Available online at www.sciencedirect.com

ScienceDirect

Procedia Computer Science 200 (2022) 175–184

Procedia Computer Science

www.elsevier.com/locate/procedia

3rd International Conference on Industry 4.0 and Smart Manufacturing

Assessing the digital maturity of micro and small enterprises: a focus on an emerging market

Lais Santiago da Costa[a], Igor Polezi Munhoz[b], Luciana Pereira[a], Alessandra Cristina Santos Akkari[a]*

[a]*Graduate Program in Engineering and Innovation Management, Federal University of ABC, Av. dos Estados 5001, Santo Andre, SP, Brazil*
[b]*Federal Institute of Education, Science and Technology São Paulo, Av. Mutinga 951, Sao Paulo, SP, Brazil*

Abstract

Digital transformation is challenging the competitiveness of micro and small enterprises (MSEs), especially in emerging markets where factors that inhibit the growth of these businesses traditionally prevail. This paper aimed to assess the digital maturity of MSEs, using the Brazilian context as a study model. A validated digital transformation framework was applied to 346 companies for data collection and subsequent statistical treatment. Almost 60% of the Brazilian MSEs are at primary levels of digital maturity, with 19.1% being unconscious about the digitization process. Digital maturity was shown to be statistically correlated with innovations ($p = 0.000$) and business revenue ($p = 0.009$), suggesting that these factors are facilitators in the MSEs digitization. This paper pointed to the urgency of efforts on the part of companies and policy makers in Brazil to implement actions that can foster behaviors, capabilities, and enablers to digital transformation. These findings can allow in-depth discussions and aligned strategies among emerging economies to point out best practices for companies inserted in markets with similar characteristics and challenges.

Keywords: Digital Maturity; MSE; Emerging Market; Brazil.

* Corresponding author. Tel.: +55 11 4996-0001
E-mail address: alessandra.akkari@ufabc.edu.br

10.1016/j.procs.2022.01.216

1. Introduction

Micro and small enterprises (MSEs) have contributed significantly to the economic development of many countries, and both developed and developing regions have a predominance of this type of business on the market. Especially in the emerging countries, besides the economic function, MSEs have social importance due to the assimilation of a significant number of workers, the development of rural regions, the encouragement of entrepreneurship, and the dissemination of business opportunities for women [1, 2]. In Brazil, an emerging country that is the focus of this paper, MSEs (up to 99 employees and revenue up to 3.6 million Brazilian Real) represent 98% of business in the country, generating 50% of formal jobs in the private sector and representing a contribution of 27% of gross domestic product (GDP) [3].

In emerging markets, the management and expansion of businesses face inhibiting factors associated with the lack of infrastructure, poor access to bank loans, limitation of tangible and integrable resources, and the absence of audacious public policies. This challenge is accentuated for MSEs, forcing them to constantly rethink their business model and organizational strategy to remain competitive [4].

In addition, currently, the organizational environment has become increasingly complex from a technology-driven approach due to digital transformation [5, 6]. In fact, many companies around the world are struggling to survive in the face of the large number of novel technologies that are becoming dominant sources of change, such as Internet of Things (IoT), Big Data/Analytics, Artificial Intelligence, Cloud Computing, 3D printing, and others [7].

Adapting to the digital age involves holistic management to carry out structural, managerial, cultural, and technological changes in companies. The leader is essential in operationalizing these changes to digitalization, requiring new sets of technical and socio-emotional skills to deal with all the dimensions of digital transformation and to lead the business transition in a position that goes beyond the role of facilitator [8].

Enterprises that have a business model in which products, services, distribution, and the workplace may have a digital configuration demonstrate greater international reach and chances of growth [9]. Consequently, companies that transact in the value chain using the internet as a base have optimization of returns in efficiency, inventory, relationship with customers, sales rates, introduction into new markets, and financial results [10, 11]. Moreover, according to Rubel et al. [12], the faster an organization anticipates its moves towards digitalization, the greater the chances of the company benefiting from these adaptations as well as the higher its maturity level, the lower the risks in adoption new technologies. Therefore, assessing the evolution degree of the organization in digital transformation is of great importance to evaluate the competitiveness and to identify strengths and weaknesses. To this end, measuring the company's digital maturity using specific frameworks reflects a holistic assessment that allows different inferences from a quantitative approach. Maturing the company means systematically improving its business processes for greater performance over time [13, 14].

