Towards the Digital Transformation: Are Portuguese Organizations in This Way?

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Abstract. Digital transformation is increasingly an element to be considered in the new paradigm of organizations. This transformation increases business opportunities and open a window for new approaches to the same business, both internally and externally, including changes in business processes and relationships with the organization's stakeholders. Due of this, several concepts like digital transformation and enablers among others have emerged, and occurred in this new era. Being this in mind, it is fundamental to see if organizations in Portugal are already living in the aforementioned digital transformation or if they are aware of the need to adapt to this new reality. Thus, the objective of this research is to perceive the state of the art of Portuguese organizations in light of digital transformation.

Keywords: Digital transformation · Agility · Four pillars · Innovation accelerators · Technology · Business processes

1 Introduction

In a time of great technological development and globalization, Digital Transformation (DT) is already a global reality that encompasses a large number of organizations. This transformation becomes disruptive in many areas, namely business, government, and society [1].

The DT is based on four pillars – Mobility, Cloud, Big data & Analytics, and Social media – and it is driving organizations to the next level of digital customer engagement and Information Technology (IT)-enabled business processes, products, and services. In the majority of the organizations, digital technologies are opening unprecedented transformations and changing the ways of working, the learning approaches and the people life in ways, that have never been anticipated [2]. In Rowe [3] a case is presented of the impact of DT's adoption on two well-known companies in the

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audiovisual sector, Netflix and Blockbuster. According to the author "*Netflix embraced digital transformation and succeeded while Blockbuster fought it and failed*". The same author asserts that people by nature are reluctant to change, but DT implies profound changes, not only in technology adoption, but mainly in organizational structure, because "*if you don't transform, your competitors surely will, and you could end up like Polaroid, Blockbuster, or Kodak—a diminished or nonexistent brand.*" In conclusion, the same author quotes Daniel Newman, to point out that the main challenge organizations are facing today, regarding digital transformation, "*is building a culture that can change*."

From the stated, it can be claim that DT, nowadays, is an unavoidable reality, it is not a passing trend. DT is the new reality, and the major reason for the implementation of DT in organizations is the rapid advancement of technology, which allows new business models to be introduced at an ever-increasing rate with rapidly declining costs. The challenges are high with expectations from customers growing. In this context, the only sustainable advantage that an organization can have over their competitors is agility.

According Kane et al. [4], the 21st century is about agility, adjustment, adaptation and creating new opportunities under the digital transformation. Agility in organizations is an integrated ecosystem that can provide a significant boost in customer engagement and value growth in organizations. As mentioned earlier, the technologies allow the emergence of innovative products and services with added value and, on the other hand, that the targeted data analyzes offer more space to leverage new product and service offerings for existing customers, or directed in order to "conquer" new audiences. Since traditional revenue models and business strongholds may face redundancy, digital tools and technologies can be used to explore new revenue sources and plan future-ready portfolio expansion. Technologies in the context of DT take, not only into account the four pillars, but also the broad spectrum of technologies that are at the service of organizations, namely artificial intelligence, virtual and augmented reality, blockchain, among others.

In this regard, the aim of this paper is to investigate the perception of digital technology adoption as a support for business transformation in Portugal and for that was constructed a questionnaire with the title "*Digital Transformation in Portugal*".

2 Background

Digital transformation has become a topic of discussion within the strategic initiative of organizations. According to the Economist Intelligence Unit (EIU), 77% of companies say DT is their first strategic priority. Both native and non-digital companies are working to reinvent today's technologies to the fullest – all to stay competitive and profitable in an increasingly dynamic environment. Customer experience, business agility, and operational efficiency are the primary goals that drive organizations through DT.

In this section, we intend to introduce the following topics, Digital transformation and Organizational agility, the basic concepts of this research work.

2.1 Digital Transformation

Lucas et al. [5], define DT as transformation "*precipitated by a transformational information technology*". This transformation involves fundamental changes in business processes, operational routines and organizational capacity. However, DT is based on the technological pillars as well as the innovation accelerators, which impose an alignment between IT and business.

