1 Producción científica en RSU

En la figura 3 se muestra la producción de artículos científicos publicados en las bases de datos *WoS* y *Scopus* asociados al tema de RSU entre los años 2001 y 2019, los cuales son 200 en total. Hasta el año 2014 se publicaron 56 documentos, siendo este periodo de tiempo el menos productivo; posterior a éste, la publicación de investigaciones enmarcadas en el tema ha aumentado de manera importante; durante el año 2018 (el periodo de más alta producción) se alcanzaron 49 artículos, lo que representa cerca del 25% de las publicaciones totales. Como lo muestran las líneas de tendencia, se presenta un aumento del interés de la comunidad científica en esta área del conocimiento, lo que se refleja en una tasa anual de crecimiento del 32%, es necesario aclarar que al momento de realizar el presente artículo habían transcurrido los primeros seis meses del año 2019, lo que explica que se contará con tan solo 18 publicaciones en ese periodo. También se debe resaltar que el comportamiento en el número de publicaciones en ambas bases de datos es muy similar en los últimos 5 años.

Al realizar el análisis de la producción científica por países, España se destaca en ambas bases de datos, con 34

publicaciones en *Scopus* y 29 en *WoS*; en la tabla 2 se puede observar el listado de los 10 países que lideran la producción académica mundial en RSU discriminados por base de datos; cabe resaltar que 6 países (España, Venezuela, Colombia, Chile, Brasil y México) se encuentran en ambos listados.

Dentro de los 10 países de más alta producción el 80% son Latinoamericanos, lo que demuestra que esta región tiene un papel importante en cuanto a desarrollo investigativo en este campo. Colombia ocupa la segunda posición en el ámbito global con 29 publicaciones, seguido de Venezuela con 18, Chile y México con 14, Ecuador con 11, Perú con 9, Romania con 8, Brasil con 7, y por último Estados Unidos con 7 (figura 4).

En relación con los autores, la tabla 3 proporciona el listado de los autores más relevantes, clasificándolos por el número de documentos publicados en cada base de datos, además, se relaciona su índice h (*H-index*), este indicador es empleado para caracterizar la producción científica de cada

Tabla 2. Producción de artículo en RSU por países

Base de datos			
Scopus		WoS	
País	Número de documentos	País	Número de documentos
España	34	España	29
Venezuela	14	Colombia	17
Colombia	12	México	10
Chile	9	Ecuador	9
Romania	6	Perú	6
Brasil	5	Chile	5
Estados Unidos	5	Venezuela	4
México	4	Brasil	2
Rusia	4	Malasia	2
Australia	3	Polonia	2

Fuente: elaboración propia
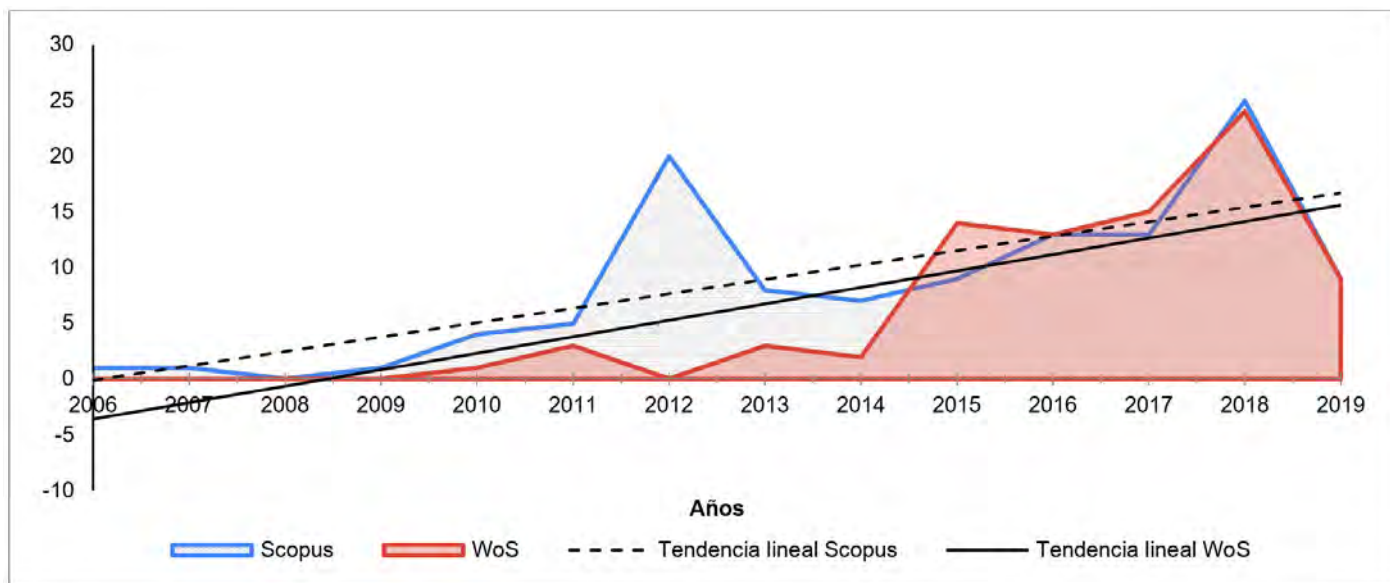
Figura 3. Producción científica anual en RSU
Fuente: elaboración propia.
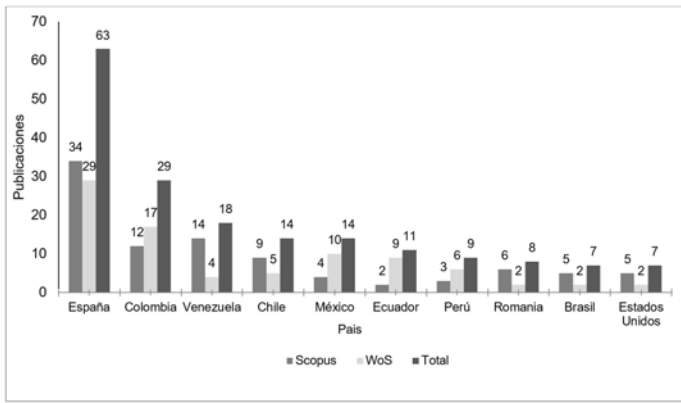
Figura 4. 10 Países con mayor producción en RSU
Fuente: elaboración propia.

Tabla 3. Autores más relevantes en la producción de artículos sobre RSU

	Scopus			WoS		
Autor	Número de publi-caciones	Índice h	Autor	Número de publi-caciones	Índice h
Quezada, R.G.	5	3	Quezada, R.G.	4	1
Chang, E.	3	31	Hernández, B.	3	0
Esfijani, A.	3	4	Vallaeys, F.	3	1
Abdel-Hameid, S.O.	2	0	Rodríguez, N.A.	2	0
Aza, C.L.	2	2	López-Noriega, M.D.	2	0
Badri, A.B.	2	2	Moreno, J.R.V	2	0
Bocean, C.	2	1	Martí No-guera, J.J.	2	1
Gallardo-Vázquez, D.	2	6	Rajab, A.	2	0
Hussain, F.K.	2	23	Shaari, R.	2	0
Lanero, A.	2	5	Zalthen-Hernandez, L.	2	0

Fuente: elaboración propia

Figura 5. Red cocitaciones
Fuente: elaboración propia.

investigador (Hirsch, 2005). Ricardo Gaete Quezada lidera la producción tanto en *Scopus* como en *WoS*, con un total de 9 artículos publicados en ambas bases de datos, sin embargo, el H-*index* de este autor no es el mejor dentro de este listado; particularmente, Elizateth Chang y Farookh Hussain, quienes son coautores, cuentan con un indicador mucho más alto (tabla 3).

Los documentos con mayor índice de impacto en Scopus y WoS son: "*Developing university social responsibility: A model for the challenges of the new civil society*" (Vasilescu, Barna, Epure y Baicu, 2010) citado 34 veces en *Scopus* y 138 en *Google Scholar*, y "*Online disclosure of university social responsibility: a comparative study of public and private US universities*" (Garde Sánchez, Rodríguez Bolívar y López-Hernández, 2013) citado 23 veces en *Scopus* y 42 en *Google Scholar*.

Las publicaciones en la base de datos *Scopus* se concen-tran en las áreas de ciencias sociales (34,5%), negocios, gestión y contabilidad (17,5%), economía, econometría y finanzas (12,1%) y artes y humanidades (10,7%). En *WoS* se centralizan en categorías como investigación en educación (38%) y ciencias sociales (21,5%), lo que muestra que la clasificación empleada por la *WoS* es más homogénea que la empleada por *Scopus*, además, ofrece un campo mucho más específico para las investigaciones enmarcadas en RSU (investigación educativa).

Respecto a la red de cocitaciones (figura 5), se observa que el autor principal es François Vallaeys, quien es el más citado dentro de la red y con el mayor número de conexiones. Además, se pueden evidenciar dos clústeres de autores, el primero y más grande integrado por algunos investigados como: Vallaeys, Gaete-Quezada, Vasilescu, Martínez, Christensen, Hernández, Matten, Benneworth y Mitchell; el segundo compuesto entre otros por: Brown, Gómez, McWilliams, Hair, Vázquez, Johnson y Fornell.

En la tabla 4 se relacionan las diez revistas científicas en las cuales se han publicado más artículos asociados al tema de RSU dentro de las bases de datos *Scopus* y *WoS*, además, se presenta el índice h y el cuartil en el que se encuentra cada una de éstas. Tan solo una de las revistas se encuentra en Q1, otra en Q2, cinco en Q3 y tres no registran cuartil.

3.2. Análisis de la red

Los resultados obtenidos de la ecuación de búsqueda produjeron una red de 2.821 nodos y 3.142 enlaces; posterior al procesamiento de esta red inicial se obtuvo una red compuesta de 260 nodos y 589 enlaces (figura 2). Para seleccionar los artículos objeto de análisis se empleó el crite-rio de puntuación más alta en los indicadores *Indegree* (grado de entrada), *Betweenness* (intermediación) y *Outdegree* (grado de salida). A partir de lo anterior, se eligieron 40 artículos en total para esta revisión: los 10 artículos con el más alto grado de entrada, 15 con el mayor grado de intermediación y 15 con el más alto grado de salida; estos artículos representan información relevante en un amplio periodo de tiempo. Los documentos clásicos o hegemónicos son aquellos que tienen un valor alto de *Indegree* y cero de *Outdegree*, los actuales son los que presentan un valor alto de *Outdegree* y cero de
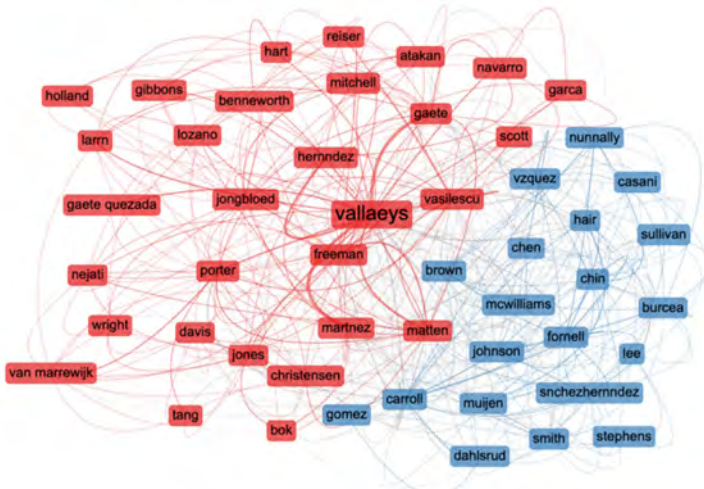
Indegree, y los estructurales son los que tienen un alto valor en *Betweenness*, es decir, lo que conectan los documentos clásicos con los actuales. Los documentos seleccionados se presentan dentro de la estructura de un árbol, en la cual los documentos que son considerados clásicos se encuentran en las raíces, los estructurales el tronco y los actuales en las hojas (figura 6).

