

Development of technological innovation in SMES in the municipality of Tepetlaoxtoc, State of Mexico

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Abstract

In the municipality of Tepetlaoxtoc, State of Mexico, the various reasons why micro, small and medium enterprises suffer from a lag in technological innovation that prevents its growth are unknown. The magnitude of the problem, a descriptive research was applied as characteristics or features of the situation or phenomenon under study are outlined. (Bernal, 2010). an assessment tool for Business Innovation was applied to quantify the major deficiencies that had MSMEs in Tepetlaoxtoc, State of Mexico. Given the above, according to the survey of MIPYMES in the municipality, it was found that over 90% of companies are micro, which are not registered with the Servicio de Administración Tributaria (SAT), which further complicates the process to generate technological innovation on their own, since they are not suitable to apply to the various programs, funds and incubators to which it gives free access federal and state government.

Tepetlaoxtoc, Mexico State, Technological Innovation, MSMEs, backwardness.

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Introduction

During the period 1940-1970 industrialization in Mexico, given accelerated way funded by the agricultural sector, starting the import substitution model where dynamism generated in MSMEs starts, allowing them to thrive in a closed economy context and the small domestic market.

Subsequently, the entry into force of NAFTA in 1994 put an end to this model with the opening to the outside market. Faced with this change, Mexico is at a great disadvantage to the industrialized countries that already relied on methodical and scientific processes for the creation and development of innovation and technology, which the country had been tightening.

Schumpeter (1912) says that "the engine of economic development and structural change is innovation a process that goes beyond macroeconomic shocks and fluctuations in demand and that drives the economy to break with his "circular flow".

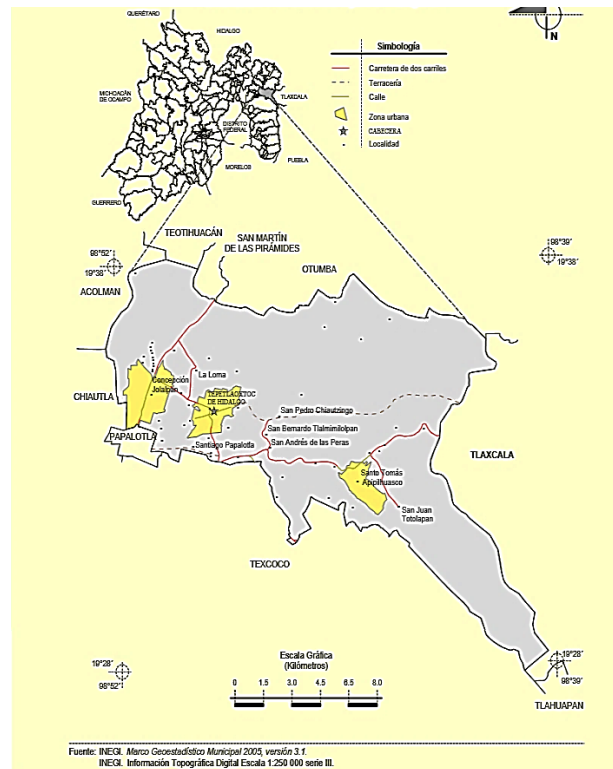
The theory of the "technology gap" argues that the main effects of technological change on specialization, are reflected in the innovations provided to specific countries and sectors most dynamic and enduring competitive advantages that are based on unit labor costs (Fagerbeb 1988 Dosi et al., 1990 and Wakelin, 1997).

In this paper, the results that were reached based on research, and giving possible solutions to solve their organizational problems are mentioned.

Finally, conclusions and recommendations that were reached based on the issues raised will be presented.

Tepetlaoxtoc: A Brief Overview

Tepetlaoxtoc comes from the Nahuatl language and means "In the caves of tepetate". It is located at the eastern end of the Valley of Mexico. It limits the north with the municipalities of Teotihuacan, San Martin of the Pyramids and Otumba; south with Papalotla and Texcoco; east with the states of Tlaxcala and Puebla; and west by the municipalities of Acolman and Chiautla. It covers an area of 172.38 square kilometers and has 42 communities. Apart it occupies 0.8% of the state's area.⁶⁹



