



Framework For Assessing The Aspiration Capacity To Entrepreneurship 4.0

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Abstract: *The entrepreneur 4.0 is the agent who has essential skills to solve problems through the introduction of new technologies, managing the changes motivated by it. With this, the objective of this study is to present a proposal of framework for analysis of the Capacity of Aspiration to the Entrepreneurship 4.0. Methodologically, this research is characterized as exploratory, its development was based on a broad survey of literature to develop the proposed framework. As a result of the theoretical survey, a set of 5 dimensions (Technology, Organization, Strategy, Production and Marketing) was identified. As suggestions for new researches, there is the application of the method and its decision support software (M-MACBETH®). To evaluate this capacity, and a greater exploration of the cited theoretical references, validating the framework in field research.*

Key Words: Entrepreneurship 4.0, Information Technology, Innovation, SME, Framework.

1. INTRODUCTION

Companies that want to survive the challenges of the market, must be able to adapt to the environment of constant change, for this, it is necessary to make adjustments in the structure and changes at various levels of the organization (Gonçalves et al., 2010). The results of this whole process can be perceived with the implementation of a new form of production, improvement of a service, implementation of a new marketing or organizational method in business practices, workplace organization or external relations (Ocde, 2015).

In this context, the application of Information and Communication Technologies by companies allows the emergence of new perspectives of growth and change in organizational management (Manochehri, Al-esmail, & Ashrafi, 2012). This requires the correct interpretation of ICTs in order to provide the emergence of a range of opportunities that can range from improving the understanding of the internal process to understanding the characteristics of the external market (Bianchini & Michalkova, 2019).

From the emergence of new perspectives and opportunities arising from the adoption of ICTs, entrepreneurship has been undergoing several changes and provoking changes at the most diverse levels of organizations. Instigating the emergence of the figure of the entrepreneur 4.0 who is the agent with aptitude to solve problems from the new technological tools available, managing the transformations motivated by its introduction (Alves, Luz, & Silva, 2020; Oberg & Grundström, 2009). Seeking to understand the link that is established between its adoption and the growth of the company, and the results that will be obtained from the increase of ICTs (Consoli, 2012; Matthews, 2007).

In view of the above, motivated by the changes that the adoption of ICTs may bring to entrepreneurial activity, this study aims at building a framework to analyze the capacity to aspire to entrepreneurship 4.0. After an extensive bibliographic research, it was observed that five dimensions were considered indispensable for this new format that entrepreneurship has been acquiring in the 4.0 era: technology, organization, strategy, production and marketing.

In this sense, as presented, each dimension pointed out by the literature and present in the proposed framework has a different level of importance, but they are interrelated when they seek a common result within the organization. Finally, it is recommended that the proposed instrument be weighted and that each criterion be able to express the relative importance in the decision-making process of the proposed final composition. Thus, it is proposed that value judgments expressed by micro and small entrepreneurs be used. In order to transform qualitative value judgments into quantitative ones, the adoption of the MACBETH multi-

criteria method (Bana e Costa & Vansnick, 1997) is suggested in a later work.

2. THEORETICAL APPROACH AND PROPOSITIONS

2.1 Impact of ICTs on Entrepreneurship

Information and Communication Technology (ICT) resources are now considered key to the achievement of institutional goals, especially in an environment characterized by dynamism, complexity and diversity (Pulka et al., 2018). Making them a vital resource for companies to enjoy better performance, making themselves more competitive within such a globalized market scenario (Ongori & Magiro, 2010).

The adoption of ICTs is no longer a choice, but an obligation among the different types of organizations operating in different sectors. The legitimization of these technologies allows new opportunities in terms of international trade, making small and medium enterprises (SMEs) able to sell their products in larger markets, thus favoring competition with large companies (Ramsey et al., 2003). In a study in the UK, with 500 companies, most of them commercially active online, it was found that 13% of them are more productive, because they do not use ICTs only as a tool to accept electronic payments, but as aspects of data activity (e.g. collection, analysis and reporting, deployment) (Bakshi, Bravo-biosca, & Mateos-garcia, 2014).

