

COMPARATIVE ANALYSIS OF ECONOMIC SECTORS: COMPETITIVENESS AND BUSINESS PERFORMANCE IN THE ALTAS MONTAÑAS, VERACRUZ STRATEGIC CONTEXT

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Abstract

This article presents the results of a study, conducted in the Altas Montañas region of the State of Veracruz, Mexico, aimed at assessing the competitiveness of small and medium-sized enterprises (SMEs) in different sectors. The study utilized a Development Competitiveness Map, which consists of nine variables: strategic planning, supply of materials, quality assurance, marketing, accounting and finance, human resources, hiring external companies, social responsibility, and environmental management. The results indicate that the commercial sector is the largest, accounting for 37 % of SMEs in the region, followed by the industrial sector (35 %) and the service sector (28 %). The service sector performed highest in several variables: strategic planning, accounting and finance, and human resources. The commerce sector performed well in hiring external companies, while the industrial sector lagged in most variables, except environmental management. The study also revealed that the service sector had a younger average age of managers compared to the other sectors. Women's participation was highest in the industrial sector, while university education was relatively balanced across sectors. The article discusses the specific results for each variable in each sector, highlighting strengths and areas for improvement. Marketing, hiring external companies, and environmental management were identified as opportunities to enhance regional competitiveness. The study suggests implementing public and private policies to support SMEs in these areas. The findings provide valuable insights into the current competitiveness among SMEs in the Altas Montañas region and offer recommendations for fostering their growth and development. However, the study acknowledges some limitations, such as the limited sample size and potential bias due to non-participation by some businesses.

Keywords: Competitiveness, Economic sectors, business performance, Sectorial analysis, and strategic planning.

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1. Introduction

Currently, micro, small, and medium-sized enterprises (MSMEs) play a significant role in the economy of both Mexico and the rest of the world. In the specific case of Mexico, these companies represent 97 % of all existing companies, generating 79 % of employment and contributing 23 % of the Gross Domestic Product [1]. In addition, it is essential to highlight its flexibility and ability to adapt to changes and economic adjustments that may arise in an economy.

The first definitions of competitiveness, proposed by the classical economists Adam Smith and David Ricardo, established a connection between the factors of production and the exploitation of comparative advantages. Later, Marxist economists stressed the importance of the sociopolitical environment in economic development. In this sense, Schumpeter emphasized the role of the entrepreneur as a factor of competitiveness. At the same time, Sloan and Drucker highlighted administration as a critical factor in this regard. For his part, Solow stressed the importance of education, technological innovation, and technical knowledge [2]. In the 1990s, Porter in his work “The competitive advantage of nations” established new bases and recognized the changes in the environment and the instability of generic strategies, pointing out the need for more dynamic models to understand the competitive advantage of nations. Indeed, in an effort to rectify this imbalance, Howard et al. endeavors to establish a more robust framework for evaluating a nation’s comparative global competitive advantage [3–6]. On the other hand, To maintain that competitiveness loses relevance at the national level since the major countries do not compete, which implies that it is more an internal matter of each nation than an external aspect [7, 8]. Based on these approaches it is based on the analysis of these premises and two of the most critical studies worldwide on the competitiveness of nations: the Global Competitiveness Report of the World Economic Forum (World Economic Forum 2009) and the Yearbook of Global Competitiveness of the International Institute for Management Capacity Development (IMD).

In Latin America, the need to have its indicators has arisen, derived mainly from research, carried out by Michael Porter and the World Economic Forum, who consider competitive advantage from other points of view. In this sense, the indicators, designed in countries, such as Mexico (IMCO, CIDE), Chile (Subsecretariat for Regional Administrative Development), Colombia (National University of Colombia), and Peru (National Competitiveness Council), stand out, to name a few. However, the work done by Esser et al. (1996) continues to be relevant when considering the analysis from a systemic perspective, which results from the interaction between the State, companies, intermediary institutions, and the organizational capacity of a society. This approach has been adopted by the Chamber of Commerce of Medellín and Antioquia.

There are two approaches, through which SMEs can be characterized: the internal and the external approach. The internal approach derives from the management of the business and the economic sector, to which the company belongs, which implies that the company is responsible for seeking solutions and improvements in these aspects. On the other hand, the external approach was characterized by the analysis of macroeconomic factors that affect SMEs and in which they have no influence. Consequently, this work uses the micro part of the holistic system; that is, it focuses on diagnosing SMEs with the variables generated.

In this context, it was considered that competitiveness is becoming increasingly relevant in the business environment due to the demands of the current economic environment, which was framed in the globalization process [9, 10], to which the external approach refers. In addition, according to the Inter-American Development Bank (IDB), preparing a competitiveness map can determine which factors affect competitiveness at the micro level, considering the size, sector, and subsector, to which the companies belong. It can even identify the variables of each factor and their influence on competitiveness, intending to raise it in companies [11]. Similarly, the studies on competitiveness were intended to serve as reference instruments for establishing strategies and proposals that promote business competitiveness in a participatory manner, as proposed in this research [12, 13].

