

ENVIRONMENTAL CONSTRAINTS AFFECTING THE PRACTICE OF TECHNOLOGICAL INNOVATION: A CASE STUDY OF ALGERIAN INDUSTRIAL ENTERPRISES

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ABSTRACT

Technological innovation is a complex phenomenon and several factors interfere in its formation and development.. The complexity is further increased by the fact that these factors may be effective in forming and fostering this activity under stimulating environmental conditions. While it is not the case in other circumstances, as they may become environmental constraints.

On this basis, the following study aims to identify the most important environmental constraints and the extent of their impact on technological innovation in Algerian industrial enterprise.

The study show a set of results, the most important of which is that the external (economic and technological) constraints and the internal (organizational) environmental ones, including the climate of the organizational environment in developing technological innovation, are among the most important obstacles affecting technological innovation.

KEY WORDS: technological innovation, external environment, internal (organizational) environment.

Jel Classification: O3, L6, M5

المعوقات البيئية المؤثرة على أداء الابتكار التكنولوجي

دراسة ميدانية على عينة من المؤسسات الصناعية الجزائرية

ملخص:

إن الابتكار التكنولوجي كظاهرة معقدة، تتداخل في تكويته و تطوره عدة عوامل و مما يزيده من درجة التعقيد هو أن هذه العوامل قد تكون فعالة في تكويته، و تحفز هذا النشاط في ظروف بيئية محفزة ، بينما لا تكون كذلك في ظروف أخرى و قد تصبح معوقات بيئية ، و على هذا الأساس هدفت هذه الدراسة إلى رصد أهم المعوقات البيئية و مدى تأثيرها على الابتكار التكنولوجي في المؤسسات الصناعية الجزائرية و قد توصلت الدراسة إلى مجموعة من النتائج: أن معوقات البيئة الخارجية منها (الاقتصادية و التكنولوجية) و معوقات البيئة الداخلية (التنظيمية) منها مناخ البيئة التنظيمية في تنمية الابتكار التكنولوجي، من أهم المعوقات المؤثرة على الابتكار التكنولوجي.

كلمات المفتاحية: الابتكار التكنولوجي، البيئة الخارجية، البيئة الداخلية (التنظيمية).

تصنيف جال : O3 , L6 , M5

**L'IMPACT DES CONTRAINTES ENVIRONNEMENTALES SUR LES PRATIQUES
DE L'INNOVATION TECHNOLOGIQUE
UNE ÉTUDE PRATIQUE SUR UN ÉCHANTILLON D'ENTREPRISES
INDUSTRIELLES ALGERIENNES**

RÉSUMÉ :

L'innovation technologique comme phénomène complexe, est constituée de plusieurs facteurs liés à sa construction et son développement. Toutefois, ce qui amplifie le degré de cette complexité, c'est que ces mêmes facteurs peuvent être stimulants dans des conditions environnementales propices, alors qu'ils ne le sont pas dans d'autres circonstances et peuvent devenir des contraintes environnementales. Dans cette optique, notre étude s'intéresse à recenser les contraintes environnementales les plus pertinentes qui ont un impact direct sur l'innovation technologique dans les entreprises industrielles algériennes. Les résultats de cette étude ont démontré que les contraintes environnementales externes (économiques et technologiques) ainsi que les contraintes environnementales internes (organisationnelles), sont parmi les plus importantes contraintes au développement de l'innovation technologique.

Mots clés: innovation technologique, environnement externe, environnement interne (organisationnel)

Jel Classification: O3, L6, M5

INTRODUCTION

In the light of changing and complex conditions and the implications of the knowledge economy that the economic world is witnessing today, knowledge and science have become the most important source of competitive advantage for any enterprise. This requires the keen interest in the phenomenon of technological innovation as the link between the level of human resource, and that of knowledge and science.