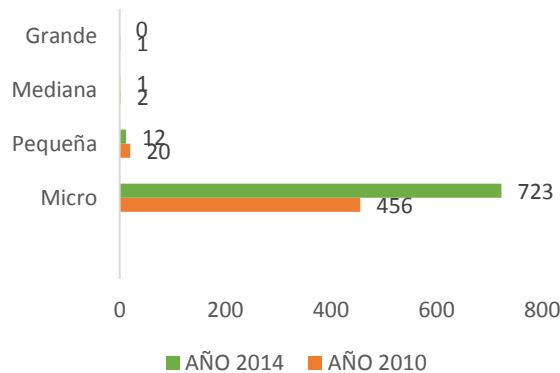
According to the results of the Census of Population and Housing 2012, conducted by the INEGI, the municipality had a total record of 27,944 inhabitants of which 10,925 constitute the economically active population (EAP) and 95.22% are occupied.

⁶⁹ Source: Municipal Electoral Platform Tepetlaoxtoc 2013-2015

The 51.31% are employed in the tertiary sector, 36.63% are occupied in the secondary sector and 10.21% in the primary sector.

According to records in the National Statistics Directory of Economic Units (DENUE), in 2010 there were 526 economic units, of which a filter, where he was ruled to organizations of educational, health and government sector was held, determining that the municipality were 479 companies, divided into micro, small, medium and large enterprises.

2014, and updating records DENUE, 821 economic units were registered, and doing the same filter, the number decreased to 736 economic units. Registering an increase of 257 companies in four years, representing 71.39% growth.

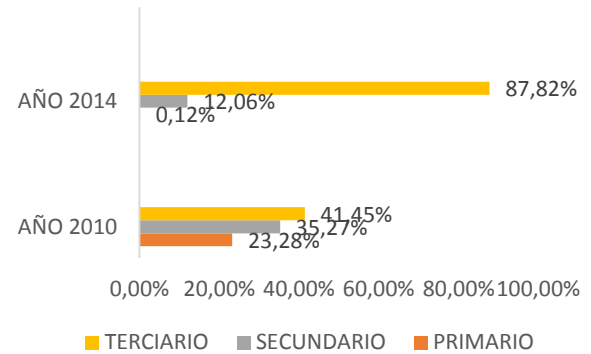


Source: Made by myself. Based on data from the National Statistics Directory of Economic Units (DENUE). 2010 and 2014.

Graphic 1 Number of Companies

Moreover, growth was markedly different economic sector between 2010 and 2014, by 2010 the primary sector accounted for 23.28% of the companies engaged in this sector, no clutch, in 2014 was severely reduced 0.12%.

The secondary sector 35.27%, declined to 12.06%. Finally, the tertiary sector grew by more than 50% over 4 years. From 41.45% in 2010 to 87.82% for 2014.



Source: Made by myself. Based on data from the National Statistics Directory of Economic Units (DENUE). 2010 and 2014.

Graphic 2 Growth Sectors

Micro enterprises are mainly engaged in the tertiary sector, contributing more than 80% of the town's economy. With respect to gross domestic product (GDP) was generated in the Municipality for 2010 was 402 (2003 million pesos), equivalent to 0.05% of the state total. But for 2012, the GDP fell to 368.75 (Millions of pesos) Municipal GDP (Base 2003 = 100), equivalent to 0.04% of the state total. As for 2012, the GDP of the State of Mexico of 9.14% nationally. And the GDP per capita of the population of the municipality of Tepetlaoxtoc of 1,836 pesos per capita.

For the eighties technological innovation was visualized as something coming from outside in the form of equipment, tools, patents and / or licenses (static approach).

However, in complex and turbulent environments as is characteristic of globalized markets, it emerged, and now with greater intensity, an interest dominates the competition with media developed within the organizations (dynamic approach), recognizing innovation technological and non-technological developed within the organization or outside of it by combining both a key element in the prosperity of a country due to the processes developed to generate knowledge, to produce research and building human capital.

Technological innovation

Technological innovation goes beyond R & D (Research and Development), given that encompasses all phases trade finance scientific, technical, and necessary for the development and successful marketing of new or improved products.

The technological innovation activities include:

- Investigation and development.
- The acquisition and generation of relevant or new to the firm, such as the acquisition of foreign technology in the form of patents, non-patented inventions, licenses, know-how, trademarks, designs, models and other scientific and technical knowledge related services with the introduction of technological innovation and the purchase of software packages; acquisition of machinery and equipment technologically improved performance, related to innovation implemented by the company.
- The priority related to production, such as the development of tools, process engineering and industrial designs, tools and equipment, personnel training, among others.
- Furthermore, technological innovation is a result of two factors:
- Increased knowledge; Y

- The way to achieve technological innovation is applying new knowledge or discovered by others in order to get an upgrade.