Rapid advances in the field and the continuous reduction of barriers to international trade show that the world is converging towards a globalized economy. This opens up vibrant new opportunities for SMEs (Mutula & Brakel, 2006). According to studies conducted by Tan (2009) in Malaysia, what led SMEs to adopt Information Technologies were the benefits provided as access to information and knowledge about the market, new business opportunities and a form of communication within and between organizations and their stakeholders.

The transformations resulting from the adoption and use of ICTs affect almost all aspects of the economy. Viewed by managers as a competitive tool, the changes include the dynamics of innovation, productivity and growth, company performance, the development of market structures, and labor demand (Kossai & Piget, 2014). In a more comprehensive vision, it represents the change in production processes and business models, configuring a new level of management for organizations (Santos et al., 2018).

Technological entrepreneurship stimulated by the advancement of information and communication technologies expresses the capacity to respond to the challenges of the contemporary context, taking advantage of new knowledge and technologies to change from the traditional to the innovation-oriented factor (Lu, 2016; Lu, 2017; Wang, 2017; García-morales et al., 2014; Rasool et al., 2017). The importance of these technological advances for

entrepreneurship and the economy has been increasingly perceived, and with this, governments and private initiative from various parts of the world have been driving their diffusion (Apulu & Latham, 2014; Piget, 2013; Yusuf, 2013).

A study by Reshetnikova (2018) shows that the investment made by the Chinese government to finance innovation in its SMEs has meant that from 2013 onwards, the growth rates of newly-registered SMEs working in the innovation sector have reached a percentage of 23.4% per year. By 2016, China had 19.1 million companies in R&D. The total number of specialists employed exceeded 164 million people. The authorized capital of these companies was estimated at about US\$ 14.5 trillion, which corresponds to 52.9% of the total capital of SMEs in the country. Innovative small and medium-sized companies cannot develop on such a large scale and so quickly without a modern research and production infrastructure supported by ICT.

Similar results were obtained in a study conducted by Brynjolfsson et al., (2011) with 179 companies in the USA, the authors in their research identified that companies that adopted the use of resources provided by ICTs, obtained an increase of 5 to 6% in production and productivity of companies, so that these technologies contributed to a leaner production, optimizing processes and reducing production deficiencies (Auschitzky et al., 2014; Bianchini & Michalkova, 2019).

The use of ICTs is directly linked to the use of the organization's resources in general, not only with the implementation of systems or equipment, but also as a tool capable of accelerating the innovation process (Pavlou & Sawy, 2006). Thus, institutions that want to survive the challenges of the market must be able to adapt to the changing environment (Gonçalves et al., 2010). It becomes necessary to make adjustments to the structure, internal changes, such as staff training, changes that cause a new profile of entrepreneur in organizations, which in the Era 4.0, can be called Entrepreneur 4.0 (Alves, Luz, & Silva, 2020).

2.2 Entrepreneurship 4.0

Entrepreneurship has increasingly become a major driving force for economic growth and development (Acs & Armington, 2004). Low and MacMillan (1988) present entrepreneurship as a process that can be realized in a variety of contexts. From this point of view, several studies believe that contextual conditions such as education, culture, social support systems, technology, presence of human capital and experience have played an important role in changing conditions for entrepreneurship (Fischer et al., 2009).

Giving birth to the entrepreneur 4.0, the agent who has essential skills to solve problems through the introduction of new technologies (Oberg & Grundström, 2009). Managing the changes motivated by ICT adoption, striving

to better understand the relationship between ICT adoption and company growth, how it can contribute, the factors that will allow or prevent contributions and how to sustain and support growth through diversification and investment in ICTs (Matthews, 2007).

The entrepreneur 4.0 is no longer characterized with entrepreneurs who are considered business owners, who seek to generate value through the creation or expansion of economic activity, identifying and exploring new products, processes or markets. Thus, there is the innovative entrepreneur and the common entrepreneur, so that both impact on different economic results, the common entrepreneur contributing mainly to the creation of jobs and the innovative entrepreneur leading to greater value-added jobs (Waasdorp, 2002; Lundstrom & Stevenson, 2002; Dahlstrand & Stevenson, 2010).