In the study presented, in [6], the authors conclude that "*executives are digitally transforming three key areas of their enterprises: customer experience, operational processes and business models"*. However, Gruman [7] defines DT as "*the application of digital technologies to fundamentally impact all aspects of business and society*".

According to [8], the main challenges of DT are: (1) Priorities; (2) Aggregate data or customize; (3) Providing more resources to IT staff vs. more self-service analytics; (4) Storing all data vs. selecting data to store that serves a specific purpose; (5) Work performed by people vs. computing machines; (6) Security vs. accessibility; (7) Privacy of individuals vs. understanding of an individual.

As mentioned in the previous section, DT is supported not only on four technological pillars, but also other technologies, called innovation accelerators that act as DT drivers. As an example of innovation accelerators, we can refer IoT, Robotics, 3D Printing, Artificial Intelligence, Augmented and Virtual Reality, Cognitive Systems and Next Generation (NextGen) Security and Blokchain. However, such technologies cannot be used without careful consideration of the organization's needs and strategy.

2.2 Organizational Agility and Digital Transformation

Considering the current context, organizations face daily challenges that require them to have a constant capacity for change, often unpredictable in several areas, namely technology, social, legislative, competitiveness and globalization. Thus, to ensure their place in the constantly evolving environment, organizations must be agile and ensure their sustainability through continuous improvement. Organizational agility must therefore be one of the main objectives of any organization [9]. Therefore and according to Sambamurthy et al. [10] "*Firms are increasingly relying on information technologies, including process, knowledge, and communication technologies, to enhance their agility."*

Organizational agility is defined, in the Business Dictionary, as the capability of an organization to rapidly change or adapt in response to changes in the market. As referred a high degree of organizational agility can help an organization to react successfully to the emergence of new competitors, the development of new industry-changing technologies or sudden shifts in the overall market conditions. Further, agility encompasses organizations' capabilities related to interactions with customers, orchestration of internal operations, and utilization of its ecosystem of external business partners. Specifically, agility comprises three interrelated capabilities: customer agility, partnering agility, and operational agility [10].

In this respect, and taking into account what has been presented in Sect. 2, it can be said that the commitment to DT should be done in order to simplify the business and make it more agile. The introduction of new technologies, as they are popular in the industry,

will hardly result in a successful digital transition. Companies should evaluate how each system can improve its agility, before making it the cornerstone of a DT plan [11].

In the era of the native digital client and the ever-changing landscape, digital transformation has become one of the most viable strategies to accelerate business activities, processes, business growth, and fully leverage available opportunities. Most companies have gone through some degree of digital transformation. However, simply adding improved software is not, by itself, a significant change.

3 State of the Art

The literature in the area of digital transformation is vast, since 2016. For the construction of the state of the art, the B-on portal (www.b-on.pt) was used, which is an Online Library of Knowledge that provides unlimited and permanent access to thousands of international scientific journals and e-books. The research was carried out for the period of 2016–2018 with the following queries search: (1) "*(Digital AND Transformation AND SMEs AND Portugal)*"; (ii) "*(DIGITAL AND TRANSFORMATION AND SMEs AND Portugal)*"; (iii) "*(Digital AND Transformation AND SMEs AND PORTUGAL)*". The results obtained indicate a near absence of studies presenting which direction digital transformation is having in SMEs in Portugal. There are only two scientific papers [12, 13], the first one surveys the relationships between the enablers of digital transformation, while the second presents a benchmark of digital transformation best practices in the Tourism industry. None of the papers include a survey of the Digital Transformation in SMEs, independently of the activity area.

In order to ensure that there are already studies performed when the search query is "*(Digital AND Transformation AND SMEs)*", a search was conducted which proved that there were already 4,250 entries, even though most of them are not directly related to the entire search query. Considering the above mentioned research, it was possible to conclude that there are no studies on Digital Transformation in Portuguese SMEs, thus making it relevant and justified.