The current concern in evaluating digital transformation in developing countries motivated the Working Group on Digital Transformation of the OECD Emerging Markets Network (EMnet) to debate actions on how companies from emerging countries can support digitalization to gain competitiveness and overcome the post-COVID-19 crisis [15]. These global discussions point to the importance of studies such as the one conducted in this paper in order to raise statistical data on the digitalization in emerging countries, which is one of the gaps in the literature.

Therefore, this paper aimed to evaluate the digital maturity of MSEs, using the Brazilian case as a study model with a sample of more than 340 companies. As a result, this study contributes to the outline of actions and structured plans both in the sphere of organizational management and public policy strategies in emerging countries to promote the alignment of micro and small businesses with digitalization. This new business perspective, associated with the challenges inherent to emerging economies, pressure the MSE of these regions to reinvent themselves by adopting new practices, implementing innovations, applying new strategies, developing new products and more intensive use of digital technologies. Thus, making efforts to diagnose behaviors, capabilities, and enablers that influence digital transformation becomes a strong strategy to support this process especially in micro and small businesses.

The remainder of the paper is organized as follows. Section 2 discusses the research design. In section 3, we analyze the data to measure the digital maturity of a sample of Brazilian MSEs. Finally, in section 4, we present the concluding remarks, pointing to futures works.

2. Methodological Approach

A digital transformation framework has been developed and validated [16] to identify the digital maturity degree of Brazilian MSEs. This maturity model is centered on eight organizational dimensions (strategy; leadership; products; operations; culture; people; governance; and technology) and five levels of digital evolution (unconscious; conceptual; defined; integrated; and transformed). According to the framework, two parameters were evaluated for each dimension, resulting in 16 multiple choice close-ended questions with Phrase Completion scale. In addition, demographic questions were added to characterize the sample, totaling 22 questions.

For the data collection, a non-probability convenience sampling was used according to the availability of individuals, demonstrating that it is an adequate type of sample because it is a specific group that represents the object of this study [17]. Regarding sample size, it was necessary to have enough samples to identify important differences. However, large samples, in addition to the high cost and time requirement, can increase the risk of type II error associated with some statistical tests, such as a normality test, compromising sensitivity [18, 19]. Therefore, in this paper, to determine the number of elements in the sample, the empirical criterion was used, considering the sample size in line with the research objective and the statistical tests that were applied [20].

In the beginning of the instrument, developed on the SurveyMonkey platform, the Free and Informed Consent Term was allocated, requesting the participant's agreement and guarantee of anonymity to start the response process. Regarding the timing of the questionnaire application, the cross-section was configured, so that data collection occurred in a single cycle, and the unit of analysis corresponded to the organization. Finally, the unsupervised modality was used, and the instrument was sent, digitally, with a self-administered character. After data collection, Cronbach's Alpha was obtained to analyze the reliability and stability of the instrument.

Descriptive statistics were applied to identify the maturity degree, considering the relationship between the total score obtained by the company and the maximum expected score (160 points). Also, to compare distributions, boxplots were built, considering median, quartiles, whiskers, fences, and outliers.

Then, the data were subjected to an inferential statistical treatment, using Statistical Package for Social Sciences (SPSS) V22.0 (IBM Corp., NY, U.S.). Four hypotheses (A to D) were tested, and the independent variable corresponded to the company digital maturity score, while the dependent variables (Hypothesis A: number of innovations implemented by the company; Hypothesis B: business revenue; Hypothesis C: company's time on the market; and Hypothesis D: business sector) were categorized into groups. To evaluate the effect between a dependent variable and a factor, the method of comparing the means between the groups was selected. As a result, the one-way analysis of variance (ANOVA) technique was used. For the one-way ANOVA, generally adopting k populations of interest, the null hypothesis H_0: $\mu_1 = \mu_2 = \cdots = \mu_k$ establishes that the population means are equal. The alternative hypothesis predicts that at least one of the means differs from all the others, mathematically represented by H_1: $\exists_{i,j}\ \mu_i \neq \mu_j;\ i, j = 1,\ldots, k$. For all tests, the p-value was used, considering α equal to 0.05 (5%).

Assumptions of ANOVA include that the observations must (i) be independent; (ii) have a normal distribution; (iii) and present homogeneous variances. The normality of the data was assessed graphically, using histogram and Q-Q plot [21, 22]. In addition, skewness and kurtosis values were obtained as measures of asymmetry and the peakedness of a distribution, respectively, with both parameters approaching zero for a normal distribution [23]. The analysis was also complemented by a test of adherence to normality, using the Kolmogorov-Smirnov test, as it is the most suitable for samples larger than 50 [24]. The null hypothesis corresponded to the fact that the random variable Y_i with mean μ_i and variance σ_i^2 followed the normal distribution H_0: $Y_i \sim N(\mu_i, \sigma_i^2);\ i = 1,\ldots, k$. To evaluate the homogeneity of variances, the Levene Test was performed, and the null hypothesis, in this case, corresponded to the fact that the variances are homogeneous $H_0: \sigma_1^2 = \ldots = \sigma_k^2$ against the alternative hypothesis H_1: $\exists_{i,j}\ \sigma_i^2 \neq \sigma_j^2;\ i, j = 1,\ldots, k$.

