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Technological Management Models as a Mechanism to Increase the Value of SMEs

MIP. Dulce María León Vega[1], Dr. Martín Vivanco Vargas[2], Dr. Josefina Morgan Beltrán[3]

[1]Master in Senior Management in Project Engineering and student of the Doctorate in Administration at the Autonomous University of Querétaro
[2]Doctor in Technological Management and Innovation, research professor at the Autonomous University of Querétaro and current Director of the Faculty of Accounting and Administration of the UAQ.
[3]Research professor at the Autonomous University of Querétaro and current head of the postgraduate studies division of the Faculty of Accounting and Administration of the UAQ. ORCID: 0000-0002-6338-6209

Corresponding Authors:** ***MIP. Dulce María León Vega, *Master in Senior Management in Project Engineering and student of the Doctorate in Administration at the Autonomous University of Querétaro*

Abstract: *The technological management process not only includes the field of technology and its development, but also refers to practices supported by knowledge, it is a challenge for many organizations. This research provides an overview of how, through technology management and the tools it offers us, the conditions can be created to innovate and manage technology, owned by each company, to improve organizational practices and increase the value of the pymes. Through an analysis of the different models of technological management, different mechanisms are identified that lead to the most efficient use of technology for decision-making on technological and innovation strategies that allow promoting the development of SMEs at competitive levels. This research manages to identify deficiencies and areas of opportunity in the organizational process to promote the increase in value through correct technological management and its essential tools, such as technological surveillance, for the generation of mechanisms that allow the creation of sustainable competitive advantages in the pymes.*

Keywords: *Technological management, intangible assets, innovation in SMEs, valuation of SMEs*

1. INTRODUCTION

Technological management is a widely recognized issue in the Law for the Development of the Competitiveness of Micro, Small and Medium Enterprises (SMEs); where through the Ministry of Economy, the commitment to develop sectoral programs to support SMEs, promote them and facilitate their access to financing in equal opportunities for all companies has been demonstrated. Despite the fact that technology management has boomed in recent years and its importance has increased, its application has been wasted and, therefore, efficient technology and tools have not been developed in the market to make it easier for companies to real asset valuation; considering that this implies a process that demands the monitoring of adequate methodologies and formal tools that allow the reasonable measurement of its value beyond the traditional ones: furniture, computer equipment, offices, passing to the not so traditional ones such as intangible assets that can even make a company grow significantly through some technological development.

According to data obtained from the National Institute of Statistics, Geography and Informatics (INEGI), in Mexico there are more than 4 million 15 thousand business units that support the country's economy, of which 99.8% are classified as SMEs (2). However, most of them do not manage to obtain the necessary growth to support themselves and disappear, highlighting among the main reasons the lack of capital, the excess of procedures and high taxes, and the ignorance of the intangibility in the company (mainly in service companies) and the competition generated by other companies.

Commonly, SMEs are focused on the development and fulfillment of their main activity, according to their commercial sector, and do not have an area dedicated to technological management, therefore, they are unaware of their true potential value since their measurement focuses only on their book

value and ignore the value of intangible assets such as, for example, their developed intellectual property, the innovative processes they employ, the know -how how , software developments, etc. The foregoing, together with other factors, increase their problems in adapting to new technologies, innovations and competing in what the market demands. In conclusion, the problem is that most companies do not know what a technology management model means and therefore much less can seek and implement one that allows them to gradually incorporate and adapt to their structure, until its implementation increases. the possibility of knowing its true intangible value, enhancing its innovative capacity and, together with its accounting value, being able to generate better business opportunities for the company, reducing the competitive stagnation of SMEs in the market.

General Objective: By means of an analysis of the characteristics and restrictions of the technological management models, *propose different mechanisms that allow to increase the real value of a company through the capitalization of its intangible assets and the increase of its innovative potential*.

Hypothesis: 1) It is possible to increase the real value of a company, through the capitalization of its intangible assets. 2) Carrying out an analysis of the management models will allow the identification of the most viable model for implementation in SMEs. 3) A work strategy based on technological management will allow the diagnosis of the current situation of the company in order to develop and enhance its capacity and competitiveness by at least 10%. 4) The identification of the ability to take advantage of the technological capacity of companies will be given in at least 10% through the use of a tool that allows measuring its real potential value.

2. THEORETICAL BACKGROUND

2.1. Innovation

Innovation for companies can represent evolution, adoption or change. From the perspective of Michael Porter, the competitive advantages of a company are achieved through innovation and, likewise, the competitiveness of a nation will depend on the ability of the industry to innovate and improve. Some definitions of the concept of innovation are:

For the COTEC foundation, technological innovation is the complex process that brings ideas to market in the form of new or improved products or services (10).