4 Research Methodology

The main feature of the scientific method is an organized research, strict control of the use of observations and theoretical knowledge. For the present study, it was used the quantitative research methodology, since it is more appropriate to determine the opinions of the respondents, based on structured questionnaires.

The aim of this study is to investigate the perception of adoption of digital technology as a support for business transformation in Portugal, and for that, a questionnaire was built with the title "*Digital Transformation in Portugal*". Before being online available, the questionnaire was subjected to an evaluation of four experts in the field.

The questionnaire consists of 3 Sections which include: "*Organization characterization*" (Sect. 1, with four questions), "*Current organization characterization regarding Digital Transformation*" (Sect. 2, with nine questions), and "*Organization's future in relation to Digital Transformation*" (Sect. 3, with three questions). To achieve

this paper´s main goal, it was only analyze the data from the two first sections to perceive the current state.

For Sect. 1, question A2 ("*What role do you play in the organization?*"), and A4 ("*What is the general feeling of your organization when it comes to technological disruption?*"), the respondents could only choose one of eight available options, and one of the four available options, respectively. Due to General Data Protection Regulation (GDPR), questions A1 and A3 could not be treated. Section 2, questions B1 ("*The organization has explored how Digital Transformation impacts suppliers, distributors and other partners*"), B2 ("*The organization's leadership has considered the costs, savings and return on investment associated with Digital Transformation*") and B3 ("*The organization has, a plan, or strategy, to implement Digital Transformation*") use a five-point Likert scale ranging: "*Strongly disagrees*" (1), "*Disagree*" (2), "*Neutral*" (3), "*Agree*" (4) and "*Strongly Agree*" (5). For questions B4 ("*What is the most important goal of the Digital Transformation strategy in your organization?*"), B5 ("*Who leads the Digital Transformation initiative in your organization?*"), B6 ("*What are the main factors that currently help your organization implement Digital Transformation?*") and B7 ("*What are the biggest obstacles that prevent your organization from implementing Digital Transformation?*"), the respondents could choose more than one option. For the remaining questions, B8 ("*Evaluate the state of the organization's current digital adoption for the following technology categories*") and B9 ("*Classify the various departments of the organization based on their ability to adapt to technological change*") the respondents must classify seven technologies and nine departments within a specific scale. For question B8, the respondents must classify eleven technologies within the following scale ranging: (1) "*Nothing prepared*", (2) "*Unprepared*", (3) "*Prepared*", (4) "*Fully prepared*", and (N/A) "*Not applicable*". Regarding the last question (B9), the respondents must classify nine departments within the following scale ranging: (1) "*Not agile*", (2) "*Not very agile*", (3) "*Agile*", (4) "*Extremely agile*", and (N/A) "*Not applicable*".

The questionnaire was online for 60 days and 77 valid responses were received. Data collected were pooled and treated by using the IBM SPSS Statistics 24.0 software. The statistical analyses [14] used for the data analysis were Descriptive Analysis (frequency analysis, descriptive statistics and graphical representations), Inferential Analysis (Spearman´s ordinal correlation) and Reliability Analysis (Cronbach´s alpha).

5 Analysis and Discussion of Results

Relatively to question (A2) of Sect. 1, what is highlighted is the Senior executive (27.3%), Senior manager (27.3%), CIO (15.6%) followed by Manager, CEO and General manager.

The general feeling about organization technological disruption (A4) reveals that 61% of the respondents think, that it "*Provides new opportunities to improve business*", being of little relevance the other options ("*Helps in the conquest of new markets*" – 18.2%; "*Eventually the organization will adapt*" – 14.3% and "*Represents a threat to the survival of the organization*" – 6.5%). The high percentage (14.3%) of respondents who say that, eventually, their organization will adapt is worrying.

