

Preparation and Collection of Technological Information for PYMES in the La Maná Canton, Cotopaxi Province, Ecuador.

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Submitted: 15/05/2024 Revised: 27/06/2024 Accepted: 05/07/2024

Abstract: The simplification caused by technological resources leads to precise control of internal processes in companies and allows the achievement of significant savings in operating costs. In the business context, recent years have resulted in widespread implementations with exponential increases in new information and communication technologies; both worldwide and especially in Ecuador. The growing use of Information and Communication Technologies (ICT) specifically in small and medium-sized businesses (SMEs) has been a reason to collect the level of technological information that is handled in these companies within the canton of La Maná, belonging to the province of Cotopaxi, Ecuador. Therefore, in terms of a non-experimental method of a descriptive nature, it has become necessary to determine how these types of companies are relying on technology and automation to improve the performance of their internal and external processes, for the benefit of a organized, clear and precise management of information; leading to real productivity and high economic growth at the local, regional and national level.

Keywords: Technological resources, PYMES, process automation, technological information.

1. Introduction

The canton of La Maná is a rural area in Ecuador. According to projections from the National Institute of Statistics and Censuses (INEC, 2022) for the year 2022, La Maná Canton, located in the province of Cotopaxi, Ecuador, has a population of 53,793 inhabitants. The economy of La Maná is primarily based on agriculture, with a small industrial sector. In the business context, small and medium-sized enterprises (SMEs) play a crucial role in the industrial sector of La Maná, serving as a significant source of employment for the local population.

SMEs, as defined by the Internal Revenue Service (SRI), constitute a group of enterprises displaying typical characteristics based on their production level or assets, number of employees, social capital, and sales volume. The objective of SMEs is to produce goods and services to meet customer demands (Espín et al., 2022).

Considered the backbone of a national economy, SMEs play a fundamental role in the development of nations. While SMEs may have relatively lower economies of scale compared to large enterprises, they significantly contribute to employment growth and innovation (Lasio et al., 2020). These enterprises are recognized as the foundation of all products and services created for the

general public, playing a crucial role in economic development. To ensure their effectiveness in the face of contemporary technological advancements, SMEs must align their performance with modern technical developments (Izaro, 2022).

In the current landscape, researchers are focusing on SMEs due to the constantly changing market and the existence of various technological obstacles for small producers (Izaro, 2022). Small entrepreneurs must navigate these challenges by thinking about more lucrative production processes and business models. In the market dynamics, automation can provide a competitive advantage by optimizing the design process to enhance efficiency and effectiveness.

The ongoing research in the canton of La Maná aims to gather technological information from SMEs, focusing on understanding the challenges and describing how process automation contributes to improvements in La Maná's SMEs in terms of competitiveness. The collection of information includes identifying technological needs and assessing the availability of resources that help these enterprises access the technological information required to contribute to the economic development of the region.

SMEs in La Maná engage in a wide range of economic activities, including trade, services, manufacturing, and agriculture. Key productive sectors include food and beverage production, garment manufacturing, woodworking, and construction materials manufacturing (GADM La Maná, 2021).

However, many SMEs face challenges in accessing the technological information necessary to compete in the

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global market (Bejob, 2023). In the case of La Maná Canton, this is attributed to factors such as a lack of financial resources, insufficient knowledge on how to use technology, and limited access to technological infrastructure (Garófalo et al., 2023; Lasio et al., 2020, p. 16).

This context revolves around the technological consequences of a globalized society, leading to continuous changes in the workplace. This demands a more qualified and prepared workforce, as companies not only focus on their local markets but also continue to expand. SMEs are subject to these regulations, even though these groups of enterprises are not exempt from these demands.

2.- State of the Art

Microenterprises are the entities with the most significant presence in the business fabric of Ecuador; however, their contribution to job generation and wealth is low. This reality is not exclusive to the country but extends to the entire Latin American region. In La Maná Canton, Cotopaxi Province, Ecuador, the presence of these types of business organizations is equally important. Descriptively, determining technological aspects and process automation in this context presents implicit technological challenges (Mantulak et al., 2017).

