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Drivers of international performance of Brazilian technology-based firms

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ABSTRACT

For Technology-Based Firms, international expansion represents an opportunity for growth and value creation. The present study was designed to analyze the role of technology-based companies (TBCs) internationalization drivers on international performance. Therefore, a descriptive research was carried out with a quantitative approach performed through a survey. Data collection happened with 53 Brazilian TBCs located in innovation habitats. These data were analyzed by multivariate statistical technique. The results showed that the determinants of the international performance of Brazilian TBCs, can be set by external influencers (localization in innovation habitats, integration into global productive chains, partnerships and strategic alliances for innovation and government policies) and internal influencers (innovation capability, international market orientation and international marketing skills).

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1. INTRODUCTION

Several decades after the insights of Penrose (1959), advocating the importance of investments in innovation for the success and survival of companies operating in a worldwide knowledge-based economy (Lewellyn & Bao, 2015), today there are companies that not only add innovation to their production and corporate processes, but also make this process of creation and conversion their main business. These are technology-based companies (TBCs).

TBCs are small organizations that show their strength through risk-taking, innovative conduct and proactive behavior in the early stages of their foundation (Li et al., 2012). Faced with the constant need for change, the innovations generated by these organizations are capable of formulating changes and efficient business models in increasingly insecure markets.

For TBCs, international expansion means an opportunity for growth and value creation. This is because, when they enter international markets, they generally broaden their technological and market experience, improve their performance and often become more innovative (Engelman et al., 2015). This improved performance leads them to develop constantly renewed and progressive strategies (Gonçalves et al., 2014), especially because they see that the need to reinvent processes is a fundamental requirement to compete at the global level (Dias, 2007). Therefore, it is necessary to investigate these organizations in terms of international performance.

Studies on international performance have gradually increased in number over time, especially in 2015 and 2016, the years that saw the highest number of publications on the topic (e.g., Guerra & Camargo, 2016; Khalid & Bhatti, 2015; Love et al., 2016; Miranda Silva et al. 2016; Pinho & Prange,

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2016). Nevertheless, any inquiries into this theme involving TBCs show the need for more maturity in terms of new mechanisms to understand and evaluate the international performance of these companies. Most studies refer to the process of acquiring knowledge, the development and use of capabilities and organizational learning when it comes to involvement in the international market (Pinho & Prange, 2016; Khalid & Bhatti, 2015; Park et al., 2015; Wu & Voss, 2015; Lahat & Shoham, 2014).

In these circumstances, the studies of Benito-Osorio et al. (2016), Gerschewski and Xiao (2015) and Gerschewski, Rose and Lindsay (2015) identified the drivers of international performance of TBCs in Spain, Australia and New Zealand, and the need to develop a study that addresses this subject in a developing country and emerging economy, such as Brazil. In Brazil, a preliminary study conducted by Ribeiro, Oliveira Jr. and Borini (2012) found that factors outside of the company had a greater influence on the internationalization of TBCs than internal factors. Even so, these authors called for further research to confirm their findings.

In this context, the aim of the present study is to analyze the role of the influencers of internationalization on the international performance of Brazilian TBCs in order to identify the drivers that define this performance. The article is divided into five parts, in addition to this introduction. The following section presents the theoretical basis concerning international performance and the influencers of internationalization, constructing the hypotheses of the study. In the third part, the methodological aspects are discussed. Finally, the results are discussed and the general conclusions of the study are presented.

2. INTERNATIONAL PERFORMANCE

The theoretical approach to organizational performance on the overseas market is one of the most recurring themes in the international business and strategic management literature in recent years (Gnizy, 2016; Pinho & Prange, 2016; Larimo et al., 2016; Oura et al., 2015; Gerschewski & Xiao, 2015; Zhu & Qian, 2015).

Efrat and Shoham (2012) explain that in the last decade, efforts have been made to understand international performance using endless measurements including evaluations on survival, global market share, improvements in strategic

position and global competitiveness, sales growth, export growth and the profitability of companies.

However, Gerschewski and Xiao (2014) argue that performance measurements remain largely heterogeneous. The most commonly used measurements in the literature have to do with sales resulting from exports, the growth of international sales and the profitability of international activities. To these authors, unlike studies on export performance, from which points that form the framework of international performance studies are derived, this approach continues to lack theoretical depth.

Therefore, in light of the most recent studies on international performance, there is a perceived diversity with regard to the topics studied. While some authors seek to build models and instruments capable of measuring performance (Gerschewski & Xiao, 2015; Gerschewski et al., 2015; Garrido et al., 2015), others have related this approach with different focuses of the organizational field, such as international diversity (Benito-Osorio et al., 2016), psychic distance (Virvilaite & Seinauskienė, 2015) and international experience and capabilities (Oura et al., 2015; Liao, 2015; Wu & Voss, 2015). Furthermore, they highlight certain points already commonly studied alongside performance, such as entrepreneurial orientation (Emoke-Szidónia, 2015) and participation in networks and the forming of alliances and partnerships (Pinho & Prange, 2016; Park et al., 2015; Gerschewski & Xiao, 2015).