The Effect Size for one-way ANOVA was obtained (eta-squared η^2), showing the ratio between the variability of a factor and the total variability of the analysis to indicate the proportion of total variability in the data that are explained by the selected effect.

3. Digital maturity of Brazilian MSEs

The sample was composed of 346 Brazilian companies from the state of Sao Paulo, covering commerce sector (44%); service segment (34%); and the industrial field (22%). The number of employees (up to 99 employees) and the

annual gross revenue (up to 3.6 millions Brazilian Real) demonstrates that most of the respondents (96%) referred to MSE, presenting convergence with the object of study. Also, 64% of the companies had more than ten years on the market, indicating stable organizations and, therefore, contributing to more consistent analysis due to these companies have already passed the period most susceptible to mortality (inactivity).

The Cronbach's Alpha value (0.947) indicated reliability and strong internal consistency of the instrument [25, 26]. Therefore, it was possible to evaluate de maturity degree of the organizations considering the data obtained through the framework (Table 1). It was observed that as the digital transformation maturity increases, the number of companies in that group decreases. In fact, almost 20% of the sample still lacking organizational awareness about the digital transformation process and only 2.8% of Brazilian MSE are truly digital.

Table 1. Characterization of the digital maturity degree of Brazilian micro and small companies.

Maturity degree in digital transformation	Score	Absolute frequency	Relative frequency	Accumulated absolute frequency	Accumulated relative frequency
Unconscious	Up to 32 points	66	19.1%	66	19.1%
Conceptual	From 33 to 64 points	129	37.3%	195	56.4%
Defined	From 65 to 96 points	111	32.1%	306	88.5%
Integrated	From 97 to 128 points	30	8.7%	336	97.2%
Transformed	From 129 to 160 points	10	2.8%	346	100%

Source: Authors (2020).

For companies concentrated in the early levels of evolution (56.4%), it was identified that the digital strategy is not yet developed as well as there is no leadership attributed to the process nor a system for controlling the results of digitization. This position is not favorable for digital transformation and the dimensions that proved to be fragile were technology, people, and governance.

The most evolved levels in digital transformation represented almost 44% of the sample, pointing to the implementation of innovations and the attribution of the business owner as the leader of digital transformation. However, only 10 companies statistically presented at least 80% of digitization according to the validated instrument. This data is in line with EMnet discussion that concluded that there is still a great demand for collaborative efforts between different sectors to develop strategies that close the digital gaps in emerging countries, and these actions are necessary to reduce the gap between OECD and non-OECD member countries [15].

For the transformed companies, it was highlighted the progression of the strategy and the control of results, since there are guidelines defined systematically, with project management practices, portfolios, and research & development.

The first ANOVA assumption was guaranteed since the data was collected on a digital platform, with individual response and random participation by sending an invitation to a large bank of managers e-mails (more than 10,000).

According to the central limit theory, for sample sizes greater than 100, the normal distribution requirement is not relevant for parametric tests, because when there is a data set with a high number of observations the distribution of means is normal, even if the data distribution is not [27, 28]. However, to allow a valid statistical interpretation of the data, the assumption of normality of the sample was assessed using three approaches in this paper. For all samples studied in the evaluation of each hypothesis, it was observed that the histograms differ to a certain extent from an exact normal distribution profile. However, in all cases, an approximation to the bell-shaped curve was found as well as no severe asymmetries or discontinuities were identified. This finding was corroborated by the Q-Q plot, which presented deviations from the theoretical line only in extreme values (outliers), showing alignment with other studies that point out normal distribution samples even with small deviations from linearity in the most extreme values [24, 29]. Figure 1 shows the histogram and the Q-Q plot related to the four set of data evaluated, suggesting an approximation of normal distribution.

Skewness (< 0.444) and kurtosis (< 0.674), according to Table 2, pointed to a sample data distribution with an approximately symmetrical profile and more neutral tails. For $n > 300$, the skewness and kurtosis values should not be adjusted by the standard error of the estimates (z test), so that only absolute values greater than 2 and 7, respectively,

indicate significant deviations from normality [23]. Kolmogorov-Smirnov test showed, for all cases, an acceptance of the null hypothesis (p = 0.200), also demonstrating that the sample data followed a normal distribution.