A condition that influences the innovative entrepreneur is the organizational culture, an operational competence molded for the orientation of innovation becomes great influence in the thinking and actions of the entrepreneur 4.0 (Siguaw et al., 2006). In order to stimulate innovative behavior among the collaborators of an institution in accordance with the thoughts of management, leading them to accept and see innovation as a basic value of the organization, instigating commitment and encouraging creativity, considered a key piece for the development of pioneering innovations (Dulaimi & Hartmann, 2006; Naranjo & Jiménez, 2011).

With the business environment is increasingly dynamic, complex and unpredictable, where technology, globalization, knowledge and competitive changes become direct impacts on overall performance, (Talebi, Ghavamipour, & Irandust, 2012). Authors such as Chandy and Tellis (1998); Hadjimanolis (2000); Gatignon and Xuereb (1997); Richard et al., (2004), have already stated that while R&D capacity is considered a central part of innovative capacity, as well as the formal process of strategic planning affects new product development practices and innovation capacity in SMEs, successful technological innovation also depends on assisting or enabling processes such as production, marketing, organization and strategic planning.

2.3 Decision making for ICT adoption by Organizations

Decision making is one of the central aspects of company management. According to Goodwin & Wright (2004), decision making is a complex process, as it comprises a deep knowledge of the organization and its environment. Kazmier (1975) apud Lima (2012, p. 17) complements yet that "the ability to make decisions is the key to successful planning at all levels of management. Since, it is an essential step for real applications such as organization management, strategic and financial planning, product evaluation, risk assessment and recommendation (Gomes

& Gomes, 2014). Even if each person has a different way of acting and understanding a problem, it is a fact that personality influences the whole decision making process, since it is loaded with information with different styles of each intimate characteristic of the decision maker (Robbins, 2000).

For a good decision it is necessary that the entrepreneur obtains all possible and correct information regarding the adoption and use of ICTs, so that this adoption can bring positive changes to the organization, configuring the entrepreneurial capacity 4.0. After performing this diagnosis it is necessary to discover the possible options so that it is possible to compare courses of action and finally analyze and choose the best alternative. So that the greater the number of alternatives, the more complex the decision making.

It is worth emphasizing that when decisions are related to ICT adoption, they should be structured in such a way that they analyze decision conflicts (Domingues et al., 2015). Thus, the traditional decision model, employing a single criterion, is no longer capable of dealing with these conflicting problems (Rocha, 2017). Thus, the analyses must be carried out in a multi-criteria context. The multicriteria techniques used are faced with the need to analyze several criteria that can be conflicting in decision making. According to Gomes and Gomes (2014, p. 69) "[...] multi-criteria methods have been developed to support and lead decision makers in the evaluation and choice of alternative-solutions, in different spaces".

3. METHODOLOGICAL PROCEDURES

This survey is essentially classified as qualitative, where the purpose of the survey is intensity and not quantity, which is obtained from respondent sources that are then cross-referenced generating understanding and meaning, which cannot be obtained in quantitative research (Creswell & Creswell, 2017). Thus, bibliographic research was used as a way to acquire the elements for the elaboration of a theoretical methodology for evaluating the capacity of aspiring to entrepreneurship 4.0 in micro and small enterprises (SMEs).

Bibliographic research is a survey of published literature and an important methodological procedure in the production of scientific knowledge capable of generating, especially in less explored themes, the postulation of hypotheses or interpretations that will serve as a starting point for other research (Lima & Kyoto, 2007). The bibliographic survey of this research resulted in a total of 146 works, among national and international ones used, from searches in databases such as: Database of Institute for Scientific Information (ISI Web of Science); Scopus; Coordination for the Improvement of Higher Level Personnel (CAPES); Academic Search Premier (ASP); Elton B. Stephens Co (EBSCO), ScienceDirect (Elsevier) and Google Scholar.