Among these topics, the need to seek knowledge on the possible influencers and determinants of performance may be emphasized. In this respect, some factors have been considered important due to the complex conjuncture that permeates the present and the need for a strategic response from organizations that seek international excellence, such as the influencers presented below (Mais et al., 2010).

2.1 External Influencers for the Internationalization of TBCs

The independent variable related to the external environment is composed of four external factors to the company proposed by Ribeiro et al. (2014) from a synthesis of the findings of Madsen and Servais (1997), Zahra and George (2002) and Fernhaber, Gilbert and McDougall (2008). Thus, they are subdivided into location in innovation ecosystems,

integration with global production chains, strategic partnerships and alliances for innovation and government policies.

2.1.1. Location in innovation ecosystems

Ecosystems are not exclusive to the technology sector, but it is in this sector that the most well-known organizations manifest, such as incubators, science parks, local production arrangements and industrial clusters. All of these are developed with a view to generating greater support for start-up companies, which seek in them a source of information, improvement and progress. These organizations are also characterized as knowledge ecosystems, in which local universities and public research agencies play a central role in advancing technical innovation within the system (Clarysse et al., 2014).

When it has a technological and innovative bias, an ecosystem is portrayed as a set of inter-related technologies, with specific overlapping functions and hierarchies. This emphasizes the organic nature of technological changes and the interactions between the interested parties (Kauffman et al., 2015).

Thus, by participating in ecosystems, companies aim to identify opportunities and encourage innovation by means of intellectual property, entrepreneurship, technology-based business incubation and technology transfer (Ishikawa et al., 2013). This means that the precepts of an innovation system can play an important role in the internationalization of the companies in which they originated by offering a physical environment and all the international connections of the members of the university (Ribeiro & Pimentel, 2009).

2.1.2. Integration into global production chains

The literature on global production chains has shown how different economic, regulatory and technological changes have enabled the organizational disintegration and geographic dispersion of production, leading to new types of cross-country relations of production and trade (Gereffi et al., 2005). Companies, when gauging the need to produce capabilities that strengthen them on the external market and create a singular identity to make themselves increasingly competitive, perceive international integration as a source of survival in the external market. This integration may originate in a relationship for providing services and products to

multinational companies, or it may be influenced by customers and competitors who have internationalized, affecting the organizational dynamic.

Therefore, to Bueno et al. (2015), using this strategy results in benefits for company management when it comes to brand and market management, by seeking to stand out amidst the other competitors through the development of differentiated products. This is because the main benefits stem from a high level of trust and satisfaction with partners in the chain related to oriented leadership, which also helps to achieve better quality service and performance (Datnow & Park, 2014).

2.1.3. Strategic partnerships and alliances for innovation

Forming strategic alliances and partnerships is an interdisciplinary concept that stems from different sources of study as part of a broader social configuration. Through this field, it is understood that organizations are organisms with limited resources and are naturally dependent on resources controlled by other companies (Seifriz et al., 2014).

According to Gabrielsson and Kirpalani (2004), the formation of these partnerships is an effective way for companies to overcome resource scarcity and at the same time learn from other organizations, a result of their ability to build and leverage relationships with their main partners.

As companies should be able to create and manage potential knowledge to strengthen their national and international competitive advantages (Bell et al. 2004), managers must develop unique and inimitable knowledge to maximize its utility in order to achieve superior international performance (Knight & Cavusgil, 2004). When they form relationships with institutions that enable better access to information and knowledge, they create a channel that gives them a competitive edge towards better performance.

2.1.4. Government policies in support of internationalization

According to Keohane and Nye (1998), the changes that have taken place in the international arena, with more openness in terms of trade and regulations, should lead to less power in the hands of nations and states. This power is then transferred to non-territorial actors such as multinational corporations,

social movements and international organizations. Nevertheless, although there have been changes with regard to this configuration, the state continues to play a fundamental role in promoting, encouraging and regulating the internationalization of companies (Figueira et al., 2015).

Government policies in support of internationalization are the driving force required to put firms on the path to internationalization and are affected by certain antecedent forces that derive from three main sources: individual characteristics, organizational characteristics and environmental characteristics (Honório, 2015).

According to Zhang et al. (2016), developing good relationships with the main government agencies can help companies gain important benefits in their international operations. Therefore, the political institutional forces of a country can influence not only the decision to enter the international market (Guler & Guillén, 2010), but also organizational performance in overseas markets (Chacar et al., 2010). These statements support the first hypothesis of the study:

H1: *External factors have a positive influence on the international performance of TBCs.*

2.2. Internal Influencers of the Internationalization of TBCs

The internal influencers of the company, proposed by Ribeiro et al. (2014) and formulated based on Knight and Kim (2009), Gabrielsson et al. (2008) and Knight and Cavusgil (2004), are innovation capability, international market orientation and international marketing skills. Each of these influencers is a foundation of and related to the later performance of TBCs.