In order for the Algerian industrial enterprises to gain the competitive advantage that enables it to continue, survive, expand and have resilience in the face of major challenges, both internal and external, it is imperative to deal with new ideas and different methods to release the creative energies. In addition, it is necessary to develop the capacity for technological innovation among the work teams and individuals and to provide an encouraging and appropriate environment, in order to provide products and services that serve customers and meet their needs. Thus, this will result in ensuring customer loyalty and enabling Algerian enterprises to increase profitability in a way that enhances its competitive position. In light of the foregoing, the features of the problematic emerge, which are concerned with addressing the phenomenon of technological innovation as a multidimensional phenomenon that has many factors overlapping in the formation and success of its projects, including those related to the external and internal (organizational) environment of the institution. From this standpoint, the question arises: What are the environmental constraints both (external and organizational) affecting the use of technological innovation in the Algerian industrial enterprises?

In order to achieve the objectives of the study, the hypothesis we intend to discuss and hope to achieve is as follows ::

H0: There is no statistically significant effect at the significance level ($\alpha \leq 0.05$) between the external environmental constraints and the

combined organizational environmental constraints (technological, economic, cultural, organizational climate in the development of technological innovation, organizational culture) on the practice of technological innovation.

The desired objectives of this research revolve primarily around:

- Defining and clarifying the concept of technological innovation and related theoretical concepts.
- Explaining the impact of external environmental constraints (technological, cultural and economic environment) on the performance of the technological innovation activity.
- Determining the effect of some internal organizational environmental constraints on the practice of technological innovation activity.

In order to answer the question that relates to the study, the researcher uses a descriptive analytical approach that is based on describing the phenomenon, testing the hypothesis of the study, analyzing and interpreting data, and clarifying the various aspects to reach conclusions that contribute to identifying environmental constraints affecting the practice of technological innovation.

This research is based on....previous studies,Djeflat (2014) Elamiri (2017), Tuna (2015), and Dattousaid (2019). These studies take into consideration the direct impact of some determinants on the activity of technological innovation in relation to the internal and external environment of the company. But what distinguishes our study from other research work is that we integrate all the variables in a single study and we try to determine the variables that have more impact on the practices of technological innovation within the Algerian company.

1 - THE THEORETICAL FRAMEWORK

1.1- The concept of technological innovation

Research on technological innovation has gained special importance in the western environment, to the point that the OECD¹ has issued a

¹ Organization of Economic Cooperation and Development

special OSLO Manual to measure the results of the technological innovation process, and its costs in business establishments in the countries that belong to this organization. According to the latter (OECD 2005), technological innovation is the process that enables converting an idea into a new product or service, or Improving it into a saleable condition along with including, all practical, technical, commercial and financial activities necessary in order to move towards success in marketing the new product or service.

Ju et al. (2012) indicate that technological innovation is the technology of design, manufacturing and commercial activities related to the first commercial application of new products and processes.

Luis Suarez-Villa (2009) sees it as anything new, or every small or large improvement in products and production methods that occurs through individual or group effort, and which proves its success from a technical or technological point of view, as well as its economic effectiveness (improving productivity and reducing costs)

Based on the aforementioned clarification of the concept of technological innovation, the following characteristics can be deduced according to Andersson et al.(2008)

- Technological innovation is related to production, and is the result of applying recognized technical or technological knowledge.
- It carries competition in the final cost and selling price.
- Technological innovation is the functional integration of production engineering, market, product, supplier, and marketing.
- Technological innovation is a continuous process in many aspects: production, organization, products, information and technologies.
- Technological innovation is the realization of the ideas obtained from the research and the development process on the ground.

1.2 - Types of technological innovation

Trott (2002) states that technological innovation in an industrial enterprise can be classified into two types: technological innovation of the product and that of the production process.

1.2.1. The technological innovation of the product

The product is the basic pillar that maintains the survival, growth and continuity of the organizations. It is defined as a set of physical and technical characteristics combined in a specific form to satisfy a specific need.

