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THE IMPACT OF COMPANY SIZE, STRATEGIC ALIGNMENT, AND EMPLOYEE TRAINING ON TECHNOLOGICAL INFRASTRUCTURE AVAILABILITY IN ALGERIAN FIRMS: AN EMPIRICAL STUDY

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Abstract: This paper aims to examine the linkage between company size, strategic alignment, employee training, and technological infrastructure within Algerian firms. A questionnaire was prepared and distributed. A descriptive method and multiple regression were used to analyze and interpret the results. Results show that in the Algerian firms, the technological infrastructure is determined by the company size. Strategic alignment and employee training explain the technological infrastructure availability, but they have no critical significance than company size factors.

Keywords: technological infrastructure, company size, strategic alignment, employee training.

1- Introduction

Information technologies (IT) have emerged, in this last decade, as an important phenomenon in information systems and management

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research. This evolution pushed companies to invest in the latest generation of these technologies to face up the competition of firms operating in the same activity sector.

Technological infrastructure is mainly about using technologies in process automation, including mobile CRM, cloud, Blockchain technologies, big data, the Internet of Things, or robotics. This process involves cognitive systems based on integrated data analysis of appropriate process monitors to predict and improve processes. Moreover, flexible technological infrastructure allows easy integration of digital technologies with existing platforms, thereby allowing the information system unit to deliver cutting-edge technology capabilities quickly and cost-effectively.

The perception that technology is considered one of the strategic factors that can help organizations improve their processes (Vial, 2019) pushes companies to make technology investments. To provide reliable services based on a centralized and coordinated information system, the company can rely on technological infrastructure. Any company hoping to benefit from a competitive advantage can create an IT service including computer materials, software, hardware, network, communication, human resources, and databases (Berghaus, 2016).

Digital initiatives do not only involve technological and companies' organizational aspects and their processes, but they also affect all stakeholders. Forced by the need to adapt to the sector's standards, all market players are introducing the latest IT and digital tools to be more effective, efficient, and more productive (Roth, 2019).

Networking, via digital technologies, contributes to the disappearance of the Fordism, Taylorism or Toyotism organizations and their rigid organization mode (Lampel & Germain, 2016), which are still considered a school of management thinking the business world and universities (Mitić & Terek, 2017). It would be better to review and reorganize the organization's structure to adapt to the new digital age by implementing technological infrastructure.

To be successful in the digital age, companies must develop a technological infrastructure similar to the human nervous system (Attaran, 2004). This new digital system enables businesses to operate efficiently, react quickly to emergencies and opportunities, anticipate environmental fluctuations, and promptly provide valuable information

to those who need it. It allows employees to make decisions, be more independent and interact with customers (Hanaysha, 2016).

This study was carried out to identify the dynamic relationship between firms' size, strategy, employee training, and technological infrastructure. Using data from some Algerian firms, we report evidence of recent changes in strategy, organizational structure, and human skills and their link to the level of use of various types of the latest digital technologies.

This paper is composed of three main parts. The first one treats the literature review across the analyses of information technological infrastructure, firm size, information technology strategy, and organizational learning. The second part concerns the study methodology, and the last one is reserved for the study results.

2- Information technology infrastructure

Information technology takes a large place in firms' concerns; it has become an essential strategic resource for organizations **(**Mitić & Terek, 2017) insofar as they help them in the decision-making. In a digital era, where companies are known by firms 4.0, IT applications do not only process data and provide management information reports, but they use IT applications to create new business opportunities. These opportunities help them improve customer service, enhance product and service quality, and integrate supplier and customer operations.

To succeed in technological infrastructure implementation, companies must consider six major dimensions: quality of information technologies, quality of data, use of information technologies, employee satisfaction, individual factors, and influence of the organization (Ferreira, Fernandes, & Ferreira, 2018).

In general, digital technologies enable firms to capture, transfer and integrate analog information (Sousa & Rocha, 2019), for instance, data and documents and processes into virtual values by digital or electronic transfers and/or by digital processing.

In the information system literature, technological infrastructure is composed of physical components are defined as tangible and intangible media used in the processing of information, such as computers, data carriers, and other items that collect, store, process, and disseminate information (Guy, 2019). Computer software may contain

details that coordinate and control the content of an information system. IT connects computers and enables digital communication across the world. A database refers to an organized area powered with information about customers, employees, inventory, competitors, and sales (Pagani & Pardo, 2017). Also, technological infrastructure is the foundation of all technological investments, including the communications network, shared customer data, computers, data centers, and servers. A flexible technological infrastructure increases the firm's ability to deliver technical solutions quickly and more effectively. Technological infrastructure capability is a firm's ability to deploy shareable platforms. This capability captures the extent to which the company is good at managing data management, network communication services, and application portfolio.