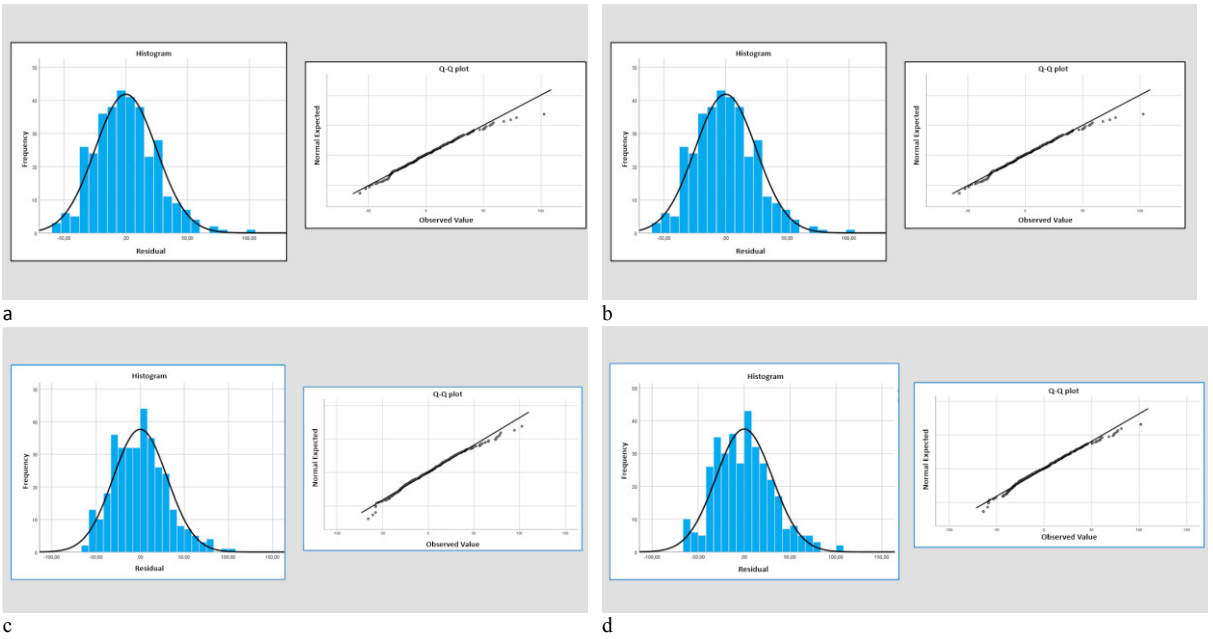

Fig. 1. Histogram and Q-Q plot for sample data according to (a) number of innovations, (b) annual gross revenue, (c) time on market, (d) and business sector. Source: Authors (2020)

Table 2. Skewness, Kurtosis and Kolmogorov-Smirnov normality test.

	Skewness		Kurtosis		Kolmogorov-Smirnov[a]		
Supplier	Statistic	Std. Error	Statistic	Std. Error	Statistic	df	Sig.*
Innovation	0.444	0.131	0.674	0.261	0.037	346	0.200
Revenue	0.372	0.131	0.089	0.261	0.042	346	0.200
Time on market	0.412	0.131	0.152	0.261	0.052	346	0.200
Business Sector	0.420	0.131	0.140	0.261	0.041	346	0.200

* This is a lower bound of the true significance [a]. Lilliefors Significance Correction

Source: Authors (2020)

Finally, the Levene Test for the number of innovations [F = (3, 342) = 2.597, p = 0.052], revenue [F = (3, 342) = 0.768, p = 0.513], time on the market [F = (2, 343) = 0.310, p = 0.734], and business sector [F = (2, 343) = 0.143, p = 0.867] showed a significance greater than 0.05, so the assumption of variance homogeneity was also satisfied.

The one-way ANOVA for the evaluation of Hypothesis A pointed out a statistically significant effect (p = 0.000) of innovation in the digital transformation process [F (3, 342) = 62.602, p = 0.000]. Also, 35% ($\eta 2 = 0.354$) of the total variation in the score of the maturity degree was attributed to the differences between the number of innovations implemented by the organization.

According to boxplot analysis (Figure 2), the medians increased between the observed levels (from 31 to 102), showing that digital maturity has increased with innovation. In fact, 50% of the companies that implemented 3 to 4 innovations were at Defined level ($Q_2 = 77$), raising this index to the Integrated degree ($Q_2 = 102$) for companies with 5 or more innovations. On the other hand, for companies that did not develop innovation, at least 25% of the sample obtained an Unconscious degree of maturity ($Q_1 = 23$), and 75% did not exceed the Conceptual degree ($Q_3 = 43$).

