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REVIEW GUIDELINES FOR THE TECHNOLOGICAL MANAGEMENT OF SMES IN THE FURNITURE AND WOOD SECTOR OF LOCALITY 10 OF ENGATIVÁ BOGOTÁ – COLOMBIA

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ABSTRACT

This article analyzes and carries out a qualitative and exploratory study, which aims to examine the effect of technology management. And incorporate basic components that understand the importance of management in the face of machinery and variables that intervene in the furniture and wood process of SMEs in locality 10 of Engativá, Bogotá-Colombia. As well as analyzing the importance of a standard-setting advisory company and defining the added value for the companies involved.

Keywords: Technology Management. Added Value.

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INTRODUCTION

During the course of 2023, 4.41 billion dollars was the figure reached in the furniture market in Colombia. For the period from 2024 to 2032, the market is considered to reach 5.20% in compound annual growth rate (CAGR). And, in this way, achieve the figure of 6.95 billion dollars, on average, by 2032. This increase demonstrates a high demand and also shows a market that is constantly evolving.

For its part, 700,034 represents the total number of companies in Bogota with active registration; this figure refers to the first month of 2023. If compared to January 2022 (668,850), there was an increase of 4.7% (31,184 companies). In contrast, for January 2023, companies with active and current commercial registration had a figure of 62.4%, that is, composed of 436,513 companies. However, 98.5% (429,932 prey companies) corresponded to those companies with a valid commercial registration that made their respective renewal and complied with the commercial registration. On the other hand, 1.5% (6581 companies) alluded to companies that, during the first of 2023, were created.

Within the period of analysis, 42,517 companies were registered; these had the characteristic of being three or more years old without having renewed the mercantile registration. Of this figure, 14,018 had five or even more years without carrying out the respective renewal. It should be clarified that this group in question reached 3.7% of the business fabric in 2023 (January); an increase of 1.9 p.p. compared to January 2022, in which there was only 1.8% participation.

Hence the concern, since, for the first half of 2023 there was a growth of 4.0% in businesses with active and current registration in the industrial sector in Bogotá. If compared to January 2022, it went from 74,014 companies to 76,971 in January 2023.

Among the localities that registered the greatest contribution to the growth of the sector, the following stand out: Puente Aranda (0.3 p.p.) with an increase of 4.5%, that is, 230 companies; Ciudad Bolívar (0.3 p.p.) with a figure of 8.2% (226 businesses). And Bosa (0.3 p.p.) with 216 companies equivalent to 6.4%.

Faced with the increase in companies in the industrial sector, the number increased by 6.2%, that is, 1897 establishments. If compared to January 2022, the figure went from 30631 establishments to 32528 in January 2023. Likewise, the localities with the highest contributions to the year-on-year increase were the following: Rafael Uribe Uribe (0.7 p.p) and an increase of 14.2%, that is, 200 companies. In

second place is Bosa with 11.7% (189 companies) and 0.6 p.p. In third place, Ciudad Bolívar obtained 0.5 p.p. and 149 companies, which translates into 12.3%.

Creación neta de empresas según tamaño de empresas por ingresos
año corrido a enero 2023

	Empresas creadas	Empresas canceladas	Creación neta
Bogotá	**6.581**	**1.781**	**4.800**
Microempresa	6.573	1.739	4.834
Pequeña	5	9	-4
Mediana	0	6	-6
Grande	3	1	2
Sin información*	0	26	-26

Fuente: Cámara de Comercio de Bogotá. Elaboración SDDE-ODEB
*Sin información: corresponden a las empresas que no tienen información sobre los ingresos.

In recent years, the productive structure has focused on service sectors that have not been sufficiently developed in the technological aspect. In these it is found that there is a close and moderate industrialization, which leans towards traditional sectors of consumer and intermediate goods. In recent years, Bogota's economy has shown difficulties when it comes to achieving stability. There is little capacity in terms of production and a low level in the manufacturing sector.

The town of Engativá, from 2019 to 2023 obtained a variation of -8.1%, while from 2021 to 2023 it was -0.2%; and from 2022 to 2023, the figure achieved was -3.6%.

The percentage of participation reached 9.0% until December 2023 and the town of Engativá was among the five places with the highest business concentration. This is due to the fact that there is a greater supply of services, both public and private, in the operation of the establishments.

