A PROPOSED FRAMEWORK TO IDENTIFY DIGITAL TRANSFORMATION MATURITY IN SMALL INDUSTRIES

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ABSTRACT

Over the last decade, the landscape for business has become more dynamic. There are several variables that contributes to it, mostly directly related to technological innovation. One of these phenomena is the digitalization, that enables information to be processed universally, in high speed and relatively low costs, while the cycle gets globalized reducing multiple barriers. Inside this process, companies start to interact with technologies using new platforms, that's when business begins its digital transformation, by implementing new digital technologies, which modifies the relationship with components of the entrepreneurial ecosystem, affecting internal scenarios and spheres of relations outside. Thus, it is relevant to understand how companies can embrace digital transformation as an opportunity to innovate, differentiate and growing. Therefore, in this paper we ask if there is a tool that could help innovation managers to evaluate the company's maturity regarding digital transformation? To answer this question, we have been proposed a framework that can identify in which part of the organizational structure innovations have been present. In addition, it can establish the achieved level of maturity. For that, the methodology applied began by developing a digitalization management framework, with seventeen questions concerning eight organizational dimensions and the adoption of technological innovations. The framework passed by an evaluation process and went available for collecting data of small enterprises through digital survey platform, sent by e-mail. The framework application permitted us to characterize 346 companies in São Paulo, from those 77 were industries, our focus on this paper. The results showed that not even one industry was characterized fully digitally transformed, most of all stayed in primary levels of maturity. It is possible to conclude that the framework can be applied in companies of diverse segments, size and locality. Its execution can be helpful for organizations themselves, serving as a basis for creating actions and plans that facilitate their evolution

Keywords: digital transformation, digitalization management framework, technology innovation management, organizational structure, digitalization

INTRODUCTION

There is a changing movement in business scenarios caused by internet, communication technologies, connectivity and other various devices that combine the most varied functions when applying those resources, pointing out that one of the variables of the success in this journey refers to the expertise in the application of digital technologies [1]. This new scenario impacts all parts of the company, which in turn must evaluate the procedural, structural and functional changes, also considering the business model adopted. Then, arrives a moment that is necessary to verify which are the digital technologies that become good alternatives for the business, and know the consequences for the organization [9].

Considering small companies, adapt to globalization involves a proper management to deal with structural, systemic, cultural and technological changes, so recognizing the opportunities inside this cycle is a competitive advantage for this public [10]. It is known that the number of entrepreneurs is increasing in Brazil, currently there are more than twelve million micro and small enterprises (MSE) with national registry of active legal person, according to the Brazilian Service of Support to Micro and Small Enterprises [4]. Micro and small companies are those that invoice annual gross revenue in the amount of 3.6 million reais or less and, in the Brazilian context, the participation of these entrepreneurs is significant, generating more than half of the formal jobs, representing 27% of gross domestic product (GDP) in 2011[13].

Because of this economic relevance, a question emerges, how small businesses can take advantage of the opportunity to innovate, differentiate and grow, managing the changes brought by digital transformation? Considering this, the present study seeks to evaluate the maturity of these companies in relation to the adoption of innovations resulted from digital transformation, as well as it is important to know which profile is more receptive to the consequent organizational changes. Therefore, the focus is on the identification of which part of the organizational structure of the MSEs the digitalization has been more present. For this, is presented theoretical fundaments, description of the process of creation and validation of the tool, main results, conclusion and future opportunities.

DIGITAL TRANSFORMATION IN MICRO AND SMALL BUSINESS

The digital transformation is a frequent phenomenon within the business, its incidence is a result of the high volume of changes brought by the high interaction of the agents of the value chain with new digital technologies. Thus, companies need to define which of these technological innovations will be inserted in their structure, to gain differentiation and growth. Hence, this challenge leads institutions to try to improve their processes, effectively and sustainably, promoting transformation of business model [6].