MSMEs and Innovation

In Mexico, of the 4 million registered economic units, 99% are MSMEs (micro, small and medium enterprises). These businesses contribute 52% of the total Gross Domestic Product (GDP), while the remaining 48% is contributed by the top 1% of large companies. (INEGI, 2010)

The State of Mexico is the most populous state of Mexico with 15 million 175 thousand 862 people living in an area of 22 000 353 km². The surface of the body is not very large for the population thus has only found above Hidalgo has a population of 2 million 665 thousand 018.

"The economic indicators show that the state entity of Mexico ranks second in the country with a high value of 91 thousand 268 million dollars (mdd) more Gross Domestic Product (GDP), representing 9.14% of the national volume total. To get an idea of the volume of GDP in the entity, just say it's more than the total GDP of Puerto Rico totaling 77 000 136 billion. However, because the company is also the most populous, the per capita GDP of 5000 is \$ 759, lower than the national average of 8000 \$ 635 figure. Furthermore, it ranks 23 in the State Competitiveness Index. This index examines the ability of a company to attract and retain talent and investment, and has 10 sub-indices that can be divided into three categories: 1) Political and Government, 2) system environment and society, and 3) economy, market and innovation factors.

The Mexiquense Council of Science and Technology (COMECYT) emerges as an institution within the State of Mexico that promotes human capital formation, scientific research, technological development, innovation and dissemination of science in order to generate higher productivity, competitiveness and modernization of the State of Mexico. For it carried out the following functions: a) provides scholarships and financial resources for the training of students and professionals in areas of scientific and technological expertise; b) made financial contributions to the projects of CTI, and facilitates collaboration agreements between educational institutions, CI, public and private organizations; c) detects and tracks human resources with scientific and technological skills in the organization and links by performing stays, symposiums, conferences and other events; d) recognition and encouragement given to citizens with merits and achievements in the areas of science and technology. COMECYT mission is to promote and support the progress of science and promoting the development and use of new technologies to meet the needs of society mexiquense, with transparent processes that enable optimal utilization of the resources allocated.

Innovation is the introduction of a new or significantly improved product, process, organizational method or marketing in the company (Oslo Manual, 2006). Companies engaged in innovation in order to increase production, reduce costs or gain competitive advantage over their competitors; All these activities generate growth for the company and its economic environment. In this regard it is of utmost importance to the economies have a measure of innovation activities and technological efforts by companies in order to foster or continue to promote these activities.

Patents are one of the most common indicators for global innovations because they contain information about the inventiveness of companies necessarily have potential to be produced at industrial level.

In the State of Mexico the number of applications has grown steadily over the whole period analyzed, with an average annual growth rate of 6.3%. In 2012 the participation of the entity in the total number of patents at the national level was 7.4%. The state ranks fourth nationally in the number of applications submitted throughout the period; the first place is the City, followed by Nuevo Leon and Jalisco.

Innovation as a strategy to increase the competitiveness of companies consolidates its position in the market and competes in the long term. Innovation is a complex process capable of measuring through the monitoring of various activities including, in general, the generation of new processes and the development and introduction of new products. Survey Research and Technological Development (ESIDET) can generate indicators that characterize the innovative activities, the scope of new products and business processes, and the degree of involvement of the companies.

Based on information from the ESIDET of 2012 is that the State of Mexico has a relatively high number of companies carrying out innovation activities, with a rate of 9.82 per thousand innovative companies domestic companies the entity exceeds the national average 8.23 companies. The technological maturity of the companies is a derived indicator ESIDET which measures the degree of assimilation and development of new technology companies through an index on seven levels, whose interpretation is rising: from low to high degree of technological maturity.

Thus it is that production companies in the State of Mexico with a rate of 1.32 have a degree of technological maturity with relatively lower than the national index of 2.07. In addition to the above in the entity only 16.3% of companies made incremental product innovations, ie changes that improve their performance valued by customers, but where the essence of them is not changed. Also it emphasizes that only 18.55% of the entity companies innovated product with global reach, while nationally it takes 21.3% of the companies. Finally it is noted that the entity 21.61% of companies state they operate in linking innovation, a percentage that places the entity below the national average of 36.85%⁷⁰.