It should be clarified that, among the criteria, quality is related to the model, precision in terms of cuts and surface finish. These criteria are linked to the problems that, today, have an impact on productivity when manufacturing furniture in Colombia. This situation arises because, in general, there is a waste in efficiency and quality. This is due to the fact that there is no effective control over the variables that have an impact. This is demonstrated in the loss of time, delays in the drying of the woods and, likewise, the lack of a quality system. It can also be said that the practice of manufacturing custom-made wood products in high-efficiency series is little implemented, which limits their added value. The general objective of this document entitled GUIDELINES FOR THE TECHNOLOGICAL MANAGEMENT OF SMES IN THE FURNITURE SECTOR IN

THE TOWN OF ENGATIVÁ, is to determine which are the variables of the technological processes that compromise the results of manufacturing. For example, the technological information management system and the competitiveness of SMEs. Likewise, it is proposed that SMEs in the town of Engativá, related to the technology sector, have the opportunity to review their situation in terms of various aspects: progress of their activity, technological development, connection with the market, human resources in favor of defense in industrial activity and, in turn, the strategy of the establishment.

JUSTIFICATION

Within the research field of the technological development of SMEs in the furniture sector in Engativá, it was observed that there are some variables, both internal and external, that have not been adequately studied. One of them refers to SMEs that do not have a knowledge base of good management in the workplace, which generates loss of time and efficiency. Thus, it is found that there is a problem in industrial growth.

As for the internal variables, the following stand out: supply of raw materials, productive capacity of the establishments, export experience, technological innovation and productive capacity of the establishments. With respect to external variables, it is necessary to make an analysis of international competition and, likewise, of the trends that consumers have in the different markets. Undoubtedly, the results could serve as guidelines for establishments that do not want to export; a guide for use and improvement within the same company.

Regarding the supply of raw materials, today there is a "Forestry Law", which is responsible for motivating investment, both national and foreign, in reforestation issues within the country. This incentive will help to achieve further growth in the furniture industry.

WHAT IS THE PURPOSE OF THE LAW?

Create the National Forest Regime to promote the sustainable development of the forestry sector in Colombia.

WHAT DOES THE LAW ESTABLISH TO ACHIEVE THIS END?

It defines the necessary administrative structure of the State and the regulations

for activities related to natural forests and, at the same time, forest plantations. The program has three phases that are applied by the assistants in a given area.

THEORETICAL MARCO

In the first instance, it is necessary to mention that 2021 is considered the year of the furniture sector. Due to the current situation, interest in the sector has intensified significantly in the face of the need to spend more time at home. "We are living in times of transformation, which are here to stay, our sector has been transformed and online sales, among other things, are reconverting us," said Amparo Bertomeu, director of the National Association of Furniture Industrialists and Exporters of Spain (Anieme), during the 2021 event, in which more than 90 people related to the furniture sector participated. The event was entitled "2021 conference, The year of furniture manufacturers: How to surf the wave without missing opportunities', organized jointly with the consulting firm Improven".

The number of manufacturing companies went from 14204 in 2004 to 6775 in 2019, reflecting a reduction of 50%. On the other hand, in the case of 2020, it is the first time in a long time that this sector shows a growth in the number of establishments. From a global perspective, the *home furnishing and DIY (Do it your self)* sector saw the greatest growth in the ecommerce channel. It even increased by 120% in the last year, beating the textile sector.

Sergio Gordillo, managing partner of Improven, said that "the home has become the second sector in consumption and the market forecast is that the profile of potential households with high purchasing power will triple in some markets, mainly driven by the Premium segment". The pandemic also helped the trend to become more pronounced. In recent years, the furniture sector has been characterized by the following reasons: greater concentration, that is, fewer but larger establishments; entry of large multinationals and references that were from other sectors (bathing, ceramics); close link between manufacturer and customer and less involvement of intermediaries; an increase in product customization as there is comprehensive customer advice; the entry of new technologies into manufacturing processes; and a greater increase in online sales.