Considering the process of transformation, some aspects are impacting and concern institutions. There are some relevant features of the developments that become digitized, the first is the worry with the compatibility of the adoption of digital technologies with the processes and culture of the company, since the modifications can cause resistance and ends up damaging the transformation. A second point is the preoccupation for the security of the digital operation. Following, comes the identification of the relation of the size of the company with the adoption of new technologies, it is believed that large companies can find greater difficulties, because changing old systems can generate inconsistencies difficult to control [7].

In the case of industries, this phenomenon is evident, causes changes in the operations of the company. The production is modified due to digital transformation, and some benefits are recurrent in the management of the factory floor. It is evidenced that performance control is improved due to the automatic updating of information, processing and more integration of productive data. Prior to problem detection and documentation of solutions for knowledge management of the production system, among other advantages [8]. Accessibility to artificial intelligence has made it possible to assign technologies to the most diverse types of companies, so that the automation of processes ends up occurring gradually. Regarding automation, it is understood that among the activities performed by an employee, up to 45% can be automated, bringing countless benefits in process conversion, such as cost reduction, quality gain and productivity that are often not possible with the traditional workforce. However, there is the challenge of managing the companies that apply these technologies. It is up to the company to be able to use automation for operational activities, freeing employees to perform tasks that require more creativity and emotions, difficult features for replicate technology [9].

There are also other innovations present in the industry, which is explicit within Industry 4.0. Advance from the fourth industrial revolution, it covers the new technologies and the digitization in the main industrial components, that begin to have high levels of integration among each other, like the machinery that are connected and promote the exchange of information automatically. Control, maintenance, production planning and the high exchange of information among the value chain agents represent well the spheres that change in Industry 4.0 [10].

Creation and validation of the Management instrument for digital transformation

In this study, the data collection happened by applying a digital survey to a selected sample, which was based on eight dimensions: *strategy, leadership, products, operations, culture, people, governance and technology* [11]. Initially, 5 classification questions were created, plus 24 closed-ended multiple choice questions, using the Phrase Completion.

This scale presents a continuous score from 0 to 10, with the addition of complementary phrases to a statement, in case of "0" there is an association with the missing attribute, while "10" relates to the maximum intensity of its presence [12]. Thus, the present study created a process for the validation of the research instrument, which consisted of three main phases: initial validation and a restructuring, followed by a second evaluation and ending with evaluation and layout methods. The process of evaluating the questionnaires resulted in the exclusion of one question and the revision of other two questions, resulting in a final instrument, presenting the sample characterization questions and 17 questions, two in each of the eight organizational dimensions and one about the volume of innovations (22 questions).

The digitalization management framework created has passed by evaluation process already described and presented its final version registered in professional research software, SurveyMonkey, with a brief invite sent by e-mail. After this evaluation stage was finalized, the collection of data began, and the survey stood opened for one month. The total number of emails sent to companies in the Metropolitan Region of São Paulo was 13,288, of which a total of 346 companies completed answered all questions. Although in percentage the number of respondents is reduced (2.6%), the absolute value is relevant (346), even emphasized by the participation of different segments organizations, enriching the study.

Main results

After the general view of the scope of the research instrument, it is relevant to describe the characteristics of the respondents, through the analysis of demographic variables. The attributes collected were type of company, number of employees, average annual gross revenue, time of operation and business segments. The sample used for this study holds a complete business scenario considering this classification level (trade, industry and services). Another important aspect of this sample is the volume of companies in each defined type, it is considered that there is an expressive volume of resentatives of each type of company. The commerce was represented by 152 respondents (44%), service by 177 (34 %) and industry by 77 (22%), however, the focus on this study is industry. In relation to the volume of respondents according to the number of employees and the revenue obtained, is possible to see that a big part of the sample size is composed by micro and small enterprises, 96%. With this, another demographic variable analyzed is the average time of existence of the organizations. Among survey respondents, 4% indicated they had less than two years of service, 32% between 3 and 9 years, while 64% had already surpassed 10 years of existence.