Competition occurs mainly between companies rather than nations. In the same way, the ability of a company to compete with others and achieve superior performance, which, according to Saavedra (2012), allows them to increase their relative market share. At the national level, the average composition of companies was divided into 59 % in the manufacturing sector, 79 % in the services sector, and 87 % in the commercial sector [14, 15].

In the State of Veracruz, the main economic corridors are in the cities of Veracruz, Boca del Río, Xalapa, Córdoba, Orizaba, Poza Rica, Martínez de la Torre, Tuxpan, Minatitlán, and Coa-

tzacoalcos. In particular, the region of the High Mountains, one of the seven regions of the State, has particular physical and cultural characteristics and is part of the Sierra Madre Oriental. This region was made up of 57 municipalities. It is home to 516 small and medium-sized companies, representing approximately 20.67 % of the total number of SMEs in the State of Veracruz [16].

In this region, the primary agro-industrial production was divided into two areas. In the lower part, corn, beans, sugar cane, orange, mango, and banana are grown, while in the upper part, crops include wheat, potato, broad bean, alfalfa, apple, peach, avocado, and walnut. The municipalities of Coatepec, Córdoba, Huatusco, and Teocelo stand out in coffee production [17]. Regarding commercial activity in the region, essential industries, such as coffee mills, milk pasteurizers, breweries, yarns and fabrics, cement, soft drinks, paper, and cardboard, have been developed. In addition, there are sugar mills and the production of handicrafts, such as woven and embroidered clothing, wooden figures, and ceramics. These companies compete with imported products at lower prices, so it is crucial to identify areas of opportunity to improve the competitiveness of companies in this area [18]. In environmental terms, the region was characterized by its valleys, forests, and rivers full of life and history [19]. From a demographic perspective, the region's rural population is 564,701 inhabitants. The urban population is 720,592 inhabitants [1], generally facing significant challenges.

This article emphasizes the close relationship between mathematics and finance, highlighting its importance in the financial field. The complexity of mathematical models in finance and the development opportunities and relevance of higher-order thinking skills in this field are highlighted.

2. Materials and Methods

The Development Competitiveness Map is a diagnostic tool, used in the business field to assess the initial State of a company in terms of competitiveness in its sector. This map was made up of eight main areas that were evaluated to determine business competitiveness. These areas are 1) Strategic Planning, 2) Production and Operations, 3) Quality, 4) Marketing, 5) Accounting and Finance, 6) Human Resources, 7) Environmental Management, and 8) Information Systems [20].

Competitiveness at the micro or business level refers to the specific knowledge of the activities, carried out by a company in various areas. This type of competitiveness is important, since the company has direct control over the variables that allow it to grow and stand out in the market [21].

Within the framework of this project, a review of the State of the art was carried out to understand the general concept of competitiveness and its application in the business field. An exploratory study was carried out to determine the composition of the service business fabric in the region of the High Mountains in the State of Veracruz, this was carried out during the year 2022. The works of Saavedra [20] for Latin America were used based on the IDB Competitiveness Map (2003), which uses eight key indicators to measure the competitiveness at the business level of SMEs. In this study, the indicators “contracting external companies” and “social responsibility” were added due to their importance and impact on competitiveness. A validated questionnaire was developed with nine sections and 100 Likert scale questions with five options. The questionnaire was administered to business owners, managers, and managers responsible for the business. Each interview lasted approximately two hours, according to the definition of SMEs, proposed by [1].

Subsequently, the study area was delimited to the region of the High Mountains in the State of Veracruz, which was made up of 57 municipalities. However, the business sample was concentrated in four municipalities: Amatlán, Atoyac, Cuitláhuac, and Yanga, since not all municipalities had the number of companies necessary to obtain a statistically significant sample. The SMEs were randomly selected using the SIEM (2013) databases, and a descriptive data analysis was carried out. The questionnaire based on the IDB [20] was developed and validated. Data collected was consented to by SMEs for use in this study.

As a result of the above, nine work variables were identified to analyze systemic competitiveness at the micro level. These variables are strategic planning, supply of materials, quality

assurance, marketing, accounting and finance, human resources, hiring external companies, social responsibility, and environmental management. Initially, a sample was proposed with a confidence level of 95 %, and it was expected to obtain 75 questionnaires for the service sector, 102 for the commerce sector, and 44 for the industrial sector. However, reaching that sample level was impossible, so it was adjusted to a confidence level of 90 % and an error of 10 %. The data was captured using the Survey Monkey program and downloaded in Excel for subsequent descriptive analysis. This analysis allowed us to characterize the companies studied according to their classification by sector. Finally, the analysis of the composition of the business fabric in the Altas Montañas region was presented.