As for the objective of the research, it is an exploratory research, which seeks to study a field not yet explored, seeking a greater familiarity with the theme and make it more explicit (Gil, 2010). The exploratory study is a preliminary study that has as its main objective to become familiar with a phenomenon that is to investigate, find patterns, ideas or hypotheses and not to test or confirm them, and in this sense, a more open method is used, and the focus is on gathering data and broad impressions about the phenomenon studied (Theodorson & Theodorson, 1969; Hussey & Collins, 2005).

3.1 Theoretical Framework of Entrepreneurship Suction Capacity 4.0

A study on the capacity to aspire to entrepreneurship 4.0 becomes primordial for the understanding of the relationship established between the dimensions pointed out by theoretical analysis and the entrepreneurial capacity. To try to explain this relationship, it is proposed the construction of a model for evaluating the entrepreneurial aspiration capacity 4.0, thus, it is necessary to define dimensions and their indicators, which are characteristic factors of the problem studied, which in general, according to Ensslin et al. (2001), are those that represent an aspect considered essential for decision makers.

After analyzing the literature on Entrepreneurship 4.0, and the use of ICTs to foster this new era of entrepreneurship, they were selected as favorable dimensions and flags of greater chances of being classified as belonging to Entrepreneurship 4.0 for the multi-criteria model to be built: Technology, Production, Strategy, Marketing and Organization, and their respective indicators, as shown in figure 1.

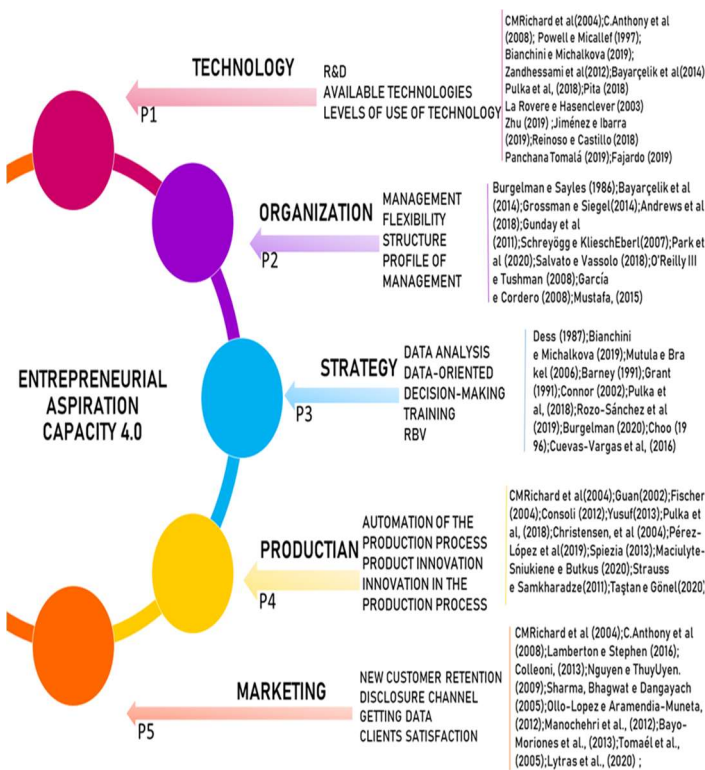


Fig-1. Theoretical model for the analysis of Entrepreneurial Suction Capacity 4.0
Source: Prepared by the authors, 2020.

Over time one can see how society has improved its capacity to create and exploit new knowledge in order to achieve greater wealth, promoting entrepreneurship and the birth of innovations (Ferreira & Lisboa, 2019; Petrakis, Kostis & Valsamis, 2015). This exploitation of knowledge, resulting from scientific and technical revolutions, has allowed a continuous development of new technologies that result in new products, processes and sectors (Braunerhjelm, 2007). From the above, some authors began to discuss how the dimensions highlighted here impact on the capacity to aspire to entrepreneurship, giving rise to the following prepositions:

Proposition 1 (P1)
There is an alignment between Technology and the capacity to aspire to entrepreneurship 4.0.