For Gordillo, it is important to consider a new post-covid panorama, "which involves leisure at home, teleworking, open spaces within the home, more renovations

to enjoy the house". Faced with this situation, it is worth asking ourselves about the social changes that will have an impact on the furniture sector. Improven knows the answer. For Guillermo Prats, omnichannel, since furniture has entered to participate in online shopping. In 2020, it was observed that 14% of consumers bought furniture in this way (internet) with an average amount of expenditure that ranges, on average, of 305 euros.

This is due, firstly, to the fact that the consumer is no longer afraid to spend large sums on online purchases; at the same time, bulky products have had prominence on Amazon and different platforms. This is due to its high value and also its low logistics cost. The general demand of the market, where the technology is offered and disseminated, defines the specific particularities of the technologies that are used. This demand is also influenced by the economic and institutional environment of the market. In territories or countries where there is technological progress, there is a variety of availability of infrastructure resources. In addition, there is an accumulation of knowledge and salaries rise more rapidly. Hence, technological activities are responsible for saving in terms of the scarce factor (labor) and making effective use of qualified personnel. In addition to this, technological innovations have been limited by markets that stand out for being large and growing in consumption. And, in turn, because it has a competitive environment between companies. In this way, the technological transformation was aimed at using economies of scale and reducing the average costs of goods. This makes it possible to increase the volume of supply and, likewise, to differentiate products according to the economic possibilities (internal and external) that consumers have.

Technological progress has advanced and is very different from the economic context in Colombia. The exploitation of natural resources in the territory has not been sufficient for different reasons: the amount of unskilled labor; the domestic market is small; There is little differentiation in consumers and competition is low between establishments. These situations generate the creation of monopolies and oligopolies, which negatively affect the setting of prices. In addition to this, there are also payments that are increased by technology. In this sense, as the industrialization process progresses, it is essential to implement advanced technology, which generates higher expenditures on imports. These expenses include royalty payments, payments for the use of licenses and brands, and have been increased by overbilling with respect to the

cost of raw materials, equipment and maintenance services provided by suppliers. In 2021, the Gross Domestic Product [GDP] increased by 10.6% compared to 2020 (see table 1). The economic activities that most favor the dynamics of added value are listed below:

- Wholesale and retail trade, repair of motor vehicles and motorcycles, transport and storage, as well as accommodation and food services, grew by 21.2%, contributing 3.9 percentage points to the annual variation. For their part, manufacturing industries increased by 16.4%, contributing 2 percentage points to the annual variation.
- Public administration and defense, mandatory affiliation security plans, education, and human health care and social services activities grew by 6.9%, contributing 1.2 percentage points to the annual variation.
- In the fourth quarter of 2021, GDP, in its original series, increased by 10.8% compared to the same period in 2020p (see table 1). The economic activities that have the greatest impact on the growth of value added are:
- Wholesale and retail trade, automotive and motorcycle repair, transport and storage, as well as accommodation and food services, grew by 21.2%, contributing 4.2 percentage points to the annual variation.
- Manufacturing industries increased by 11.7%, contributing 1.5 percentage points to the annual variation.

Board 1. Value added by economic activity

Tabla 1. Valor agregado por actividad económica
Tasas de crecimiento en volumen[1]
Año total 2021p

Actividad económica	Tasas de crecimiento (%)		
	Serie original		Serie ajustada por efecto estacional y calendario
	Año total	Anual	Trimestral
	2021p / 2020p	2021p- IV / 2020p-IV	2021p - IV / 2021p - III
Agricultura, ganadería, caza, silvicultura y pesca	2,4	1,4	0,9
Explotación de minas y canteras	0,4	8,2	2,8
Industrias manufactureras	16,4	11,7	2,0
Suministro de electricidad, gas, vapor y aire acondicionado[2]	5,1	5,7	1,1
Construcción	5,7	6,2	4,3
Comercio al por mayor y al por menor[3]	21,2	21,2	4,6
Información y comunicaciones	11,2	18,1	4,7
Actividades financieras y de seguros	3,4	3,5	1,7
Actividades inmobiliarias	2,6	2,6	0,9
Actividades profesionales, científicas y técnicas[4]	9,7	10,1	-0,3
Administración pública, defensa, educación y salud[5]	6,9	6,5	1,0
Actividades artísticas, de entretenimiento y recreación y otras actividades de servicios[6]	33,0	31,6	4,0
Valor agregado bruto	**10,3**	**10,5**	**4,1**
Total impuestos menos subvenciones sobre los productos	13,5	13,8	3,4
Producto Interno Bruto	**10,6**	**10,8**	**4,3**