Microenterprises in Ecuador represent 93.8% of the total economic entities, with a considerable impact on employment (25.6% of the country's total workforce). Despite their high numbers, their performance levels are lower, as seen in their contribution to total sector sales (0.54% of the total) (INEC, 2022). There is a lack of correlation between the number of microenterprises and their performance, highlighting an ongoing challenge that needs attention from the perspective of public policies, business management, and socio-economic research conducted by academic and scientific institutions.

In the context of La Maná Canton, Cotopaxi Province, small and medium-sized enterprises (SMEs) active in the canton represent approximately 95% of the total registered businesses and generate around 60% of local employment (INEC, 2022). In recent years, the number of SMEs in La Maná has steadily increased, thanks to supportive entrepreneurship and investment policies implemented by the local government. This trend is expected to continue in the coming years, driven by the growing demand for local products and services and the improved economic conditions of the canton.

3. Materials and methods

Methodologically, the study was based on a documentary design at a descriptive level, relying on the review of specialized literature in the research line related to the level of technological information and process automation in SMEs within the coverage of La Maná Canton, Cotopaxi Province, Ecuador. Consequently, an instrument containing 11 closed-ended items was designed. This instrument underwent validation through expert judgment and verification of reliability using Cronbach's Alpha determination through the SPSS statistical computing package version 18. In this argumentation, the attainment of a value of 0.66 is consolidated, representing the Cronbach's Alpha based on the standardized elements for the 11 items of interest; hence, the instrument is deemed reliable.

The target population for the study consisted of all SMEs registered under the administrative records of the Internal Revenue Service (SRI), the Statistical Register of Enterprises (REEM), and the Territorial Development and Planning Plan of La Maná Canton (GADM La Maná, 2021). In this context, through the cross-referencing of information and the respective data cleansing of the target population consisting of 376 SMEs, information was gathered from a sample framework comprised of 172 SMEs in La Maná Canton, Cotopaxi Province, Ecuador (See Table 1).

Table 1. Research parameters in terms of population and sample.

Study Parameters	Description
N= Population	376 SMEs in La Maná Canton, Cotopaxi Province
Instrument	Survey
Sampling Method	Simple Random Sampling
(1 - α) = Confidence Level	95%
Critical Value Z for a significance level	1,96
$\alpha = 5\%$	
<i>E = Maximum Allowable Error Level</i>	5,5%
<i>P = Q = Probability of Success and Failure</i>	50%
<i>n = Optimal Sample Size</i>	172,38

The mathematical determination of the optimal sample size yielded an approximate sample of 172 SMEs, which

was obtained through simple random sampling from the total sample frame. Achieved through field research, the

survey was conducted during the period from 04/01/2024 to 06/01/2024, targeting the specified number of small and medium-sized enterprises in La Maná Canton, Cotopaxi Province, Ecuador.

4. Results and discussion

4.1. Internal and situational description of SMEs in La Maná Canton, Cotopaxi Province, Ecuador.

This section summarizes various indicators of the findings in the research regarding: Company size, level of process

automation, economic sector in which they operate, educational level of SME managers, growth plans, and implementation of technological innovations, as well as the technological resources in software and hardware implemented by SMEs in La Maná Canton, Cotopaxi Province, Ecuador.

Table 2. Size of SMEs in La Maná Canton

How many employees work in your company?	Frequencies	Percentages
From 1 to 5	107	62%
From 6 to 10	51	30%
More than 10	14	8%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

As shown in table 2, the majority of SMEs in La Maná are microenterprises, with less than 10 employees. This assumes 158 employees, which represents a proportion of 92% of the SMEs present in the canton of La Maná-Province of Cotopaxi, Ecuador. However, there are also 14 small and medium-sized companies, at a percentage level it denotes 8%. When considering the relevance of SMEs in any country in the world, Hoyos-Estrada & Sastoque-Gómez (2020) is cited, assuming that every small and medium-sized company tends to contribute to the development of the nation due to its significant participation in the economy. ; increasing the employment rate, increasing the gross domestic product.