The introduction of technologies aims to establish an interaction with the various contexts of the organization, which for many managers is a transformation of processes, since they are related to processes of collection, storage, processing and transmission of information (Marcolla, 2012; Pulka et al, 2018). The technology adopted refers to physical tools (computers, tablets, smartphones, wired networks, etc.) as well as dematerialized tools (software, wireless connections, e-mail, internet/intranet, etc.) (Tsambou & Komga, 2017). Like the authors Tarutê and Gatautis (2014), they point out that if there is some infrastructure, qualified personnel and sufficient budget it

is possible to invest in technological innovations, adopting mobile resources.

The application of technology in production processes, for example, is able to optimize the effect of yield by identifying patterns for data analysis (Bianchini & Michalkova, 2019). The development of technology, transforming technological resources into technological advantage, R&D, anticipation of technological changes, helps the company to obtain cost reduction or product differentiation (Li & Chen, 2011), providing economic value through the adoption and diffusion of new products, or as an alternative, promoting continuous improvements of existing products and services (Garcia & Calantone, 2002).

But besides the adoption of technologies for process improvement, it is important to have management quality (Andrews, Nicoletti & Timiliotis, 2018), since organizational readiness plays an important role in the success of ICT projects in the company (Khazanachi, 2005). In this sense, proposition 2 (P2) of this research is that:

Proposition 2 (P2)
There is an alignment between Organization and the capacity to aspire to entrepreneurship 4.0.

In this 4.0 scenario, organizational transformation refers to a new way of working, a new knowledge management system, new methods of mobilizing workers' creativity (Tsambou & Komga, 2017). The figure of the manager/leader who instigates the adoption of innovative technologies, encourages the employees' capacity for innovation, supports personal growth and development, are very important characteristics for fostering innovation (Menzel et al., 2007). In addition to the ability to coordinate all activities towards shared objectives by promoting cross-functional integration, connecting different functional departments in the innovation and development process of the institution (Li & Chen, 2011).

The impact of ICTs on the organization can be perceived through the "center of excellence", where all business units can obtain information and knowledge from a core team (Grossman & Siegel, 2014), develop new organizational and management approaches or significantly improve existing practices (data-based organization) (Bianchini & Michalkova, 2019).

Therefore, investment in infrastructure, planning and qualified personnel is inevitable. According to a survey in the manufacturing sector, it was observed that one of the main obstacles to the use of ICTs was related to the lack of human resources and planning (Bianchini & Michalkova, 2019). The perceived strategic value of ICT innovations by small business managers is essential for their subsequent adoption and use as support for decision making (Love & Irani, 2004; Grandon & Pearson, 2004). In this sense, proposition 3 (P3) of this research is that:

Proposition 3 (P3)

There is an alignment between Strategy and the capacity to aspire to entrepreneurship 4.0.

Within the company, strategic capacity refers to the adoption of different actions that can adapt to changes in the highly competitive environment, contributing to successful product and process innovations, configuring resources, products, processes and systems in a way that allows them to maximize their benefits (Li & Chen, 2011; Poblete, 2018). The data analysis resource refers to a technique of probing data from structured and unstructured sources that can become an essential factor of competitiveness for the company (Bianchini & Michalkova, 2019).

The strategic added value perceived by SME managers to the adoption of data analysis is the use as support to decision making, allowing better communication of information and providing a basis for more assertive decisions for the performance of the organization. The impact of this action can be perceived mainly in five channels: research and development, production, process optimization, marketing, new approaches to internal processes (Bianchini & Michalkova, 2019; OECD, 2013).

To make the best use of these opportunities it is necessary to take transformative actions, such as changing internal operations, marketing, delivery systems and remodeling the decision making process to improve performance, as well as introducing training can be a useful tool to increase the positive impact (Bianchini & Michalkova, 2019).