3. Results

According to the results, obtained in this project, the SMEs in the Altas Montañas region were distributed as follows: 28 % of the companies belong to the service sector, 35 % to the industrial sector, and 37 % to the commercial sector. **Fig. 1** compares the composition of the High Mountains and the State of Veracruz. The highest percentage of companies corresponds to the commercial sector, with 46 % in the State and 37 % in the High Mountains. The most significant differences were found in the industrial and service sectors. In the High Mountains, the industrial sector accounts for 35 %, compared to 20 % at the state level. Regarding the service sector, the State has 34 %, while the High Mountains have 28 %.

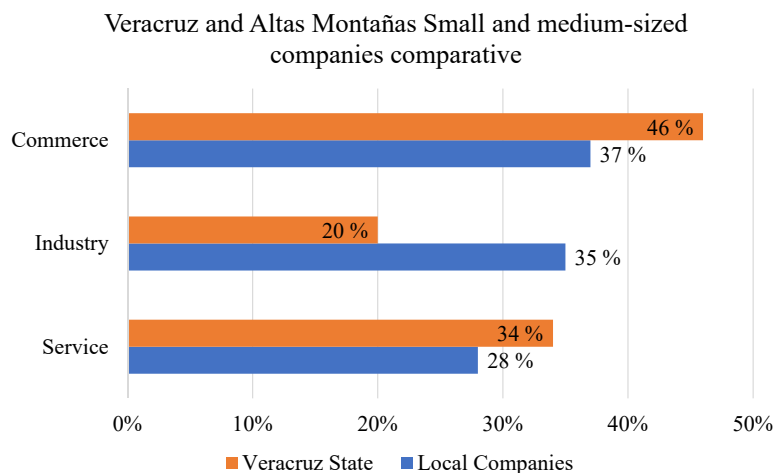


Fig. 1. Veracruz and Altas Montañas Small and Medium-sized companies comparative

Concerning the average age of the respondents, it was observed that it varies according to the sector, to which the company belongs. The average age of male managers, directors, or owners in the industrial sector is 43 years. In the services sector, the average age is 38 years, and in the commercial sector, it is 37 years. Regarding the participation of women as administrators, directors, or owners, 32.1 % are in the service sector, and 34.6 % are in the commercial sector. There is an increase in participation in the industrial sector, with 39.4 %.

Regarding the variable of the level of university studies, the interviewees showed an apparent balance in the sectors analyzed. The results were distributed as follows: the services sector had a slightly higher percentage, with 38 %, the commercial sector obtained 30 %, and the industrial sector reached 32 %.

Analysis of items by sector:

The following section presents the results, obtained in the surveys, through a radial graphic representation, also known as a spider web. These results are based on the answers, provided by the interviewees, considered as items, and according to the Likert scale in each of the figures corresponding to each sector. The general description of the items corresponds to the “always” option, and the figure allows a visual comparison.

Service sector:

1. Strategic planning: 4, 79 % of the companies stated that they have plans that guide them, although only 55 % of the objectives are measurable, and 52 % have an effective term for their fulfillment. 46 % use a strengths and weaknesses analysis for strategy creation, and 61 % adapt to market changes.

Regarding the implementation of strategies, 43 % of the managers always communicate the company's objectives to employees, and 37 % involve employees in their fulfillment. On average, 40 % motivate employees to achieve their goals, and 61 % provide the necessary resources.

2. Production and operations: This aspect considers how materials were provided. 70 % of the companies frequently plan the purchase of merchandise and raw materials to avoid shortages. However, less than half have a contingency plan in case of shortages. On average, 55 % state they have a supplier selection and inventory control process. In addition, 76 % of the companies consider and satisfy infrastructure needs, and 82 % consider and satisfy furniture needs.

3. Quality: 43 % of the companies promote quality programs, and this percentage increases to an average of 56 % when it comes to implementing quality systems related to defects in their products and services. On average, 67 % always identify customer needs and adapt to them.

4. Marketing: Regarding marketing, on average, 34 % of the companies claim to have an annual marketing plan, but only 18 % have it in writing. Only 70 % of the companies have clearly defined their target market and know their market share. On average, 46 % of the companies have positioning and marketing strategies. In addition, 37 % establish sales quotas and control their compliance, and 42 % affirm that their companies have generated significant sales/profits in the last two years. Of these, 43 % carry out advertising, and 37 % consider it efficient. In addition, 34 % periodically evaluate promotional mechanisms to increase their sales.

Regarding the service the companies offer, 49 % affirm that their direct contact staff with the client was trained, and 27 % frequently use a research method to measure client satisfaction.

Regarding distribution, 46 % of those surveyed affirm that they have a trained sales force, and 33 % affirm that this sales force is motivated. In addition, 49 % consider that their sales force is always competent, and 43 % consider their distribution system efficient.

5. Accounting and finance: 61 % of general managers claim to be informed during the first week of each month about the company's financial operations. On average, more than 61 % state that they have an accounting management method that provides the necessary information to make appropriate decisions.

Regarding financial administration, 49 % make future projections, 43 % have a process accounting to determine the profitability of the product lines, and 43 % compare their financial closings with the same month of the previous year to propose strategies. In addition, 40 % evaluate the profitability of the equipment and machinery, and 70 % carry out monthly financial closings.