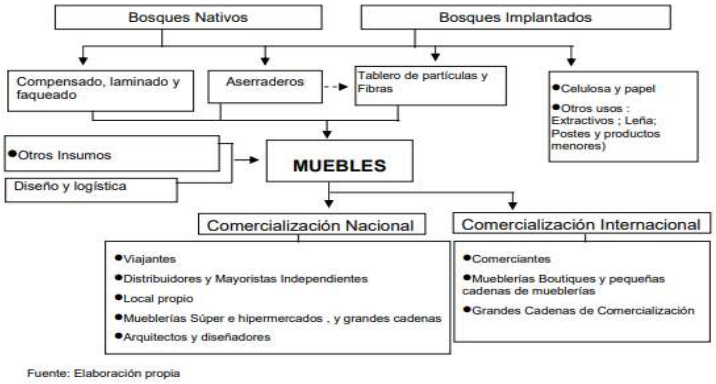
Fuente: DANE, Cuentas nacionales

- Compared to the previous quarter, GDP, adjusted for seasonal and calendar

effects, increased by 4.3%. This variation is mainly due to the following:

- Information and communications increased by 4.7%.
- Wholesale and retail trade, motor vehicle and motorcycle repair, transportation and storage, along with food accommodation, experienced growth of 4.6%.
- Construction increased by 4.3%.

Figure 1. Specific furniture model



Fuente: Elaboración propia

SCOPE OF TECHNOLOGY MANAGEMENT

Technology plays a crucial role in the design of artificial artifacts and in the modification of natural elements. In this sense, technology management becomes a key tool that facilitates human activities and executes tasks that require more individual skills. It is important to mention that technology management emerged as a response to the need to treat the technological component with a strategic focus in the business environment. Its main objective is the intentional and systematic integration of technological change, both at the national level and in companies and organizations. In short, its purpose is to promote industrial and technological progress through the planning and management of the necessary technology, guaranteeing its correct integration (Mejía, 1998).

This process includes the introduction and dissemination of knowledge, which is perceived in tangible objects: devices, equipment, processes used to produce, methods, distribution and marketing of services. This contributes to continuously improving activities. It even increases productivity and promotes the creation of new goods and services, improving quality. Nowadays it can be said that technology management maintains a life cycle that maintains permanent progress. Hence, it is essential to carry out processes that involve technological innovation. In these there

must be an improvement in terms of socioeconomic and technical aspects.

It should be clarified that, in this process of technological innovation, it has to begin by evaluating the level of technological integration in the establishments. This situation will help to differentiate the technology that is integrated into machines (*hardware*) and that which is in programs, magazines and manuals (*software*). Similarly, it also takes into account the one that is integrated into organizational structures (*orgware*) and the one that refers to people who have concrete knowledge (*humanware*) (Correa, 2008).

All of the above is reflected in the business plans, policies and strategies adopted for the acquisition, use and development of technology. In addition, this is manifested when the company places innovation at the center of its development strategies. So in an organization that has internalized technology management, it can be seen that its activities are integrated into its value chain, which are carried out through processes that involve the use of data, information, and knowledge.

Consequently, technology management will manifest itself in the processes of knowledge management, technology transfer, monitoring, technological intelligence, negotiation, research and development, evaluation of alternatives, and technological assimilation. Technology management processes encompass both basic and generic functions that address various areas of business activity (Gaynor, 1996).

For Ávalos (1993), the basic functions are the following:

- Identify and carry out an analysis of the appropriate technologies.
- The separation of technological packages in order to carry out an analysis and application.
- Dialogue for the acquisition or transfer of technologies.
- Build and implement productive systems, which are based on technology.
- Effectively use and assimilate adopted technologies.
- To generate and commercialize new technologies used by the establishment.
- Adapt and continuously improve the technologies available.

On the other hand, the generic functions include the following (Ávalos, 1993):

- The supply, monitoring, analysis and evaluation of technical training and technological foresight.
- The comprehensive technological evaluation of the company.
- Plan technological development and manage financing fundamental to

development.

- Select technical advisors for hiring.
- Creation of standards related to training and human resources.
- Processes that are linked to patenting, in order to protect intellectual property rights against the resources and technologies that the company develops.