The Oslo Manual in its first versions tells us that an innovation is a new or improved product or process (or a combination of both) that differs significantly from the previous products or processes of the unit, and that has been made available to potential users (product) or put to use by the unit (process) (11).

On the other hand, in the most recent version of the Oslo Manual, the OECD defined innovation as the introduction of a new or significantly improved product (good or service), a process, a marketing method or a new organizational method, in the internal practices of the company, the organization in the workplace or in external relations (12).

A common feature in the above definitions is that in order to be considered innovation, the product (good or service) must include an element of novelty, that is, it must be new or show considerable improvement, as well as it must have been launched to the market.

Although we find similarities in all the definitions of innovation, there are different classifications according to their nature, impact or degree of intensity.

Scope of action or nature:

1. Product innovation. Introduction of a new or significantly improved good or service in terms of its characteristics or in terms of its intended use.
2. Process innovation. Introduction of a new, or significantly improved, production or distribution process, improving quality, or producing or distributing new or significantly improved products.
3. Marketing innovation. Application of a new marketing method that involves significant changes in the design or packaging of a product, its positioning, its promotion or its rate.

4. Organization innovation. Introduction of a new organizational method in the practices, the organization of the workplace or the external relations of the company.

Impact of innovation:

- Radical. Fundamental changes occur. A redefinition of the organizational context and its practices is created.
- incremental. Small changes or improvements, mainly given in the processes or services.

Over time, the concept of innovation has had various meanings, however, the development of innovation in organizations is considered a key factor in creating the conditions to respond competitively to changes proposed by the market.

2.2. Technology

Technology is a word of Greek origin that can be defined as the set of scientifically based knowledge that allows describing, designing and applying technical solutions to practical problems in a systematic and rational way (13). In other words, technology is the ability to create a reproducible form capable of generating new and improved goods, processes or services:

- New products, goods or services (Product technology).
- New processes (Processtechnology).
- Adaptations to the needs of consumers or users (Design Technology).

Technology can be classified into:

1. Soft technology. Knowledge applied to the direction of the organization, forms and methodology used to carry out operations and the administration of its resources.

2. Hard technology. Knowledge applied and related to productive practice in order to obtain a product or service (machinery, equipment, supplies, etc.).

Technology includes both theoretical and practical knowledge, tangible and intangible assets such as know -how. how, productive, managerial and organizational methods and procedures. Its domain is based on the principle of preserving its competitive capacity and the possibility of adapting to emerging situations in the environment (14).

2.3. Intellectual Capital

Intellectual capital is the set of intangible assets of an organization that, despite not being reflected in traditional financial statements, currently generates value or has the potential to generate it in the future (15).

To speak of intellectual capital is to speak of those assets that, even without being able to be seen, are capable of adding value to companies to achieve distinctive capabilities. The challenge in organizations is to be able to identify and exploit the wealth that these assets provide, because despite not being an accounting concept, without a doubt, it has a real value.

Intellectual capital can be classified into:

- Human capital. The knowledge that companies possess, as well as their ability to develop and apply it: Tacit knowledge and explicit knowledge.
- Structural capital. Structured and protected knowledge in information systems, technologies, organizational processes. Example: Culture organizational.
- Relational capital. Set of relationships that the company has with the environment. Companies are considered an open system with constant interrelationships with other agents.

The true value of a company in a world as developed as today cannot be fully expressed through traditional accounting due to the inability to determine the value of intangible assets such as the ability to improve and create new stuff.

2.4. Management Technological

Technology management can be seen as the instrument that links the strategic and operational aspects of companies with the process of technological innovation.

COTEC recognizes technology management as the set of activities that enable an organization to make the best possible use of science and technology generated both externally and internally (10). The importance of implementing adequate technology management is based on the establishment of a technology strategy aligned with the organization's business plan.

The main purposes to which technological management is oriented in companies are:

- Integration with the company's strategy. Alignment of technology with the strategic plan in order to create a competitive advantage.
- Surveillance of technological advances. Instant response capacity to technological innovations that occur at high speed in the market.
- Appropriate selection of technology for the company's value chain. Technology adjusted to the company's strategy in response to the activities of its competition.
- Drive innovation. Application of new technologies for the creation of innovative products (goods and services).
- Secure the know how of the company Assimilate knowledge as a fundamental asset of the organization: preserve and promote learning-
- Linking companies with higher education institutions. Strategic alliances with research and knowledge generation companies. (16)

2.5. Surveillance Technological

2.5.1. Surveillance

The issue of surveillance in organizations can represent a process dedicated to obtaining relevant and pertinent information from the environment to be used in decision making.