Nylén and Holmström [30] discuss that the implementation of innovations must occur holistically in the enterprise, and the management of this process is a requirement to start the path of digitalization. For that, it is necessary to reorganize the operational processes, business models, and redefine interaction between the company's functions, focusing on change management.

A statistically significant effect [F (3, 342) = 3.931, p = 0.009] of the revenue in the digital maturity of MSE was also identified, with $\eta 2 = 0.033$. According to Figure 3, companies with the lowest revenue ranges (up to 3.6 million), which characterizes micro and small businesses in Brazil, presented a median (between 50 and 61) significantly lower than the group with revenues exceeding 3.6 million (100).

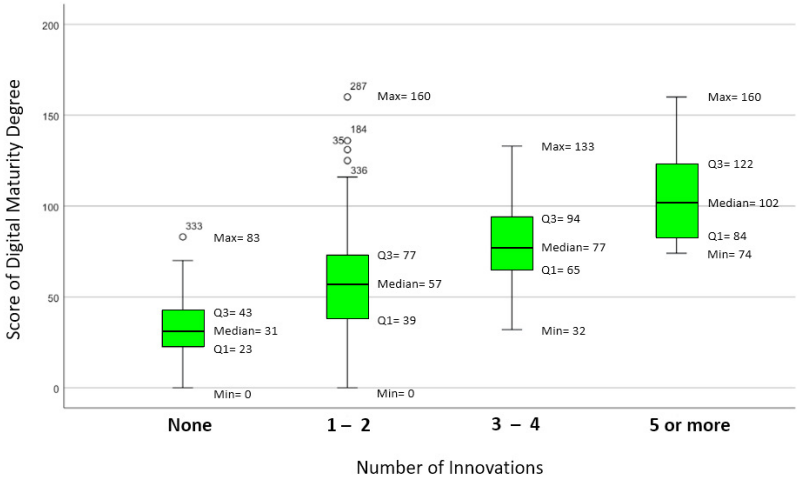

Fig. 2. Boxplot for the digital maturity degree according to the number of innovations. Source: Authors (2020)

The medians were very similar for revenues of up to 360 thousand ($Q_2 = 58$) and 360 thousand to 3.6 million ($Q_2 = 61$), as well as the lower and upper limits, indicating that the company financial structure is a relevant factor for the digital transformation from a certain volume of gross revenue. Actually, at least 75% of companies with revenues up to 3.6 million obtained a degree of maturity equal to or less than the Defined level ($Q3 < 83$). Catlin et al. [31] state that digitalization requires significant investments and exemplify cases of companies that, in a period of five years, double the costs of updating their information systems. Matt et al. [32] report that the expenses resulting from digitization are higher for companies that previously had financial difficulties, especially for small enterprises, as it limits changes and delays the transformation process.

Regarding Hypothesis C, it was not possible to reject the null hypothesis [F (2, 343) = 3.127, p = 0.045], suggesting that the digital maturity of Brazilian MSE does not depend on how many years the organization has been on the market. Andal-Ancion et al. [33] identified that the challenges for adopting new digital technologies exist for both new and established companies. In addition, the authors state that, for new companies, the obstacle lies in the use of new technologies as tools for competitiveness, while for established businesses, the bottleneck is adaptation, which covers a long and a little more difficult process, as it requires substantial changes. The boxplot analysis (Figure 4) also showed proximity of Q_2 and Q_3 quartiles mainly for groups up to 2 years ($Q_2 = 70$; $Q_3 = 86$) and 3 to 9 years ($Q_2 = 68$; $Q_3 = 88$) on the market, indicating that 75% of companies with up to 9 years presented a degree of maturity up to the intermediate level. For the most established companies, 50% of the sample ($Q_2 = 55$) was aligned with the profile of Conceptual maturity.