Rahmouni (2011) sees this type of innovation as centred on the internal and external environment. The internal is represented in research, development and marketing activities, while the external is represented in the customer and competitors.

The technological product innovation is in the form of new products (goods and services) or the development of old products, and it takes two forms (Trott, 2012)

- Introducing a new product: that is, introducing a new product that has not been marketed and sold in the market before.
- Improving an existing product: changing some characteristics of the existing product to increase its survival and improve its performance.

The distinction between introducing a new product and improving an existing product poses some difficulties, especially in some sectors such as the service sector.

1.2.2. The technological innovation of the production process

Kim et al. (2012) indicate that a process is one or more tasks, one that transforms a group of inputs into a specific set of outputs through a combination of human and material factors, and process innovation is based on the way products are made.

Golder et al. (2009) among others, classify process innovation as a design innovation for a new production process and an improvement of an existing process aimed at reducing costs and improving quality

Designing a new production process: it means a complete re-arrangement of the production process, introducing new working methods, and substantially improving the production elements. (Gunday et al, 2011).

According to Reichstein et al. (2006), improving an existing process is: it is, , the introduction of gradual and simple adjustments to production processes, or the gradual improvement of production factors.

1.3 - The importance of technological innovation

Daft (2001) states the most important reasons why technological innovation has emerged as follow:

- Technological innovation is included in the various measures used to evaluate performance.

- The economic prosperity of the countries that supported technological innovation compared to the countries that did not provide appropriate conditions for this innovation.

Schilling et al. (2006) consider that the competition for the possession of more advanced technology is more important than that to produce high quality products and deliver them in record time. This is because the first competition is the way to achieve the second competition, and there is no longer any room to talk about a competitiveness using old technology.

- Technological innovation aims to continuously support the technical capacity of the organization.

- The importance of technological innovation is highlighted by reducing costs, and increasing the profits of the organization through selling its new products.

- Technological innovation plays a key role in the development of human capital, through qualifying and training humans in technological knowledge, research and development processes.

1.4 - Methods of resorting to technological innovation in the institution

Enterprise-wide research and development activities are not the only way to bring about technological innovation. There are other methods that the institution can resort to, which are subject to exploitation with varying costs and risks, and in accordance with the principle of rationalizing resources, time, and risks: The institution must make trade-offs in choosing the best alternatives. The various

methods of resorting to the production of technological innovations can be restricted to the following:

According to Broustailand et al. (1993), the incorporation of research and development activities into the institution gives it great independence to set an innovative program that guarantees an aspect of confidentiality and confidence in its activities and limits the imitators' aspirations to obtain new ideas and innovations in progress. This makes competitors take two to three years to imitate the idea of the innovation. Further, the lack of capabilities available to the institution, and the increase in the costs of research and development activities, oblige the institution to enter into contracts or conclude cooperation agreements with other or similar institutions in the same sector, or other economic sectors that aim to establish a set of relationships and connections in the field of research and development. Tarondeau (1994) states that obtaining technological innovations through subcontracting means that the institution has resorted to other institutions requesting partial or complete implementation of research and development activities, i.e. concluding agreements with external organizations. Among these organizations, for example: study offices, public and private research centers, universities, specialized industrial institutions, scientific societies and clubs, among others. This form is used in order to obtain technological innovations due to the lack of financial and qualified human capabilities of the concerned institution. The acquisition of an innovation license according to Landry et al. (2005) is the direct means of obtaining innovation, which is the purchase of a specific innovation from a foreign party in exchange for a material return. Moreover, next to being the most effective because it offers institutions knowledge about what they are buying, it is the fastest in terms of exploitation and direct transfer of knowledge and information on the subject of innovation in the case of contracting, and the least expensive according to the large number of individuals who request the acquisition of an innovation license.