Surveillance is based on four main axes (17):

- Competitive surveillance. Analyze information about potential competitors.
- Commercial surveillance. I study aspects related to customers and suppliers.
- Technological surveillance. It deals with available, emerging or newly created technologies.
- Environment monitoring. His study is based on the facts that may condition the future of organizations: politics, environment, regulations, laws, etc.

2.5.2. Surveillance Technological

Technological surveillance is an organized, selective and permanent process of capturing information from abroad and from the organization itself on science and technology, selecting it, analyzing it, disseminating it and communicating it, to convert it into knowledge to make decisions with less risk and be able to anticipate changes (18).

Technological surveillance can be considered a key element of technological management due to the ability to detect signs of change, competitive strategies, threats and opportunities for the benefit and exploitation of the company.

The purpose of carrying out technological surveillance lies in the need to maintain competitiveness in complex and changing environments. In order for a company to be competitive, it must have the ability to perceive in advance the changes that are coming in the market, maintain control and react in the right way and in a timely manner, also, as mentioned in the innovation sub-topic, it is the only way that we have in such a changing world to be able to predict technology and know where it could go.

VT is closely linked to innovation management and the company's strategy. Surveillance is projected on business decision-making, alerting about possible threats and opportunities, providing new elements and approaches, minimizing risks, which allows organizations to make decisions with a minimum degree of uncertainty. Likewise, the results of the TV can help guide the strategy in terms of projects based on R&D and their focus by detecting suitable investment and commercialization opportunities. However, as each company is different, the surveillance concept must be adapted to the needs and characteristics of each unit, turning it into a specialized process, which supports with greater importance having a suitable management model for the company.

3. METHODOLOGY

The procedure used to analyze companies and the relationship between management models and their value was developed based on a case study based on deterministic sampling. Therefore, the size and selection of the sample was marked by reasons of the follow-up that was sought to be given to the companies, in this way only companies that met 3 characteristics were inquired: the first that they were located in the state of Querétaro; the second that they were willing to answer the complete survey and receive a visit as well as allow subsequent monitoring for analysis and behavior in the subsequent 12 months and the third that they were interested in obtaining funds from some type of organization that promotes innovation or development of technological projects.

In this way, although the sampling is not probabilistic, from the outset, there are criteria that make the study quite relevant since, initially, it was sought to generate a probabilistic sampling, however, the companies were not responding in quantity. Sufficient and, generating the obligatory nature of the response generated several problems such as cost. This, coupled with the fact that for more than 12 months we have been experiencing characteristics that complicate the face-to-face visit and access to organizations to pressure the development of the survey due to the health contingency, deterministic sampling was established with a ratio of 4 to 1 considering the employment data where about 75% of jobs are generated by Micro, Small and Medium Enterprises and 25% by large companies, in this way, it was chosen to maintain this proportion as a sampling quota but based on the criteria above exposed.

As a first step, the main objective was analyzed and what was sought to be obtained from the survey, this was mainly linked to the issue of not dispersing efforts since what is intended is to promote the increase in the value of the company and identify the role played by management models to thereby propose the appropriate mechanisms delimited based on the above and the selection of companies surveyed.

The design of the questionnaire for the collection of information on the objective study was designed with the purpose of generating responses as homogeneous as possible with the aim of making them comparable to each other and facilitating the processing of data through spreadsheets, without forgetting the elements that were available such as: time to carry out the instrument, time to carry out the studies, time to follow up later, human, technological and economic resources to carry out the same, thinking about the relevant information that could be obtained from them.

4. RESULTS AND ANALYSIS

The valuation of intangible elements within SMEs through a technological management model allows, in addition to knowing their real value to implement strategies that allow it to be exploited, to measure the return on investment in people, their skills and technological capabilities of the organization.

This research has led to knowing how the correct management of intangible assets has a positive impact within SMEs in terms of increasing intellectual capital and its link with economic agents.

Each model presented over the years and the development of research is aimed at perfecting the previous ones, strengthening weaknesses, making new contributions and incorporating perspectives and alternatives that allow adaptation to organizational capacities.

The analysis of the results allowed us, among other things, to observe that of the different respondents in the process there was a lot of variation regarding the process of adaptation to change or resilience of the organization, which is also closely linked, among other things, with the members of the

organization. the same, the knowledge and openness as well as the organizational structure that they present, so in the first column we talk about the type of structure identified, in the second the characteristics according to the authors and in the third the observations that we found when following up to the different companies surveyed to find out how they can improve their technology management (37).

