Determinant Variables of Logistic Management in Micro and Small Enterprises

Variables Determinantes de la Gestión Logística en las Micro y Pequeñas Empresas

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Resumen

La presente investigación tiene como objetivo identificar las diferencias y similitudes que pueden existir entre las variables asociadas a la gestión logística de las organizaciones empresariales en función de su tamaño. Para ello, se realizó una comparación entre 992 empresas del Ecuador en la que se representaron cuatro tipos de empresas: micro, pequeña, mediana y grande, en proporción a la estructura que presenta la composición de las empresas del país. Los resultados mostraron, mediante la aplicación de una prueba de hipótesis para verificar la igualdad de medias, la existencia de diferencias estadísticamente significativas en los niveles de análisis en variables asociadas a funciones administrativas, procesos de abastecimiento, almacenamiento, producción, distribución y logística inversa. Se demostró que el grado de desarrollo de la actividad logística es muy limitado en las micro y pequeñas empresas, por lo tanto, el cuerpo de conocimientos e instrumentos metodológicos disponibles para la administración de empresas debe adaptarse con cautela al aplicarlos en el contexto de organizaciones pequeñas.

Palabras Clave

Gestión logística; Micro y pequeñas empresas; Medianas y grandes empresas.

Abstract

The present research aims to identify the differences and similarities that may exist between the variables associated with the logistics management of business organizations based on their size. For this, a comparison was made between 992 companies in Ecuador, where four types of companies were represented: micro, small, medium and large, in proportion to the structure that the composition of the country's companies presents. The results showed, by applying a hypothesis test to verify the equality of means, the existence of statistically significant differences in the levels of analysis in variables associated with administrative functions, supply processes, storage, production, distribution and reverse logistics. It was shown that the degree of development of logistics activity is very limited in micro and small companies. Therefore, the body of knowledge and methodological instruments available for business administration must be adapted with caution when applying them in the context of small organizations.

Keywords

Logistics management; Micro and small enterprises; Medium and large enterprises.

Introduction

Micro, small and medium-sized enterprises (MSMEs) represent a significant percentage of the total number of companies in the vast majority of countries (Krishman, 2016). According to the report of the Organization for Economic Cooperation and Development OECD (2015), more than 99 % of the companies of the countries that make up the organization and the G20 are MSMEs. Similarly, in the Asia-Pacific region between 30 % and 50 % of employment comes from this sector. In the European Union, about 66 % of jobs are provided by MSMEs, while in the US around 99 % of commercial companies are MSMEs and provide 52 % of total employment.

The parameters for classification in MSMEs vary from one country to another in their magnitude and classification criteria. In the US they can reach up to 500 workers, while in Europe up to 250. In Ecuador two criteria are used: number of workers, where up to 49 employees are assumed, and the volume of sales they generate, which can be confusing since one can be fulfilled and the other cannot.

Despite how significant MSMEs are, Barret (2006) cited Tansky and Heneman (2003): "Small and medium-sized companies have been treated as second-class citizens by authors in the literature on management of human resources for too long (…)" (p. 299), and although this situation has improved, since every day it deepens and contributes a little more about this object of study, it can be argued that it is still insufficient. Not everyone recognizes that the tools and methods designed for large companies do not work in the same way in the conditions of MSMEs, which by their nature are different.

According to Gélinas and Bigras (2004), the distinctive particularities of MSMEs logistics have been analyzed since the 1970's, when Love and Gilmour (1976) published one of the first works to consider logistics as applied to SMEs (Logistics Review for Small Business). However, these differences were not accepted or recognized by the scientific community in general (Murphy et al.,1999).

This research aims to characterize to what extent the logistics management practices of MSMEs in Ecuador differ or resemble the practices of this discipline in medium and large enterprises.