2.2.1. Innovation capability

Innovation capability consists of implementing inter-related organizational routines to achieve innovation for the development of products and services, the production process, management, market and marketing (Ngo & O'cass, 2012). This capability can be determined by the factors of vision and strategy, taking advantage of the core competence of the company, organizational intelligence, management of creativity and ideas, organizational structure and systems, culture and technology management (Valladares et al., 2014).

These intangible resources have been increasingly identified as the source of competitive advantage of successful companies, given that intangibility is associated with being difficult for competitors to imitate or substitute (Brito et al., 2009). Through innovative capability, business competitiveness emerges from the differentiated use of internal resources available in or generated by companies, stimulating the concept of the inside-out strategy (Miranda et al., 2015).

Consequently, entrepreneurial success in the development of innovative capabilities can have a positive effect on company performance (Yang & Hao-Yu, 2011), recognizing that this capability directly influences organizational skill when it comes to adopting new thinking, production and procedures to meet the requirements of the international market (Lumpkin & Dess, 2001). This set of factors, linked to the willingness for organizational learning and experimental knowledge, is one of the main strategic tools that determine international performance (Roudini & Osman, 2012).

2.2.2. International market orientation

Market orientation is a construct that has already been widely used, be it for its ability to create a competitive advantage or because it constitutes a strategy for the development of international markets (Barbosa & Ayala, 2014). It can be viewed as organizational emphasis on success at the world level rather than success from country to country, constituting part of organizational culture (Zou & Cavusgil, 2002).

A market-oriented company, systematically and proactively, succeeds in achieving a better evaluation of the intelligence of this market with regard to customers and other environmental forces (He & Wei, 2011) that influence its business, and may constitute forces that provide opportunities.

For this reason, this orientation, as proven in recent empirical research, takes on an important meaning when it comes to the organizational performance of an internationalized company (Morais & Soares, 2016). This argument is supported in that organizations that focus on the market, i.e., monitor the needs and preferences of customers and react to them, can better serve customers and thus achieve better performance (Jaworski & Kohli, 2006).

2.2.3. International Marketing Skills

Marketing capabilities can be understood as skills or competences processed in a firm that help to understand the changes that occur in commercial markets with a view to perceiving which of these can no longer be used efficiently (Day, 1994). For this purpose, it is necessary to acquire a variety of skills such as the ability to sense the market and research it, create ties with the market and manage relationships with customers (Ripollés & Blesa, 2012).

The risks of expanding a business into international markets are considerable and difficult to predict (Palacios & Sousa, 2004). In these circumstances, the current situation of fierce competition leads companies to develop marketing concepts to anticipate, react to and capitalize on changes in the market that will lead to better performance (Neto et al., 2013).

This happens because strong marketing actions can accelerate the organizational process, as can the production of new products, consequently functioning as a performance driver (Homburg et al., 2015). Therefore, they are viewed as direct influencers of organizational performance (Gnizy, 2016).

Based on these statements, the following hypothesis is supported:

H2: A technology-based company's internal factors have a positive influence on its international performance.

2.3. Entrepreneur-related influencers

The independent variable related to the entrepreneur is made up of four factors in accordance with the model of Ribeiro et al. (2014), proposed from the research of Simões and Dominginhos (2004) and Oviatt and McDougall (2005).

As proposed in the international business literature, organizational factors related to the characteristics of the entrepreneur, such as knowledge of languages and the market and especially experience in other countries, are determinants for international businesses (Silva et al., 2012).

Thus, the international entrepreneurship approach has been viewed as an important support

for organizational capabilities that influence performance (Autio et al., 2011), mainly because it highlights the creation of value and the search for opportunities by combining aspects relative to proactive and innovative behavior (Roudini & Osman, 2012).

Therefore, demonstrating the importance of identifying the figure of the entrepreneur and the need to instil a more entrepreneurial culture in organizations led to an increase in the number of studies, resulting in the consideration of different types of approaches and perspectives (Öner & Kunday, 2016). These include paying attention to how much the international orientation of executives can be considered a significant antecedent for operating in the international market (Knight & Cavusgil, 2004). This was corroborated by Jantunen et al. (2008), who announced that entrepreneurial orientation is associated with better performance in external markets. Thus, based on these statements, the following hypothesis may be given:

H3: Factors related to the entrepreneur positively influence the international performance of TBCs.