La figura 7 muestra la red de la RSU (compuesta por 260 documentos) a la cual se aplicó el algoritmo de modularidad

Tabla 4. Revistas científicas más importantes

Revista	Artículos	Índice h	Cuartil	Base de datos
Opción	12	11	Q3	Scopus
World review of entrepreneurship management and sustainable development	9	13	Q3	Scopus
Revista digital de investigación en docencia universitaria RIDU	9	1	-	WoS
Revista venezolana de gerencia	4	7	Q3	Scopus
Espacios	3	12	Q3	Scopus
International review on public and nonprofit marketing	3	11	Q3	Scopus
EUREKA Revista científica de psicología	3	0	-	WoS
Revista CONRADO	3	1	-	WoS
Education policy analysis archives	2	40	Q1	Scopus
International Journal of Management	2	44	Q2	Scopus

Fuente: elaboración propia

de clase, el cual permite visualizar dentro de la red diferentes comunidades (clúster) integradas por nodos densamente conectados (Blondel, Guillaume, Lambiotte y Lefebvre, 2008), en este caso se identificaron tres perspectivas. Los nodos de mayor tamaño son los documentos que se han citado con mayor frecuencia dentro de la red, esto implica que son considerados los más relevantes en este campo del conocimiento. En este caso se señalaron los 4 más importantes.

3.3. Documentos clásicos

Los documentos que son considerados hegemónicos (tabla 5) pueden clasificarse en dos grupos, el primero en el cual se encuentran autores que han realizado aportes considerables a la Responsabilidad Social en términos generales (Bowen, 1960; Carroll, 1999, 1979; Freeman y Mcvea, 1984; Porter y Kramer, 2006), el segundo integrado por investigaciones sobre Responsabilidad Social enmarcadas en el sector universitario; es allí donde se encuentran cinco trabajos elaborados por François Vallaeys, lo que corrobora los resultados presentando en la red de cocitaciones y ratifica el protagonismo de este autor en el campo de estudio.

El documento de mayor impacto en el tema de RSU es "Responsabilidad Social Universitaria: manual de primeros pasos", este libro publicado por Vallaeys (2009) presenta una herramienta de autodiagnóstico compuesta por cuatro ejes (campus responsable, gestión social del conocimiento, participación social y formación profesional y ciudadana) que permiten integrar diversas áreas como las funciones y los diferentes grupos de interés de estas instituciones; este instrumento también facilita el desarrollo estrategias de RSU
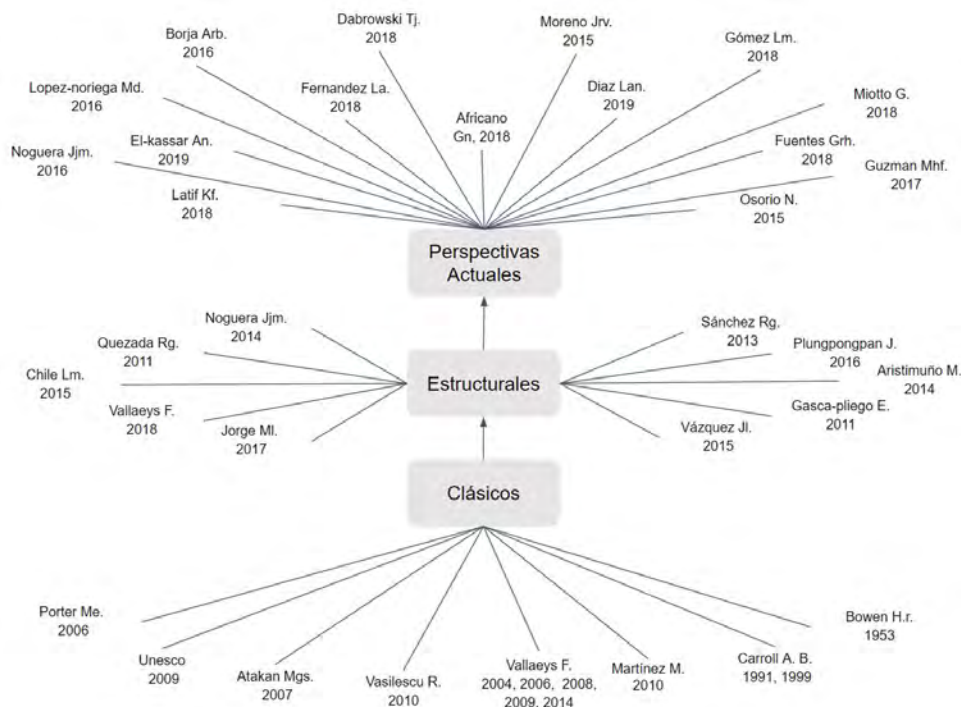
Figura 6. Árbol de la RSU
Fuente: elaboración propia.
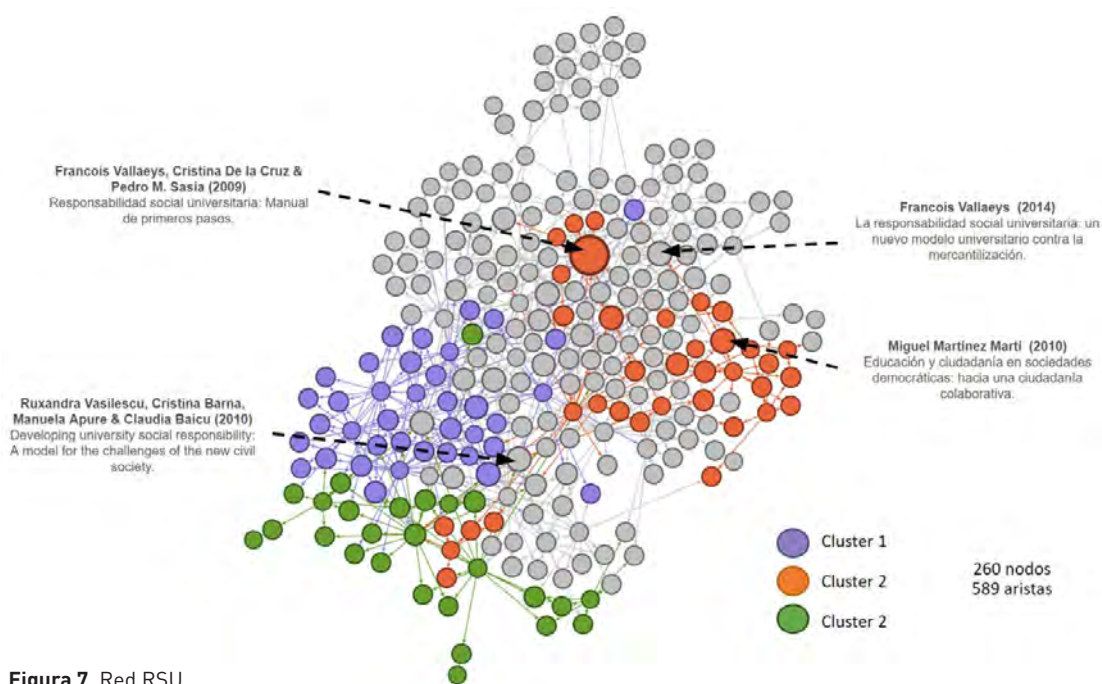
Figura 7. Red RSU
Fuente: elaboración propia.

Tabla 5. Documentos hegemónicos

Documento	Autor (es)	Año	Citaciones	Referencia
Social Responsibility of the businessman	Howard R. Bowen	1953	6658	(Bowen, 1960)
A Three-Dimensional Conceptual Model of Corporate Performance	Archie B. Carroll	1979	12665	(Carroll, 1979)
Strategic Management: A Stakeholder Approach	R Edward Freeman John McVea	1984	34084	(Freeman y Mcvea, 1984)
The pyramid of corporate social responsibility: Toward the moral management of organizational stakeholders	Archie B. Carroll	1991	9965	(Carroll, 1991)
Corporate Social Responsibility: Evolution of a Definitional Construct	Archie B. Carroll	1999	8616	(Carroll, 1999)
Strategy and Society	Michael Porter Mark Kramer	2006	10925	(Porter y Kramer, 2006)
Enseñar la ética y el desarrollo en la Universidad en la era planetaria	François Vallaeys	2004	12	(Vallaeys, 2004)
Breve marco teórico de la Responsabilidad Social Universitaria	François Vallaeys	2006	372	(Vallaeys, 2007)
Corporate Identity of a Socially Responsible University – A Case from the Turkish Higher Education Sector	M. G. Serap Atakan Tutku Eker	2007	136	(Atakan y Eker, 2007)
Responsabilidad Social Universitaria: una nueva filosofía de gestión ética e inteligente para las universidades	François Vallaeys	2008	179	(Vallaeys, 2013)
Conferencia Mundial sobre la Educación Superior - 2009: La nueva dinámica de la educación superior y la investigación para el cambio social y el desarrollo	Organización de las Naciones Unidas	2009	10	(UNESCO, 2009)
Responsabilidad Social Universitaria: manual de primeros pasos	François Vallaeys Cristina De la Cruz Pedro M Sasia	2009	524	(Vallaeys, De la Cruz y Sasia, 2009)
Educación y ciudadanía en sociedades democráticas: hacia una ciudadanía colaborativa	Miguel Martínez Martín	2010	15	(Martínez Martín, 2010)
Developing university social responsibility: A model for the challenges of the new civil society	Ruxandra Vasilescu Cristina Barna Manuela Apure Claudia Baicu	2010	141	(Vasilescu et al., 2010)
La Responsabilidad Social Universitaria: un nuevo modelo universitario contra la mercantilización	François Vallaeys	2014	162	(Vallaeys, 2014)

Fuente: elaboración propia

que generan mayores impactos organizacionales, educativos, cognitivos y sociales.