As the percentage of those who stated that the technological disruption "*Provides new opportunities to improve business*" is so high, we find it pertinent to assess the percentage of individuals who indicated this option according to the role they play in the organization (Fig. 1).

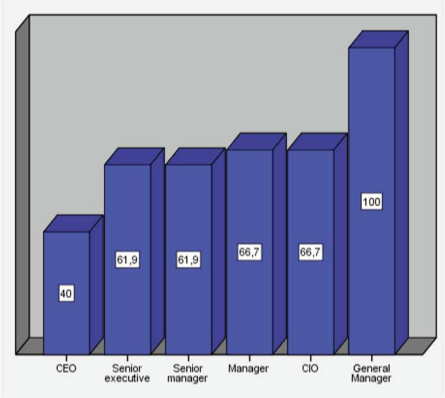

Fig. 1. Percentage of individuals who think that technological disruption "*Provides new opportunities to improve business*" by function in the organization.

As shown at Fig. 1, all General Manager consider that this is the general feeling of their organizations, as well as most of the individuals who perform other functions.

Regarding to questions (B1) and (B2) from Sect. 2, we found that: 68.9% of respondents agree/strongly agree that their organization has explored how DT impacts suppliers, distributors and other partners; 62.4% of respondents agree/strongly agree that their organization's leadership considers the costs, savings, and return on investment associated with implementing DT. It is important to observe that, a considerable percentage of organizations (20.8%) have a neutral opinion on this issue.

Question (B3) allows us to conclude that 63.7% of respondent organizations state that they agree/strongly agree that the organization has a plan, or strategy, to implement DT. It is also important to mention the high percentage of organizations (19.5%) that showed no opinion.

The most important goal of the DT strategy in organization (B4) was "*Reach and engage with customers more effectively*" (39%), followed by "*Modernize legacy IT systems and processes and reduce costs*" (29.9%), and "*Improve business visibility and increase income*" (19.5%).

Figure 2 shows, for each role the respondent plays in the organization, which objectives are pointed out as the most important of the DT strategy applied to your organization.

According to Fig. 2, it is clear that for "*CEOs*" and "*Senior managers*", it is a primary objective to modernize legacy IT systems/processes and reduce costs. For "*CIOs*" and "*Senior executives*", the most important goal pointed out is to reach and engage with customers more effectively. "*General Managers*" consider that achieving

Fig. 2. Percentages of objectives by each of the roles played in the organization

better visibility to the business and increasing the income, it is the most important objective. Finally, for the managers is equally important, in the strategy of DT in their organization to reach and engage with customers more effectively, and achieve better visibility to the business and increase the income.

Concerning who leads the DT initiative in the organization (B5), there is massive leadership from the "*Senior executive*" team and the "*CEOs*".

When questioned regarding the main factors that help implementation of DT (question B6), the "*Leadership Vision*" factor pointed out by 64.9% of the organizations, stands out significantly. It can also highlight the "*Culture of the organization*" (48.1%), the "*Support of the organization's managers"* (42.9%) and the "T*echnological partners*" (40.3%) as relevant factors. It should also be mentioned the low result (27.3%), which was surprising for us, regarding the factor "*collaborators with knowledge*".

The most pointed obstacles that prevent organization from implement DT (B7), with approximately equal percentages are the "*Culture of the organization*", and "*Inadequate budgets with the values*" 42.9% and 40.3%, respectively.

The organizations in analysis it was found that the leadership and culture of the organization are the most important factors for the implementation of DT, therefore, it makes perfect sense that the inadequate budget is a relevant obstacle.

The percentage of organizations that indicate that one of the biggest obstacles is "*Managers resistance*", "*Employees do not have the necessary skills*" and "*Confused leadership on what to do*" is similar (between 20% and 30%), percentages that, in our opinion, are worrying. Among the various options to choose the obstacle "*Few technological partners*" was the least chosen (6.5%).