Through the methodology developed, the results achieved enables identification of the maturity degree in digitalization of the companies analyzed. Figure 1 shows that none of the industries evaluated was classified as transformed, and it was realized that micro and small organizations studied were in primary stages of digital transformation. That because, 19.5% indicated that the actions for the digitization of the business are in the Unconscious stage, while 39% indicated the Conceptual phase. Among the companies that already have defined activities to guarantee digital transformation, there were 29.9% of the industries, but only 11.7% already have an integration between strategy, leadership, products, operations, culture and people management, governance and new technologies, which were aligned with the digital strategy.
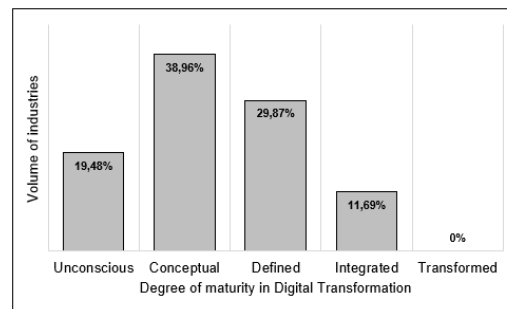

Figure 3 – Degree of Digital Transformation maturity

In addition, it was possible to know more about the management profile considering the digital transformation of the industries studied. For this purpose, it was selected the organizational aspects of the dimensions studied, those that the managers affirmed to be present in their organizations. The worst performance among the organizational dimensions evaluated (from 0 to 3 on the scale) was *products*, p*eople management, governance and technology*. While in the remaining dimensions, the performance was in the average zone, presenting intensity between 4 and 7 at the Phrase Completion scale.

The company profile that showed to be more opened to digital transformation in case of industries is related to the strategy, 55% of the participants showed that there is a strategy plan, documented and communicated formally to digitalization, and that it caused partially changes the business model (60%). Also informed that the leadership promotes the culture of changes (68%), and the responsibility of implementing the digital strategy is led by the owner of the company (65%). Another indicated benefit stated was the influence of digitization on the speed of decision making is significant, facilitating the decision-making process (56%) and the permanent transformation of the corporate culture is significant, there are stimulus of changes and innovations (57%).

In relation to the modifications of the products, it was alerted that by digitalizing the company's range of products, no new market segments were created (48%). About the resources applied, affirmed that the resources (personnel, money) available to implement the digital strategy are significant (49%). Besides all these aspects, there is the information about the volume of innovations performed to guarantee that the full digital transformation process is going to occur,45% of the companies participating indicated that one to two innovations was performed, while 25% said that it was between three and four innovation, but only 8% expressed to accomplish five or more innovations.

CONCLUSION

Considering the complexity situations the business faces to understand the digital technologies available in the market, to present the necessary resources to implement some of them, the difficulties to select which one might be,

besides the necessity to present a leadership that performs a good change management to apply the digital strategy created, is possible to understand that the digital transformation of an enterprise it is a challenge.

The micro and small Brazilian industries studied showed that they started the process of digitalization, but they are in the moment of developing strategies to make the necessary adjustments in the organizational structure, so by the end they accomplish this goal. Also, was observed that the most defying dimensions for them were related to the changes in their range of products, commercial model and digital value chain. As also, about appliance of technology at the process, such as software, cloud infrastructure and all the other possibilities inside the industry 4.0 concept. Besides, industries apparently struggled to manage the company's tasks and capacities, to allocate human resources in those actions needed to innovate. At last, there was also difficulties with the governance dimension, through the appliance of a communication plan and control of initiatives on going, as well as the performance assessment.

So, our study provides research contributions, by presenting a framework to classify business in degrees of maturity concerning digitization, enabling the characterization and comparison of a group of companies, of any region, size, type of activity or segment of actuation. Additionally, presents practice contributions, once allows companies to understand how they are performing the process for digital transformation. And works as a guidance for future necessary actions to achieve digital transformation. Future opportunities for the development of this study, would be related to the appliance of the methodology in companies of bigger structures, to understand if the needs look the same. Would be interest to collect data from bigger number of business, so it is possible to have more company classified as transformed, so the profile and good practices of those enterprises could be benchmarked.

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