Vallaeys realiza otros aportes considerables al campo de estudio:

• En el año 2006 publica el artículo titulado "Breve marco teórico de la Responsabilidad Social Universitaria" en el cual plantea una reflexión sobre lo que significa el concepto de RSU y sus implicaciones, además, explica su evolución, al pasar de ser sencillas iniciativas de proyección social, hasta lo que hoy representa; también expone los desafíos que deben enfrentar todas las iniciativas que se emprendan en este tema.
• En el año 2008 publica el artículo titulado "Responsabilidad Social Universitaria: una nueva filosofía de gestión ética

e inteligente para las universidades", en este documento el autor expone que la RSU debe dejar de verse como un agregado o un conjunto de acciones encaminadas a la proyección social, y la presenta como un modelo de gestión, que puede generar a las instituciones innovación académica, coherencia institucional y pertinencia social.
• Finalmente, en el año 2014 publica el artículo "La Responsabilidad Social Universitaria: un nuevo modelo universitario contra la mercantilización", en este analiza el modelo de gestión de las instituciones de educación superior basado en la RSU y lo presenta como una herramienta para reivindicar los valores y verdadera finalidad de las universidades. Según el autor, el desprestigio que enfrentan estas organizaciones se debe a la visión de "universidad empresarial" lo que las convierte en organizaciones con fines

Tabla 6. Documentos estructurales

Documento	Descripción	Metodología	Referencia
Construir ciudadanía desde las universidades, Responsabilidad Social Universitaria y desafíos ante el siglo XXI	Es un documento reflexivo que aborda el rol que deben desempeñar las universidades como agentes de transformación y ratificación del modelo democrático, mediante la formación de ciudadanos completos y participativos, preocupados por las necesidades sociales.	Teórico	(Gasca-Pliego y Olvera-García, 2011)
Responsabilidad Social Universitaria. Su gestión desde la perspectiva de directivos y docentes. Estudio de caso: una pequeña universidad latinoamericana	A través de un caso de estudio de la Universidad Nacional Experimental de Guayana en Venezuela se examina la percepción de los directivos y docentes de esta institución respecto a la RSU, mediante la medición de cinco factores (cognitivo-ambiental, currículo y clima organizacional, comportamiento organizacional, selección de *stakeholders* y planificación hacia el compromiso social)	Empírico	(Aristimuño y Rodriguez Monroy, 2014)
Students' experiences of university social responsibility and perceptions of satisfaction and quality of service	Mediante un instrumento aplicado a los estudiantes de la Universidad de León en España se identificaron los factores que definen la percepción que estos tienen sobre la RSU.	Empírico	(Vázquez, Lanero y Aza, 2015)
University social responsibility and brand image of private universities in Bangkok	Es una investigación aplicada que examina los efectos de la RSU sobre la imagen de marca de las universidades privadas en Bangkok. Los resultados de este estudio muestran que para los directivos de estas instituciones la RSU es más un deber que un elemento usado para la estrategia comercial, y para los estudiantes las acciones de RSU no son un factor decisivo para elegir una universidad u otra.	Empírico	(Plungpongpan et al., 2016)
Online disclosure of university social responsibility: a comparative study of public and private US universities	Es un estudio comparativo entre universidades públicas y privadas en Estados Unidos, en el cual se analiza si estas instituciones integran dentro de sus actividades prácticas de RSU, además, si utilizan la RS como un factor diferenciador.	Empírico	(Garde Sánchez et al., 2013)
Analysing the literature on university social responsibility: A review of selected higher education journals	Es una revisión de la literatura sobre RSU durante el periodo 2000 a 2015.	Empírico	(Larrán-Jorge y Andrades-Peña, 2017)
La Responsabilidad Social Universitaria como desafío para la gestión estratégica de la Educación Superior: el caso de España	Es un análisis del concepto de RSU y una clasificación del mismo a través de tres perspectivas: gerenciales, transformadoras y normativas. Se analiza el desarrollo de este concepto en España	Empírico	(Gaete Quezada, 2011)
Las diez falacias de la Responsabilidad Social Universitaria	Mediante la descripción y análisis de un conjunto de falacias comunes sobre la RSU se expone la evolución de este concepto, además muestra el avance de este modelo en el contexto Latinoamericano.	Teórico	(Vallaeys, 2018)
University–community engagement: Case study of university social responsibility	Es un informe de los programas de participación juvenil desarrollados entre la universidad Tecnológica de Auckland y las escuelas de Auckland en Nueva Zelanda.	Empírico	(Chile y Black, 2015)
Responsabilidad Social Universitaria: influencia de valores y empatía en la autoatribución de comportamientos socialmente responsables	Es una revisión de la RSU desde la psicología, analiza cómo la formación permite adquirir a los estudiantes comportamientos socialmente responsables. La investigación evaluó tres escalas: valores humanos, empatía multidimensional y autoatribución de comportamientos socialmente responsables.	Empírico	(Martí Noguera, Martí-Vilar y Almerich, 2014)

Fuente: elaboración propia

de lucro, y cualquier fin diferente a la universalidad termina destruyendo a estas instituciones.

Otras publicaciones que se consideran clásicas dentro de este campo de estudio son: "*Developing university social responsibility: A model for the challenges of the new civil society*" y "*Corporate Identity of a Socially Responsible University – A Case from the Turkish Higher Education Sector*", las cuales a diferencia de las investigaciones de Vallaeys son desarrolladas fuera de Latinoamérica. En el caso de la primera se exhibe un modelo general de RSU en el contexto de la globalización, considerando las realidades y los desafíos del sistema de educación superior en Rumania; la segunda es un estudio que describe las iniciativas de Responsabilidad Social de una institución de educación superior en Turquía.

Martínez Martí (2010) realiza una propuesta pedagógica sobre formación de ciudadanos en sociedades democráticas, plurales y en época de globalización, argumentando que la ciudadanía activa y colaborativa se logra desde la educación formal, no formal e incluso la informal.

Finalmente, la Organización para las Naciones Unidas para la Educación, la Ciencia y la Cultura (UNESCO) en la conferencia celebrada en París en el año 2009, analiza el papel de la educación superior y la investigación en el cambio social y desarrollo, y emite un comunicado que plantea las responsabilidades de la educación superior, sus retos y las dinámicas que debe enfrentar para contribuir al cumplimiento de los Objetivos de Desarrollo del Milenio.

3.4. Documentos estructurales

Los documentos con mayor interés son los que vinculan los recientes con los clásicos, son los que presentan mayor tasa de centralidad, es decir, son citados de manera importante y al mismo tiempo citan los documentos hegemónicos, estos artículos conectan la red.

Dentro de los documentos que hacen parte del tronco (estructurales) del árbol de la RSU se identificó una tendencia a desarrollar investigaciones de corte empírico, algunos se interesaron en construir y aplicar instrumentos que permitieran evaluar cómo los diferentes grupos de interés percibían las prácticas de responsabilidad social desarrolladas por las universidades (Aristimuño y Rodriguez Monroy, 2014; Larrán Jorge y Andrades Peña, 2017; Plungpongpan, Tiangsoongnern y Speece, 2016; Vázquez, Lanero y Aza, 2015). También se identificaron documentos completamente teóricos como el publicado por Gasca-Pliego y Olvera-García (2011), en el cual de manera reflexiva se analiza el papel que desempeñan las universidades como agentes del cambio social. En la tabla 6 se presentan los documentos y la descripción de cada uno.

3.5. Documentos recientes

Los documentos con mayor grado de salida son los que emplean como referentes a los que hacen parte de las raíces y el tronco, en este caso reciben el nombre de hojas. En esta sección hay una tendencia a desarrollar investigaciones empíricas que pretenden determinar cómo son percibidas las prácticas de Responsabilidad Social de las universidades por parte de los diferentes grupos de interés, además, de proponer y validar escalas para medirlas. En la tabla 7 se exponen los documentos que integran esta categoría y se presentan elementos como el objetivo, la metodología y la revista en la cual fueron publicados.

Tabla 7. Documentos recientes

Documento	Objetivo	Metodología	Revista / Editor	Referencia
The Development and Validation of Stakeholder-Based Scale for Measuring University Social Responsibility (USR)	Desarrollar y validar una escala de medición de la RSU	Empírico	Social Indicators Research (Q1)	(Latif, 2017)
El desarrollo regional como responsabilidad social de la universidad. Caso ecoturismo en la provincia de Tungurahua	Analizar el rol de la universidad en el desarrollo regional mediante un caso de estudio	Empírico	Revista colombiana de ciencias sociales	(Martí Noguera, 2016)
Student–university identification and loyalty through social responsibility: A cross-cultural analysis	Examinar el efecto de la RSU sobre la lealtad de los estudiantes y el efecto moderador de la importancia percibida de la RSU	Empírico	International Journal of Educational Management (Q2)	(Vázquez et al., 2015)
La gestión en la universidad, una perspectiva de sus grupos de interés internos	Determinar la percepción que tiene los *stakeholders* internos sobre las acciones y prácticas de la RS en el marco de la gestión de la Universidad Autónoma del Carmen	Empírico	Ra Ximhai	(López-Noriega, Zelthen-Hernández y Carillo-Marín, 2016)
Responsabilidad Social Universitaria. Tratamiento en la UMET	Analizar los elementos que intervienen en la puesta en práctica de la RSU en la Universidad Metropolitana del Ecuador	Empírico	Conrado	(Brivio Borja y Montano Rodríguez, 2016)

Tabla 7. Documentos recientes (continuación)

Discursos representacionales sobre transferencia social del conocimiento en la Universidad de Carabobo	Generar una interpretación sobre las representaciones sociales de docentes de la Universidad de Carabobo (Venezuela) asociado a la transferencia social de conocimiento	Teórico	Orbis	(Osorio y Zambrano, 2015)
La comunicación y medición de la Responsabilidad Social Universitaria: Redes sociales y propuesta de indicadores	Analizar la comunicación de las prácticas de Responsabilidad Social de las universidades Españolas a través de Twitter	Empírico	Revista Digital de Investigación en Docencia Universitaria	(Aldeanueva y Arrabal, 2018)
Practicando la Responsabilidad Social Universitaria en el Caribe: Perspectivas de los públicos internos	Analizar las perspectivas de públicos internos sobre las iniciativas y procesos de responsabilidad social en una universidad privada en Puerto Rico	Empírico	Revista Digital de Investigación en Docencia Universitaria	(Gómez, Alvarado Naveira y Pujol Bernabel, 2018)
University Social Responsibility Strategies	Investigar cómo las instituciones de educación superior desarrollan sus estrategias de responsabilidad social	Empírico	e-mentor	(Dsntowski, Brdulak, Jastrzebska y Legutko-Kobus, 2018)
La transferencia tecnológica como práctica de Responsabilidad Social Universitaria	Definir a partir de una revisión bibliográfica cómo se puede entender la transferencia tecnológica como práctica de RSU	Teórico	Arbor (Q2)	(Naranjo Africano y Mejia Reatiga, 2018)
Hacia una definición latinoamericana de Responsabilidad Social Universitaria. Aproximación a las preferencias conceptuales de los universitarios	Identificar cuánto han avanzado los universitarios latinoamericanos en la comprensión del paradigma de la RSU	Empírico	Educación XX1 (Q2)	(Vallaeys y Álvarez Rodríguez, 2019)
La inclusión de grupos de atención prioritaria en proyectos de vinculación de la sociedad	Analizar las bases teóricas y prácticas sobre la inclusión de los grupos prioritarios para que se integren a la sociedad, mediante los diferentes proyectos de vinculación que ofrece la Universidad Metropolitana del Ecuador (UMET)"	Empírico	Conrado	(Novillo Díaz, 2019)
Social Responsibility: A Tool for Legitimation in Spanish Universities' Strategic Plans	Definir si las estrategias RSU e Innovación responsable son consideradas herramientas para la legitimidad en los Planes Estratégicos de las universidades.	Empírico	Trípodos	(Miotto, Blanco González y Del Castillo Feito, 2018)
El aprendizaje organizacional como herramienta para la universidad que aprende a ser responsable socialmente	Analizar cómo debe organizarse la universidad para ser socialmente responsable y cumplir su proyecto institucional.	Teórico	Pensamiento Americano	(Henríque Fuentes, Vallaeys y Castrillón Garzón, 2018)
Responsabilidad Social Universitaria "Una aproximación desde la percepción de la colectividad académica"	Identificar el significado de Responsabilidad Social Universitaria (RSU) percibido por parte de sus grupos de interés, especialmente, de los clientes internos.	Empírico	Hermes	(Flórez Guzmán, Rubio-Rodriguez, Rodrad Cooperativ y UniveCurvelo Hasssl, 2017)

Fuente: elaboración propia

Martí Noguera (2016) sugiere que el deber y responsabilidad de la universidad es generar e incentivar investigaciones aplicadas que puedan ser transferidas en términos sociales, además, considera que la RSU no se limita a investigar, publicar y formar, sino a buscar formas de comprender, adaptar y transferir el conocimiento. Vallaeys y Álvarez (2019) sugieren que el concepto de RSU, visto desde la gestión de impactos, toma cada vez más fuerza. En su investigación titulada "Hacia una definición latinoamericana de Responsabilidad Social Universitaria. Aproximación a las preferencias conceptuales de los universitarios" concluyen

que en el contexto latinoamericano se está superando la visión reductora de compromiso social universitario asumido solamente desde la extensión voluntaria. Henríque, Vallaeys y Castrillón (2018) analizan cómo debe organizarse la universidad para ser socialmente responsable y cumplir su proyecto institucional, como resultado proponen un modelo teórico de aprendizaje universitario para la responsabilidad social.