3- Firm size

Size is considered an explanatory variable used in most studies concerning the adoption of new technologies in firms and technological infrastructure availability (Anthony Byrd & Bryan, 2006). There is a variety of coexisting arguments concerning the role played by company size in the innovation implementation process, particularly when it comes to digital technologies adoption.

Firm size is measured using the number of persons working in a company on average during a given year, normalized by the average number of persons in all industrial establishments. Firms are grouped into three size categories, i.e., small (up to 50 persons), medium (51 to 250 persons), and large (more than 250 persons) firms.

Researchers have found that size is a contextual or enabler variable in the ownership of technological infrastructure. It is common for small firms to lag behind larger firms in implementing new technologies (Qiu & Yang, 2018). There are many reasons why large firms began using digital technologies more rapidly than small ones. They have more resources and are better able to take risks than their smaller rivals (Swamidass & Kothab, 1998). It is also supposed that larger companies generate more complex coordination problems and a greater need for information flow, making them more susceptible to use digital technologies.

Earle et al. have studied the impact of firm size on the level of adoption of information technologies in the Czech Republic, Hungary,

Romania, and Slovakia (Earle, Pagano, & Lesi, 2006). also analyzed the relationship that can exist between firms' size and technological infrastructure. They defend the idea that organizational size is an essential element in analyzing organizations and technological infrastructure (Goode & Gregor, 2009).

In the same perspective, organizational size is considered one of the most currently examined structural variables and has been used to study issues raised by innovation, R&D spending, and technological infrastructure (Birkinshaw, 2018).

Hypothesis1. There is a positive relationship between firm size and the setting up of the technological infrastructure.

4- Strategic alignment

Strategic business-IT alignment refers to applying digital technologies in an appropriate and timely way, in harmony with business strategies (Anthony Byrd & Bryan, 2006). Strategic alignment means the extent to which the digital technologies' mission, objectives, and plans support, and are supported by, the company's mission, goals, strategy, and plans (Queiroz, 2017). This IT-Business alignment creates an integrated organization in which every function and employees are focused on the organization's competitiveness. IT management is a problem of adjusting the relationship between the company strategy and the technological infrastructure to take advantage of digital technologies opportunities.

To succeed in technological infrastructure implementation, the IT strategy should be aligned with the corporate strategy. In information system literature, strategic IT alignment is defined as the fit between information technology and business strategy (Anthony Byrd & Bryan, 2006). When IT strategy is linked with the firm strategy, it allows obtaining better performance. Strategic alignment is the process of achieving competitive advantage by developing and sustaining a symbiotic relationship between corporate strategy and IT strategy. Thus far, studies have suggested responsibility for business-IT alignment in both business process governance and information technology governance frameworks (Rahimi, Møller, & Hvami, 2016).

The closer alignment should point to a closer working relationship between IT and business managers, which should lead to the

development of more effective systems, especially long-term strategic systems, so it is enabled to raise a technological infrastructure in better conditions. Top management involvement is an important factor in technological infrastructure implementation success. Technology and business orientation are being covered. Moreover, IT alignment is claimed to help coordinate IT with firm decisions; however, it is neither a sufficient nor a necessary prerequisite for effective integration

Hypothesis2. The link between these two factors will likely lead to better business results. On this basis, our study has empirically verified whether the alignment of information systems and business strategy has a positive influence on the technological infrastructure.

5- Employee training

The current business scenario appears to be characterized by strong organization competitiveness, market globalization, and technological progress (Hanaysha, 2016). In this new digital era, it is crucial to have high skills to be more reactive to environmental changes and follow technological evolution speed (Tortorella & Sawhneyn, 2020). Employee training refers to the programs that contribute to forming employees with the required information, new skills, and new knowledge to enhance the opportunities of professional development and build a professional carrier (Hanaysha, 2016). In general, the notion of training is related to skills that an employee should acquire to help him work with others to achieve his goals, which should be in adequacy with the organizational goals and objectives (Anthony Byrd & Bryan, 2006).

Employee training is essential, for any company, in the process of gaining a competitive advantage. One way to improve employees' quality and productivity is to provide them with beneficial training and development programs in different eras because talented employees' knowledge and skills were proved to be the key determinants of competitive advantage in global marketplaces (Hanaysha, 2016).