1.5 - Environmental constraints affecting technological innovation

The success of technological innovation projects is intertwined with many factors, including those related to the external environment (technological, cultural, economic) and the internal environment of the institution (the organizational environment). As for the external environment, it is mainly based on the technological environment, which consists of the basic structure of science and technology (institutions, individuals, capabilities), the level of scientific and technological progress prevailing in society and the national capacity for creativity and innovation, as well as the ability to transfer, develop and adapt foreign technology and achieve benefit.

Regarding the cultural environment, it represents the general tendencies in society (authority, collectivism, masculinity and femininity, avoidance of risk). As for the economic environment, it includes financial resources, loans, direct financial aid, tax encouragement, intense competition in the market, etc. With regard to the internal environment, it refers to the organizational factors, which in order to enhance technological innovation, the institution encourages individuals to develop and think innovatively. On this basis, Antony et al. (2008) indicate that workers in major international institutions present many ideas and suggestions annually and that more than 90% of these ideas and proposals are adopted by the institution.

Rahmouni et al. (2011) believe that the organizational environment has a role in making the innovative process of functional value that represents a common concern for workers. This is by adopting an institutional participatory system and establishing open communication channels, and considering training as a functional duty aimed at enriching and developing the knowledge, skill and behavior of the individual to perform his/her work with a high degree of efficiency and effectiveness. Additionally, attention should be paid to research, experimentation, and the provision of financial resources, as well as setting objective criteria for performance evaluation, and systems for material and moral incentives for innovators who contribute to the development of the institution's performance.

Cozijnsen et al. (2000) state that it is imperative to build an organizational culture that encourages innovation and is capable of facing new challenges in implementing business, which requires attention to elements such as selection, research, reward and retention. Furthermore, it is worth emphasizing on:

The job affiliation, which is represented in the employees acceptance of the organization's goals, values, and the desire to work and continue with it.

Developing and rewarding distinguished individuals in important work sites.

Attracting, developing, and maintaining competent workers and adhering to them.

2 - EMPIRICAL FRAMEWORK

2.1 - Study population and sample

The study population includes workers in departments of production management, research and development, of industrial enterprises. It is the study sample that consists of four institutions representing the public and private sector (CMA institution, FMAG Agricultural Hardware Industry Corporation, the National Company for Electronic Industries ENIE, and Chiali Complex for Plastic Pipes). We have tried to focus on the major industrial enterprises in western Algeria. This is on the basis of the great amount of these institutions' capital, especially in the productive departments, as the technological innovation activity needs significant material capabilities and high-quality and trained human capabilities.

Due to the large population of the study, the sample method is used. Given the specificity of the study, the researcher resorted to selecting a sample (quota random), due to the availability of certain characteristics that the study requires. The sample is represented by department managers, engineers and technicians (for production and operations management, research and development, quality control, maintenance, etc.) as they are the closest to technological innovation. (100) questionnaire forms were distributed, i.e. a rate of (25) for each

entreprise, and (72) complete and valid questionnaires were retrieved for analysis.

The empirical study is limited to the sample of companies chosen over a period of two (02) months (September and October 2020).

2.2- Data collection and processing tool

The questionnaire is the main tool in collecting the information and data required for the study, and it is presented to a group of academic referees and some Algerian industrial institutions. The researcher responded to the opinions of the referees and made the necessary amendments in the light of their observations.

The internal consistency (Cronbach's Alpha coefficient) is calculated, Table (1), shows the validity of the study tool and its reliability for conducting statistical analysis. Furthermore, The Likert scale is also used as a method for designing the questionnaire. The results were calculated and processed depending on the Statistical Program for Social Sciences (SPSS V23) based on parametric statistical methods with the aim of discovering the relationships and the effect between the research variables:

Table 1. The internal consistency coefficient for the environmental constraints and technological innovation items