A partir de lo anterior, se identificaron tres perspectivas dentro de los documentos recientes que se analizarán a continuación (figura 8):

• Perspectiva 1: medición de la RSU

Esta perspectiva representa el 7% del total de artículos de la red y está integrada por investigaciones que centran su atención en la comunicación y medición de la RSU.

Algunos de los resultados de las investigaciones presentes en esta perspectiva se presentan a continuación: Aldeanueva y Arrabal (2018) analizaron la comunicación de las prácticas de Responsabilidad Social de las universidades españolas a través de Twitter, para ello emplearon 50 variables asociadas con el tema la RSU, concluyendo que los conceptos semánticos asociados a la Responsabilidad Social Corporativa no forman parte de las estrategias de comunicación exterior de las universidades. Garde Sánchez et al. (2013) efectúan un estudio comparativo entre universidades públicas y privadas en Estados Unidos, en el cual se analiza si estas instituciones integran dentro de sus actividades prácticas de RSU, además, si las utilizan como un factor diferenciador. Latif (2017) diseñó y validó una escala de medición para la RSU, compuesta por 7 dimensiones. Gómez, Alvarado y Pujol (2018) realizan su aporte a la literatura sobre el tema a través de la aplicación de un instrumento ajustado al propuesto por Vallaeys et al. (2009) específicamente desde la perspectiva de los públicos internos (docentes, administrativos y estudiantes).

• Perspectiva 2: estratégico

Esta perspectiva representa el 5% del total de artículos de la red y la caracterizan investigaciones que dan un enfoque estratégico a la RSU, dimensionándola como un factor que permite diferenciar una institución de la otra.

Algunos de los resultados de las investigaciones presentes en esta perspectiva señalan: Gaete Quezada (2011) afirma que la RSU se constituye como un desafío estratégico para las universidades, sin embargo, aún no existe un consenso de su significado ni aplicación, para ello propone tres perspectivas: gerenciales, transformadoras y normativas, que facilitan la identificación de las iniciativas institucionales

y a la vez la clasificación de las mismas. Dentro de esta misma línea, Dsntowski et al. (2018) determinaron que las instituciones de educación superior desarrollan acciones socialmente responsables que pueden representarse a través de 7 diferentes modelos de estrategia universitaria, los cuales reflejan las diferencias entre las universidades en términos de sus enfoques estratégicos generales. Miotto et al. (2018) plantean que para aumentar su legitimidad ante la comunidad las universidades deben incluir aspectos sociales y temas relacionados con la responsabilidad social en de su modelo estratégico.

• Perspectiva 3: conexión RSU y sociedad

Esta perspectiva representa el 5% del total de artículos de la red y está compuesta por investigaciones que plantean la relación y responsabilidad de las instituciones de educación superior con el desarrollo y cambio social.

A continuación, se exponen algunas apreciaciones de las publicaciones que hacen parte de esta perspectiva: el desarrollo de las comunidades locales, regionales y nacionales debe ser un elemento misional para las universidades y un proceso bidireccional que genere beneficio para la sociedad como para la universidad (Păunescu, Drăgan Gilmeanu y Găucă, 2017), lo anterior implica reconsiderar el papel de estas instituciones en la sociedad y evaluar la forma en que estas se relacionan con sus grupos de interés, además, repensar su papel como socios industriales y regionales (Jongbloed, Enders y Salerno, 2008).

En la actualidad, la sociedad se enfrenta a desafíos sin precedentes y cada vez más urgentes asociados con la aceleración del cambio ambiental, la escasez de recursos, el aumento de la desigualdad y la injusticia, bajo este nuevo panorama las universidades son consideras un agente de cambio con un papel protagónico (Stephens, Hernandez, Román, Graham y Scholz, 2008); bajo esta misma línea, la UNESCO (2009) en la Conferencia Mundial sobre la Educación Superior manifiesta "ante la complejidad de los desafíos
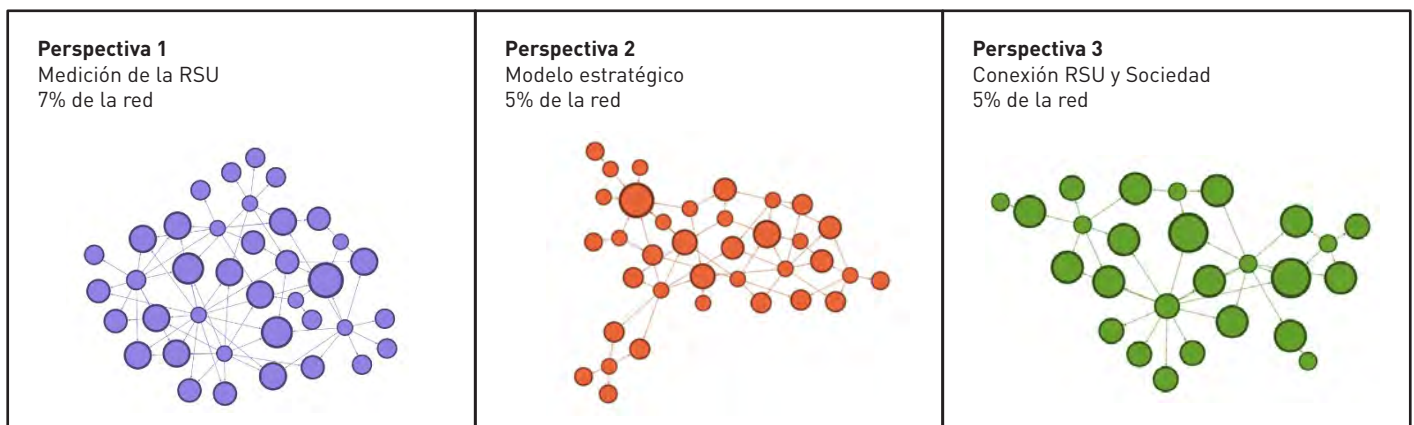
Figura 8. Perspectivas en RSU
Fuente: elaboración propia.

mundiales, presentes y futuros, la educación superior tiene la responsabilidad social de hacer avanzar nuestra comprensión de problemas polifacéticos con dimensiones sociales, económicas, científicas y culturales, así como nuestra capacidad de hacerles frente" (p. 1).

4. Conclusiones

Se observa el crecimiento en relación con el número de publicaciones sobre RSU en los últimos años, aunque en términos generales la producción académica se acelera de manera importante a partir del año 2015, seis años después de la publicación del documento más referenciado en este campo "Responsabilidad Social Universitaria: manual de primeros pasos" (Vallaeys et al., 2009)

El país que encabeza la producción de trabajos en el área de la RSU es España, y este liderazgo se presenta en las dos bases de datos empleadas en esta investigación (*WoS* y *Scopus*), lo que muestra que teóricamente no hay sesgo respecto a las fuentes. En el top 10 de los países con mayor producción en este campo 7 de ellos son latinoamericanos, lo que representa que el 54% de la producción dentro de este top se generó en esa región.

Respecto a las bases de datos, la que presenta mayor producción en el área es Scopus con 58% de las publicaciones sobre el 42% de *WoS*; en referencia al número de publicaciones en revistas, dentro top 10 de estas se encuentran 7 indexadas en *Scopus*, lo que muestra una inclinación a publicar dentro de esta base de datos investigaciones que se refieren a la RSU. La revista con mayor número de publicaciones (12 en total) es Opción, ésta tiene como área principal las ciencias sociales, artes y humanidades, el mayor número de sus publicaciones están relacionadas al campo de la educación (41% en total), también cabe destacar las revistas *World review of entrepreneurship management and sustainable development* y *Revista digital de investigación en docencia universitaria RIDU*, la primera cuenta con 9 artículos y se encuentra indexada en Scopus, la segunda cuenta con el mismo número de artículos y se encuentra indexada en WoS.

Esta área de estudio es relativamente joven, al verificar los documentos hegemónicos se evidencia que no superan los 15 años desde su publicación, además, solo se encontraron 200 publicaciones asociadas a este tema en las dos bases de datos más grandes e importantes del mundo. Sin lugar a dudas el autor protagónico es François Vallaeys, quien es el investigador más citado dentro de la categoría de Responsabilidad Social Universitaria en *Google Scholar* (2.045 citaciones en total), donde la red de cocitaciones y la red de RSU así lo corroboran.

Aun no hay claridad respecto a si las prácticas de RSU tienen algún impacto frente a sus grupos de interés, particularmente en temas como la imagen y la reputación, las investigaciones son en cierta medida contradictoras, por un lado Chile y Black (2015) determinaron que el compromiso de la universidad con la comunidad (en términos de proyección social) generó beneficios en términos de reconocimiento de marca y reputaciones para la institución; por otro lado, Plungpongpan et al. (2016) indican que para los estudiantes

las acciones de RSU no son un factor decisivo para elegir una universidad u otra, lo que demuestra que es necesario dar mayor profundidad al tema con el fin de aportar al establecimiento de un consenso en estos términos. Adicionalmente, Latif (2017) sugiere llevar a cabo más investigaciones que permitan la construcción de una escala confiable para la medición de la RSU, pues es claro que el tema requiere una mayor investigación, en poblaciones diferentes con orígenes culturales diferentes, para así lograr una generalización de los conceptos.

La red presenta de manera preliminar tres perspectivas: perspectiva 1 (medición de la RSU), perspectiva 2 (estratégico) y perspectiva 3 (RSU y sociedad); sin embargo, no pueden considerarse definitivos ni concluyentes, ya que al ser un campo del conocimiento tan reciente las perspectivas no están integradas por un número importante de investigaciones que las consoliden, pero son una propuesta que invita a un análisis más exhaustivo.

Finalmente, según la literatura revisada, esta es la primera revisión sistemática sobre RSU que ha aplicado la teoría de grafos para analizar la producción científica en este campo. Este análisis ha permitido la visualización de una red que describe la interacción de 2.821 publicaciones durante un periodo de tiempo amplio, permitiendo identificar las publicaciones clásicas, estructurales y recientes, donde las últimas son de gran relevancia ya que permiten identificar las perspectivas o líneas de estudio en este campo; convirtiéndose en una guía para la comprensión de la evolución y estado actual de la RSU, un área de investigación joven, pero con un crecimiento importante.