Finally, three models are used to illustrate and explain technology management: what, how, and why (Botero et al., 2003). The "what" model focuses on a company's innovation and technology management, highlighting the fundamental components of a successful innovation process: surveillance, focus, training, implementation, and learning. On the other hand, the "how" refers to the way in which technology management is articulated in a typical business. It alludes to the way in which business processes favor this. It is based on a description of the links between processes that are immersed in innovation, for example: the creation of a technological strategy or the creation of new products. Finally, the "why" model refers to the fact that technology management is important and is related to the fundamental functions for the management of the company. These three models are incorporated into technology management plans.

From another perspective, technology plans include objectives, goals, actions, and strategies that are aimed at achieving effective technology management. Likewise, they integrate a planning model that refers to corporate rules, so that the model is aligned synergistically with other institutional strategies. This is due to the fact that it seeks to improve the use, investment in technology and development (Delgado, 2008). In addition to this, technological plans have to incorporate a technological package, which consists of combining, in an integrated way, knowledge in technology, and methods to produce goods and services (De La Rosa, 1997).

In the case of SMEs, these companies have the ability to incentivize innovative attributes that provide them with competitive advantages. They are based on their ability to operate without requiring large investments and, likewise, the possibility of achieving the reduction of fixed costs. This allows for an agile adaptation to the transformations that arise in demand conditions (Jiménez & Castellanos, 2008).

Therefore, if the analysis is carried out from the point of view of technological management in SMEs based on the model (what, how and why) through the establishment of different approaches and considering elements such as rationality in

technological development, the impact of the use of technology and technological reputation, differences are found between establishments in terms of their approach to the subject of technological development. Likewise, the effects that impact the use of technology and the perception of technological reputation.

DOMAIN ANALYSIS

Based on this analysis, the aim is to obtain a diagnosis of the domain that the establishment has against each of its particular and transversal technologies, in which three fundamental aspects are taken into account:

- Approach: an evaluation is made of the degree of coherence of the application of each technology and the standards that guide the company.

A high score in this factor will be obtained when the users of a technology recognize the strategic purposes of the company and, likewise, use the technology as an instrument to achieve the objectives.

- Implementation: refers to the way in which the knowledge of each technology is shared among users. When a technology is applied, new knowledge appears and increases efficiency.
- Results: refers to the achievements that the organization achieves through the use of a specific technology.

There is a high level of mastery if there is comprehensiveness and, likewise, coherence between these items.

Personal interviews are the methodology for diagnosing each technology. It consists of interviewing a group of officials who use technology or who are affected in a certain way by its results. A correct choice of the officials to be interviewed must be made, in order to obtain an opinion that is as universal as possible.

The result is understood as the knowledge of the strengths and opportunities that each technology has to achieve organizational goals.

ANALYSIS OF IMPORTANCE.

It is essential to recognize the revenue channels of the business, that is, the accounting way in which the company records its profits, to evaluate the importance of technologies. At the same time, it is necessary to recognize the performance indicators for each of these. Usually, these indicators are: market share, efficiency, quality,

profitability, number of customers and revenue per employee.

To analyze its importance, workshops are held with different participants, in which, after a relative rating of each technology, carried out by each participant individually, consensus agreements are reached on the general opinion of the proportion in which each technology bases each business channel.

With respect to domain and importance analysis, a matrix is constructed for each channel. In each technology, the level of dominance and importance for the channel is indicated.

By taking into account the strategic purposes of the business (short, medium and long term), the actions to be executed are proposed, in order to transfer the technologies from the point where they were positioned in the matrix to new points that help improve the company's performance. Greater priority is given to those actions that, based on fewer efforts, produce greater results.

On the other hand, internal monitoring refers to a cyclical process whose period will be related, will depend, among other aspects, on the duration of the defined actions and the strategic planning of the company.

BRECHA TECHNOLOGY

When mentioning the concept of technological gap, it is normal for this situation to be interpreted as if all economic sectors share the same technological backwardness. However, this is not true. Each sector in a country has a different level of technological capacity. In other words, while some sectors have developed a capacity that allows them to compete intentionally, others have stayed away from this process. This allows a gap to be opened compared to the sector in other countries.