Axis No	Axis	Cronbach Alpha Coefficient	Result
01	The technological environment constraints	0.954	Consistent
02	The economic environment constraints	0.935	Consistent
03	Cultural environment constraints	0.914	Consistent
04	Organizational climate constraints	0.965	Consistent
05	Organizational culture constraints	0.977	Consistent
06	Technological innovation	0.945	Consistent

	All paragraphs of the questionnaire	0.988	Consistent
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Source: prepared by the researcher based on the outputs of SPSS V23

From the above table, we note that Cronbach alpha coefficient for all the questionnaire axes is very high, as its value ranges between 0.914 and 0.977, which is a high value if compared to the theoretical minimum 0.6, while its value was 0.988 for all the paragraphs of the questionnaire. In general, we notice that the reliability coefficient of the questionnaire was high, and this is what achieves the reliability in the consistency of the obtained results.

2.3- The presentation and analysis of results

In order to find out the general trend of the respondents' opinion on the direction of the axes' paragraphs, and after calculating the results of the mean values and standard deviations for all the paragraphs of the questionnaire axes, the weighted mean value and the standard deviation of each axis are extracted and compared with the fields of Likert as shown in the following table:

Table 2. The arithmetic means and standard deviations of the external and internal (organizational) environment axes

External and organizational environment	Arithmetic mean	Standard deviation	Percentage	Direction of the sample
The technological environment constraints	2.09	1.39	41.8	Low
The economic environment constraints	3.92	1.32	78.4	High
Cultural environment constraints	2.03	1.25	40.6	Low
The organizational climate constraints	1.95	1.15	39	Low

in developing innovative thinking				
Organizational culture constraints	2.06	1.23	41.2	Low

Source: prepared by the researcher based on the outputs of SPSS V23

Table 3. The arithmetic means and standard deviations of the axes of the technological innovation practicing

Technological innovation	Arithmetic mean	Standard deviation	Percentage	Direction of the sample
(Design, process)	2.22	1.34	44.4	Low

Source: prepared by the researcher based on the outputs of SPSS V23

2.3.1. The technological environment constraints

This axis is studied through questions (1,2,3), where the paragraph that states that (there is a high level of industrial efficiency in the institution) with a standard deviation (2.28) and an arithmetic mean (1.44) with disagree came first. Table 2 shows a low level of sample response for this axis.

Commentary: The technological environment has a central role in the process of creating technological innovations. On this basis, we can highlight some deficiencies that impede the practice and promotion of technological innovation activity as follows:

- Failure to take care of the educational institutions and professional training in companies development and linking them to the world of work to form directive, supervisory and creative workers, which resulted in a large deficit in the field of industrial coaching, whether at the level of management or control of technologies.

- The lack of communication mechanisms between the institution and the university, which is reflected in the difficulty of embodying technological innovations in the economic reality, if they are carried out at the level of scientific bodies (universities and research centers).

-The inappropriateness of buying technology by the private sector for the local environment of these institutions, and working to develop or reproduce it in another way, thus, it remains dependent on every development or even costly maintenance process.

2.3..2. The economic environment constraints:

Through questions (4,5,6), where the paragraph states that (the lack of financial resources has a negative role in technological innovations) with a standard deviation (0.96) and an arithmetic average (4.44) with strongly agree came first, which corresponds to the high level of the sample response.

Commentary: Despite the numerous economic reforms undertaken by Algeria in the field of innovation promotion in general, there are various shortcomings and obstacles hindering the practice of technological innovation in our national institutions, including:

- The lack of financial resources, which is considered to be the most important economic obstacles facing the innovation process, as it does not allow advanced research to be carried out in order to achieve technological innovations, nor to attract scientific and technological competencies.

- The absence of a tax reduction or exemption policy, and direct financial aid (loans and grants directed to research and development activities).Without it, institutions will not have sufficient financial capabilities to carry out all their activities aimed at technological innovation, through the exercise of the research and development process. This is in addition to the high costs of changing the equipment used in production or development, especially in public institutions, where obsolete technology is used with an equipment that often exceeds 40 years.