6. Human resources: 67 % affirm that they have files that contain the corporate image, such as mission, vision, general objectives, organization chart, policies, and specific functions of the personnel. Regarding workers' rights, 73 % of employees have social security, 61 % with INFONAVIT, 70 % receive a vacation bonus, and 85 % have a day off every six days of work. 76 % claim to train their new staff, and 58 % train old staff related to new projects. 58 % announce the changes, made within the company, to all employees, and 55 % rate communication between employees well, which favors the organizational culture. Besides, 67 % of the companies always comply with official regulations to guarantee the worker's integrity regarding industrial health and safety.

7. Hiring external companies: Only 18 % of the companies hire external companies to help them operate more efficiently. 23 % consider that these external companies are the most efficient, and 23 % affirm that they are always efficient.

8. Social responsibility: 42 % of the companies implement the social responsibility approach, while the rest do not consider it.

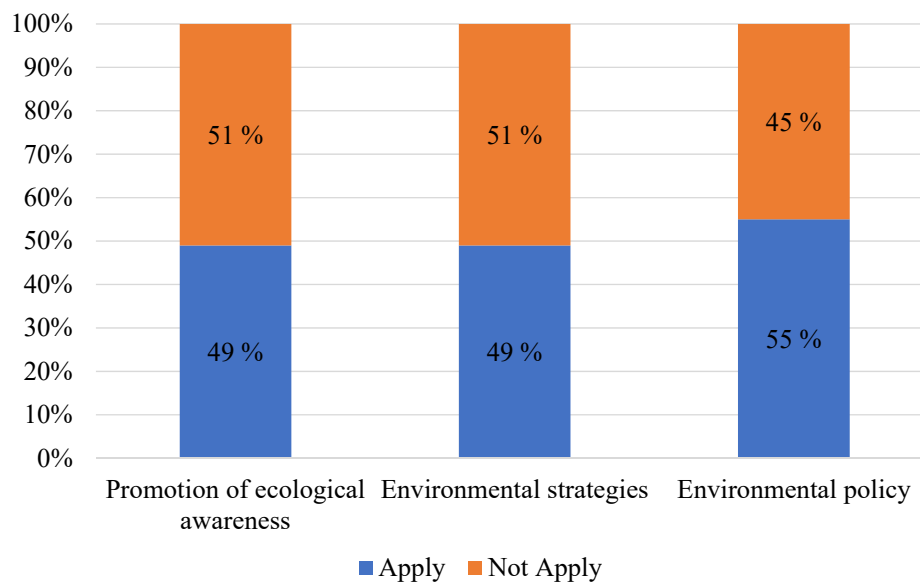


Fig. 2. Social Responsibility and environmental management in the service sector

9. Environmental management: **Fig. 2** shows that 49 % of those interviewed state that they have an established environmental policy within the company. In addition, 49 % implement strategies for protecting the environment in the company, and 55 % promote environmental awareness among staff frequently. These aspects are considered essential for environmental management.

Analysis of items by sector: Commerce Sector

1. Strategic planning: 70 % of the companies affirmed having plans that guide them. Although only 46 % of the objectives are always measured, 48 % have an effective term for their fulfillment. In addition, 43 % use a strengths and weaknesses analysis to create strategies, and 65 % adapt to market changes.

Regarding the implementation of strategies, 53 % of the managers always inform employees of the company's objectives, and 57 % involve them in their fulfillment. On average, 51 % motivate employees to achieve their goals and provide the necessary resources.

2. Production and operations: This aspect considers how materials were provided. 73 % of the companies frequently plan the purchase of merchandise and raw materials to avoid shortages. However, less than half have a contingency plan. On average, 61 % state they have a supplier selection process, and 57 % have inventory control. In addition, more than 60 % of the companies consider and satisfy the infrastructure and furniture needs.

3. Quality: Regarding quality, 36 % of the companies promote quality programs. This percentage increases to an average of 40 % when implementing quality systems related to defects in their products and services. Also, on average, 66 % always identify and adapt to customer needs.

4. Marketing: Regarding the marketing issue, 38 % of the companies claim to have an annual marketing plan, but only 29 % have it in writing. In addition, only 61 % of the companies have clearly defined their target market and know their market share. On average, 46 % of the companies have positioning and marketing strategies. It also stands out that 62 % consider the company stable. Regarding sales, 36 % establish sales quotas, 39 % control their compliance, and 51 % affirm that their companies have generated significant sales/profits in the last two years. 39 % carry out advertising, and 34 % consider it efficient. In addition, 34 % periodically evaluate promotional mechanisms to increase their sales.

Regarding the service, the companies offer, 56 % affirm that their direct contact staff with the client was trained, and 32 % frequently use a research method to measure client satisfaction.

Regarding distribution, 43 % of those surveyed state that they have a trained sales force, and 36 % affirm that this sales force is motivated. In addition, 44 % always consider their sales force competent, and 52 % consider their distribution system efficient.