Al igual que en cualquier tipo de investigación, la revisión presentada en este artículo muestra ciertas limitaciones. En primer lugar, la búsqueda inicial se realizó en las bases de datos *WoS* y *Scopus*, como consecuencia natural de esta situación, las investigaciones que no se incluyen en estas bases de datos están fuera del alcance del estudio actual. En segundo lugar, el tema de búsqueda *University Social Responsibility* podría implicar ciertas limitaciones, ya que puede excluir palabras clave relacionadas a la RSU. Para futuras investigaciones se sugiere realizar un metaanálisis de este campo, además, de profundizar en el análisis de las perspectivas propuestas.

Conflictos de intereses

Los autores declaran no tener ningún conflicto de intereses.

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UNIVERSIDAD ICESI

Información sobre *Estudios Gerenciales*

Política editorial

Estudios Gerenciales es la revista Iberoamericana de administración y economía enfocada principalmente en las subáreas temáticas de gestión organizacional, emprendimiento, innovación empresarial, mercadeo, contabilidad, finanzas, estrategia, negocios internacionales y economía de los negocios. Su principal objetivo es la difusión de rigurosos trabajos de investigación y casos de enseñanza en estas áreas temáticas, que generen herramientas de estudio de la comunidad Iberoamericana y su actual contexto económico y administrativo.

La revista *Estudios Gerenciales*, a través de la publicación de artículos inéditos, relevantes, de alta calidad y arbitrados anónimamente (*double-blind review*), está dirigida a investigadores, estudiantes, académicos y profesionales interesados en conocer las más recientes investigaciones y análisis en administración y economía en la región Iberoamericana.

Se admiten artículos en español, inglés y portugués y, como política editorial, la revista busca un equilibrio de artículos de autores de diversos países iberoamericanos o de otras regiones; por lo tanto, un número de la revista podrá incluir como máximo un 20% de artículos de autoría de Investigadores-Docentes asociados a la Universidad Icesi. Sin embargo, para todos los casos, los artículos serán sometidos al mismo proceso de evaluación.

Estructura de la revista

En *Estudios Gerenciales* se privilegia la publicación de la producción intelectual con origen en investigaciones científicas o tecnológicas y que susciten artículos de investigación, revisión y casos de estudio, que sigan una rigurosa metodología investigativa y generen aportes significativos a los conocimientos en los campos citados, para la comunidad Iberoamericana.

La estructura de la revista *Estudios Gerenciales* comprende la publicación de artículos y un caso de estudio. El caso de estudio se define como un "documento que presenta los resultados de un estudio sobre una situación particular con el fin de dar a conocer las experiencias técnicas y metodológicas consideradas en un caso específico. Incluye una revisión sistemática comentada de la literatura sobre casos análogos." (Definición de Colciencias). El objetivo de incluir un caso de estudio es brindar herramientas de análisis sobre diversas situaciones del contexto iberoamericano, las cuales generen discusión a partir de las preguntan que se deben plantear en cada caso.

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La periodicidad de la revista es trimestral; la revista se distribuye a través de una base de datos de suscriptores, bibliotecas y centros de investigación en administración y economía en Iberoamérica y otros países. Adicionalmente, se puede acceder libremente (Open Access) a través de la página web de la revista *Estudios Gerenciales*:

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Los artículos postulados a la revista *Estudios Gerenciales* serán revisados inicialmente por el equipo editorial y, si se ajusta a los parámetros de publicación de artículos (estándares académicos y editoriales), se envía a dos pares evaluadores externos para una revisión "doblemente ciega", donde se tienen en cuenta aspectos como la originalidad, aporte al área de conocimiento, pertinencia del tema, claridad en las ideas, entre otros.

A partir de los comentarios y recomendaciones de los revisores, el equipo editorial decide si el artículo es aceptado, requiere de modificaciones (leves o grandes) o si es rechazado. El proceso de revisión inicial (entre el momento de postulación y la emisión del primer concepto) puede tomar un tiempo aproximado de 5 meses. Posteriormente, los autores de artículos que requieren cambios tendrán un tiempo máximo de 2 meses para realizar los ajustes necesarios (este tiempo lo indica el equipo editorial). Una vez los autores reenvían su artículo con los cambios solicitados y una carta de respuesta a los revisores, se somete a una segunda evaluación por parte de los pares, a partir de lo cual el equipo editorial toma una decisión final sobre la publicación del artículo (esta parte del proceso puede tomar 3 meses).

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Los autores interesados en postular un artículo a *Estudios Gerenciales* deben registrarse y luego ingresar en el Sistema de Gestión Editorial de la revista en Open Journal System (OJS). Para esto se debe ingresar en el link http://www.icesi.edu.co/revistas/index.php/estudios_gerenciales/login y seguir todas las instrucciones de la sección "Nuevo envío". Al realizar la postulación se deben registrar a todos los autores del artículo usando la opción "Añadir colaborador". La postulación de artículos se puede realizar ininterrumpidamente durante todo el año.

Pautas generales para los artículos

Para poder postular un artículo en *Estudios Gerenciales* se deben preparar dos archivos, la página de presentación y el manuscrito anónimo, estos deben contener:

1) Página de presentación del artículo. Primera página del documento, que debe separarse del resto del manuscrito. Incluye:

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b) Breve reseña de cada autor, indicando: último título académico alcanzado, vinculación institucional, cargo, dirección de correspondencia y correo electrónico de contacto. En el caso de varios autores, se debe seleccionar un solo autor para correspondencia.

c) Resumen analítico del artículo en español e inglés. El resumen no debe exceder 120 palabras y debe incluir: objetivo del trabajo, metodología y el resultado o recomendación más importante que surge del trabajo. No debe contener referencias.

d) Palabras claves en español y en inglés (mínimo 3, máximo 5). No se acepta el uso de abreviaciones.

e) Clasificación JEL[1] para todos los artículos (máximo 3 códigos).

f) Si es el caso, se debe anexar la información básica de las investigaciones que dan origen al artículo, fuentes de financiación y agradecimientos a los que se dé lugar.

2) Manuscrito anónimo. Además del título, resumen, palabras clave (lo anterior en español e inglés) y los códigos JEL, el manuscrito anónimo debe incluir (el texto no se debe enviar en dos columnas):[2]

• Para los artículos de investigación científica y tecnológica se sugiere la siguiente estructura:

a) Introducción: debe dar cuenta de los antecedentes, el objetivo y la metodología de la investigación. Al final plantea el hilo conductor del artículo.

b) Marco teórico: comprende la revisión bibliográfica que justifica la investigación, donde se comentan resultados de estudios que validan la relevancia y necesidad del trabajo de investigación.

c) Metodología: presenta y justifica la metodología escogida, para luego pasar a desarrollarla y mostrar los resultados de la aplicación de la misma.

d) Resultados: presenta los principales resultados de la aplicación de la metodología empleada de manera comprensible y necesaria para evaluar la validez de la investigación.

e) Conclusiones: se resaltan los principales aspectos del artículo mas no representa un resumen del mismo. Se resaltan las recomendaciones, limitaciones del artículo y se plantean futuras líneas de investigación.

f) Referencias bibliográficas: se presentarán de acuerdo al estilo APA sexta edición (véase el final de esta sección)[3].

g) Anexos.

• Para los artículos de revisión se sugiere la siguiente estructura:

a) Introducción: debe dar cuenta de los antecedentes, el objetivo y la metodología de la investigación. Al final plantea el hilo conductor del artículo.

b) Marco teórico: comprende la revisión bibliográfica que justifica la investigación, donde se comentan resultados de estudios que validan la relevancia y necesidad del trabajo de investigación.

c) Desarrollo teórico: incluye la revisión de aspectos destacables, hallazgos o tendencias que resultan de la investigación.

d) Conclusiones: se resaltan los principales aspectos del artículo mas no representa un resumen del mismo. Se resaltan las recomendaciones, limitaciones del artículo y se plantean futuras líneas de investigación.

e) Referencias bibliográficas: se presentarán de acuerdo al estilo APA sexta edición. Debe presentar una revisión bibliográfica de por lo menos 50 referencias.

f) Anexos.

• La estructura de los casos de estudio (reporte de caso) puede variar dependiendo de la forma como se aborde el estudio de la situación particular. Se sugiere la siguiente estructura:

a) Introducción: debe dar cuenta de los antecedentes, el objetivo y la metodología de la investigación. Al final plantea el hilo conductor del artículo.

b) Marco teórico: comprende la revisión bibliográfica que justifica la investigación, donde se comentan resultados de estudios (otros casos) que validan la relevancia y necesidad del trabajo de investigación.

c) Caso de estudio: incluye una revisión sistemática comentada sobre una situación particular, donde se den a conocer las experiencias técnicas y metodológicas del caso bajo estudio.

d) Discusión o reflexión final: reflexión o comentarios que surgen de la revisión de la situación planteada en el caso de estudio.

e) Preguntas de discusión: debe incluir preguntas o ejercicios que se resuelvan a partir de la revisión y/o reflexión sobre del caso bajo estudio.

f) Referencias bibliográficas: se presentarán de acuerdo al estilo APA sexta edición.

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3) Tablas y figuras. En el texto se deben mencionar todas las tablas y figuras antes de ser presentadas. Cada una de estas categorías llevará numeración (continua de acuerdo con su aparición en el texto), título y fuente. Las tablas y figuras se deben incluir en el lugar que corresponda en el cuerpo del texto y se deben enviar en un archivo a parte en su formato original (PowerPoint, Excel, etc.). Para las tablas y figuras que sean copiadas y reproducidas de otras fuentes, deben agregar el número de página del que fueron tomados. Las tablas y figuras deben diseñarse en escala de grises o en blanco y negro. Las imágenes y fotos deben enviarse en alta definición.

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a) Extensión: no debe exceder de 30 páginas en total (incluye bibliografía, gráficos, tablas y anexos).

b) Formato de texto y páginas: el artículo se debe enviar en formato Word; se sugiere el uso de fuente Times New Roman, tamaño 12, tamaño de página carta, interlineado 1,5, márgenes simétricos de 3 cm.

c) Los artículos se deben redactar en tercera persona del singular (impersonal), contar con adecuada puntuación y redacción y

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[1] Para seleccionar los códigos según la clasificación JEL, consultar: https://www.aeaweb.org/econlit/jelCodes.php?view=jel

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[3] Para mayor información, visite el sitio: http://www.apastyle.org

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Prychitko, D. y Vanek, J. (1996). *Producer cooperatives and labor manager Systems* (3ra ed.). Boston, MA: Edgar Elgar Publishing.

• Capítulo en libro editado
Nombre del autor del capítulo. (año). Título del capítulo. En inicial del nombre y apellido de los editores del libro (Eds.), *Título del libro* (rango de páginas del capítulo en el libro). Ciudad de publicación: Editorial.
Ejemplo:
Becattini, G. (1992). El distrito industrial marshalliano como concepto socioeconómico. En F. Pyke, G. Becattini y W. Sengenberger. (Eds.), *Los distritos industriales y las pequeñas empresas* (pp. 61–79). Madrid: Ministerio de Trabajo y Seguridad Social.