Instrument Construction and Design of the sample

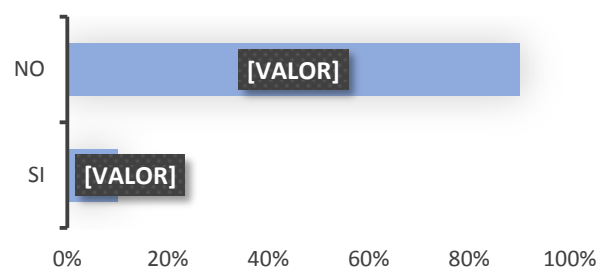
The tool consists of six blocks. The first block is to identify the participating company. The second collects information on general aspects of innovation of products and / or services developed in the surveyed company. The third section focuses in more detail about the characteristics of innovation processes acquired. Then, the fourth block analyzes the sources of information for innovation activities. After the fifth block mentioned factors hampering innovation activities. Finally, the sixth block lists the intellectual property rights of innovation.

According to records in the National Statistics Directory of Economic Units (DENUE), in 2010 there were 526 economic units, of which a filter, where he was ruled to organizations of educational, health and government sector was held, determining that the municipality were 478 companies, divided into micro, small, medium enterprises.

⁷⁰ Source: Diagnostics State for Science, Technology and Innovation 2014, p. 23-43.

II- Results

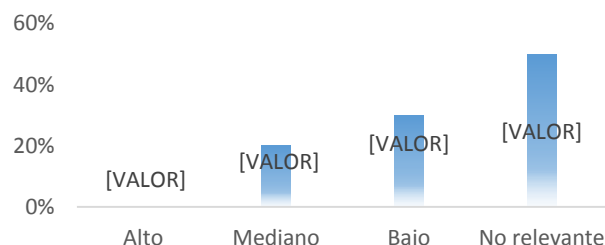
The results of the surveys conducted in the municipality of Tepetlaoxtoc entrepreneurs are presented.



Source: Own elaboration

Graphic 1 Development of innovation activities for products or services During the years 2010 to 2014

In Figure 1, we see that only 10% of MSMEs in the municipality of Tepetlaoxtoc, State of Mexico, active in innovation in products or services offered. Remarkably, this corresponds to only 10% of small and medium enterprises sector. Leaving lag to micro enterprises, which account for 90% of establishments in the municipality.

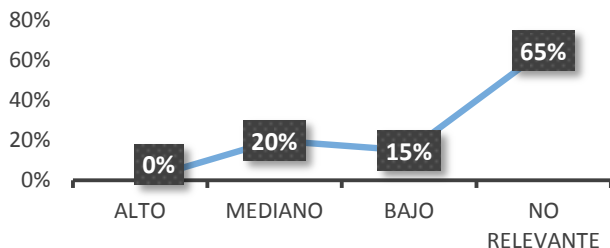


Source: Own elaboration

Graphic 2 Importance of Innovation

This table can be seen as only 20% of the companies interviewed considered a medium status to the importance of innovation, 30% established a low status, and 50% said they would be relevant implementing innovation in the organization.

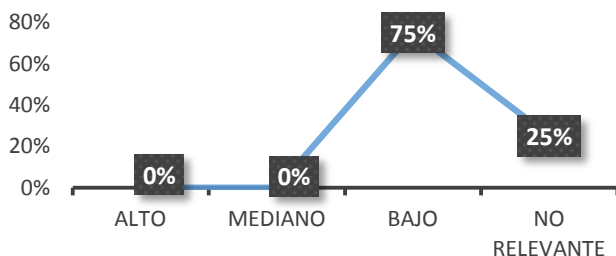
With these results, and through the application of the questionnaire, it was found that within MSMEs need a corporate culture that allows inform, develop and implement the benefits that the implementation of innovation within the organization.



Source: Own elaboration

Graphic 3 Entering new markets or increased market share through innovation

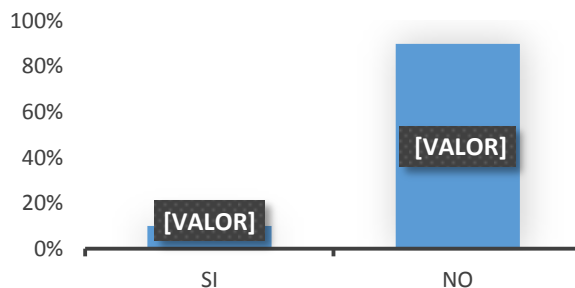
Innovation companies that were implemented in the period comprising the years 2010-2014, only 20% had a degree of medium-range to entry for new markets for their product or service; 15% noticed low and 65% was not a relevant factor, since not implement innovation.