The current state of the organization's digital adoption (B8), on a 4-point Likert scale and N/A (Not Applicable), is evaluated by a set of ten technologies (Table 1). The test of validity and reliability was performed for this items and a high internal reliability was obtained (Cronbach´s alpha = 0,852) [15]. Table 1 shows the mean (*m*) and standard deviation (*sd*) for each item in question (B8).

Table 1. Descriptive measures for items of question (B8)

Items	*m*	*sd*
Mobility	3.21	.778
Cloud solutions	3.18	.770
Big data & analytics	3.16	.861
IoT technology/sensors	2.57	1.003
3D printing	1.68	.872
Virtual reality/augmented reality	1.90	.911
Robotics/automation	2.69	.988
Agile collaboration tools	3.36	.804
AI	2.45	.968
Blockchain	1.80	.943

The technological categories that the respondents most pointed out as a response for (N/A) (Not Applicable), to the state of the organization's current digital adoption, are "*3D Printing*", "*Blockchain*", "*Virtual Reality Technology/Augmented Reality*", "*IoT Technology/Sensors*" and "*Robotics/Automation*". It is interesting to see that it is in these categories that organizations are less prepared, even though these technologies are the main innovation enablers.

In relation to categories which the organizations have a greater degree of preparation, it is verified that the one for which the organizations are more prepared is to "*Agile Collaboration Tools*" followed by "*Mobility*", "*Cloud Solutions*" and "*Big Data & Analytics*", the 4 pillars of DT. In addition to these results, it was also found that there is homogeneity in the responses given by the organizations, since the variation coefficients are low (maximum 27%). The analysis that was made also allows us to identify a respondent outlier, a respondent whose role in the organization (A2) is Specialist, and for all the pillars of DT, attributes the minimum value to the degree of agility of his organization.

We also found that, among the respondents who most agree that their organization has a plan or strategy to implement DT (B3), there are also those who consider that the organization is better prepared with respect to Mobility and "*Big Data & Analytics*" (r_s = 0.424; p-value = 0.000 and r_s = 0.472, p-value = 0.000, respectively).

The results of organizations' assessment of their adaptability to technological change in the various departments of their organization (question B9), are presented in Table 2.

Table 2. Descriptive measures for items of question (B9)

Item	*m*	*sd*
IT	3.37	.670
Marketing	3.07	.804
Sales/business development	2.76	.755
Manufacturing/logistics	2.55	.891
Customer service	2.85	.765
Product management	2.68	.850
Human resources	2.54	.958
Legal department	2.32	.918
Retail	2.53	.983

The test of validity and reliability was performed on 9 departments and a very high internal reliability was obtained (Cronbach´s alpha = 0,903).

It should be considered that, regarding the adaptability to technological changes, the department of the organization which most points out opinion (N/A) is the retail department (58%). This result is, perhaps, due to the fact that adopting DT does not make much sense in such departments. The departments that have a greater degree of agility in the adaptation to technological change are IT, followed by Marketing. In addition to these results, it was also found that there is homogeneity in the responses given by the organizations, since the variation coefficients are low (maximum 26%).

With regard to the technological categories (B8) that constitute the four pillars of DT, we evaluated the association of each of them with (B9). We conclude that, after the correlation analysis was performed, there is only a moderate positive correlation between Big Data & Analytics technology and the ability to adapt to change in the Marketing department and in the Sales/Business development department. For the technological category "*Agile tools for collaboration*", there is also a moderate positive correlation between this and the ability to adapt to change in the Manufacturing/Logistics, Human Resources, Legal and Retail departments. All these correlations are statistically significant with p-value < 0.1.

6 Conclusions

Digital Transformation is becoming, more and more an expression of the everyday live, due to its relevance for the life of organizations. As a consequence of not observing and integrating their implications, it has led large companies, with a consolidated market, to disappear. This reluctance to change is an intrinsic factor of the human being, and it is not recognized at the deepest level of the change that organizations have to make for DT, because technology adoption is not enough, it has to be deeper, it has to be organizational. In order to understand the perception of Portuguese organizations regarding the adoption of DT, a questionnaire was created.