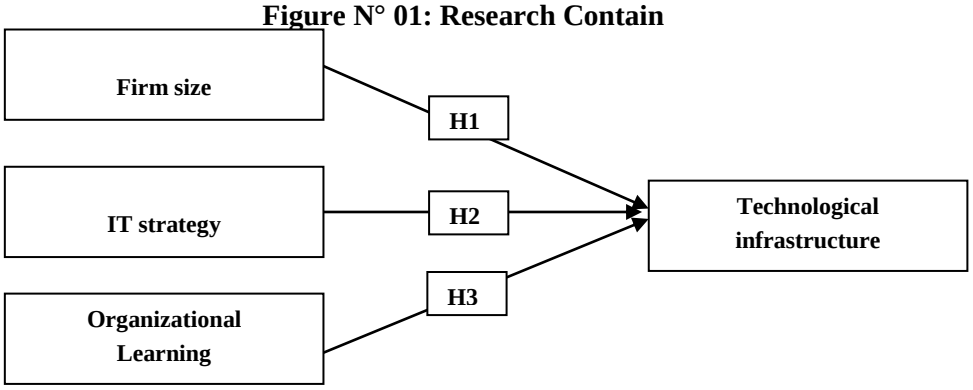
One of the main workforce variables taken into account in technological infrastructure is the educational level. In the IT adoption literature, it is often posited that qualified workers facilitate IT adoption. High-skilled workers can make technology investment more important and use technological infrastructure easier (Tortorella & Sawhneyn, 2020) since their workers can assimilate and exploit new

knowledge and absorb novel technologies. In this respect, organizational training and experience play a crucial role in technology investment and adoption.

The implementation and beneficial exploitation of ITs require specific knowledge, expertise, qualifications, and skills that workers can primarily obtain through education and training. It is therefore essential to analyze the impacts of employee training on technological infrastructure.

Hypothesis3. The technological infrastructure is influenced by the degree of employee training.

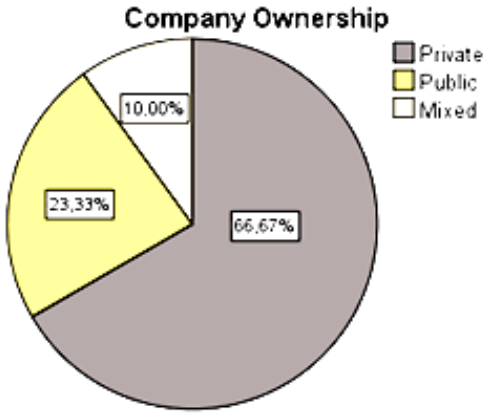
Figure N° 01: Research Contain



6- Study Results

To understand the impact of company size, strategic alignment, and employee training on Algerian firms' technological infrastructure availability, we have selected 30 companies. Among them, we found 21 manufacturing firms, and 09 of them come from other sectors, including banks and financial service firms, distributors, retailers, and so on. Therefore, we classified the sample as manufacturing and 06 non-manufacturing corporations (see figure 2).

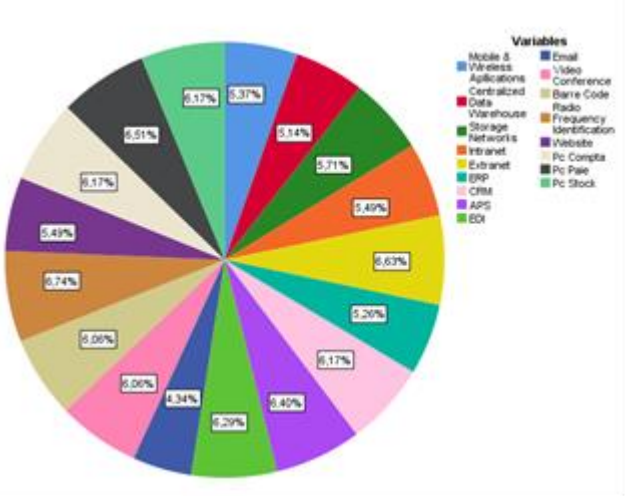
Figure N° 02: Company ownership



Source: Made by authors, based on SPSS analysis

Companies selected on our sample are from different sectors but mostly from two administrative departments (Wilaya), namely Bejaia and Batna, due to the researchers' geographical proximity. Given the difficulties to access state-owned companies, 66.7% of the companies are private, and only 23.3% are public, and the remaining 10% have mixed ownership, as presented in figure 3.