Source: Own elaboration

Graphic 4 Improved qualities of products or services

In this graph, companies that implemented innovation, they noticed a low percentage compared to improving the quality of products or services offered to its market. While 25% represent companies that did not implement innovation.



Source: Own elaboration

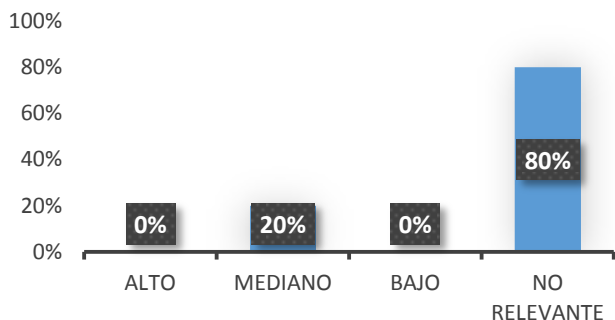
Graphic 6 Has implemented organizational innovation during the years 2010-2014

With regard to the organizational implementation, 90% of MSMEs, said failure to implement any improvement or internal significant change in the company. In addition, only 10% introduced this type of innovation, having resulted in a median change from time reduction in responding to the needs of its customers. Moreover, this limited their search for suppliers to obtain raw material.

Remarkably, 90% of organizations that did not implement organizational innovation said they were not interested in its future implementation. And the remaining 10% only saw one more method, unable to distinguish their advantages.

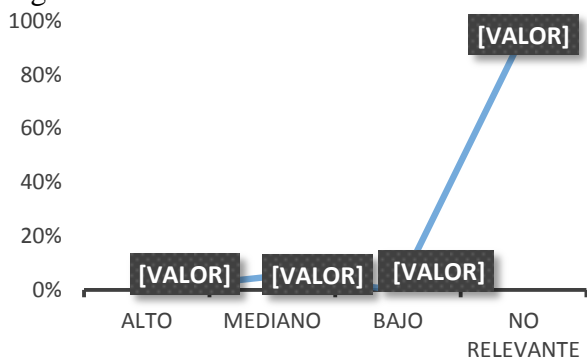
Moreover, since most companies are micro, they did not have adequate staff to such implementation, hence, lack of interest. Affecting the way of marketing your product or service.

Since these micro and small enterprises are mainly engaged in local market that circumscribed their municipality. How to distribute your product, it did not have a structure and even a method. So most guests had to go to the hotel for their product, and in the case of services, the attention was a little lengthy.



Source: Own elaboration

Figure 7 Effects of innovation in the organization



Source: Own elaboration

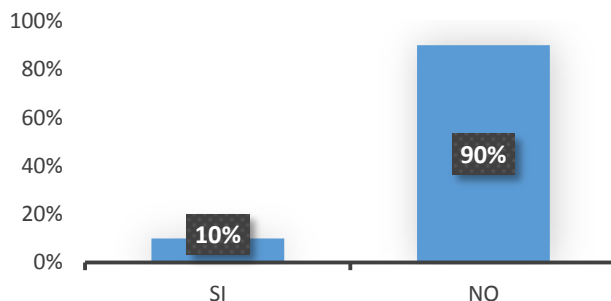
Graphic 8 Reduced prices through promotions

In the graph we can see how the application of innovation in the organization, such as new or significant changes in company structure or management methods that are intended to improve the use of knowledge or efficiency workflows, hit only 20% in medium grade companies that introduced the change.

Note that the generators of this innovation, part of the range of small to large enterprise. This means that less than 1% of firms in the town of Tepetlaoxtoc induced this change, and over 99% are still in a structural and business lag affecting its improvement by not considering significant positive changes they can make.

In addition, only 5% lowered prices through promotions, this is clearly reflected in the cost that had the implementation of business innovation.