Literature Review

The publications related to logistics management in general, indexed in the Scopus database, show a trend of increasing growth per year, as can be seen in Figure 1. From 1991 to 2019, if all articles are searched oriented to logistics management, and that are considered specific to administrative sciences, a total of 9 843 publications are reported. However, of this total, only 614 are oriented to the context of MSMEs, which represents 6.3 % and is insignificant if one considers that MSMEs, on average, are close to 90 % of the total number of companies.

In general, logistics management is the object of research in all latitudes, regardless of the socio-economic context where the company is located. Investigations are reported in the different continents: Asia (Zulkiffli et al., 2019), Africa (Kikawa et al., 2019), Europe (Dincă et al., 2019), Latin America (Salas Navarro et al., 2019), North America (Dallasega et al., 2019) and Oceania (Divisekera and Nguyen, 2018). Similarly, the sectors in which research associated with logistics are reported are varied: manufacturing (Piyathanavong et al., 2019), crafts (Mukhopadhyay and Maulik, 2019), food (Arifeen, 2019), construction (Kazancoglu et al., 2018) and services (Chowdhury et al., 2017). All of which shows the relevance of the subject at a global level.

Research topics within logistics management cover all the elements that make up the supply chain and range from customer orientation with service level analysis (Chromčáková et al., 2018) or demand forecast (Kačmáry et al., 2019), going through the analysis of the distribution process in general (Oey and Nofrimurti, 2018) and as part of this the study of transportation (Gružauskas et al., 2018).

Figure 1. Behavior of publications on logistics management in Scopus
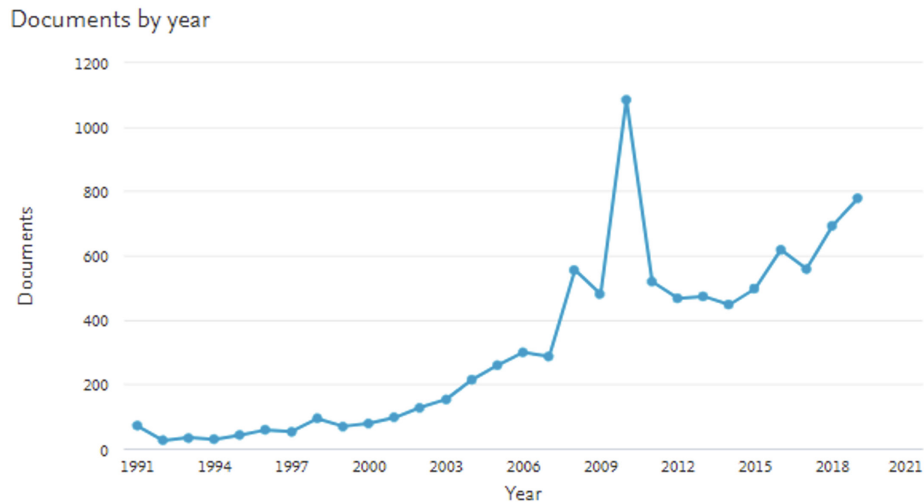
The production process is analyzed from various perspectives: planning (Sudarto et al., 2016), organization of production (Qamar and Hall, 2018), analysis of capacities (Pongpanit and Sornsaruht, 2019) and quality control (Gissin et al., 2019). Regarding procurement, in the same way, multiple factors are analyzed: relationship with suppliers (Suriyajaroen and Sopadang, 2018), inventory management (Alzate Rendón and Boada, 2017) and evaluation of the outsourcing alternative (De Oliveira Neto et al., 2018).

More and more topics are being introduced aimed at environmental management in particular (Ueasangkomsate, 2019) or sustainability in general (Boonlua, 2019). In this context, as a response to both environmental and economic needs, multiple reverse logistics analyzes are developed (Pinheiro et al., 2019; Starostka-Patyk and Bajdor, 2019).

The great diversity of research topics associated with logistics, in the opinion of the researchers, is due to two reasons: the great variety of activities that take place within logistics management and that can be investigated, and the particularity that many of these activities may or may not be developed by an organization, depending on the business model chosen, that is, the organization can decide whether or not to undertake a distribution or production process, it can choose to produce or buy from suppliers, among other decisions that modify the logistics conception of the organization.