3. METHODOLOGICAL PROCEDURES

With a view to achieving its objectives and observing its specific characteristics, this study is characterized as quantitative and of a descriptive nature, conducted by means of a survey. The study is based on the constructs that address the influencers of internationalization and international performance, and is based on a framework prepared using a combination of the models of Ribeiro, Oliveira Jr. and Borini (2012) and Gerschewski, Rose and Lindsay (2015), shown in Figure 1.

3.1. Population and sample

The research population for this study was composed of TBCs located on Brazilian territory that have conducted international activities and are located in innovation habitats such as technology incubators, science parks, start-up accelerators and industrial clusters.

The sample was characterized as non-probabilistic by convenience, when the participants are chosen because they are available to participate in the study. This choice was made because there is no official census with data capable of pinpointing precise

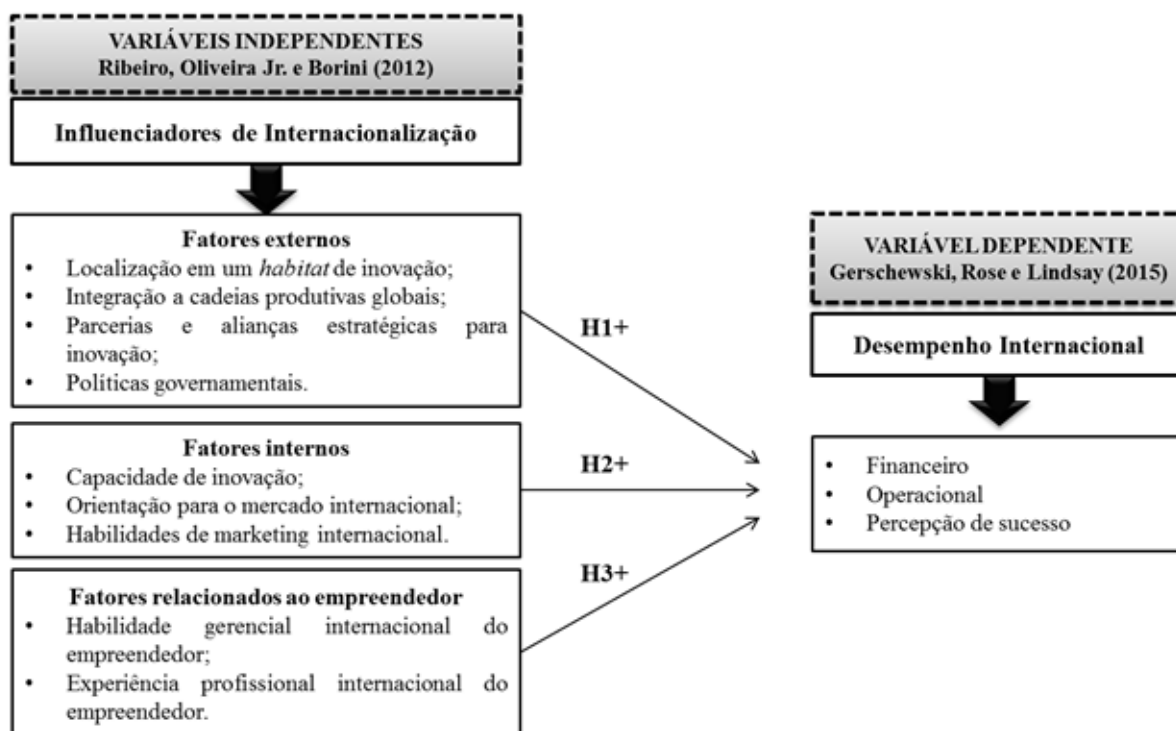


Fig. 1

Research model

Source: Prepared by the authors based on Ribeiro, Oliveira Jr. and Borini (2012) and Gerschewski, Rose and Lindsay (2015).

information on these companies in the country. Therefore, the website of the ANPROTEC (Brazilian Association of Science Parks and Incubators) served as the main source of information, with the use of data and contacts of the member companies, published by the association. As a complementary source, the following bases were used: SOFTEX, CECOMPI, P&D Brasil, Brasil IT, ABES Software and ABRAGAMES. Thus, the research instrument was applied electronically with the use of SurveyMonkey.

A total of 53 valid responses were obtained, which show that most Brazilian TBCs have been active in the market for 12 years, beginning their internationalization processes on average 7 years ago. They are predominantly located in São Paulo State and, due to the number of employees, are characterized as micro businesses. They began their international activities electronically and dealt mostly with customers in North America. Their origins can be traced back to an innovative environment, more precisely, technology incubators.

3.2. Data collection instrument

The primary data collection instrument was a four-part questionnaire based on the questionnaires used

in the models of Ribeiro et al. (2014) and Gerschewski, Rose and Lindsay (2015). Regarding the structure, the first part was made up of questions to identify the company and respondent. The second part dealt with basic information on the internationalization of the company. The third part addressed the internationalization influencers, and the fourth part looked at international performance.