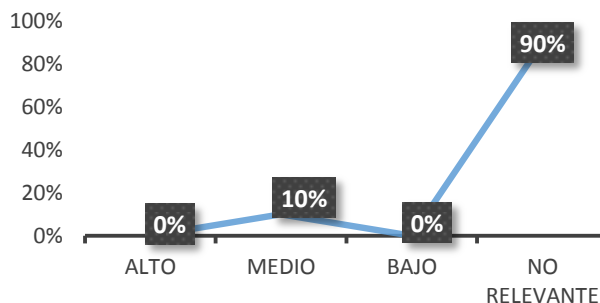
However, when asked about the cost I had the innovation process and why not about generating more promotions to make their products or services more accessible to consumers, survey participants chose to omit the question.



Source: Own elaboration

Graphic 9 Conducted innovation activities in the production of a product or service during the years 2010-2014

In this graph, during the four years, only 10% of businesses started and finished a process of innovation in the production of its products or services, while 90% were not relevant to them, or they obtained tools to reduce common or commercial production processes.



Source: Own elaboration

Graphic 10 Effects of process innovation

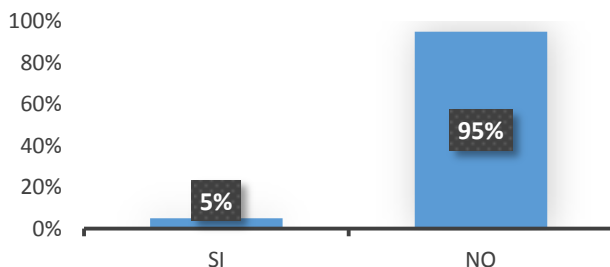
The effects seen by the owners in the implementation of innovation in production processes had a grade average of 10% relevance. What it says it had an impact, but still was not as expected. While the remaining 90% representing MSMEs not implemented innovation in production.



Source: Own elaboration

Graphic 11 Reduction of time to respond to customer and / or supplier

Derived from the innovation in the organization and production, and the customer being the main factor for the success and development of MSMEs and large business, the effect seen by only 5% of business owners noticed a mean change in reducing time to respond to their customer needs. Now the process inventories possibly used reduced the time to obtain raw materials from suppliers.

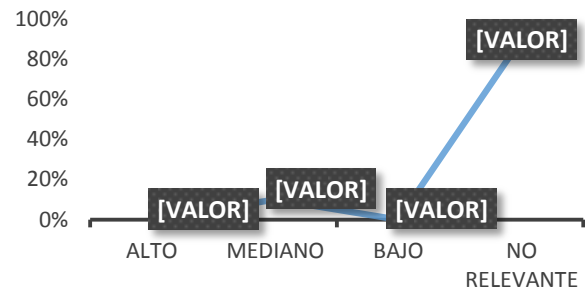


Source: Own elaboration

Graphic 12. Has commercial innovation activities implemented during the years 2010-2014

Regarding commercial innovations, which is the implementation of new or significantly improved designs as sales and distribution methods to increase the attractiveness of its products and services and thus enter new markets, making only 5% of MSMEs applied or they are being implemented, while 95% did not implement any commercial innovation.

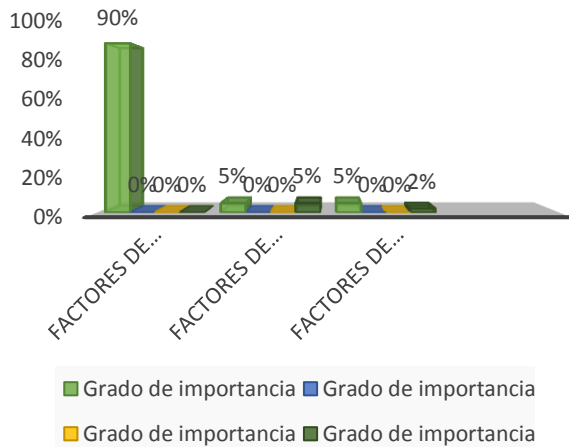
The factor for not implementing innovation was the cost of this and the time required for development.



Source: Own elaboration

Graph 13 Effects of innovation in marketing

However, businesses that implemented marketing innovation, only 10% had an average degree of development as the cost for implementing required both materials and trained personnel. And 90% are companies that abandoned innovation or not tried to implement or did not know what commercial innovation was.