SMEs that adopt targeted strategies estimate that production and productivity in the company are 5 to 6% higher than would be expected from their other investments and use of technology and information (Brynjolfsson, Hitt & Kim, 2011). Overall, company-level studies suggest that data use and data analysis increases labor productivity faster than in non-user companies by approximately 5- 10% (OECD, 2015). In this sense, proposition 4 (P4) of this research is that:

Proposition 4 (P4)

There is an alignment between Production and the capacity to aspire to entrepreneurship 4.0.

In recent decades, the development of information and communication technologies (ICT) and their rapid integration into the production processes of companies has brought several benefits. The evolution in technological capacity has leveraged industrial productivity, reducing production costs and providing effective solutions to serve customers with quality, speed and better cost/benefit (Cheng et al., 2015), coordinating processes and deadlines with the aim of increasing efficiency and optimizing production time and capacity, improving quality in development (Ferreira & Lisboa, 2019).

Today, the introduction of new concepts such as Internet-based production not only enables improved communication between manufacturers, customers and suppliers (Urbikain et al., 2017), but also creates an intelligent network of machines, assets, ICT systems, intelligent products and individuals throughout a value chain and product life cycle (Seebode, Jeanrenaud & Bessant, 2012; Freeman & Louçã, 2001). In addition to fostering new ways to serve customers through new business models.

For Gonçalves and Gonçalves (1995) Small and Medium Enterprises are in search of several ways to reinvent themselves, when it comes to the relationship with their stakeholders, ICTs enter as allies of SMEs since it provides a range of services that help companies in their core activities such as information management, devices and applications used for the creation, production, analysis, processing, as a way to increase business performance and competitive advantage of organizations (Ongori & Migiro, 2010). On this horizon, we have the fifth proposition (P5) of this research:

Proposition 5 (P5)

There is an alignment between Marketing and the capacity to aspire to entrepreneurship 4.0.

Marketing within organizations is the ability to convert the company's internal technology into an external competitive advantage and bring results through the ability to price, advertise and sell, link customers, and market and distribution channel detection (C.M.Richard et al., 2004; C. Anthony Et Al., (2008).; R. K. Chandy E G. J. Tellis, 1998). In a survey by Qiang, Clarke & Halewood (2006), it was already possible to note that companies using email had up to 3.4% faster growth in sales. As Matthews (2007) says, sites, email contacts and low-cost phone calls with customers can help improve customer service and increase the customer base.

The adoption of ICTs for marketing not only reduces costs, but also makes campaigns more effective, by knowing exactly which clients are active, willing to receive commercial information, etc., making marketing through targeted advertising more efficient (Bianchini & Michalkova, 2019). Considering simpler strategies for using ICTs, are the social media networks that include marketing, promotion and advertising (Hanna et al., 2011), which supports organizations in creating databases that can be used to generate competitive business and can be translated into increased sales, increasing the growth of SMEs and the neutralization of geographical barriers (Jagongo & Kinyua, 2013).

After presenting the propositions that guide the study, this proposal follows with the challenge of knowing the level of entrepreneurial capacity 4.0 through its dimensions and indicators as presented.

4. FINAL CONSIDERATIONS

Few studies have sought to understand the aspiration capacity of the 4.0 entrepreneur, only understanding the tangent issues related to ICTs, as it was possible to observe in the bibliographical review process, pondering the dimensions in isolation, forming a research gap of how these dimensions act jointly.

Thus, this article sought to make a theoretical proposal of an index of entrepreneurial capacity 4.0, since, the study is a proposal of index construction, from the bibliographic survey developed throughout this research, the structure that will be used to analyze the entrepreneurial capacity is the result itself, as shown in Figure 1.

Bringing an approach to the study of the dimensions that influence the formation of the new entrepreneurial capacity based on ICTs, with the support of research models, since the study is a proposal of index construction, a structure that will be used to analyze the entrepreneurial capacity using the Multicriteria Decision Support methodology, more precisely, the MACBETH method will be used in subsequent studies.

However, it is believed that there is still much to be developed in this direction. As suggestions for new studies are the application of the MACBETH method, a greater exploration of the theoretical references cited, as well as the application of the framework in field research.

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