The international performance construct, prepared by Gerschewski, Rose and Lindsay (2015), was submitted to the procedures of back translation and later validation by judges. The variables referring to the influencers of internationalization were made operational by questions with a five-point Likert scale, whereas those on international performance were made up of questions with a seven-point Likert scale. To enable an evaluation of the differences in average, the scales were standardized prior to application to a single level of intensity (1-5).

3.3. Data analysis procedures

The collected data were tabulated and analyzed using SPSS 21.0 software. For the statistical analyses, a data entry matrix was prepared, where the existence of missing values and multivariate outliers was not

verified. The normality of the data was calculated and verified by the Kolmogorov-Smirnov test (K-S test). The result showed that the research data are considered normal. Given the normality of the data, multivariate statistics were adopted.

Two factors were excluded from the original model: the external factor referring to integration with global production chains and the factor related to the perception of success (performance). Despite having two variables each with high factor loadings

Tab. 1

Main characteristics of the sample (n=52)

Existence and operation in the international market	Age	On average 12.19 years (between 02 and 40 years)
	Internationalization	On average 7.15 years (between 01 and 28 years)
Internationalization pattern	Traditional internationalization	45.55 %
	Born global	57.45 %
Modes of entry	Electronic commerce	19.23%
	Local distributor	13.46%
	Export	17.31%
	Sales office	13.46%
	Joint ventures or strategic alliances	19.23%
	Licensing of brands, products, technologies or processes to companies overseas	11.54%
	Acquisition of companies overseas	1.92%
Region of operation	Greenfield	3.85%
	North America	23.8%
	South and Central America	23%
	European Union	18%
	Eastern Europe and Russia	5.7%
	Middle East	6.6%
	Asia	10.7%
	Africa	8.2%
Size of company	Oceania	4.1%
	Micro enterprise (up to 10 employees)	50.9%
	Small business (10 to 49 employees)	22.6%
	Medium-sized company (50 to 249 employees)	22.6%
Innovation habitats	Large company (over 250 employees)	3.8%
	Science park	21%
	Company incubator	35.5%
	LPA (Local Production Arrangement)	11.3%
	Accelerator	8.1%
	None	24.2 %

Source: Research data (2017)

Initially, an Exploratory Factor Analysis (EFA) was performed, following the orientations proposed by Hair et al., (2009). For the data rotation, the Varimax orthogonal method was used, and to judge the significances, only the variables with factor loadings greater than 0.50 were maintained. To gauge the quality of the correlation between the variables, the Kaiser-Meyer-Olkin (KMO) test and Bartlett's sphericity test were used, paying attention to the fact that the former presents values greater than 0.60 and the latter values under 0.05 (sig.< 0.05). Finally, to analyze the degree of internal consistency of the scales, the Cronbach's Alpha reliability coefficient was calculated, maintaining in the model the dimensions with limits over 0.70 (HAIR et al., 2009).

and satisfactory values of explained variance, both had low Cronbach's Alpha values, with 0.587 and 0.562, respectively.

Thus, with the model adjusted by the condensation enabled by EFA, a multiple linear regression analysis was performed through the stepwise method, with the use of the Least Squares method, by which the coefficients are estimated with a view to minimize the sum of the squares of the residuals (Hair et al., 2009).

4. RESULTS

To test the hypotheses proposed in the study, a linear regression analysis was performed. To conduct this

analysis, it was determined that the independent variables of the model (predictors) would be concentrated in the influencers of internationalization, considering the macro division into external factors, internal factors and factors related to the entrepreneur. In turn, the dependent variable is defined by international performance, with regard to its evaluation. All four variables were obtained by calculating the weighted average of the factors extracted from the EFA.

The analysis was conducted because of the need to discover the existence of a relationship of dependence between the variables of the model and was performed using the stepwise estimation method, also known as the step by step method. According to Cunha and Coelho (2007), it allows an examination of the additional contribution of each independent variable to the model.

With the model obtained by this parameter and following the criterion for the inclusion of variables with a probability of F equal to or less than 0.05, and for removal greater than or equal to 0.10, it was determined that “External factors” and “Internal factors” have a significant influence on the variation of international performance, while the variable “Entrepreneur factors” was excluded from the model because it does not have a significant influence on the dependent variable.

the expected distribution. Thus, with a level of significance with a value higher than 0.05 (0.868), the hypothesis that the distribution of the tested serial is normal was accepted (Pestana & Gageiro, 2003).

To evaluate the existence of homoscedasticity (constant variance of the residuals) the Pesaran-Pesaran test was performed, which gauges whether the variance of the residuals remains constant throughout the spectrum of independent variables (Cunha & Coelho, 2007). The result was a significance value greater than 0.05 (0.924), retaining the hypothesis that the residuals are homoscedastic.

The absence of serial autocorrelation was verified using the Durbin-Watson test, which sought to evaluate the independence of the errors. The result shows that the hypothesis of absence of correlation is confirmed (Pestana & Gageiro, 2003), presenting a value close to 2 (1.769).