However, the technological gap not only refers to the inability to develop one's own technology, but also refers to the inability to choose (outside or inside the country) the optimal technology to adapt and develop it.

Therefore, the concept of the technological gap lacks a direct indicator to assess it. However, based on the parameters (expenditure on research, development, percentage of licenses for the use of local patents, number of researchers and graduates, bibliographic citations of works that emerged locally, exports and imports of technology, capital goods, comparisons at the international level), it is feasible to build the technological gap, compared to others, in front of a particular industrial branch or, in

a general, but less valid way, in the related productive plant as a whole.

At the national level, there are some indicators, if compared with other countries, where the technological level that exists in Colombia is observed. It is critical to identify that this information states absolutely nothing about the sectoral gaps that are present during the industry. It is necessary to be concerned about comparisons of information, since it is not homogeneous, especially in the definition. It is therefore necessary to maintain a perspective in the face of the conclusions that arise from it.

In terms of the budgetary aspect, the resources that are focused on science and technology originate, mainly, from the State. This is achieved through Colciencias and other public institutions. In recent years, several of the resources have come from loans from the Inter-American Development Bank [IDB]. However, in relation to GDP, the impact of the efforts made is irrelevant, since it shows a downward trend. This is because total spending on science and technology reaches 1% of GDP by 2021. According to Tito Crissien, Minister of Science, in an interview with Forbes, he confirmed that, according to

period 2024-2025 of ECLAC Colombia, total spending reached only 0.2% of GDP on science and technology by 2024. This shows that the wood furniture sector, which has been made up of SMEs, has begun to understand the importance of improving its industrial equipment. This has been achieved in order to obtain benefits related to the quality of its processes, after-sales service and final products. Today, without a doubt, there is the opportunity to open new possibilities to sustain and enter new and better markets.

In recent years, there has been a greater interest in the national industry to qualify for effective attention to domestic demand and, in turn, to meet trade commitments with other countries. At the same time, it has sought to respond to the guidelines of the FTA. In this sense, it is not only a matter of using state-of-the-art machinery, but of improving, in a comprehensive way, based on the competition in other markets represented by the US.

Within this panorama, the link that the sector proposes with respect to technology is essential for progress and, in this way, to be maintained. However, it is a connection that requires transformations, challenges, investment, changes and openness. The above, above all, taking into account SMEs that need support and the creation of mechanisms that allow access to credit. This refers to the purchase of equipment, for

technical support in order to obtain the most advantage of this possibility.

There are certain fears that impact SMEs, such as training. When training is alluded to for the solution of these shortcomings, it is complex, since the excuse that is added is the lack of time. But, behind this, there is most likely a lack of identification of its usefulness. Businessmen find it desirable, but it is not compatible with the already functioning of the establishment. They usually kill it with phrases like "I wish I had more time to complete my training" or "when I'm calmer, I'll complete it."

At the time of creation or during the operation of SMEs, there is no knowledge about the aid. This situation is observed because, from the beginning, they are not aware of the required documents, since it only focuses on the Chamber of Commerce and what is required for the creation and immediate operation.

Regarding the technological challenges faced by SMEs in the furniture and wood sector in South America, it is essential to establish different initiatives and programs. Within this context, the importance of SMEs not being far from integration processes, both local and global, is identified, and it is important that these companies adapt and improve new technologies. Above all, those that operate on a small scale, since their production process adapts to the flexibility required by industry 4.0 (Agcid, 2020; ECLAC, 2006).

Certain general recommendations are set out below, in order to encourage the increase of business through appropriate technological management in SMEs in the furniture and wood sector. It should be clarified that technological innovation covers any of the phases of the production process: obtaining raw materials, drying, brushing, cutting, polishing, sawmilling, measuring, assembly, painting, finishing and/or finished product.

In the first instance, it is essential to carry out a diagnosis of the technological requirements. With respect to the implementation of any technological solution, it is essential to carry out a detailed analysis of the particular requirements of each SME. Even if they are part of the same sector, which will help to recognize areas of improvement and, likewise, establish areas that help to improve and specify the most appropriate technologies to achieve growth objectives.