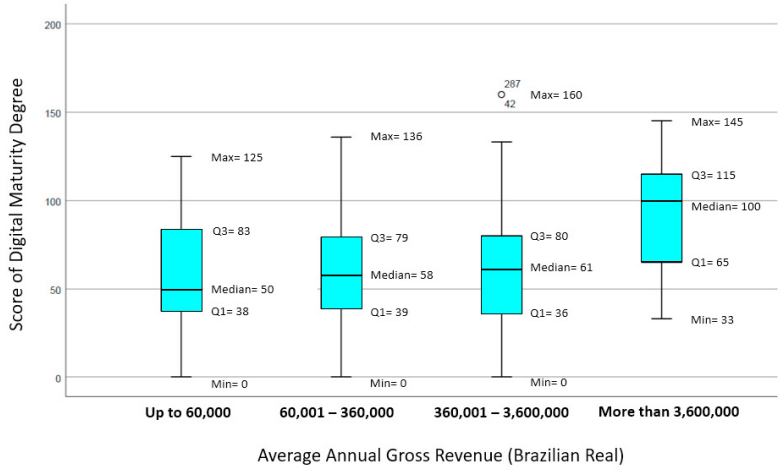

Fig. 3. Boxplot for the digital maturity degree according to business revenue. Source: Authors (2020)

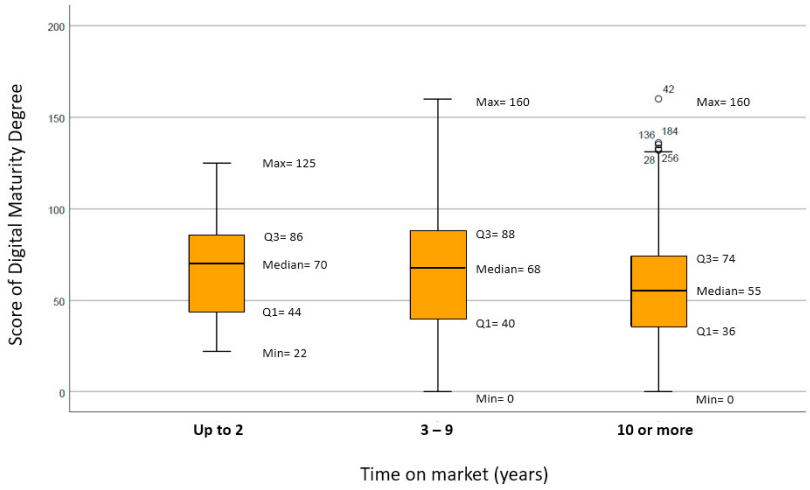

Fig. 4. Boxplot for the digital maturity degree according to time on market. Source: Authors (2020)

Finally, for the evaluation of Hypothesis D, the one-way ANOVA (Figure 5) pointed out that there was no difference between the means with statistical significance [$F(2, 343) = 1.027$, $p = 0.359$], indicating that the business sector did not impact the performance of the digitization process in MSE.

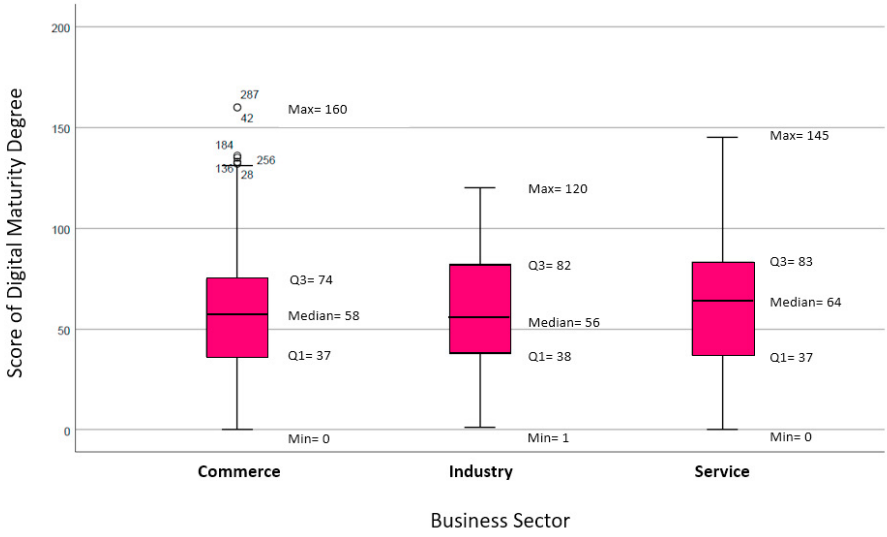

Fig. 5. Boxplot for the digital maturity degree according to business sector. Source: Authors (2020)

Therefore, at least 50% of the sample had a degree equal to or less than the Conceptual level ($Q_2 < 64$), and 25% of the companies reached maturity at least at the Defined degree ($Q_3 > 74$), regardless of the type of company activity. Berman [34] states that the condition of choosing the best digitalization route does not depend only on the company's operating environment, but also must be considered the pressures for competitiveness, customer expectations, and alignment with strategic objectives.