Due to the size of the workforce within SMEs, only 3% of these small and medium-sized companies implement a high level of automation of their processes. On the contrary, 118 SMEs in the La Maná canton of the Province of Cotopaxi, presented a low level of automation, to consolidate a percentage of 69%; In addition, 28% of these SMEs implement a medium level of automation; These findings are defined with a 95% confidence level based on the sample evidence (See Table 3).

Table 3. Level of automation of processes in SMEs in the canton of La Maná

What is the level of automation of processes in your company?	Frequencies	Percentages
High	5	3%
Low	118	69%
Half	49	28%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

These characterizations are supported in the economic-commercial sector in which small and medium-sized companies operate within the canton of La Maná-Province of Cotopaxi, Ecuador. In descriptive order, the highest proportion is presented for the 85 SMEs in the commercial sector, with 49% and the 43 SMEs that work in the service sector, with 25% (See Table 4). Considering a medium or high level of process automation has a

positive impact in environments where creation goes through multiple processes; That is why Cando and Lozada (2021) emphasize applying automation to simplify tasks within the Márquez Cabinetry, with the objective of designing a process cost system for the year 2020 and its impact on the profitability of the company in the province of Cotopaxi, canton of La Maná.

Table 4. Economic sector performance of SMEs in the canton of La Maná

In which economic sector does your company operate?	Frequencies	Percentages
Agricultural	6	3%
Associations	5	3%

Commercial	85	49%
Pharmaceutical	9	5%
Financial	10	6%
Hotel	2	1%
Industrial	7	4%
Services	43	25%
Transport	1	1%
Tour	4	2%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

It is necessary to note that this performance in the economic and commercial sectors will depend on the level of academic training presented by the person in charge or who presides over decision-making at the level of SMEs in the canton of La Maná-Province of Cotopaxi, Ecuador. In this order of ideas, it was determined that 89% of those in charge of these SMEs must have an educational level between the second (39%), third (37%) and fourth level (13%). Only a low percentage, 11%, have a first level of schooling and 1% without any level of schooling (See table 5).

These findings, resulting from the descriptive research, have been similar to those provided by Chango (2023), concluding that SMEs in the canton of La Maná are mainly dedicated to commercial, service and finally manufacturing activities. Highlighting a breakdown into the main products and services offered by these companies, to detail: Processed food products, beverages, textiles, footwear, furniture, cleaning products, construction services, vehicle repair services, health services and educational services. In general terms, the level of education of the owners and employees of the SMEs in La Maná is generally low. Most of them have high school education or less.

Table 5. Educational level (schooling) of the person in charge of the SMEs of the La Maná cantón

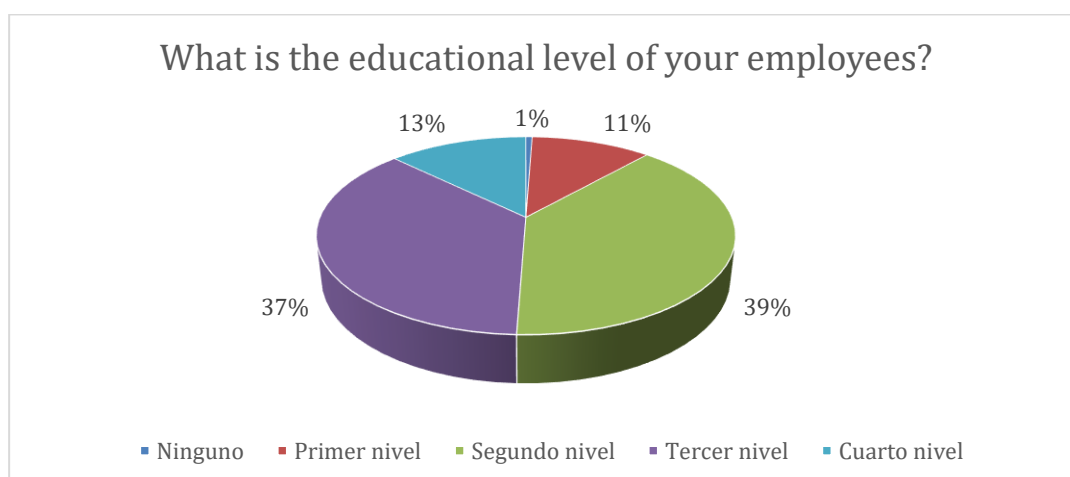
What is the educational level of your employees?	Frequencies	Percentages
None	1	1%
First level	19	11%
Second level	67	39%
Third level	63	37%
Fourth level	22	13%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