Finally, to address all the assumption, multicollinearity analysis was performed by verifying the Variance Inflation Factor (VIF) value, indicating the measurement of the extent to which each independent variable is explained by the others. Thus, having obtained values between 1 and 10 (1.034), the multicollinearity of the regression model was deemed acceptable (Hair et al., 2009). The final results of the linear regression, which tested the hypotheses of the study, are shown in Table 2.

Tab. 2
Results of linear regression

Hypothesis	Interaction	Standardized Beta	T-value	Sig.	Situation
H ₁	External factors => International performance	0.643	8.066	0.000	Confirmed
H ₂	Internal factors => International performance	0.424	5.318	0.000	Confirmed
H ₃	Entrepreneur-related factors => International performance	-	-	-	Not confirmed

Source: Research data

With a view to avoiding statistical bias, analyses were conducted of five assumptions inherent to multiple regression in the search for consistent estimates. These are: (1) residual normality test; (2) homoscedasticity test; (3) test of the absence of serial correlation in residuals; and (4) multicollinearity among the dependent variables.

The normality of the residuals was verified using the Kolmogorov-Smirnov (K-S) test, with the purpose of examining whether the series is in accordance with

With the results generated by the multiple regression analysis, it can be concluded that of the three hypotheses of the study, two were confirmed (H1 and H2), while one was not (H3). A discussion of these conclusions now follows, supported by the statistical results and the theoretical framework.

The results of the multiple regression analysis show a positive influence between external and external factors and international performance. However, in this study, the factor related to the

entrepreneur did not show an influence on performance, as it was excluded from the multiple regression model.

Thus, international performance is influenced by external factors in a proportion of 0.48. This shows that the more important external influencers of internationalization are, the better international performance will be, thereby confirming the first hypothesis (H1). Therefore, it is inferred that location in innovation habitats, the formation of strategic alliances and partnerships for innovation and government policies have a positive influence on the performance of TBCs.

This relationship of dependence is also shown between international factors and performance, at a proportion of 0.505. Thus, the more important the internal influencers of internationalization are, the better the evaluation of international performance will be, confirming the second hypothesis (H2). It can therefore be inferred that innovation capability, international market orientation and international marketing skills positively influence the international performance of TBCs.

In turn, the factors related to the entrepreneur, which did not adhere to the multiple regression model, had no influence on performance. With this result, the third hypothesis (H3) was rejected. Thus, it can be inferred that for the TBCs in question, the international managerial skills of the entrepreneur did not influence international performance.

5. THEORETICAL AND PRACTICAL IMPLICATIONS

The degree of dependence of the relationship between the factors studied was obtained through a multiple regression analysis, enabling an analysis of how intensely the internationalization influencers contribute to international performance.

5.1. International performance influenced by external factors

The conclusion that external factors influence the international performance of TBCs is in keeping with the literature, showing circumstances in which these factors can influence international performance (Clarysse et al., 2014; Galateanu & Avasilcai, 2014).

In accordance with Liao (2015), when Brazilian TBCs are located in an innovation habitat, this influences their trade in international markets. As

argued by Clarysse et al. (2014), in a business ecosystem, connections between companies can be essential for international performance, as pointed out by Iansiti and Levien (2004), considering them an important ingredient for organizational success.

With regard to forming strategic alliances and partnerships, according to Andersson and Victor (2003), both personal and organizational relationships are important for implementing successful global strategies. This can be confirmed by the results of this study, as sharing knowledge and information, as identified by Zhou, Wu and Luo (2007), in research on Chinese companies, can be related to better performance in international markets.

Therefore, the different partnerships that TBCs form with multinationals, learning institutions and research institutes in Brazil show how important they are for better organizational development at the international level, providing support through knowledge and technology.

In turn, government policies that support internationalization proved significant in terms of performance on the international market. In Brazil, policies have encouraged the internationalization of domestic companies. The Brazilian Agency to Promote Exports and Investment (APEX) and the BNDES have provided significant stimuli to this end (Ribeiro et al., 2012). The role of Technology Innovation Nuclei (TINs) is also important. They usually have funding from public innovation and research agencies. This is also the case of Research Support Funds and agents who are graduates from public universities and focus on the development of innovation habitats, technology transfer and the integrated action of agents from the public, private and third sector. Given the results of the study, it can be concluded that these incentives can be used effectively for better performance on the international market, as they have a significant influence on this process.

5.2. International performance influenced by internal factors

By inferring that internal factors influence the international performance of TBCs, the present study is in agreement with research confirming this relationship of dependence (Oura et al., 2015; Nalcaci & Yagci, 2014; Maydeu-Olivares & Lado, 2003).