Once the diagnosis has been made and the needs have been pointed out, an analysis must be carried out on where and how to invest in the technological instruments that best suit SMEs, their operations and processes. In addition, it is crucial

to have a specific budget for investments in technology management. Business management systems [ERP], accounting *software*, customer link management [CRM] solutions, cutting-edge equipment and machinery are some of the technological tools.

Process automation is another component to consider, as it helps SMEs increase their operational efficiency. In addition, it helps increase your operational efficiency, decrease costs, and improve the quality of products and services. Hence, it is necessary to recognize that processes are automated and use the optimal technological tools to execute activities. This is because this can be a key element in optimizing the operation of the company and helps reduce human errors.

Within technology management, it is necessary to invest in instruments that help protect data and confidential business information, especially in the digital age. In this regard, cybersecurity measures are implemented, such as *firewalls*, identity management systems for the protection of industrial secrets, antivirus, *know-how* and consumer-customer information. SMBs can be safeguarded from cyber threats while preserving business continuity.

Within this context, the digitization of the supply chain is considered another good practice. SMEs in the furniture and wood industry have the possibility of using IT to improve supply chain management. This is linked to the purchase of raw materials to the distribution of finished products. The use of inventory management software and the implementation of traceability and tracking systems can be considered.

On the other hand, the incorporation of new technologies requires a qualified and motivated team. In addition, it is essential that companies offer employees the training required to effectively use technological tools and get the most out of them in order to encourage business growth. Hence, it is essential to create courses that train and hire training services that are specialized.

The creation of innovative products is essential to maintain relevance and competitiveness in the market. It is therefore necessary to promote creativity and innovation within the organisational structure. However, it does not lead to the search for original solutions, but also to pay attention to the search for procedures in the face of new trends and demands that arise in the market. Investigating these trends identifies opportunities to distinguish products through the inclusion of emerging technologies, such as the adoption of emerging technologies, the addition of smart sensors, or the use of sustainable materials. Which not only add value to the product, but, at the same

time, respond to social and environmental concerns.

Joint work with organizations and research institutes has been established as an effective strategy to promote technological innovation. It is possible to establish strategic alliances with academies (universities) at an educational and scientific level. This generates access to specialized knowledge and technological tools that are advanced. This alliance can promote the exchange of ideas, collaboration in the field of research and the development of innovative projects. Likewise, with the work of external experts, it is possible to recognize opportunities for improvement and, in this way, examine new areas of innovation that, perhaps, have not been previously considered.

Likewise, it is essential to promote entrepreneurship in business, in order to stimulate innovation. This is equivalent to promoting a company culture that gives importance to creativity, critical thinking and the permanent search for solutions that are innovative. It is paramount to encourage employees to come up with new ideas and solutions, while providing a context and work environment that encourages experimentation and continuous learning. Their new and creative skills and effort are identified, which contributes to maintaining a high level of employee commitment and motivation. This drives the emergence of innovative ideas and the realization of new projects. Choose a building block.

Because technology is constantly evolving, it is essential to be informed about updates and trends. Hence, the possibility of investing in modern and efficient machinery and equipment that helps to improve productivity and product quality is being evaluated. For example, the adoption of Computer Numerical Control [CNC] machines is considered in the case of wood cutting and carving. In addition to this, another way to improve processes alludes to time studies. As a methodology, a small door factory is given as an example and the consignment will be made in a record format, in which the operational exercises for the exercise in question are put. First, you define the timing method that is used. In this case, the return to zero is used to record the times formalized in seven observation rounds. After this, the time taken to execute an element or the entire operation is recorded.

Then, the observed times are totaled and the number of cycles per operation is indicated. In the case of the example, in relation to the total time observed, the average cycle time for each cutting operation is calculated. Thus, it evokes the cutting of door studs in which the radial saw was used; and the time was 62.6 seconds.

After the conversations are completed, the average time for each component of the operation is calculated and the analysis of the results of the operations is executed, and then the normalized time is established. This is the total time a skilled worker takes to complete a task, working at a regular pace and using set methods. The measurement is made according to the observed time, the classification factor, the rest allowance and, likewise, contingency.

The ranking factor is an increase that adds to the average time observed. A subjective comparison is presented between the pace at which the worker performs the task and the observer's perception of that rhythm.

In practice, these comparisons are complex, but managers and workers, by mutual agreement, can organize the rhythms to a leaderboard that is structured of good experiences that are supervised in furniture manufacturing establishments and supported by the management and engineering teams.