Research is reported that highlights the necessary system approach that must characterize logistics management (Shvartsburg and Zaborowski, 2019), as well as a required strategic conception. Although investigations are reported for the multiple sub-processes that make up logistics management, the most recurrent theme is the conception of the supply chain (Nagitta and Mkansi, 2019; Zimon and Madzík, 2019; Zimon et al., 2019).

Through an analysis of 302 publications of the 614 identified as oriented to MSMEs, the orientation of these investigations was characterized according to the object of the logistics under study. As can be seen in Figure 2, the analyzed topics correspond to the majority in which logistics management in general is studied in depth. Similarly, the conception of supply chain management continues to be the most analyzed element.

Figure 2. Orientation of logistics research in MSMEs
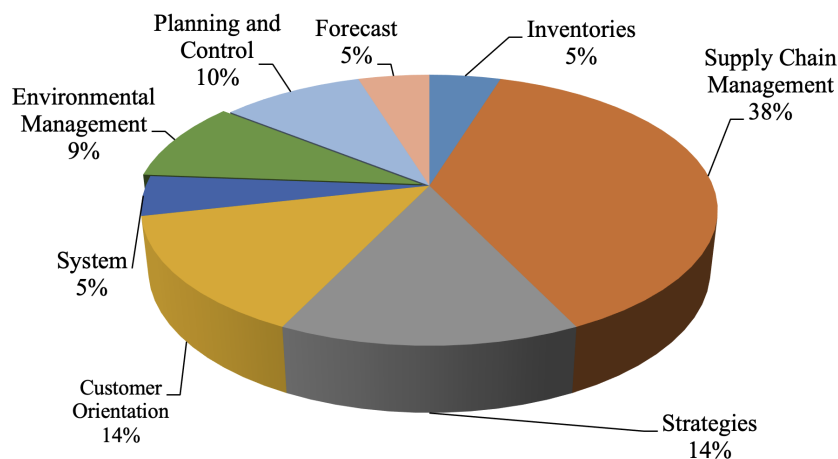
Note: own elaboration.

Gélinas and Bigras (2004), in the study of the distinctive characteristics of the logistics of MSMEs, defined a group of variables for analysis: Suppliers, Inventories, Forecast, Operation, Distribution and Transportation Processes, and Administrative Functions (Planning Organization). He concluded that the functions least developed by MSMEs were: forecasting, distribution, inventory management, and supplier relations. In addition, he highlighted some characteristics of MSMEs: they do not have defined organizational functions, the capabilities of the logistics flow are lower, there is a more direct link between the administrator and the logistics flow, and greater flexibility of the processes.

Materials and Methods

In the development of the investigation the following steps were used.

Design of research instruments

To characterize the logistics management in the organizations under study, a group of items were determined to identify the degree of presence of these in the organizations. The items were defined in correspondence with the main activities and characteristics that are associated with logistics management. Table 1 shows a summary of the different items identified by function. The presence or not of the items and variables analyzed in the organizations was characterized by applying a questionnaire to each of the entities selected for the study.

Definition of the population and sample

According to the data provided by the Ecuadorian Institute of Statistics and Census (INEC) dated December 2018, 823 005 en-

terprises were registered in the country, distributed by types of enterprises. As shown in Table 2, as can be seen, there is a high prevalence of micro and small enterprises.