5. Accounting and finance: 71 % of general managers claim to be informed during the first week of each month about the company's financial operations. On average, more than 62 % state that they have an accounting management method that provides the necessary information to make appropriate decisions.

Regarding financial administration, 48 % make future projections, 51 % have an accounting process to determine the profitability of product lines, and 53 % compare their financial closings with the same month of the previous year to propose strategies. In addition, 51 % evaluate the profitability of equipment and machinery, and 56 % carry out monthly financial closings.

Regarding legal and tax regulations, 82 % of the companies were registered with the SHCP, 84 % updated tax accounting, 73 % were registered with a commercial chamber, 77 % generated a budget to pay taxes, and 67 % prepared a projected tax budget.

6. Human resources: 54 % affirm that they have files that contain the corporate image, such as mission, vision, general objectives, organization chart, policies, and specific functions of the personnel. Regarding workers' rights, 62 % of employees have social security, 52 % with INFONAVIT, 58 % receive a vacation premium, and 73 % have a day off every six days of work. In addition, 64 % of the companies claim to train their new staff, and 55 % train old staff about new projects. 62 % announce the changes, made within the company, to all two employees, and 69 % rate the communication between employees as good, which favors the organizational culture. Finally, 70 % of the companies always comply with official regulations to guarantee the worker's integrity regarding industrial health and safety.

7. Hiring external companies: 27 % of the companies hire external companies to help them run more efficiently, but only 14 % consider that most of the time, these external companies are efficient, and 12 % claim they are always efficient.

8. Social responsibility: 48 % of the companies implement the social responsibility approach, while the rest do not consider it, as shown in Fig. 3.

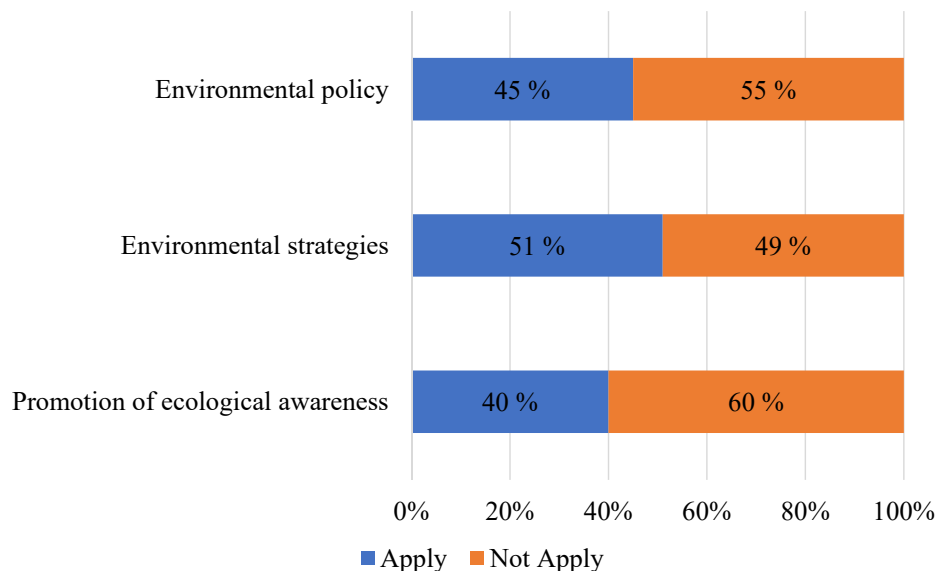


Fig. 3. Social Responsibility and environmental management in the commerce sector

9. Environmental management: Regarding environmental management, 45 % of those interviewed have established an environmental policy within the company. In addition, 40 % implement strategies for protecting the environment in the company, and 51 % promote environmental aware-

ness among staff frequently. These aspects were considered essential for environmental management, as shown in **Fig. 3**.

Analysis of items by sector: Industrial Sector

1. Strategic planning: 84 % of the companies stated that they have plans that guide them. Although only 51 % of the objectives are measurable, 61 % establish an effective term for their fulfillment. In addition, 39 % of the companies use a strengths and weaknesses analysis for strategy creation, and 58 % adapt to market changes.

Regarding the implementation of strategies, 68 % of the managers always inform employees of the company's objectives, and 72 % involve them in their fulfillment. On average, 60 % of the companies motivate employees to achieve their objectives and provide the necessary resources.

2. Production and operations: consider how the supply of materials was carried out. 65 % of the companies affirmed that they frequently plan the purchase of merchandise and raw materials to avoid shortages. However, only half of them have a contingency plan in case of shortages, a supplier selection process, and control of inventories. In addition, 81 % of the companies consider the infrastructure and furniture needs.

3. Quality: 40 % of the companies promote quality programs regarding their products and services. On average, 60 % always identify customer needs and adapt to them, among other variables analyzed.