• Contribución no publicada para un simposio
Apellido, inicial(es) del nombre (año, mes). Título de ponencia o comunicado. En nombre organizadores (Organizador/Presidente), *nombre del simposio*. Descripción del Simposio, Ciudad, País.
Ejemplo:
Lichstein, K.L., Johnson, R.S., Womack, T.D., Dean, J.E. y Childers, C.K. (1990, junio). Relaxation therapy for polypharmacy use in elderly insomniacs and noninsomniacs. En T.L. Rosenthal (Presidente), *Reducing medication in geriatric populations*. Simposio efectuado en la reunión del First International Congress of Behavioral Medicine, Uppsala, Suecia.

• Internet
Apellido, inicial(es) del nombre (año). *Título*. Recuperado el día del mes del año, de: dirección electrónica.

Ejemplo:
Echevarría, J. J. (2004). *La tasa de cambio en Colombia: impacto y determinantes en un mercado globalizado.* Recuperado el 21 de junio de 2005, de: http://www.banrep.gov.co/documentos/presentacionesdiscursos/pdf/tasa.pdf

Responsabilidades éticas

Responsabilidad. Los autores de los artículos deben declarar que la investigación se ha llevado a cabo de una manera ética y responsable y siempre acorde con las leyes pertinentes.

Claridad. Los resultados del estudio deben explicarse de forma clara y honesta y los métodos de trabajo deben describirse de manera inequívoca para que sus resultados puedan ser confirmados por otros.

Publicación redundante o duplicada. *Estudios Gerenciales* no acepta material previamente publicado y no considerará para su publicación manuscritos que estén remitidos simultáneamente a otras revistas, ni publicaciones redundantes o duplicadas, esto es, artículos que se sobrepongan sustancialmente a otro ya publicado, impreso o en medios electrónicos. Los autores deben ser conscientes que no revelar que el material sometido a publicación ya ha sido total o parcialmente publicado constituye un grave quebranto de la ética científica.

Autoría. Los autores se comprometen a asumir la responsabilidad colectiva del trabajo presentado y publicado. En la declaración de autoría se reflejará con exactitud las contribuciones individuales al trabajo. En la lista de autores deben figurar únicamente aquellas personas que han contribuido intelectualmente al desarrollo del trabajo.

El autor de un artículo deberá haber participado de forma relevante en el diseño y desarrollo de éste para asumir la responsabilidad de los contenidos y, asimismo, deberá estar de acuerdo con la versión definitiva del artículo. En general, para figurar como autor se deben cumplir los siguientes requisitos:
1) Haber participado en la concepción y diseño, en la adquisición de los datos y en el análisis e interpretación de los datos del trabajo que ha dado como resultado el artículo en cuestión.
2) Haber colaborado en la redacción del texto y en las posibles revisiones del mismo.
3) Haber aprobado la versión que finalmente va a ser publicada.

La revista *Estudios Gerenciales* declina cualquier responsabilidad sobre posibles conflictos derivados de la autoría de los trabajos que se publican en la Revista.

Financiación. Los autores deberán declarar tanto las fuentes de financiación como posibles conflictos de intereses. Existe conflicto de intereses cuando el autor tuvo/tiene relaciones económicas o personales que han podido sesgar o influir inadecuadamente sus actuaciones. El potencial conflicto de intereses existe con independencia de que los interesados consideren que dichas relaciones influyen o no en su criterio científico.

Obtención de permisos. Los autores son responsables de obtener los oportunos permisos para reproducir parcialmente material (texto, tablas o figuras) de otras publicaciones. Estos permisos deben solicitarse tanto al autor como a la editorial que ha publicado dicho material.

La revista pertenece al Committee on Publication Ethics (COPE) y se adhiere a sus principios y procedimientos (www.publicationethics.org).

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Information about *Estudios Gerenciales*

Editorial policy

Estudios Gerenciales is the Ibero-American journal of management and economics focused primarily on the sub-thematic areas of organizational management, entrepreneurship, business innovation, marketing, accountancy, finance, strategy, international business and business economics. The journal's primary objective is the dissemination of rigorous research and teaching cases related to these subject areas to further the study of the Ibero-American community and its current economic and administrative context.

Estudios Gerenciales, through the publication of relevant high quality previously unpublished articles subject to a double-blind peer review process, is generally aimed at researchers, students, academics and professionals interested in the most recent research and analyses in economics and management in Ibero-America.

Articles can be submitted in Spanish, English or Portuguese and, as editorial policy, the journal seeks a balance of articles by authors from different Ibero-American countries or other regions; therefore, an issue of the journal may include a maximum of 20% of articles authored by researchers-professors associated with Icesi University. However, in all cases, the articles will be subjected to the same evaluation process.

Structure of the journal

In *Estudios Gerenciales* we privilege the publication of intellectual production originating in scientific and technological research that foster research articles, literature reviews and case studies that follow a rigorous research methodology and generate significant contributions to knowledge in the above fields in the Ibero-American community.

The structure of the journal *Estudios Gerenciales* includes the publication of articles and a case study. The case study is defined as a "document that presents the results of a study on a particular situation in order to publicize the technical and methodological experiences considered in a specific case. It includes a systematic review of literature on similar cases" (Colciencias definition). The purpose of including a case study is to provide analysis tools on various situations from the Latin American context which generate discussions based on the questions to be asked in each case.

Copyright

Articles are the sole responsibility of their authors, and will not compromise Icesi's University principles or policies nor those of the Editorial Board of the journal *Estudios Gerenciales*. Authors authorize and accept the transfer of all rights to the journal, both for its print and electronic publication. After an article is published, it may be reproduced without previous permission of the author or the journal but the author(s), year, title, volume, number, range of pages of the publication and DOI must be mentioned. In addition, *Estudios Gerenciales* must be mentioned as the source (please, refrain from using Revista *Estudios Gerenciales*).

Periodicity, distribution and electronic access

The journal has a quarterly periodicity; the journal is distributed through a database of subscribers, libraries and research centers in management and economics in Latin America and other countries. Additionally, it can be freely accessed (Open Access) through the journal's website *Estudios Gerenciales*:

• Journal's website: http://www.icesi.edu.co/estudios_gerenciales

***Estudios Gerenciales* is a continuity of Publicaciones ICESI.**

***Estudios Gerenciales* is a scientific journal sponsored and published by the Business School of the Universidad Icesi.**

Guidelines for authors of articles

• Authors should ensure that their articles are unpublished, ie, that they have not been previously published (fully or partially) in another journal (printed or electronic). Application of articles that have already been published in another language, similar articles published by the same authors, articles with an irrelevant contribution or those whose results are already published are not accepted either. Documents in working papers, personal or institutional websites, memories of events (proceedings not published in other academic journals), etc. will be admitted for application, but must be mentioned.
• The editorial team uses Turnitin software to check the originality of the applications received.
• The authors are responsible for obtaining permission to reproduce copyrighted material (images, photos, etc.). Permits will be added to the documents sent for application.
• The journal does not charge fees (article processing charge -APC) for the postulation, review and/or publication of the articles.

Article review process

Articles submitted to the journal *Estudios Gerenciales* will be initially reviewed by the editorial team and, if they fit the parameters of article publication (academic and editorial standards), they are sent to two external peer reviewers for a "double-blind" review, which take into account aspects such as originality, contribution to the area of knowledge, relevance of the theme, and clarity of ideas, among others.

Based on the comments and recommendations made by the reviewers, the editorial team decides if the article is accepted, requires modifications (minor or major) or if it is rejected. The initial review process (between the time of application and the issuance of the first concept) can take an approximate time of 5 months. Subsequently, the authors of articles that require changes will have a maximum of two months to make the necessary adjustments (the extent of the period will be established by the editorial team). Once the authors return their articles with the requested changes and a response letter to the reviewers, articles are subjected to a second evaluation by peers, from which the editorial team makes a final decision on the publication of the article (this part of the process may take 3 months).

Article submissions

Authors interested in submitting an article for the publication in *Estudios Gerenciales* must register and then enter the journal's Editorial Management System at Open Journal System (OJS). In order to do this, click on the link http://www.icesi.edu.co/revistas/index.php/estudios_gerenciales/login and follow all the instructions in the "New Submission" section. When making the submission, all the authors of the article must be registered using the option "Add contributor". Applications for article publication can be continuously sent throughout the year.

General guidelines for articles

In order to apply for the publication of an article in *Estudios Gerenciales* must be prepared two files, the presentation page and the anonymous manuscript, which should contain:

1) Article submission sheet. First page of the document, to be

separated from the rest of the manuscript. Includes:

a) Title in English and Spanish. Clear and precise, should not exceed 20 words. It must be consistent and must be related to the content of the article. It should not contain abbreviations.
b) Brief outline of each author, indicating: last academic degree reached, institutional affiliation, position, postal address and email contact. In case of co-authored articles, only one of the authors will be selected to receive correspondence.
c) Analytical summary of the article in English and Spanish. The abstract should not exceed 120 words and should include: work objective, methodology and outcome or the most important recommendation arising from the work. It should not contain references.
d) Keywords in English and Spanish (minimum 3, maximum 5). The use of abbreviations is not accepted.
e) JEL classification[1] for all the articles (maximum 3 codes).
f) If applicable, basic research information giving rise to the article, sources of funding and relevant thanks must be attached.

2) Anonymous manuscript. Besides the title, abstract, keywords (all this in English and Spanish) and JEL codes, anonymous manuscripts should include (the text should not be sent in two columns):[2]

• For articles of scientific and technological research, the following structure is suggested:

a) Introduction: must account for the background, the purpose and research methodology. At the end, the guiding thread of the article must be expressed.
b) Theoretical framework: includes a literature review that justifies research, where results of studies that validate the relevance and necessity of the research are discussed.
c) Methodology: presents and justifies the chosen methodology, to then develop and display the results of its application.
d) Results: presents the main results of the application of the methodology in an understandable and necessary way to assess the validity of the research.
e) Conclusions: highlight the main aspects of the article but does not represent a summary of the same. Recommendations and limitations of the article are highlighted and future research areas are raised.
f) Bibliographic references: must be presented according to the APA sixth edition style (see the end of this section)[3].
g) Annexes.

• For literature reviews articles the following structure is suggested:

a) Introduction: must account for the background, the purpose and research methodology. At the end, the guiding thread of the article must be expressed.
b) Theoretical framework: includes a literature review that justifies research, where results of studies that validate the relevance and necessity of the research are discussed.
c) Theoretical development: includes a review of major aspects, findings or trends that result from the research.
d) Conclusions: highlight the main aspects of the article but does not represent a summary of the same. Recommendations and limitations of the article are highlighted and future research areas are raised.
e) Bibliographic references: must be presented according to the APA sixth edition style. A literature review of at least 50 references must be included.

f) Annexes.

• The structure of case studies (case report) may vary depending on how the study of the particular situation is addressed. The following structure is suggested:

a) Introduction: must account for the background, the purpose and research methodology. At the end, the guiding thread of the article must be expressed.
b) Theoretical framework: includes a literature review that justifies research, where the results of studies (other cases) that validate the relevance and necessity of the research are discussed.
c) Case Study: includes a systematic review on a particular situation, where technical and methodological experiences of the case under study are made known.
d) Discussion or final reflection: reflection or comments arising from the review of the situation presented in the case study.
e) Discussion questions: should include questions or exercises to be resolved from the review and/or the reflection on the case under study.
f) Bibliographic references: must be presented according to the APA sixth edition style.
g) Annexes.