- The lack of incentives and technological innovation motives due to the lack of competition and the absence of its transparency in some cases, which led to a lack of respect for the rules of fair competition in the Algerian market.

2.3.3. The cultural environment constraints

Through questions (7,8), where the paragraph states that (the organization is willing and able to take risks concerning the outputs of technological innovation) with a standard deviation (1.05) and an arithmetic mean (1.74) with strongly disagree came first, which corresponds to the low level of sample response in Table 2.

Commentary: Studies in the field of management have shown that, depending on the culture of the Algerian manager, the percentage of uncertainties in decision-making regarding the application of new methods of work obtain the largest percentage. This explains why the majority of workers avoid taking risks, nor do they easily accept change, especially at the organizational level, because it is risky. This is what intersects with the majority of the respondents' answers regarding keeping the production pattern and product unchanged for several reasons, including:

- The fear of not ensuring the effectiveness and efficiency of the outputs of the technological innovation activity, and the belief in the high cost that institutions will incur at the beginning of implementing the outputs of technology innovation, either the process or product innovation.

- Not welcoming the renewal, and adhering to the fixed patterns of organization and work relations from fear to change on the part of workers because they see it as a threat to their positions or a reduction in wages.

2.3.4. The constraints of organizational climate in developing innovative thinking

This axis has been studied through questions (9,10,11,12), where the paragraph that states that (the administration of the establishment cares and listens to the ideas and suggestions of the workers) with a standard

deviation (1.37) and an arithmetic mean (2.32) with disagree came first. It is followed by the second paragraph that shows that (the institution management encourages learning and training through teamwork) with a standard deviation (1.08) and an arithmetic mean (1.79) with strongly disagree, and Table 2 shows a low level of the sample's response to this axis.

Commentary: Depending on the direction of the sample, the organizational climate in developing innovative thinking of the human resource in the institutions of the research sample and the majority of Algerian institutions can be described through the following points:

- Weak dealing with ideas and proposals resulting from a poor communicating process with workers; most decisions are taken by high managers without involving workers. This is due to the presence of a kind of arrogance among some officials, through their lack of acceptance of the employees' suggestions, their contempt and their belief that they are not a source of suggestions or innovation.

- The absence and weakness of learning through teamwork to develop skills in order to solve all problems related to production processes. This leads to a negative impact on the efficiency and effectiveness of the workforce currently present in the research sample institutions and the Algerian institution in general, which resulted in the poor control over the manufacturing process by the majority of production workers.

- Workers' fear of making mistakes and sanctions and the tendency to depend on others , which result in low attempts at creation and innovation

- The type of work contracts applied by some private economic institutions that do not guarantee the future of workers in the event of a crisis for the institution, which makes them feel insecure and in a state of job instability.

2.3.5. The organizational culture constraints

Through the respondents' answers to questions (15,14,13), the paragraph that states that (there is a high level of organizational loyalty among workers towards the institution) came in first place, with a

standard deviation (1.3) and an arithmetic average (2.21) with a disagree. This corresponds to the low level of the sample response, as shown in Table 2.

Commentary: The reality of the organizational culture prevailing in the institutions of the research sample, and the Algerian institution in general, can be described as follows:

- Weak organizational loyalty to the institution, where the employee's loyalty to the organization lies in the fulfilment of only the minimum tasks assigned to him/her, and s/he works carelessly. Thus not expecting him/her to contribute in any form of technological innovation.

- The failure of the administration to establish and introduce the worker to the participatory culture in achieving organizational goals which leads to low morale and innovation.

- Taylorism thought still dominates some officials (separation between design and implementation) through the inflexible organizational structure, which directly affects the level of technological innovation capacity in the institution.