4. Marketing: Regarding the marketing issue, on average, companies in the industrial sector have a written annual marketing plan. However, only 60 % of the companies have clearly defined their target market and know their market share. On average, 50 % of the companies have positioning and marketing strategies. In addition, 75 % of the companies consider the company stable. Regarding sales, 46 % of the companies establish quotas, and 52 % control their compliance. 56 % affirm that their companies have generated significant sales/profits in the last two years. Lastly, 52 % of the companies carry out advertising, although only 47 % consider it efficient, and only 33 % periodically evaluate promotional mechanisms to increase sales.

Regarding the service the companies offer, 63 % affirm that their direct contact staff with the client was trained. In addition, the company uses a research method to measure customer satisfaction with a frequency of 39 %.

Regarding distribution, 51 % of those surveyed state that they have a trained sales force, and 49 % affirm that this sales force is motivated. In addition, 44 % always consider their sales force competent, and 54 % consider their distribution system efficient.

5. Accounting and finance: 75 % of the general managers claimed to be informed during the first week of each month about the company's financial operations. Indeed 60 % of the companies, on average, state that they have an accounting management method that provides the necessary information for making appropriate decisions.

Regarding financial administration, 61 % of the companies make future projections. In addition, 67 % of the companies have an accounting process to determine the profitability of product lines, and 57 % compare their financial closings with the same month of the previous year to propose strategies. 54 % evaluate the profitability of the equipment and machinery, and 75 % carry out monthly financial closings, among other data presented.

Within the legal and tax regulations section, 86 % of the companies were registered with the SHCP. In addition, 81 % make tax accounting updates, and 56 % are registered in a commercial chamber. On average, 70 % of the companies generate a budget that allows them to pay taxes, and 72 % prepare a projected tax budget.

6. Human resources: 59 % of the companies state that they have files that contain the corporate image, such as mission, vision, general objectives, organization chart, policies, and specific functions of the personnel. Regarding workers' rights, 75 % of employees have social security, 70 % with INFONAVIT, 72 % receive a vacation premium, and 91 % have a day off every six days of work. In addition, 74 % of the companies claim to train their new staff, 62 % train old staff, and No reference to new projects. 63 % of the companies announce changes, made within the company, to all employees, and the same percentage rates communication between employees as good, which

favors organizational culture. Finally, 74 % of the companies always comply with official regulations to safeguard the integrity of the worker regarding industrial health and safety.

7. Hiring Outside Companies: 44 % of the companies hire outside companies to help the business run more efficiently. However, only 56 % consider that these external companies are efficient most of the time, and this percentage drops to 12 % who affirm that they are always efficient.

8. Social responsibility: 68 % of the companies implement the social responsibility approach, while the rest do not consider it, as shown in **Fig. 4**.

9. Environmental management: 42 % of the companies have established environmental policies. In addition, 46 % implement strategies for protecting the environment in the company, and 61 % of the companies' ecological awareness was frequently promoted among the staff. These aspects were considered essential for environmental management, as shown in **Fig. 4**.

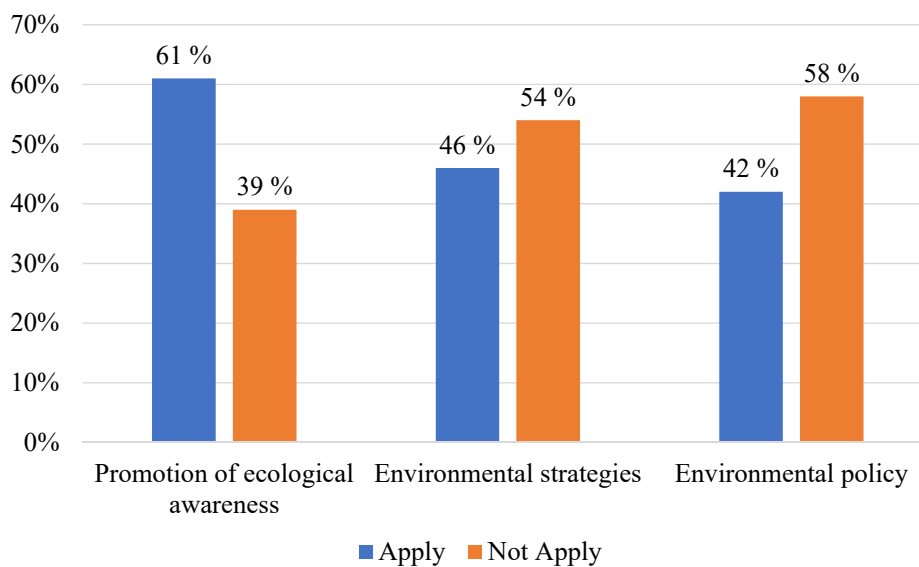


Fig. 4. Social Responsibility and environmental management in the industry sector

Competitiveness by variable between sectors

According to **Fig. 5**, it can be observed that the services sector, in general, shows the best indicators, being surpassed only by the variable of hiring external companies in the commerce sector.