In the case of larger companies, it happens differently, since with age the most mature companies improve in replicating structures and routines that legitimize them to external parties, so the change becomes very difficult and costly, however for them the solution could be in overcoming "creative destruction" over time, that is, adapting to the new dynamics of the sector, closing or opening new lines of business to create something "better" all based on free competition since here, according to Schumpeter, In free competition, not even the government can direct or stop innovation; however, these mature companies have achieved something more important, which is to develop and evolve technological capabilities (38).

5. CONCLUSIONS

The study of previous research directly related to the valuation of intangibles allowed the company to realize the deficiencies and areas of opportunity of the current methods applied for the identification of intangible assets and their creation of value for SMEs. From the review of the literature and the observation made in the companies assigned for study, the following is identified:

- Most companies do not know the meaning of technological management and do not know the true scope of intangible assets.
- Introducing an area in charge of technological management or assigning dedicated personnel to this area is something that most companies, at the beginning of this research, did not consider relevant.
- Intangible assets present distrust in companies regarding the proportion of value. They are assets that they do not see and, therefore, are not considered value-generating assets.
- Although a company, regardless of its size, performs basic technology management functions, the relevant environment qualifies them as innovative companies; however, on some occasions it is not enough to generate a real competitive advantage in the market.
- The development and growth of a company are factors that limit the ability to access resources and the technological environment.
- There are many studies that measure intellectual capital, but without a well-implemented technology management model, there is no way of knowing the impact of these competitive advantages, mainly from an economic point of view.
- Innovation does not necessarily require extensive research with many resources and converting this intellectual capital into advantages is something possible that becomes more tangible when there is understanding on the part of the organization.
- The speed of change today makes technology-based innovation a crucial element in maintaining a sustainable competitive advantage.
- It is necessary for the government at its different levels to continue carrying out policies to promote innovation in the productive sector and in the institutions, since if it continues with the current policy, it is very likely that there will be a setback.
- It is necessary to increase the tangible processes in organizations that do not have it, since when a "valuable" employee leaves, they take not only the knowledge but also the experience of the organization and part of its value.
- Increase the structural capital that remains in the company.
- Maintain and document the Relational Capital that includes customers, suppliers, partners, etc.

6. RECOMMENDATIONS

Based on the research carried out, the following recommendations are presented:

- Publicize the impact that technology has on the variables that determine the competitiveness of products or services in organizations.
- Identify the technological skills that a company has and define the best strategies to enhance them.
- Include an area dedicated to technology management. The investment in this area will be reflected in economic results for the benefit of the company.
- Budget allocation for investment in R&D in organizations.
- Change the vision of desktop innovation by studying success stories from the past by applying innovation in our own processes.
- Implement a sustained process of technological surveillance aimed at competitive intelligence that allows the organization to have at least located:
    - main competitors
    - Past and present technologies related to your area.
    - Technologies under development
    - Industry and technology leaders
    - Current demands and possible changes in the future.
    - Threats and opportunities that may impact the business.
- Generate and adjust your plans based on the results obtained by the different processes such as: Technological surveillance, historical analysis of the company, forecasts and, if possible, make the prospective. Within the planning, the lines of action that represent potential advantages should be included and the project portfolio should be prepared.
- Implement the changes and make them traceable and verifiable, within the company's capabilities.
- Enable the corresponding areas so that they can carry out their functions.
- Evaluate the impact of the implemented changes and their results.
- Detect and protect any idea or process that could be innovative or susceptible to its protection through the corresponding titles of intellectual and industrial property.
- Increase management commitment to these projects.

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AUTHORS' BIOGRAPHY

DULCE MARIA LEON VEGA, Free-time professor at the Autonomous University of Querétaro, Bachelor of Administration with a Master's Degree in Management in Project Engineering and an intern for the Master's Degree in Administration with a Terminal Line in Finance. Currently a Ph.D. student in Administration at the Faculty of Accounting and Administration of the UAQ.

Dr. Martín Vivanco Vargas, Doctor in Technological Management and Innovation, Director of the Faculty of Accounting and Administration and research professor at the Autonomous University of Querétaro, ORCID: 0000-0002-0637-579X

Dr. Josefina Morgan Beltrán, Research Professor of the Autonomous University of Querétaro, head of the postgraduate division of the Faculty of Accounting and Administration, Doctor of Administration with post-doctorate in Education, member of the National System of Researchers level I (SNI), member of the Program for Professional Development Teacher (PRODEP) and the National Association of Accounting and Administration Faculties and Schools (ANFECA).

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