Each of the business sectors will present specific needs in the development of its potential, as well as in the optimization of attributes in face of the digital environment. Therefore, Brazilian MSE must outline driving strategies for digitization besides identifying weaknesses and strengths, so that the particularity will be linked with the type of action for digital transformation and the management of this process.

4. Conclusion

It was found that digital transformation is a highly integrated and multifaceted process, showing that less than 3% of the Brazilian MSEs presented a consistent digital structure, representing a maturity degree of at least 80% of digitalization according to the validated instrument. Considering this group of companies, the main aspects identified were related to the development of a digital strategy as well as systematic control of organizational results and data management, strengthening the digital business transformation.

At the same time, more than half of the sample still has low digital maturity due mainly to weaknesses in technology, people, and governance dimensions. In addition, it was observed an absence of learning management controls, so the enterprise applies some innovation related to digitization, but not to collect, share and disseminate the lessons learned especially those related to technological innovations.

As a result of the descriptive statistical analysis, the scenario evaluated for Brazilian MSEs was not shown favorable to the digital transformation, mainly requiring remodeling of processes and strategic planning by companies to develop structural, systemic, cultural and technological changes towards digitization.

The evolution of digitalization was facilitated by the implementation of innovations in the organizational structure, and by the increase in the company's revenue. Inferential analyzes showed that being innovative characterizes a condition for Brazilian MSEs digitalization, in addition to the fact that the greater the business revenue, the more digitally the organization becomes. However, there were no statistical differences in digital maturity for commerce, industries, and services as well as the company's time on the market did not influence the performance of digital transformation.

Therefore, this paper pointed to the urgency of intense efforts on the part of companies and policy makers in Brazil to foster behaviors, capabilities and enablers aligned with the digital transformation to ensure the competitiveness of MSEs. Also, these findings can direct reflections and holistic evaluations of the emerging markets for comparison and identification of best practices, stimulating the development of digital companies in these regions.

References

[1] Nichter, Simeon, and Lara Goldmark. (2009) "Small Firm Growth in Developing Countries." *World Development* **37 (9)**: 1453–1464

[2] Tambunan, Tulus. (2019) "Recent evidence of the development of micro, small and medium enterprises in Indonesia." *Journal of Global Entrepreneurship Research* **9 (18)**.

[3] Serviço Brasileiro de Apoio às Micro e Pequenas Empresas (2018) "Panorama dos pequenos negócios", São Paulo, Sebrae.

[4] Simba, Amon, Nathanael Ojong, and George Kuk. (2021) "Bricolage and MSEs in emerging economies." *The International Journal of Entrepreneurship and Innovation* **22 (2)**: 112–123.

[5] Hinings, Bob, Thomas Gegenhuber, and Royston Greenwood. (2018) "Digital innovation and transformation: An institutional perspective." *Information and Organization* **28 (1)**: 52–61.

[6] Zapata, Melissa Liborio, Lamia Berrah, and Laurent Tabourot. (2020) "Is a digital transformation framework enough for manufacturing smart products? The case of Small and Medium Enterprises." *Procedia Manufacturing* **42**: 70–75.

[7] Santos, Reginaldo Carreiro, and José L. Martinho. (2019) "An industry 4.0 maturity model proposal." *Journal of Manufacturing Technology Management* **31 (5)**: 1023-1043.

[8] Sahyaja, CH, and KS Sekhara Rao. (2018) "New Leadership in the Digital era- A Conceptual study on Emotional dimensions in relation with Intellectual dimensions." *International Journal of Civil Engineering and Technology* **9 (1)**: 738–747.

[9] Hair, Neil, Lyle Wetsch, Clyde Eiríkur Hull, Victor Perotti, and Yu-Ting Caisy Hung. (2012) "Market orientation in digital entrepreneurship: advantages and challenges in a web 2.0 networked world." *International Journal of Innovation and Technology Management* **9 (6)**: 1250045.1–1250045.18.

[10] Oliveira, Tiago, and Maria F. Martins. (2010) "Understanding e-business adoption across industries in European countries." *Industrial Management & Data Systems* **110 (9)**: 1337–1354.

[11] Pelletier, Claudia, and L. Martin Cloutier. (2019) "Conceptualising digital transformation in SMEs: an ecosystemic perspective." *Journal of Small Business and Enterprise Development* **26 (6/7)**: 855–876.

[12] Rübel, Sarah, Andreas Emrich, Sabine Klein, and Peter Loos (2018) "A maturity model for business model management in industry 4.0.", in *Proceedings of Multikonferenz Wirtschaftsinformatik*, Lüneburg, Leuphana Universität Lüneburg.