In collecting empirical evidence, there will be a confidence of 95% to establish the frequent use of technological resources for sales control (28%), inventory management (17%) and accounting (11%); in the different SMEs within the La Maná canton of the Province of

Cotopaxi (See Table 6). On the other hand, there are 60 SMEs (35%) that do not use software resources and computer programs for the functionality of their areas (See Figure 1).

Fig 1. Percentage distribution of the educational level of the person in charge of the SMEs in the La Maná canton



When comparing these results, they are not far from the existing reality, consequently a market study carried out by Castellano (2021) evaluated the feasibility of creating a spa and beauty center with home delivery service in the Canton of La Maná, Province of Cotopaxi. period 2020,

determined that 58.2% of those in charge of SMEs in the La Maná canton had a secondary educational level, while 28.6% had a higher educational level. The remaining 13.2% had a primary education level or less.

Table 6. Technological resources implemented by SMEs in the canton of La Maná

What software and computer programs are used in the functional areas?	Frequencies	Percentages
Communications	8	5%
Accounting	19	11%
Inventory management	29	17%
Production Management	4	2%
Sales management	49	28%
Medical management and control	1	1%
Office automation	2	1%
None	60	35%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

In correlation with the use of technological resources to manage the economic and commercial information of SMEs in the La Maná canton of the Province of Cotopaxi. Based on Table 7, it is determined that the greatest

technological asset to be presented by these small and medium-sized companies is found around the use of computers (85%), communication equipment (5%) and printers (2%).

Table 7. Description of hardware resources in SMEs in the canton of La Maná

What hardware supports are used as technological resources in your SME?	Frequencies	Percentages
Computers	146	85%
Communications Equipment	8	5%
Sewing Equipment	1	1%
Printers	3	2%
Dental instruments	1	1%
scanner	1	1%
Other equipment	2	1%
None	10	6%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

In essence, the majority are microenterprises located in the La Maná canton of the Cotopaxi Province, Ecuador. These tend to have less than ten (10) employees with a predominance of a low level in the automation of internal processes, dedicated to a greater proportion of commercial and service activities. In addition to frequent use of technological resources (Software and Hardware) for sales control, inventory management and accounting, through the implementation of computers, communication equipment and printers).

and use of computers, internet, email and mobile phones is not great. 77% of respondents who said they had an information system said it worked well. They also argue that 91% of SMEs do not make any investment in information and communication technologies, citing the significant cost for them. On the other hand, the use of information and communication technology management requires people who are adequately trained to use it; However, 86% of SMEs have not been able to provide any type of ICT training to their employees. La Maná SMEs use a variety of technological resources, including computers, printers, mobile phones and basic software.

In this order of ideas, according to Párraga (2017), SMEs in zone 4 of Ecuador do not make sufficient use of information and communication technologies. Access to

However, most of them do not use advanced technologies, such as business management systems or e-commerce.

4.2. Benefits and expectations in the use of technological resources in the La Maná canton, Cotopaxi Province, Ecuador.

The benefits and expectations in the use of technological resources in the La Maná canton, Cotopaxi Province, Ecuador, are wide and varied. Furthermore, reflecting that

technological resources have transformed the way in which small and medium-sized companies (SMEs) operate and compete in the market. In the La Maná canton, Cotopaxi province, Ecuador, SMEs are increasingly adopting these tools to improve their efficiency (35%), customer satisfaction (30%) and productivity (19%), cost reduction (15%). %); These factors are determinants of a high level of competitiveness to achieve success in the target market (See Table 8).