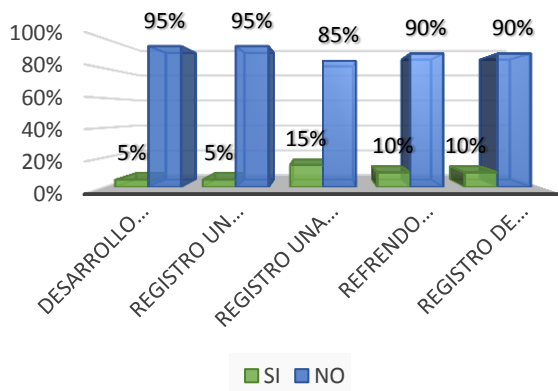


Source: Own elaboration

Graphic 14 Factors that hamper innovation

In this graph, we can see clearly as the biggest obstacle to the development of innovation in MSMEs in Tepetlaotoc, MEXICO State are the cost factors. At the interview, many business owners, said they had no notion of institutions or funds to support the implementation of innovation.

Making access to financing the biggest problem to attack, deriving to impede other factors, both knowledge and market.



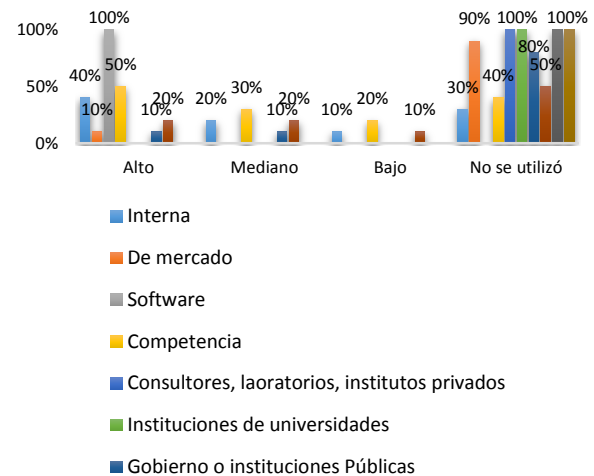
Source: Own elaboration

Graphic 15 Intellectual property rights

Since the cost factors are the main problem for the development of MSMEs, information on the benefits of innovation is also ignorance for trademark registration.

In addition, MSMEs that have low growth prospects and this no more than two years. Doing that only companies that reach small, but consist of a solid form, and midsize companies go on to develop patents, registered industrial design, trademark registrations, copyright endorsement and registration of a logo.

It is the highest percentage of the registration of a trademark, 15% of companies, only considered to SMEs, in addition to forming the lowest percentage in relation to companies established in the municipality of Tepetlaotoc, State of Mexico.



Source: Own elaboration

Graphic 16 Sources of innovation cooperation

In the graph on the sources of innovation cooperation, many of the owners or representatives of MSMEs Tepetlaoxtoc Township, State of Mexico, concluded that their total resource is due to the use of software developed primarily by an external agent the company, but that generates innovation and exclusively within the organization. While getting help to generate innovation was not obtained directly from the government sector, so that innovation expenditures were made directly by the organization. And to visit and be involved in conferences and exhibitions had a degree of 50% not be used.

Conclusions

Based on the results obtained from the survey of the MIPYMESS Township Tepetlaoxtoc, State of Mexico, one could deduce that there is a lag in technological innovation in the city, since most do not have a notion of innovation development.

For the years 2010 to 2014 only 10% of MSMEs active in innovation in products or services offered. On the other hand among the major causes of poor development of innovation, the cost was 90% of relevance within the main obstacles to the implementation and development of innovation.

Since there are 478 economic units in the city mostly devoted to the tertiary sector, with the main feature in the market informality and poor internal organization, generating an increase in the rate of negative results corresponding to the 4 main types of innovation mentioned in the survey, representing 90% of poor results.

Not to mention, given the nature of the question, was not obtained clear whether the development of these innovations are still carrying out or stopped in the corresponding period a year 2010-2014, this information was restricted by policies and distrust the same organization. The most notorious were the following issues, human resources, technology, financing and management of the legal framework. So we propose:

- Carry out the strategic plan for technological innovation in MSMEs, of Tepetlaoxtoc, State of Mexico, to reduce informality and involve businesses and government support programs that aid the organization in its development and continued market , achieving a boost to the establishment of their own innovation.

- Helping micro businesses in their struggle for the permanence of their companies in the market, creating competitive advantage employment of university students and their development as future business managers and management of SMEs, being a being hand cheap labor, but full of innovative ideas that will contribute positively to its improvement.

- Measure the results after the implementation of the plan to create a new action tool that provides innovative ideas for MSMEs.

- Encourage micro entrepreneurs in developing your organization to generate more jobs and prosperity for the growth of micro enterprises.

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