As identified by Oura, Zilber and Lopes (2015) in a study of small and medium-sized Brazilian industrial companies, for the sample of TBCs there is a positive relationship between innovation capability and international performance. As constant innovation is the essence of these companies, it is possible to perceive how much this attitude is essential for organizational growth.

International market orientation also makes a powerful contribution to success, in accordance with the findings of Maydeu-Olivares and Lado (2003), who empirically demonstrated that organizations with greater market orientation can achieve better results. Therefore, it can be inferred that Brazilian TBCs seek to base their strategies on understanding the international market while they attempt to monitor customers and competitors in the external environment.

To this end, a set of capabilities can spur this orientation. Thus, with regard to international marketing skills, as observed by Nalcaci and Yagci (2014), in a study of Turkish companies, it can be concluded that these capabilities influence organizational performance in the external market.

5.3. International performance without the influence of factors related to the entrepreneur

Recent studies have shown the existence of a positive relationship between orientation and the international experience of the entrepreneur with the performance of internationalized companies (Gerschewski et al., 2015; Emöke-Szidónia, 2015). However, the findings of the present study did not support this notion, showing that factors related to the entrepreneur (international experience and skills) do not influence the international performance of Brazilian TBCs.

In general, studies suggest that factors related to the entrepreneurial competence of these companies are vital to the early internationalization process (Khalid & Bhatti, 2015). However, the findings of the present study did not show that this is a determinant for international expansion and successful financial and operational performance.

This may occur because of the vision of the entrepreneur that TBCs adopt by greatly valuing the business context and conceptions that surround them, especially due to the strong influence of the startup culture. This culture advocates that the

notion of entrepreneurship in the period following entry into the external market is applied more due to an overall understanding of complementarity than by the initiative of the founders. To these organizations, according to Costa et al. (2015), the main point of success lies in the brains that make the managerial decisions, i.e., the team that constitutes the principal asset of the company, whose function is to develop and create.

Thus, owing to this more holistic perspective, it is perceived that in their efforts to achieve greater probability of survival in the international market, TBCs make more use of aspects related to their internal and external environment than the characteristics of their entrepreneurs. In other words, employing market actions and enjoying the benefits of forming partnerships, for example, is more important than only depending on the skills of the entrepreneurs.

In light of the above and in the framework of the notion that survival and expansion of companies and the consequent economic growth of many countries are highly dependent on a better understanding of the determinants that influence international performance (Sousa et al., 2008), with the present study, it is possible to define the drivers of the international performance of TBCs.

Therefore, it can be inferred that the determinants of this performance, i.e., drivers, can be defined by the following factors: (a) participating or having participated in an innovation habitat; (b) forming strategic alliances and partnerships for innovation; (c) taking advantage of national government policies for internationalization (d) developing innovation capabilities; (e) being oriented for the international market; and (f) having international marketing skills.

6. FINAL CONSIDERATIONS

By focusing on the international performance of TBCs, the present study can be added to the most recent studies on international business that seek to understand the aspects involved in the internationalization of these companies. Like startups and Born Globals, TBCs have attracted attention in the academic community by developing highly technological and innovative products and services for the market through bold actions and more proactive examples of management.

With this configuration, the present study contributes to the field with the application of a quantitative research instrument to evaluate international performance that had not been tested in the Brazilian context. This instrument, prepared based on the model developed by Gerschewski, Rose and Lindsay (2015), served the characteristics of the environment in question well and showed internal consistency when gauging the international performance of TBCs.

Although the results are capable of answering the research problem and achieving the proposed objective, the study has limitations, the main one being that the findings apply only to the reality of the companies in question. As the study deals with a relatively small sample, the findings cannot be extrapolated and applied to all internationalized TBCs.

Another limitation stood out during the cataloguing of internationalized TBCs in the data collection. During this time, a high number of innovation environments was found in Brazil with a large number of technology companies. However, in addition to the difficulty involved in identifying them, only a limited number of organizations had internationalized.

In a highly innovative sector, with the products sold and services offered, companies are able to offer these to different countries, especially due to the advantages made possible by the internet. However, in Brazil, few technology organizations focus on the international market, and the number of TBCs in the country using this strategy remains low.

In light of this finding, it is suggested that future studies revisit the early internationalization processes and, through in-depth research and exploratory studies, seek to identify the reasons why so few Brazilian TBCs enter the international market. A further recommendation for future studies is to stratify business sectors to gauge their involvement in global chains. A final recommendation for future research is related to the factors related to the entrepreneur. As there were signs of a refutation of the theory that is in vogue, it is necessary to conduct more in depth studies to understand how these factors affect or do not affect the international performance of Brazilian TBCs.

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APPENDIX 1

Field research questions by dimension of analysis

Location of your company in an innovation habitat (science park, incubator, LPA, etc.) (Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. Belonging to an innovation habitat facilitated your company's entry overseas.
2. To be recognized in the international market, your company uses the name of its innovation habitat.
3. Your innovation habitat aided your company's strategic planning to operate overseas.
4. The help provided by the resources of the innovation habitat (equipment, laboratories, specialized services, commercial structures to purchase and input and sell products) accelerated your company's internationalization.