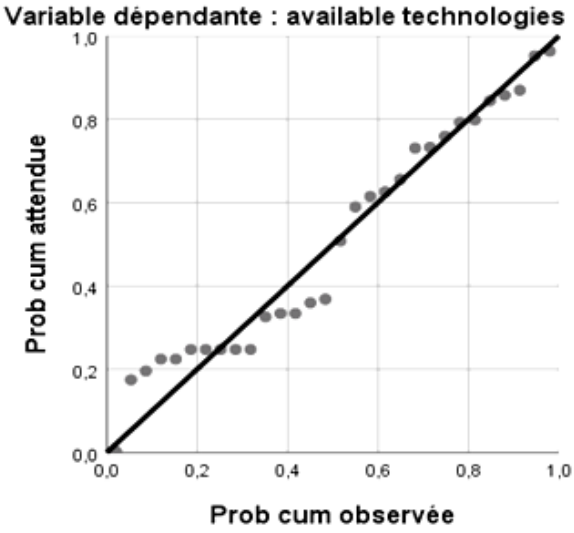
Figure N° 03: Availability of digital technologies in Algerian firms



Source: Made by authors, based on SPSS analysis

Company size, strategic alignment, and employee training are factors that can have an impact on technological infrastructure availability. For this, we have chosen these determinants as independent variables. This case study treats the effect of independent variables on the dependent variable. On this line of Henry, the points follow approximately a straight line. There are no signs of non-normality, outliers, or unknown variables (see figure 7).

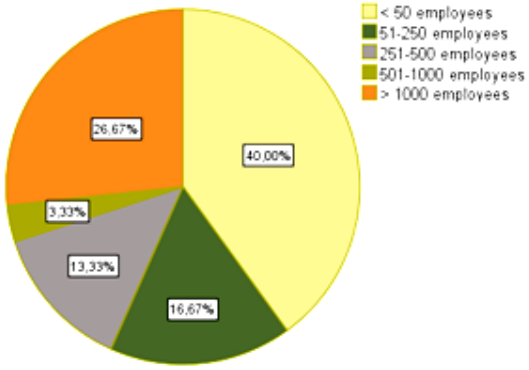
Figure N° 07: Normal P-P plot of Standardized regression residuals



Source: Made by authors, based on SPSS analysis

Technological infrastructure in Algerian firms is composed of several digital technologies but with a reduced frequency for each type, as shown in figure 4.

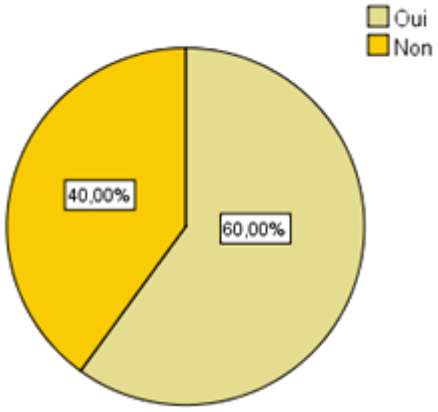
Figure N°04: Company size



Source: Made by authors, based on SPSS analysis

Algerian firms consider digital technologies training and their uses as an essential factor to be more productive, more performing, and sustainable. The results obtained indicate that 60% of Algerian firms offer training to their employees while 4O% of firms do not do that, as shown in figure 5.

Figure N°05: IT training

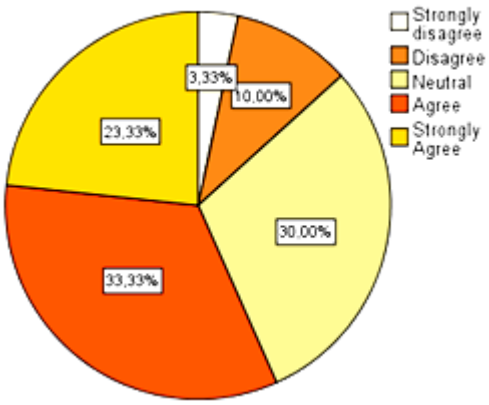


Source: Made by authors, based on SPSS analysis

Strategic alignment is considered crucial for firms to enhance the performance of their departments and activities. For this, the strategic alignment seems to us as an essential element to consider in the analysis of technological infrastructure availability.

The study results confirm that most Algerian firms take digital technologies as strategic resources to reach their objectives. By analyzing the data, the results highlight that 56.66% (with 33.33% how are strongly agree) of the firms questioned are agreed with the suggestion indicating that the IT strategy should be aligned with the corporate strategy for technologies to be beneficial. In contrast, 43.33% do not agree with this suggestion, where 30% are neutral regarding this alignment (neither agree nor disagree), as illustrated in figure 6.