A table designed at the global level and adopted by the International Labor Organization [ILO], through its labor office and described in the Manual Introduction to the Study of Work, established work rhythms according to the main evaluation scales:

Board 2. Rating Scales (ILO)

0	Actividad nula.
50	Actividad muy lenta.
75	Actividad a ritmo constante pero sin prisa.
100	Actividad normal. Se considera ritmo tipo.
125	Actividad muy rápida.
150	Actividad excepcionalmente rápida.

Finally, the normal time in the process of cutting door studs is calculated. This was executed as follows:

1. The combination of the average time recorded together with the classification factor generates the base time to perform the task:

Board 3. Basic Time for Tasks

$$\text{Tiempo básico} = \frac{\text{Tiempo medio observado} \times \text{Factor de Clasificación}}{\text{Básico}} = \frac{62{,}6 \times 125}{100} = 78{,}25 \text{ segundos}$$

In this sense, the normal times of repetitive manufacturing steps can be used to estimate direct labor costs. Similarly, they seek to build hiring systems and incentives.

In the case of normal times, repetitive manufacturing steps can be used in direct labor cost estimates and in processing they can be used in incentive and contract systems.

Thanks to the aforementioned tools, small furniture production centers can execute better control of their operations when manufacturing and accelerate their processes. We work in an organized, product and efficient way, in which simple but useful strategies are incorporated.

FINAL IDEAS

The detailed analysis that has been developed about the technological management in SMEs in the furniture and wood sector in Colombia and in locality 10 of Engativá, reveals a set of essential conclusions that guide actions in order to encourage their increase and competitiveness in the market.

In the first instance, it is necessary for Colombia to invest more in R+D, since it only contributes 0.2% of its GDP, given that the furniture and wood manufacturing industry, worldwide, leads to a competitive advantage. Cases to mention are the United States and China and other European countries, which lead the market for this product, followed by Brazil and Mexico in Latin America.

Secondly, the relevance of understanding technology management as a complex process, which includes the administration and management of technological resources to achieve business goals, is highlighted. This technological management is expressed in the incorporation, establishment and use of effective technologies, as well as the training of personnel related to business and the continuous improvement of the processes that are executed in logistics processes. This can be achieved with a mindset that is receptive to transformation and the ability to innovate. It is necessary to have a culture of innovation, which is related to the technological advances of the market with Artificial Intelligence, Big Data, MRP, Warehouse Automation, Internet of Things, WMS, ERP. It should be clarified that SCMs are integrated management systems that are responsible for managing external information flows (suppliers, customers, logistics operators) and other entities that can provide support to SMEs to collaborate in the supply chain and, in this way, be more competitive in the market.

Different technological challenges faced by SMEs in the furniture and wood sector are pointed out. Among these is the limited capacity for the adoption of modern technologies. Likewise, the absence of programs adapted to their specific requirements and, in turn, the unfair competition in which large companies fall and that organize imported products. To address these challenges, a set of practical recommendations are suggested: carry out a diagnosis of technological requirements; investing in suitable technological instruments; provide training to staff; achieve process automation; protect confidential information and protect data; and digitize the supply chain. In addition to this, it is essential that government institutions, such as the Mayor's Office of Engativá, help the development of innovative products with sustainable materials. This is as awareness of sustainability spreads and the need to adopt responsible practices in each of the phases of the furniture and wood supply chain arises. This is related to the circular economy and it is sought that the institutions, located around the university institutions of the town of Engativá, support SMEs in research topics with their group of students who are part of research hotbeds. It is necessary to encourage the entrepreneurial spirit within the company and to apply new technologies to collaborate and optimize its production processes and, in this way, compete in the international market.

In conclusion, after the detailed review, it is concluded that technological management is a fundamental component for the growth and competitiveness of SMEs in the furniture and wood sector in the town of Engativá. The above, in order for SMEs to enter, compete in international markets and improve their supply chain with sustainable materials. It is essential to have the full support of government entities, the Mayor's Office of Engativá and university institutions, to provide them with advisory, consulting and research services. It is intended that SMEs in the furniture and wood sector can leave the national market to compete in international markets with their 100% quality products. Which will undoubtedly bring more investment to the town and generate more jobs.

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