[13] Kosieradzka, Anna. (2017) "Maturity Model for Production Management." *Procedia Engineering* **182**: 342–349.

[14] Schumacher, Andreas, Selim Erol, and Wilfried Sihn. (2016) "A Maturity Model for Assessing Industry 4.0 Readiness and Maturity of Manufacturing Enterprises." *Procedia CIRP* **52**: 161–166.

[15] OECD. (2021) "Digital Transformation in Emerging Markets." EMnet Working Group, Paris, OECD Publishing.

[16] da Costa, Laís Santiago, Luciana Pereira, Alessandra Cristina Santos Akkari (2019) "Organizational Digital Transformation: A Proposed Instrument for Digitalization Management.", in Yuzo Iano, Rangel Arthur, Osamu Saotome, Vania Vieira Estrela, and Hermes Loschi (eds) *Smart Innovation, Systems and Technologies*, Cham, Springer.

[17] Bickman, Leonard, and Debra J. Rog. (2009). "The SAGE handbook of applied social research methods." 2 ed. Thousand Oaks, Sage Publications, Inc.

[18] Chantarangsi, Wanpen, Wei Liu, Frank Bretz, Seksan Kiatsupaibul, Anthony J. Hayter, and Fang Wan. (2015) "Normal probability plots with confidence." *Biometrical Journal* **57 (1)**: 52–63.

[19] Sürücü Baris, and Erol Koc. (2008) "Assessing the validity of a statistical distribution: some illustrative examples from dermatological research." *Clinical and Experimental Dermatology* **33 (3)**: 239–242.

[20] Fink, Arlene. (1995) "How to Sample in Surveys." Thousand Oaks, Sage Publications, Inc.

[21] Hayes, Andrew, and Li Cai. (2007) "Further evaluating the conditional decision rule for comparing two independent means." *British Journal of Mathematical and Statistical Psychology* **60 (Pt 2)**: 217–244.

[22] Schucany, William R., and H. K. Tong Ng. (2006) "Preliminary goodness-of-fit tests for normality do not validate the one-sample Student t." *Communications in Statistics - Theory and Methods* **35**: 2275–2286.

[23] Kim, Hae-Young. (2013) "Statistical notes for clinical researchers: assessing normal distribution (2) using skewness and kurtosis." *Restorative Dentistry & Endodontics* **38 (1)**: 52–54.

[24] Mishra, Prabhaker, Chandra M. Pandey, Uttam Singh, Anshul Gupta, Chinmoy Sahu, and Amit Keshri. (2019) "Descriptive statistics and normality tests for statistical data." *Annals of Cardiac Anaesthesia* **22 (1)**: 67–72.

[25] Streiner, David L. (2003) "Starting at the Beginning: An Introduction to Coefficient Alpha and Internal Consistency." *Journal of Personality Assessment* **80 (1)**: 99–103.

[26] TAVAKOL, Mohsen, and Reg Dennick. (2011) "Making sense of Cronbach's alpha." *International Journal of Medical Education* **53 (2)**: 53–55.

[27] Ghasemi, Asghar, and Saleh Zahediasl. (2012) "Normality tests for statistical analysis: A guide for non-statisticians." *International Journal of Endocrinology and Metabolism* **10 (2)**: 486–489.

[28] Kwak, Sang Gyu, and Jong Hae Kim. (2017) "Central limit theorem: the cornerstone of modern statistics." *Korean Journal of Anesthesiology* **70 (2)**:144–156.

[29] Rodriguez, Adrian. (2020) "Know your data: Evaluation of normality for continuous variables and tools to deal with non-normal distributions." *Medicina Clinica (Barc)* **154 (4)**: 142–145.

[30] Nylén, Daniel, and Jonny Holmström. (2015) "Digital innovation strategy: A framework for diagnosing and improving digital product and service innovation." *Business Horizons* **58 (1)**: 57–67.

[31] Catlin, Tanguy, Jay Scanlan, and Paul Willmott. (2015) "Raising your digital quotient." *McKinsey Quarterly* **(June)**: 1–13

[32] Matt, Christian, Thomas Hess, Alexander Benlian, and Florian Wiesbock. (2016) "Options for Formulating a Digital Transformation Strategy." *MIS Quarterly Executive* **15 (2)**: Article 6.

[33] Andal-Ancion, Angela, Phillip A. Cartwright, and George S. Yip. (2003) "The digital transformation of traditional business." *MIT Sloan Management Review* **44 (4)**: 35–41.

[34] Berman, Saul J. (2012) "Digital transformation: opportunities to create new business models." *Strategy & Leadership* **40 (2)**: 16–24.