3) Tables and figures. The text must mention all the tables and figures before being presented. Each of these categories will be numbered (continuous numbering according to their appearance in the text), will have a title and will mention a source. Tables and figures should be included in the relevant place inside the body and must be sent in a separate file in their original format (PowerPoint, Excel, etc.). Tables and figures that are copied and reproduced from other sources, should include the page number from which they were taken. Tables and figures should be designed in grayscale or in black and white. Images and photos should be sent in high definition.

4) Equations. Equations are to be made only with an equation editor. All equations must be listed in order of appearance.

5) Footnotes. They will only show explanatory information. Each note will be numbered consecutively without figures or tables.

6) Literal quotes. They correspond to original quoted material from another source. A literal quote incorporated into the text must be written in double quotation marks. In any case, the author, the year and the specific page of the quoted text, should always be added, and the full quote should be included in the reference list. Quotes must be exact, that is, changes should not be made in the text, even if the spelling is wrong. They should not be underlined or italicized. In cases where the author wishes to emphasize, he can add italics and brackets to the text "[added italics]." The page number should only be added in cases of literal quotes (including figures and tables).

7) General considerations
a) Length: the article should not exceed 30 pages in total (including bibliography, graphs, tables and attachments).
b) Text and page formatting: the article must be sent in Word format. Times New Roman font, size 12, letter page size, spacing 1.5, and symmetrical margins of 3 cm are suggested.
c) Articles should be written in the third person singular (impersonal), have suitable punctuation and writing and lack of orthographic errors. The author is responsible for reviewing style prior to its application to the journal.
d) In articles written in Spanish and Portuguese, in all the numbers (in text, figures and tables), periods are used to separate thousands and commas to separate decimals. In articles in English, commas are used to separate thousands and periods to separate decimals.

[1] To select the codes according to JEL classification, see: https://www.aeaweb.org/econlit/jelCodes.php?view=jel
[2] Readers are encouraged to review the structure of articles previously published in Estudios Gerenciales to see examples of the structure of a scientific manuscript: http://www.icesi.edu.co/revistas/index.php/estudios_gerenciales/issue/archive
[3] For more information, visit: http://www.apastyle.org.

APA style for presenting bibliographic references

Bibliographic references will be included in the body text in two ways: as a narrative (only the year of publication, eg: family name (year) is enclosed in parentheses); and as a reference (the author's family name and the year are enclosed in parentheses, example: (family name, year)). In cases of articles co-authored by more than two authors, the name of all of them must be expressed the first time, and then only the first one followed by "et al.".

All references that are named in the body of the article must be included in the list of references. Likewise, all the references in the list must be named in the body of the document.

For references that have DOI, it must be included at the end of each one. The format is https://doi.org/10 .....

The list of references should be included at the end in alphabetical order, for which the following style must be taken into consideration:

• Journal article
Family name, name's initial(s) (year). Article title. *Name of the journal*, *Volume* (Number), range of pages.DOI.
Example:
Deery, S., Rayton, B., Walsh, J. y Kinnie, N. (2016). The Cost of Exhibiting Organzational Citizenship Behavior. Human Resource Management, 56(6), 1039-1049. https://doi.org/10.1002/hrm.21815

• Book
Family name, name's initial(s) (year). *Title* (# Ed., Vol.). City of publication: publisher.
Example:
Prychitko, D. & Vanek, J. (1996). *Producer cooperatives and labor manager Systems* (3rd ed.). Boston, MA: Edgar Elgar Publishing.

• Chapter in edited book
Name of the author of the chapter. (year). Chapter title: In names of the editors of the book (Eds.), *Title of the book* (range of pages of the chapter in the book). City of publication: publisher.
Example:
Becattini, G. (1992). The Marshallian industrial district as socio-economic concept. In F. Pyke, G. Becattini and W. Sengenberger (Eds.), *Industrial districts and small businesses* (pp. 61-79). Madrid: Ministry of Labour and Social Security.

• Unpublished contribution for a symposium
Family name, name's initial(s) (year, month). Title of the paper or communication. In organizers' name (Organizer/Chairman), *name of the symposium*. Symposium description, city, country.
Example:
Lichstein K.L., Johnson, R.S., Womack, T.D., Dean, J.E. & Childers, C.K. (1990, June). Relaxation therapy for polypharmacy use in elderly insomniacs and noninsomniacs. In T.L. Rosenthal (Chairman), *Reducing medication in geriatric populations*. Symposium held at the First International Congress Congress of Behavioral Medicine, Uppsala, Sweden.

• Internet
Family name, name's initial(s) (year). *Title*. Retrieved on day, month year from: website address.
Example:
Echevarria, J.J. (2004). *The exchange rate in Colombia: impact and determinants in a global market.* Retrieved on June 21, 2005, from: http://www.banrep.gov.co/documentos/presentacionesdiscursos/pdf/tasa.pdf

Ethical responsibilities

Responsibility. The authors of the articles must state that the research has been conducted in an ethical and responsible way and always in accordance with applicable laws.

Clarity. The results of the study should be clearly and honestly explained, and working methods should be described unambiguously so that their results can be confirmed by others.

Redundant or duplicate publication. *Estudios Gerenciales* does not accept previously published material and will not take into consideration for publication those manuscripts that are simultaneously submitted to other journals. Similarly, neither redundant nor duplicate publications, i.e., articles that substantially overlap another already published, whether in printed or electronic media, will be taken into consideration. Authors should be aware that not disclosing that the material submitted for publication has been totally or partially published constitutes a serious breach of scientific ethics.

Authorship. Authors agree to take collective responsibility for presented and published work. In the statement of authorship, it must be accurately reflected the individual contributions to the work. In the list of authors, should only appear those who have contributed intellectually to work development.

The author of an article must have participated in a relevant way in the design and development of that article and must take responsibility for the contents. Also, he/she must agree with the final version of the article. In general, to appear as an author, the following requirements must be met:
1) Having participated in the conception and design, in data acquisition, and data interpretation and analysis of the work that has resulted in the article.
2) Having collaborated in drafting the text and its possible revisions.
3) Having approved the version that will finally be published.

In no event shall *Estudios Gerenciales* Journal be liable for possible conflicts arising from the authorship of the works published in the Journal.

Funding. The authors must declare both funding sources and possible conflicts of interest. There is conflict of interests when the author had/has financial or personal relationships that may skew or influence their actions improperly. The potential conflict of interests exists regardless of whether interested parties consider that these relations influence their scientific judgment or not.

Obtaining permission. Authors are responsible for obtaining the appropriate permissions to partially reproduce material (text, tables or figures) from other publications. These authorizations must be obtained from both the author and the publisher that published such material.

The journal belongs to the Committee on Publication Ethics (COPE) and adheres to its principles and procedures (www.publicationethics.org).

Informações sobre Estudios Gerenciales

Política editorial

Estudios Gerenciales é a revista Ibero-americana de gestão e economia focada principalmente nas subáreas temáticas de gestão organizacional, empreendedorismo, inovação de negócios, marketing, contabilidade, finanças, estratégia, negócios internacionais e economia de negócios. O seu principal objetivo é a difusão de rigorosos trabalhos de investigação e casos de ensino relacionados com as anteriores áreas temáticas que criem ferramentas de estudo da comunidade Ibero-americana e do seu atual contexto económico e administrativo.

Estudios Gerenciales, através da publicação de artigos originais, de alta qualidade, relevantes e arbitrados anonimamente (*double-blind review*), tem como público-alvo investigadores, estudantes, académicos e profissional interessados em conhecer as mais recentes investigações e análises em economia e gestão na região Ibero-americana.

Serão recebidos artigos em Inglês, Espanhol e Português e, como política editorial, a revista procura um equilíbrio de artigos de autores de diversos países ibero-americanos ou de outras regiões; como tal, um número da revista poderá incluir no máximo 20% de artigos da autoria de Investigadores-Docentes associados à Universidade Icesi. Porém, para todos os casos, os artigos serão submetidos ao mesmo processo de avaliação.

Estrutura da revista

Em *Estudios Gerenciales* é privilegiada a publicação da produção intelectual baseada na pesquisa científica e tecnológica e que promova artigos de pesquisa, revisões de literatura e estudos de caso que sigam uma metodologia investigativa rigorosa e gerem contribuições significativas para o conhecimento nos campos acima na comunidade ibero-americana.

A estrutura da revista *Estudios Gerenciales* inclui a publicação de artigos e um estudo de caso. O estudo de caso é definido como um "documento que apresenta os resultados de um estudo sobre uma situação particular, a fim de divulgar as experiências técnicas e metodológicas consideradas num caso específico. Inclui uma revisão sistemática da literatura sobre casos análogos" (Definição de Colciencias). O objetivo da inclusão de um estudo de caso é fornecer ferramentas de análise sobre várias situações do contexto latino-americano que gerem discussão a partir das perguntas propostas em cada caso.

Direitos Autorais

Os autores dos artigos serão responsáveis dos mesmos e, assim, não comprometam os princípios ou políticas da Universidade Icesi nem do Conselho Editorial da revista *Estudios Gerenciales*. Os autores autorizam e aceitam a transferência de todos os direitos para a revista *Estudios Gerenciales* para a publição impressa ou eletrônica. Após a publicação do artigo, pode ser reproduzido sem a permissão do autor ou da revista, se mencionar o(s) autor(es), o ano, o título, o volume, o número, o intervalo de páginas da publicação e o DOI, e *Estudios Gerenciales* como fonte (se abster de utilizar Revista *Estudios Gerenciales*).

Periodicidade, distribuição e acesso eletrônico

A periodicidade da revista é trimestral; a revista é distribuída através de um banco de dados de assinantes, bibliotecas e centros de pesquisa em gestão e economia na América Latina e em outros países. Além disso, pode ser acessada livremente (*Open Access*) através do web site da revista *Estudios Gerenciales*:

• Web site da revista: http://www.icesi.edu.co/estudios_gerenciales

Estudios Gerenciales é uma continuidade de Publicaciones ICESI.

Estudios Gerenciales é uma revista científica patrocinada e publicada pela Faculdade de Ciências Administrativas e Econômicas da Universidad Icesi.

Diretrizes para os autores de artigos

• Os autores devem garantir que o seu artigo é inédito, ou seja, que não foi publicado anteriormente (total ou parcialmente) em outra revista (física ou eletrônica). Não é aceita a solicitação de artigos que foram publicados em outro idioma, artigos semelhantes publicados pelos mesmos autores, artigos com uma contribuição irrelevante, ou aqueles cujos resultados foram já publicados. É admitida a solicitação de documentos de *working papers*, de web sites pessoais ou institucionais, de memórias de eventos (trabalhos não publicados em outras revistas acadêmicas), etc., mas devem ser mencionados.
• A equipa editorial utiliza o software *Turnitin* para verificar a originalidade dos pedidos recebidos.
• Os autores são responsáveis pela obtenção das autorizações para reproduzir material protegido por direitos autorais (imagens, fotos, etc.). As autorizações serão anexadas aos documentos enviados para a solicitação.
• A revista não cobra taxas (*article processing charge -APC*) para a postulação, revisão e/ou publicação dos artigos.

Processo de revisão dos artigos

Os artigos submetidos à revista *Estudios Gerenciales* serão inicialmente analisados pela equipe editorial e, se respeitarem os parâmetros para a publicação dos artigos (padrões académicos e editoriais), são enviados para uma revisão por dois pares evaluadores externos com cegamento duplo, que levam em conta aspectos como a originalidade, a contribuição para a área de conhecimento, a significância do tema e a clareza de idéias, entre outros.