The results presented and discussed in Sect. 5, have showed that the awareness of the importance of DT in organizations begins to be noticeable, both the importance of

organizational awareness and by the adoption of technology. However, we are aware that the sample is small relatively to the high amount of survey questions. These results show that DT in Portugal is still at a relatively mature stage. This conclusion is based, on the one hand, on the existence of a significantly high percentage of responses to organizational awareness that is necessary for this adoption 14.3% of respondents who say that eventually their organization will adapt (A4), 20.8% of organizations that have neutral opinion on this issue (B2), and 19.5% of organizations without opinion (B3) and, on the other hand, on the point of view of the technological adoption by technological inductors/accelerators which is presented at very low adoption values (B8).

As future work, an analysis of the data obtained from Sect. 3 "*Organization's future in relation to Digital Transformation*" will be carried out, in order to understand how Portuguese companies are preparing to respond to this incoming challenge. In addition, this study will be extended broader audience, by evaluating the Iberian Peninsula organizations.

References

1. Schuelke-Leech, B.: A model for understanding the orders of magnitude of disruptive technologies. Technol. Forecast. Soc. Change **129**, 261–274 (2018)
2. Uhl, A., Gollenia, L.: Digital Enterprise Transformation: A Business-Driven Approach to Leveraging Innovative IT. Routledge, Taylor & Francis Group (2016)
3. Rowe, S.: Digital transformation needs to happen: the clock is ticking for companies that have been unwilling to embrace change, Customer Relationship Management, pp. 30–33 (2017)
4. Kane, G., Palmer, D., Phillips, A., Kiron, D., Buckley, N.: Strategy, not technology, drives digital transormation: becoming a digitally mature enterprise, MIT Sloan Management Review and Deloitte University Press (2015)
5. Lucas, H., Agarwal, R., Clemons, E., El Sawy, O., Weber, B.: Impactful research on transformational information technology: an opportunity to inform new audiences. MIS Q. **37**(2), 371–382 (2013)
6. Westerman, G., Bonnet, D., McAfee, A.: The nine elements of digital transformation. MIT Sloan Manag. Rev. **55**(3), 1–6 (2014)
7. Gruman, G.: What digital transformation really means. InfoWorld. (2016). http://www.infoworld.com/article/3080644/it-management/what-digital-transformationreally-means.html. Accessed: 10 Oct 2018
8. Heavin, C., Power, D.: Challenges for digital transformation –towards a conceptual decision support guide for managers. J. Decis. Syst. **27**(1), 38–45 (2018)
9. Imache, R., Izza, S., Ahmed-Nacer, M.: Clustering-based urbanisation to improve enterprise information systems agility. Enterp. Inf. Syst. **8**(9), 861–877 (2015)
10. Sambamurthy, V., Bharadwaj, A., Grover, V.: Shaping agility through digital options: reconceptualizing the role of information technology in contemporary firms. MIS Q. 237–263 (2003)
11. Kane, G.C., Palmer, D., Phillips, A.N., Kiron, D., Buckley, N.: Strategy, not technology, drives digital transformation - becoming a digitally mature enterprise. MIT Sloan Manag. Rev. Deloitte Univ. Press **14**, 1–25 (2015)

12. de Mendonca, C., de Andrade, A.: Microfoundations of dynamic capabilities and their relations with elements of digital transformation in Portugal. In: Proceedings of the 13th CISTI, vol. 1, pp. 1–6 (2018)
13. Pereira, N.: Digital transformation at turismo de Portugal (Doctoral dissertation) (2017)
14. Maroco, J.: Análise Estatística com o SPSS, 7a edição. ed. ReportNumber, Lda (2018)
15. Pestana, M., Gageiro, J.: Análise de dados para Ciências Sociais. a complementaridade do SPSS, 6a Edição. ed. Edições Sílabo, Lisboa (2014)