The services sector stands out for its good performance in the adequate materials supply. Companies in this sector consider planning in the supply process, supplier evaluation, warehouse control, and infrastructure as the main processes. The industrial sector follows closely, followed by the commercial sector.

Regarding the general aspects of quality and commercialization, service companies obtain the best score, although they only reach 60 %. These companies have quality programs, identify customer needs, and focus on continuous production, product, processes, and service improvement. In addition, they have marketing and sales plans, trained personnel, and efficient distribution. In contrast, companies in the industrial and commercial sectors are around 40 % in these aspects.

The service sector reaches the maximum value of 88 % in accounting and finance. In this way, the companies indicate that companies in this sector have reliable, efficient, and timely systems for decision-making, as well as low levels of indebtedness, future projections, and compliance with legal and tax regulations. The commerce and industry sectors follow with 61 % and 62 %, respectively.

The human resources variable evaluates good practices related to knowledge of the business philosophy, compliance with labor obligations, training, safety and hygiene, and the organizational climate. In this aspect, the services sector obtains 80 % of the indicator, the industrial sector reaches 67 %, and the commerce sector obtains a score of less than 60 %.

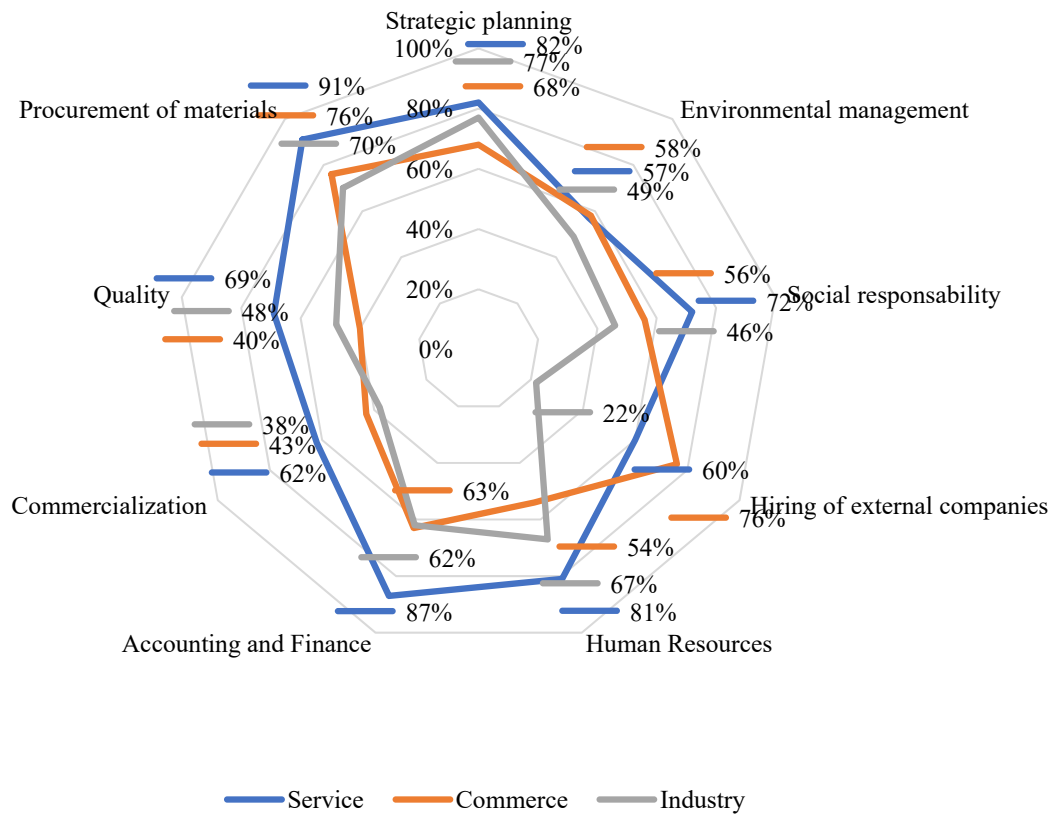


Fig. 5. Competitiveness of SMEs in the Altas Montañas region

Notably, the variable of contracting external services for the industrial sector obtains the lowest valuation, with 20 %. In contrast, the trade sector registers the highest value, with 73 %. The contracting of external services is directly related to belonging to a value chain.

Regarding social responsibility, the services sector is the one that carries out a greater number of practices that contribute to the benefit of society, reaching 68.4 %. On the other hand, the industrial sector is the one that carries out fewer actions of this type, with 42 %.

Finally, in the environmental management variable, which refers to compliance with environmental policies and the implementation of practices that promote both internal and external environmental awareness, low performance is observed in general for all sectors, with percentages of 68.4 %, 55 %, and 40 % for the services, commerce, and industry sectors, respectively. However, implementing the ISO 14000 standard is more present in the industrial sector.