2.3.6. Technological innovation performance

Through the respondents' answers to questions (16,17,18,19), the paragraph that states that (product designs have changed in the last 3 years) came in first place, with a standard deviation (0.72) and an arithmetic average (1.61) with strongly disagree. This is followed by the paragraph (the enterprise has improved production processes in the last 3 years). As for the paragraphs related to the continuous improvement of product designs and production processes, the respondents' opinions are neutral, which corresponds to the low level of the sample response. This means that the performance of both types of technological innovation (product and process) is weak to an extent that may be almost non-existent.

Commentary: The approach and philosophy of technological innovation is directed towards the customer as a part of the enterprise being the first to be responsible for providing ideas and accurate opinions, especially in the field of design, and improving the physical

properties of the product. However, the research sample institutions and many of our national institutions shape their product designs according to the objective of the market, because they do not have a culture of listening (to the customer's voice), to use his/her contribution in solving problems and improving designs.

-The research sample institutions and the Algerian enterprise in general do not have sufficient flexibility to make any improvements in production processes. This is due to the quality of the machines, the advanced equipment that is not suitable for the local environment and the outdated ones in the public sector.

2.4- Hypothesis test

H0: There is no statistically significant effect at $(0.05 \geq \alpha)$ between the external environment constraints and the combined organizational environment (technological, economic, cultural, organizational climate in the development of technological innovation, organizational culture) on the performance of technological innovation. This hypothesis is subjected to standard multiple linear regression analysis and the results were as follows:

Table 4. Results of the overall significance analysis of the regression model
Model summary

Model	Correlation coefficient R	Determination coefficient R2	R2 modification
1	0.979	0.958	0.955

Variance analysis

Model	The total sum of squares	F value	Significance level
Regression	1349.553	301.635	0.000

Source: prepared by the researcher based on the outputs of SPSS V23

In order to know the relationship between technological innovation as a dependent variable, and the independent explained variables

(external and organizational environment), a multiple linear regression model is used see (Table 3).

The results show that there is a strong correlation between the variables, given the value of the high correlation coefficient (97.9). The results also show that the regression model is significant, through the value of F of (301,63) in terms of (0.000) less than the level of significance (0.05). Given the value of the coefficient of determination, the results show that the independent variables explain 95.8% of the variance in technological innovation, while the ratio (4.2%) represents the unexplained variance, which reflects the influence of some other variables that are not included in this study. Thus we accept the alternative hypothesis H1, and we reject the null hypothesis H0. This, therefore, means that the model has the overall significance.

Table (5) shows the partial significance, in order to find out and determine which of the obstacles most affecting technological innovation, and the results showed that:

Table 5. The results of the partial significance analysis of the regression model

Model	Non-standard coefficients		Standard coefficients	T value	Significance level
	B	Deviation estimate	Beta		
(Constant) A	-1.218	0.420		-2.896	0.005
The technological environment constraints	1.157	0.331	0.609	3.497	0.001
The economic environment constraints	0.389	0.049	0.304	7.921	0.000
Cultural environment constraints	0.332	0.195	0.296	1.702	0.093

The organizational climate constraints	0.398	0.046	0.396	3.672	0.002
Organizational culture constraints	-0.330	0.187	-0.268	-1.761	0.083

Source: prepared by the researcher based on the outputs of SPSS V23

The statistical significance value of the constant (A) is 0,005, which is less than the level of significance 0.05, indicating that the constant magnitude in the regression model is significant.

As for the independent variables or obstacles affecting technological innovation, they are as follows, respectively:

1. The economic environment constraints:

We notice that the value of $t = 7.921$, which is greater than the tabular value (2), in addition to the level of significance, which equals 0,000 that is less than 0.05. This reflects the importance of the variable in the model, and, thus, has a significant effect.

2. The constraints of the organizational climate in developing innovative thinking:

The T-test value = 3.672, which is greater than the tabular value (2), in addition to the significance level, which is equal to 0.002, and less than 0.05. This indicates that this variable has a significant effect on the dependent variable.