A partir das observações e recomendações dos avaliadores, a equipe editorial decide se o artigo será aceito, requer modificações (pequenas ou grandes) ou se é rejeitado. O processo de revisão inicial (entre o tempo da solicitação e a emissão do primeiro conceito) pode levar um tempo aproximado de 5 meses. Posteriormente, os autores dos artigos que requerem mudanças terão um máximo de dois meses para fazer os ajustes necessários (este prazo é indicado pela equipe editorial). Uma vez que os autores reenviam o seu artigo com as mudanças solicitadas e uma carta de resposta para os avaliadores, é submetido a uma segunda avaliação por pares, a partir da qual a equipe editorial faz uma decisão final sobre a publicação do artigo (esta parte do processo pode levar 3 meses).

Submissão de um artigo

Os autores interessados na submissão um artigo para *Estudios Gerenciales* devem se registrar e, em seguida, entrar no Sistema de Gestão Editorial da revista em Open Journal System (OJS). Para isso, o link http://www.icesi.edu.co/revistas/index.php/estudios_gerenciales/login deve ser acessado e seguir todas as instruções da opção "Nova submissão". Ao fazer a submissão, todos os autores do artigo devem ser cadastrados utilizando a opção "Incluir coautor". A submissão de artigos pode ser realizada de forma contínua ao longo do ano.

Diretrizes gerais para artigos

Para solicitar a publicação de um artigo em *Estudios Gerenciales*, devem ser preparados dois arquivos, a página de apresentação e o manuscrito anônimo, que devem conter:

1) Folha de submissão do artigo. Primeira página do documento. Deve ser separada do resto do manuscrito. Inclui:

a) Título em português e inglês. Claro e preciso, não deve exceder 20 palavras. Deve ser coerente e estar relacionado com o conteúdo do artigo. Não deve conter abreviaturas.

b) Breve resenha de cada autor, indicando: último título acadêmico atingido, afiliação institucional, cargo, endereço e e-mail. No caso de vários autores, deve-se selecionar um autor para a troca de correspondência.

c) Resumo analítico do artigo em português e inglês. O resumo não deve exceder 120 palavras e deve incluir: objetivo do trabalho, metodologia e o resultado ou a recomendação mais importante resultante do trabalho. Não deve conter referências.

d) Palavras-chave em português e inglês (mínimo 3, máximo 5). Não deve conter abreviaturas.

e) Classificação JEL[1] para todos os artigos (máximo de 3 códigos).

f) Se for o caso, a informação básica das pesquisas que deram origem ao artigo, as fontes de financiamento e os agradecimentos pertinentes devem ser anexados.

2) Manuscrito anônimo. Além do título, do resumo, das palavras-chave (em português e inglês) e dos códigos JEL, o manuscrito anônimo deve incluir (o texto não deve ser enviado em duas colunas):[2]

• Para os artigos de pesquisa científica e tecnológica sugere-se a seguinte estrutura:

a) Introdução: deve levar em conta os antecedentes, o objetivo e a metodologia da pesquisa. O final propõe o fio condutor do artigo.

b) Marco teórico: inclui a revisão da literatura que justifica a investigação, onde os resultados de estudos que validam a importância e necessidade da pesquisa são discutidos.

c) Metodologia: apresenta e justifica a metodologia escolhida para, em seguida, passar para desenvolver e mostrar os resultados da aplicação dos mesmos.

d) Resultados: apresenta os principais resultados da aplicação da metodologia de forma compreensível e necessária para avaliar a validade da pesquisa.

e) Conclusões: destacam os principais aspectos do artigo, mas não são um resumo. As recomendações e as limitações do artigo são destacadas e as futuras linhas de pesquisa são propostas.

f) Referências bibliográficas: devem ser apresentadas de acordo com o estilo da sexta edição da APA (ver o final desta seção)[3].

g) Anexos.

• Para os artigos de revisão sugere-se a seguinte estrutura:

a) Introdução: deve levar em conta os antecedentes, o objetivo e a metodologia da pesquisa. O final propõe o fio condutor do artigo.

b) Marco teórico: inclui a revisão da literatura que justifica a investigação, onde os resultados de estudos que validam a importância e necessidade da pesquisa são discutidos.

c) Desenvolvimento teórico: inclui a revisão dos destaques, os resultados ou as tendências que resultam da pesquisa.

d) Conclusões: destacam os principais aspectos do artigo, mas não são um resumo. As recomendações e as limitações do artigo são destacadas e as futuras linhas de pesquisa são propostas.

e) Referências bibliográficas: se presentearam de acordo com o estilo da sexta edição da APA.

f) Uma revisão da literatura de pelo menos 50 referências deve ser apresentada.

g) Anexos.

• A estrutura dos casos de estudo (relato de caso) pode variar dependendo de como o estudo da situação em particular é abordado. Sugere-se a seguinte estrutura:

a) Introdução: deve levar em conta os antecedentes, o objetivo e a metodologia da pesquisa. O final propõe o fio condutor do artigo.

b) Marco teórico: inclui a revisão da literatura que justifica a investigação, onde os resultados de estudos (outros casos) que validam a importância e necessidade da pesquisa são discutidos.

c) Caso de estudo: inclui uma revisão sistemática sobre uma situação particular, onde se divulgam as experiências técnicas e metodológicas do caso objeto de estudo.

d) Discussão ou reflexão final: reflexo ou observações decorrentes da análise da situação levantada no caso de estudo.

e) Questões para discussão: deve incluir perguntas ou exercícios que sejam resolvidos a partir da revisão e/ou reflexão sobre o caso em estudo.

f) Referências bibliográficas: se presentearam de acordo com o estilo da sexta edição da APA.

g) Anexos.

3) Tabelas e figuras. O texto deve mencionar todas as tabelas e figuras antes de ser apresentadas. Cada uma dessas categorias conterá uma numeração (contínua de acordo com a sua aparência no texto), título e fonte. As tabelas e figuras devem ser incluídas no lugar apropriado do corpo do texto e devem ser enviadas em arquivo separado em seu formato original (PowerPoint, Excel, etc.). As tabelas e figuras que sejam copiadas e reproduzidas a partir de outras fontes, devem adicionar o número da página a partir do qual foram levadas. As tabelas e figuras devem ser desenhadas em escala de cinza ou em branco e preto. As imagens e fotos devem ser enviadas em alta definição.

4) Equação. As equações serão feitas exclusivamente com um editor de equações. Todas as equações devem ser listadas em ordem de aparecimento.

5) Notas de rodapé. Irão mostrar apenas informação de esclarecimento, cada nota irá ser numerada consecutivamente, sem figuras ou tabelas.

6) Citações textuais. Correspondem ao material citado que é original de uma outra fonte. Uma citação textual incorporada no texto se deve incluir entre aspas duplas. Em qualquer caso, o autor, ano e página especifica do texto citado devem ser incluídos sempre, e devem incluir a citação completa na lista de referências. As citações devem ser fiéis, isto é, não devem ser feitas mudanças no texto, mesmo se a ortografia está errada. Não devem ir em texto sublinhado ou itálico, e nos casos em que o autor deseje enfatizar, pode adicionar-se itálico e, em seguida, o texto entre colchetes "[itálico adicionado]." Só precisa-se adicionar o número da página no caso de citações textuais (incluindo figuras e tabelas).

7) Considerações de caráter geral

a) Extensão: não deve exceder 30 páginas no total (inclui bibliografia, gráficos, tabelas e anexos).

b) A formatação do texto e das páginas: o artigo deve ser enviado em formato Word; fonte Times New Roman, tamanho 12, tamanho de página carta, espaçamento 1,5, margens simétricas de 3 cm.

c) Os artigos devem ser escritos em terceira pessoa do singular (impessoal), ter uma pontuação e uma redação adequadas e com ausência de erros ortográficos. O autor é responsável por revisar o estilo antes da sua solicitação à revista.

d) Nos artigos em espanhol e português, devem ser utilizados pontos em todas as cifras como separadores de milhar e vírgula

como separadores decimais (texto, tabelas e figuras). Em artigos em inglês, as vírgulas são usadas como separadores de milhar e os pontos como separadores decimais.

O estilo APA para a apresentação de citações bibliográficas

As referências bibliográficas são incluídas no corpo do texto de duas maneiras: como uma narrativa (entre parênteses apenas o ano de publicação, por exemplo: sobrenome (ano)); e como uma referência (entre parênteses o sobrenome do autor e o ano, exemplo: (sobrenome, ano)). No caso de mais do que dois autores, citar o sobrenome de todos pela primeira vez e, em seguida, apenas o primeiro seguido por um ˝et al.˝.

Todas as referências nomeadas no corpo do artigo devem ser incluídas na lista de referências. Da mesma forma, todas as referências na lista devem ser nomeadas no corpo do documento.

Para referências que têm DOI, deve ser incluído no final de cada um. O formato é https://doi.org/10 .....

A lista de referências deve ser incluída no final, em ordem alfabética. O seguinte estilo deve ser considerado:

• Artigo de revista
Sobrenome, inicial(-ais) do nome (ano). Título do artigo. *Nome da revista*, *Volume* (Número), intervalo de páginas.DOI.
Exemplo:
Deery, S., Rayton, B., Walsh, J. y Kinnie, N. (2016). The Cost of Exhibiting Organzational Citizenship Behavior. Human Resource Management, 56(6), 1039-1049. https://doi.org/10.1002/hrm.21815

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Sobrenome, inicial(-ais) do nome (ano). *Título* (# Ed., Vol.). Cidade de publicação: editorial
Exemplo:
Prychitko, D. e Vanek, J. (1996). *Producer cooperatives and labor manager Systems* (3ª ed.). Boston, MA: Edgar Elgar Publishing.

• Capítulo em livro editado
Nome do autor do capítulo. (ano). Título do capítulo. Em nomes dos editores do livro (Eds.), *Título do livro* (intervalo de páginas do capítulo no livro). Cidade de publicação: editorial.
Exemplo:
Becattini, G. (1992). O distrito industrial marshalliano como conceito sócio-económico. Em F. Pyke, G. Becattini e W. Sengenberger. (eds.), *Os distritos industriais e as pequenas empresas* (pp. 61–79). Madrid: Ministério do Trabalho e da Segurança Social.

• Contribuição inédita para um simpósio
Sobrenome, inicial(-ais) do nome (ano, mês). *Título da palestra ou comunicado*. Em nome organizadores (Organizador/presidente), nome do simpósio. Descrição do simpósio, cidade, país.
Exemplo:
Lichstein, K.L., Johnson, R.S., Womack, T.D., Dean, J.E. e Childers, C.K. (1990, junho). Relaxation therapy for polypharmacy use in elderly insomniacs and noninsomniacs. Em T.L. Rosenthal (Presidente), *Reducing medication in geriatric populations*. Simpósio realizado na reunião do First International Congress of Behavioral Medicine, Uppsala, Suécia.

• Internet
Sobrenome, inicial(-ais) do nome (ano). *Título*. Recuperado no dia do mês do ano, de: endereço eletrónico.
Exemplo:
Echevarría, J. J. (2004). *A taxa de câmbio na Colômbia: impacto e determinantes num mercado global.* Recuperado em 21 de junho de 2005, de: http://www.banrep.gov.co/documentos/presentacionesdiscursos/pdf/tasa.pdf

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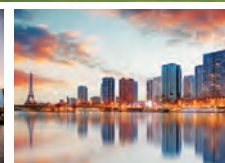
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