Table 8. Benefits in the implementation of technological resources in SMEs in the canton of La Maná

What are the benefits your company has experienced from using technology?	Frequencies	Percentages
Productivity increase	32	19%
Improved efficiency	61	35%
Improved customer satisfaction	51	30%
None	1	1%
Costs reduction	25	15%
Appropriate technology has not yet been managed	1	1%
Has not yet implemented technologies in SMEs	1	1%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

Because there are multiple expectations presented by those in charge or those who have to preside over the decision-making process at the level of SMEs in the canton of La Maná-Province of Cotopaxi, Ecuador. It can be emphasized, with evidence from the findings presented in Table 9, a general trend focused on the use of technological resources by small and medium-sized companies to achieve the consolidation of improvements

in customer satisfaction (28%). In relevance, these factors must be considered to mitigate any impact, as established by Cheng et al. (2020), managers and staff found the app valuable as it helps improve the quoting process by optimizing delivery time and managing information accurately. The inclusion of business intelligence aspects is essential to improve decision making.

Table 9. Expectations present in SMEs in the canton of La Maná in the use of technological resources

How would you like your company to improve internal processes using technological trends?	Frequencies	Percentages
Increase efficiency	24	14%
Increase productivity	21	12%
Improve communication	26	15%
Improving customer satisfaction	49	28%
Reduce costs	25	15%
Stand out from the competition	27	16%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

Small and medium-sized businesses (SMEs) are an important driver of the Ecuadorian economy, however, many SMEs face challenges in the adoption and use of technological resources, which can limit their growth and competitiveness. The study concluded that SMEs in the La Maná canton have high expectations regarding the benefits they can obtain from technology, but they also face a series of barriers that prevent them from adopting it

effectively. To overcome these barriers, SMEs need support in terms of financing and training. Such a situation has already been emphasized in previous studies, for example, according to Lasio et al. (2020), reflects the lack of specific government policies for microenterprises and small businesses, the enormous procedures to be carried out, and the tax burden have been the barriers or limitations for entrepreneurial development and economic

growth of SMEs in the country; as well as highlighting the limited access to financing. These expectations correlate with the factors implicit in the maintenance of technological resources in SMEs, the occurrence of repair

costs (33%), as seen in Table 10. In addition, with security failures (26%) and the inherent search for the quality of the product or services offered (26%).

Table 10. Factors associated with the maintenance of technological resources in SMEs in the canton of La Maná

What are the aspects related to the maintenance of your equipment in the Company?	Frequencies	Percentages
Product or service quality	44	26%
Repair cost	56	33%
Costs caused in production due to equipment stoppage	12	7%
Environmental impact	14	8%
Safety	45	26%
None	1	1%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

To weigh these limitations, it is determined to work on growth plans, which is why the use of innovations in: Software (32%), technological infrastructure (18%), process automation and Cybersecurity (17%) must be addressed. , respectively (See Table 11).

In this sense, it is essential to efficiently deploy an organizational culture that guarantees the long-term presence of the company at a favorable level of technological management, based on its management capabilities and other organizational aspects, in order to differentiate itself from its competitors. and a timely response to market demand (Mantulak et al., 2017).

Table 11. Growth plans and implementation of technological innovations in SMEs in the canton of La Maná

What would you like to implement in your company in relation to new technological trends?	Frequencies	Percentages
Process automation	30	17%
Cybersecurity	29	17%
Hardware	7	4%
Software	55	32%
Technological infrastructure	31	18%
Database software	20	12%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

In general, SMEs in the La Maná canton, Cotopaxi Province, Ecuador, face a series of challenges, including the lack of financial and technical resources, the low level of schooling of the owners (51%), and the lack of plans of growth and implementation of technological innovations. However, there are also some opportunities for SMEs in La Maná, such as the growing local market and the growing demand for quality products and services. By virtue of these premises, there is similarity in the findings in the contributions of Albarracín et al. (2022), in addition, established that all employees, managers and clients must agree that the adoption of new technologies in companies

helps to improve the operational capacity and both internal and external management of SMEs, as well as to maintain the competitiveness of the company in line with market standards.