3. The technological environment constraints:

The value of $t = 3.497$ which is greater than the tabular value (2) in addition to the level of significance that is equal to 0.001 which is less than 0.05. This reflects the importance of the variable in the model, thus, this reflects that this variable has a significant effect on the dependent variable.

As for the rest of the variables or constraints related to the cultural environment and organizational culture constraints, the t-test values are less than the tabular values, in addition to the significance level that equals (0.093) and (0.083), which is greater than 0.05. This reflects that these variables or constraints do not have a significant effect on the dependent variable (technological innovation).

2.5 Results and Discussion

We proceed to the discussion of the results based on a comparison with the previous studies in this field. Our study allowed us to arrive at the following results:

-Our results show that the economic and technological constraints in the external environment in Algeria represent a major obstacle to the development of innovation. According to the empirical study, the main factor comes from the external environment, hostile to any attempt to establish a technological innovation strategy in the company. This dysfunction can be caused by an economic instability that persists in our country.

This finding is different in the context of developed and even emerging countries since according to a scientific consensus among previous studies, there should be a positive correlation between the two determinants above. In addition, the work of Tuna (2015) and Dattousaid (2019) focuses on the one hand on the exploitation of tacit knowledge as an essential lever to promote technological innovation and, on the other hand, on investment in a knowledge management project in order to successfully face the external environment and, thus, reduce economic constraints.

-The constraints of the internal environment (organizational), and in particular, the organizational climate have a positive impact on the construction and development of skills related to the conduct of the technological innovation project. Therefore, the organizational climate factor that we have detailed in our article revolves around problems related to the management of human resources in the companies

studied. This result is consistent with previous studies, both recent and ancient.

-The absence of an impact of the cultural environment (external) and organizational culture (internal) on the development of creativity in technology, despite the presence of a moral impact (psychological and behavioural at work) of two variables during their analysis. This contradicts previous studies where we found a significant impact and a strong correlation between organizational culture and the innovation project.

CONCLUSION

It is worth noting that there is no longer any need to talk about competitiveness with old technology. Rather, competition is on the volume of investments that are allocated to technological innovation activity. However, stimulating the innovative capabilities may occur in a stimulating environmental condition, while it is not the case in other environments and may become environmental constraints. On this basis, the results of this study show that:

- The (economic and technological) constraints of the external environment bear the greatest impact on the performance of technological innovation of the research sample institutions. This is due to many factors that are outside the control of any institution trying to practice a technological innovation activity.

- The constraints of the internal (organizational) environment, especially (the organizational climate in developing innovative thinking), had a clear impact on the practice of technological innovation. This is due to many factors it is worth noting that this study has addressed the problems related, as the problems related to human resource management in the institutions of the research sample represent the main basis for these factors.

- The results indicate that the cultural environment (external) and organizational culture (internal environment) have no effect on technological innovation, despite the presence of a significant impact of these variables when studying them. This is very different from what is happening in the environments of developed countries, where it is

assumed that there is a strong impact and relationship, as theoretical logic requires.

In the light of the results of this study, the researcher recommends the following:

- The need for the state to support industrial enterprises, by thinking about mechanisms on how to assist financial institutions and encourage them to work on technological innovation.

- Ensuring the promotion of the quality of education and training in educational institutions and training institutes, and the development of continuous communication mechanisms with institutions.

- Company management should pay attention to competencies, work to develop them, motivate them, and encourage them to present their ideas and opinions.

- The management of institutions should create a suitable work environment, and work to create a sense of stability and encourage the employee's loyalty towards his institution.

- The necessity of developing values in order to build an organizational culture based on serious cooperation, teamwork, continuous improvement of production processes, desire for creativity and innovation in the productive field.

- Managers should consider the customer as an effective party in the should, by introducing and adding him/her to the membership of the quality teams for the purpose of listening to his/her views, and requesting his/her contribution in improving and solving the problems of quality designs.

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