Figure N° 6: Strategic alignment



Source: Made by authors, based on SPSS analysis

In this study, technological infrastructure was used as the dependent variable. Given the amount and variety of the technologies comprised in technological infrastructure, and to improve the validity of the study results, we found that it was convenient to analyze the impact of three technological infrastructure determinants instead of restricting the analysis to just one of them. We believe that this adds to the value of our paper in that it enables us to determine whether the various factors can influence the availability of technological infrastructure.

Multiple regression analysis results showed the significant influence of company size, strategic alignment, and employee training on overall technological infrastructure. The (F) value is 14.987, which was the biggest of its tabulated value under the 0.05 level of significance, amounting to 8.6341. Company size, strategic alignment, and employee training affect Algerian firms' technological infrastructure at 63.4% (R2).

Also, R calculated (.796) highlights a strong correlation between the dependent variable, technological infrastructure, and the independent variables composed of company size, strategic alignment, and employee training (see table 1). These three factors explain the availability of digital technologies in Algerian firms. Company size is the factor that positively affects the existence of technological infrastructure with a correlation of .726. The other factors act modestly on the technological infrastructure with .419 for strategic alignment and .478 for employee training (with a negative sign), as illustrated in table 2, which can be explained by the fact each time the rate of training increases, the use of technologies becomes easier (see table 1).

Table 1: Correlations

		available technologies	Company Size	Strategic alignment
Correlation de Pearson	available technologies	1,000	,726	,419
	Company Size	,726	1,000	,302
	Strategic alignment	,419	,302	1,000
	Training	-,478	-,256	-,363
Sig. (unilateral)	available technologies	.	,000	**,011**
	Company Size	,000	.	,053
	Strategic alignment	**,011**	,053	.
	Training	,004	,086	,024
N		30	30	30

Source: Made by authors, based on SPSS analysis

The Durbin-Watson statistic will always have a value between 0 and 4. A rule of thumb is that test statistic values in the range of 1.5 to 2.5 are relatively normal. In this case, the Durbin-Watson has a value of 2.146, so it is relatively normal. It means that there is a positive autocorrelation (see table 2).

Table 2: Model Summary

Model	R	R-deux	Variation de R-deux	Variation de F	ddl1	ddl2	Durban-Watson
1	,796[a]	,634	,634	14,987	3	26	2,146

Source: Made by authors, based on SPSS analysis

The results highlight that the relationship between company size, strategic alignment, and employee training does not randomly. Still, it is due to the influence these three factors may have on the technological infrastructure availability.

7- Conclusion

In recent years, firms face new challenges and difficulties launched by the new era of the digital age, characterized by speed, scale, complexity, and the power of transformation that drives companies to rethink their business organizations by introducing different digital technologies. The technological infrastructure is considered, nowadays, as a strategic resource for each company wishing to gain a competitive advantage. This article has explored the technological infrastructure within Algerian firms and the importance of this infrastructure for them. No doubt investing in digital technologies infrastructure can bring even more significant improvements in all aspects of the organization.

Our analysis indicated that the technological infrastructure within Algerian firms is affected by three main factors: company size, strategic alignment, and employee training. The multiple regression results highlight that technological infrastructure availability is determined in the first position by company size. The strategic alignment and organizational training are also digital technologies' adoption determinants but less significant than the company size factor.

While the study provides interesting insights into the technological infrastructure of Algerian firms, there are certain limitations. Although we consider the lack of Google Form mastery by the Algerian enterprises as one of the barriers to reaching more administrative departments (Wilaya), another obstacle is the companies' access authorizations that took a long time to be delivered by the university. Although the basics of IT infrastructure have been laid, there are various research perspectives, which can be divided into different topics: The causes of the delay of Algerian companies in the IT infrastructure and the impact of the IT infrastructure Algerian firm's performance.

Out of the distributed questionnaire analysis and the interviews made in many of the sample companies, some suggestions might be made as follows: Firms need to realize the importance of being present in this new digital era. Investing more in digital technologies is essential to enhance communication inside and outside the company and coordinate the different activities. Algerian firms should invest more in employee training regarding digital technologies, facilitate its

use, and reduce the change resistance when a new technology is adopted, which is still underestimated and neglected by some managers. For digital technologies to be more advantageous, technological infrastructure must play a large part in corporate strategy; thus, the strategic alignment is a crucial element to consider.

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