4.3. Technological challenges presented by SMEs in the La Maná canton, Cotopaxi Province, Ecuador.

Small and medium-sized businesses (SMEs) in the canton of La Maná, province of Cotopaxi, Ecuador, face a series of technological challenges that limit their growth and competitiveness. These challenges are included in Table 12:

Table 12. Descripción de los desafíos en el uso de la tecnología en las PYMES del cantón La Maná

What are the main challenges your company faces when using technology?	Frequencies	Percentages
Technology cost	87	51%
Lack of training	58	34%

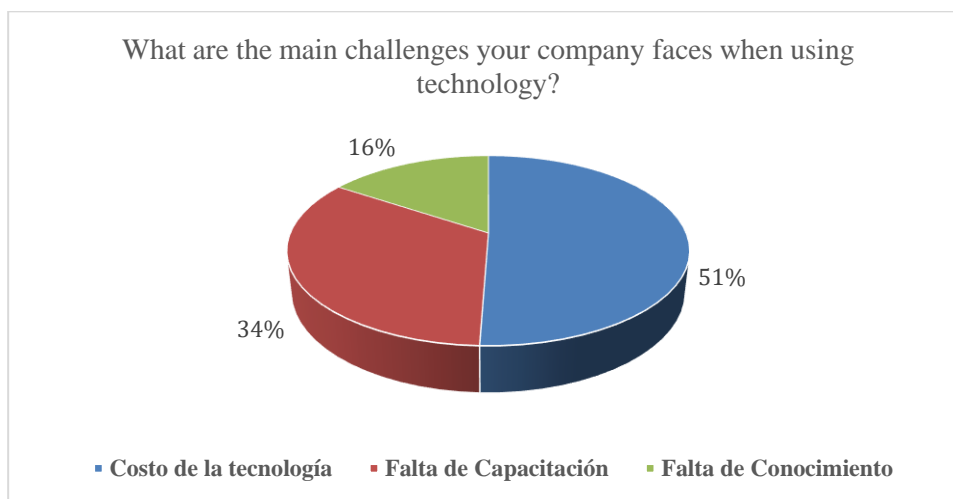
Lack of knowledge	27	16%
Grand Total	172	100%

Source: Outputs generated by the statistical computing package SPSS version 18.

As evidenced by what is stated in table 12, the greatest challenge or barrier focuses on the cost of implementing technology to simplify processes in small and medium-sized companies in the canton of La Maná in the Province of Cotopaxi, Ecuador. This characterization of the cost underlying the use of technological resources is supported

by the survey carried out in SMEs, showing 87 SMEs (51%), only 58 SMEs express a lack of training (34%), 27 SMEs limit the lack of knowledge (16%) as a deciding factor (See Figure 2). Ultimately, to overcome these challenges, SMEs need access to technology, technical knowledge, financial resources and government support.

Fig 2. Percentage description of the challenges in the use of technology in SMEs in the canton of La Maná



In essence, Latin American SMEs face several additional challenges and impediments that their counterparts in industrialized nations do not, including access to medium and long-term financing, economic activity laws, energy costs, and the increasing cost per square meter in the big cities. However, without a doubt, the biggest problem is the ability to acquire and retain quality personnel at a reasonable cost (Aguello et al., 2021; Chiogna, 2017).

5. Conclusions

Small and medium-sized companies in the canton of La Maná, province of Cotopaxi, Republic of Ecuador, face several challenges to adapt to technological developments and automate their production operations. SMEs are often distinguished by manufacturing processes that rely heavily on human labor, as these companies are less mechanized. The workforce of these organizations cannot go beyond their products and product range to explore new industries as there is no opportunity to invest in new technologies without risking financial losses by focusing on the wrong technologies. For these industries to function properly and generate a new economy in the country, their performance must be at par with contemporary technical advances. In this sense, sufficient education and training in complex technologies is required to allow people to function effectively in an increasingly interconnected world.

Small and medium-sized businesses have seen steady growth in recent times and are trying to keep up with larger industrial companies that regularly upgrade their facilities. Many small and medium-sized organizations still use outdated procedures and are reluctant to implement newer technological advances due to budget and resource constraints. These SMEs must be competitive on a global scale and developing their skills is essential for process automation.

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