4. Discussion

Concerning the quality variable, shown in **Table 1**, it was observed that the commercial sector shows less dedication in this aspect, with 64 % of the companies in this sector that do not promote quality programs. They were followed by companies in the service sector with 60 %, and in last place are companies in the industrial sector with 57 %. In addition, regarding the application of quality standards, the services sector is the one that applies them the least, with 55 %, followed by commerce, with 51 %. In contrast, the industrial sector presents a different behavior, reaching only 39 %.

In the commercialization variable, the industrial sector stands out for having the highest percentage of compliance with the actions analyzed. Three aspects with the highest percentages stand out: the lack of a written market plan (82 %), the lack of analysis of the level of customer satisfaction (73 %), and the non-existence of a market plan (66 %). In contrast, the other two sectors have lower percentages regarding the lack of these activities.

Regarding social responsibility, it was observed that the industrial sector has the least focus on this issue, with 58 %, followed by the commerce sector, with 55 %. On the other hand, the service sector shows different behavior, with 31.6 % of companies considering social responsibility important.

In the environmental management variable, the three sectors show similar behavior. The industrial sector has 51 % of companies with established environmental policies, followed by commerce with 55 % and services with 58 %, the latter with the least established policies.

Table 1

Opportunity areas distributed by variable and sector.

Variables	Sector		
	Service	Commerce	Industry
<i>Quality</i>			
Does not promote Quality programs	60 %	64 %	57 %
Does not apply quality standards	55 %	51 %	39 %
They do not measure defects in their product and services	53 %	53 %	42 %
Does not implement corrective actions	56 %	57 %	39 %
<i>Commerce</i>			
Does not always have a marketing plan	56 %	62 %	66 %
No written market plan	60 %	71 %	82 %
Does not have a defined target market	39 %	39 %	30 %
Does not have positioning strategies	46 %	56 %	57 %
Does not have marketing strategies	51 %	52 %	51 %
The company is not stable	25 %	38 %	42 %
It does not have established objectives and sales quotas	54 %	64 %	63 %
It does not have a competition analysis	58 %	62 %	60 %
It does not have an analysis to detect customer needs	63 %	68 %	63 %
It does not have an analysis of the impact of the promotion	67 %	66 %	66 %
No customer satisfaction level analysis	51 %	68 %	73 %
<i>Social responsibility</i>			
Does not have a socially responsible company approach	31.60 %	52 %	58 %
<i>Environmental management</i>			
It does not have established environmental policies	58 %	55 %	51 %
Does not promote environmental awareness among staff	49 %	49 %	45 %

This study identified three variables as areas of opportunity to promote competitiveness in the Altas Montañas Region: marketing, hiring external companies (outsourcing), and environmental management. It was suggested to implement public and private policy strategies that support SMEs in increasing their competitiveness and reducing their closing rate.

This study reveals that the main activity in the Altas Montañas Region is agriculture and that the value added to the products is deficient. In addition, tourism potential is observed in the service industry. However, it is not present in all the region's municipalities, as is the commercial sector. These findings are consistent with the national survey on productivity and competitiveness of micro, small, and medium-sized companies [1], where it was found that only 2 % of these companies participate in value chains.

This study provides relevant information for improving competitiveness. It can be used to create programs and public policies that promote linkage, financing, training, and innovation in micro, small, and medium-sized enterprises [18, 19]. Successful experiences in countries, such as

Ireland and Spain, show that support programs for SMEs, designed with measurable indicators and clear objectives, positively impact business and national development.

It is essential to mention, that there was some mistrust on the part of the interviewed people in business or administrators, many of whom refused to participate in the survey. It could be due to the insecurity environment in the area. It may have affected the statistical significance of the results obtained.

This article was limited to discussing the relationship between mathematics and finance, its importance in the financial field, and the teaching of financial mathematics. It also addresses the challenges and opportunities, associated with applying mathematical models in finance and highlights the need for a multidisciplinary approach to mathematical finance. Future research could be focused on particular applications of mathematics in accounting.

5. Conclusion

This research article analyzed the competitiveness and performance of the service, trade, and industry sectors. The results revealed that the services sector was the most competitive, standing out in strategic planning, supply of materials, quality, marketing, accounting and finance, human resources, and social responsibility. The commercial sector showed strengths in contracting external companies and marketing. However, it required improvements in quality, accounting and finance, human resources, and environmental management. The industrial sector stood out in strategic planning, supply of materials, and accounting and finance. However, there are opportunities for improvement in quality, marketing, human resources, and environmental management. These findings offer valuable information for economic actors and authorities, allowing the identification of areas of strength and weakness in each sector. In addition, they highlight the importance of promoting quality practices, trained human resources, effective marketing strategies, and a responsible approach toward society and the environment. This study contributes to existing knowledge and provides a foundation for future research and policies that drive growth and economic sustainability.

Conflict of interest

The authors declare that there is no conflict of interest in relation to this paper and the published research results, including the financial aspects of conducting the research, obtaining and using its results, and any non-financial personal relationships.

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Data availability

Manuscript has no associated data.

Use of artificial intelligence

The authors confirm that they did not use artificial intelligence technologies when creating the current work.

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