Your company's integration into global production chains with regard to its internationalization

(Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. Operating in an internationally integrated sector accelerated the need for your company to internationalize.
2. Being a supplier of a large multinational's product or service accelerated your company's internationalization.
3. To compete in your sector, internationalizing activities is a matter of survival.
4. The internationalization of your main customer led to the need for your company's own internationalization to continue supplying them.
5. Competing in a sector in which your direct competitors operate overseas accelerated your company's internationalization.

Your company's partnerships for innovation with other companies in Brazil aided your company's entry into the international market.

(Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. Partnerships with Brazilian universities.
2. Joint R&D projects with multinational companies operating in Brazil.
3. Partnerships with Brazilian research centers or institutes.

State policies, projects and agencies helped your country to enter the international market.

(Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. Funding from the BNDES
2. APEX projects for your sector
3. Funding institution projects such as FINEP, PIPE-FAPESP etc.
4. International agreements made by the Brazilian government
5. Brazilian government tariff policies

Innovation capability (Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. Our company is at the forefront of technology in our industry in international markets.
2. We develop a great deal of the technology contained in our product.
3. In the conception and manufacture of our product, we employ some of the most qualified specialists in the business.
4. We are recognized in the international market for products that are technologically superior.
5. Compared with our local competitors, we are often the first to introduce product innovations or new approaches to operating in international markets.
6. We have formal expenditure on R&D for new products.

International market orientation (Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. In our company, the strong and weak points of our main international competitor are frequently discussed.
2. If a competitor launched an intensive campaign aimed at our international customers, we would respond immediately.
3. Our business functions (e.g., commercialization/sales, finances, production) are integrated to meet the needs of the international market.
4. Company strategy is based on our understanding of the needs of international customers.
5. International customer satisfaction with our products or services is systematically measured.

Your company's international marketing skills (Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. The planning process for international marketing.
2. Skill in segmenting and identifying niches in the overseas market.
3. Skill in using marketing tools to differentiate the product (design, price setting, advertising).
4. Development and adaptation of the product to the international market.
5. Company image
6. Worldwide recognition of the product/service.

Entrepreneurs' international managerial skills in relation to internationalization

(Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. Our company's managers tend to see the world, rather than only Brazil, as its target market.
2. The guidance of the entrepreneurs was important in our decision to enter foreign markets.
3. The managerial qualifications of the entrepreneur was important for the company to enter foreign markets.

4. Our company managers can negotiate in English.
5. When hiring people, our company managers think of the candidates' abilities for working in international markets.
6. Our company's professionals can work with people from other countries, with cultures different from ours.
7. Our professionals can adapt to other countries and cultures.
8. Our company managers can identified business opportunities overseas.

Entrepreneur's previous experience (Source: Ribeiro, Oliveira Jr. & Borini, 2012)

1. The entrepreneur's previous experience and work in multinational companies in Brazil (in international or export departments).
2. The entrepreneur's previous work experience abroad as an expatriate employee of a company with headquarters in Brazil.
3. Educational experience abroad (MBA, doctorate, courses).
4. The entrepreneur's personal relationships overseas.
5. Family origin of the entrepreneur.

International Performance (Source: Gerschewski, Rose & Lindsay, 2015)

1. International sales.
2. Growth of international sales.
3. International profitability.
4. Return on investment (ROI) of international businesses.
5. Market share in international markets.
6. Company's international reputation.
7. Introduction of new products/services in international markets.
8. Global reach (presence in strategically located countries around the world).
9. Commercialization time for new products/services at the international level.
10. Climbing the ranking in international markets.
11. Number of successful new products in international markets.
12. International performance.

Drivers do desempenho internacional de empresas de base tecnológica (EBTs) brasileiras

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RESUMO

Para as Empresas de Base Tecnológica (EBTs), a expansão internacional representa uma oportunidade de crescimento e de criação de valor. Diante disso, o presente estudo destinou-se a analisar o papel dos influenciadores de internacionalização no desempenho internacional de EBTs. Para tanto, foi realizada uma pesquisa descritiva, de abordagem quantitativa, operacionalizada por meio de uma survey. A coleta de dados se deu juntamente a 53 EBTs brasileiras localizadas em ambientes de inovação. Tais dados foram analisados por meio de técnica estatística multivariada e com os resultados obtidos, constatou-se que os determinantes do desempenho internacional das empresas analisadas, podem ser definidos pelos influenciadores de internacionalização externos (localização em ecossistemas de inovação; integração a cadeias produtivas globais; parcerias e alianças estratégicas para inovação e políticas governamentais) e internos (capacidade de inovação, orientação para o mercado internacional e habilidades de marketing internacional).

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