Table 1. Set of items to characterize logistics management

Perspectives	Variables
Provisioning	Warehouse stock Existence of safety stock Warehouse type Warehouse size Defined warehouse areas Provisioning frequency Provisioning system type Suppliers reaction time Unitarizing means Means of transport Stock review frequency Inventory control type Existence of low-cost products Existence of idle inventory Existence of losses Causes of losses: • Low negotiation capacity • Shopping facilities • Degree of negotiation with suppliers
Criteria for location	Opportunity Customer access Providers access Costs Means Location selection method
Distribution	Own means or Outsourcing Design of distribution routes Applies indicators for the control of means of transport
Relationship with suppliers	Possibility of selection Selection method Supplier evaluation Existence of contracts Aspects regulated by the contract: • Evaluation methods • Discrepancy resolution methods
Production	Production capacity System of indicators to control Work organization studies Control indicators Aggregate planning and demand forecasting
Reverse logistics	Apply recycling actions Reprocess raw materials Disassemble for reuse
Administrative function	Planning Organization Control System character Strategic character

Note: own elaboration.

To establish the size of the sample, the typology of companies as different populations was taken into account since each one has different characteristics from each other. In determining the sample size, equation 1 was applied.

Where:
N: population size
p: probability of success (0.5)
q: probability of failure (0.5)
e: investigator error (5%)
z: constant of the normal distribution: 1.96 for the 95.5 % confidence level.

Equation 1

$$n = \frac{N*p*q*z^2}{e^2*(N-1)+z^2*p*q}$$

Table 2. Composition of the population and the research sample

Types of enterprises	Population	Sample		Real value of e
		Plan	Real	
Micro	773 772	384	380	0.05
Small	41 647	381	327	0.05
Medium	6 344	363	194	0.07
Large	1 242	294	91	0.10
Total	823 005	1,422	992	

Note: own elaboration.

It was not possible to carry out the study in all the enterprises foreseen for the size of the product sample to which many enterprises did not facilitate access to the information, which is why the real value of the researcher's error (e) was calculated from of Equation 2. As can be seen in Table 2, in all cases an investigator error of less than 10 % is ensured, which is considered admissible.

Equation 2

$$e = 0.98 * \sqrt{\frac{N-n}{n*(N-1)}}$$

Table 3 characterizes the composition of the general sample by productive sector of de economy. As can be seen, there is a predominance of the services and commerce sectors, which corresponds to the general structure of companies in Ecuador and other countries.

Table 3. Composition of the sample by productive sector

Productive sector	Micro	Small	Medium	Large	Total	Percentage
Agriculture	•		22	11	69	7
Production	3	21	37	28	89	9
Commerce	139	79	38	22	278	28
Construction	0	4	9	7	20	2
Services	234	191	88	23	536	54
Total	380	327	194	91	992	100

Note: own elaboration.

Processing form design

The information analysis focused on evaluating the existence of each wwof the defined variables. Subsequently, we proceed to evaluate whether the level of presence of each variable showed any relationship with the type of sector with which the enterprise operates. For the analysis of significant differences, the hypothesis test for mean differences in independent samples was applied with the Kruskal-Wallis statistician. The degree of presence of each of the functions was determined from the analysis of the degree of presence of the items evaluated for their characterization.

Analysis and Results

The analysis began with the characterization of the behavior of each dimension and variable, as shown below. Regarding the functions of the administration, as can be seen in Table 4, the conscious application of planning, organization and control increases as the size of the enterprises increases. Resulting very low the percentage of micro and small enterprises. In general, the existence of strategies is the least recognized variable in the four types of enterprises.

Table 4. Percentage of presence of administration functions

Type of enterprise	Planning	Strategy	Formalized function	Function responsible	Cost system
Micro	9.74	6.32	9.74	9.74	7.89
Small	14.07	11.01	14.07	14.07	11.31
Medium	57.22	54.12	57.22	57.22	54.12
Large	89.01	75.82	89.01	89.01	82.42

Note: own elaboration.

In Table 5 it can be seen that access to customers is the variable with the greatest weight in decision-making on where to locate the business. While in small enterprises, costs are the variable that is most taken into consideration. Being conditioned by the place where the resources are available was only recognized as a determining variable by 18 % of the micro enterprises, in this case it is necessary to point out that all these enterprises are from the agriculture sector. It is also important to establish that, according to the information collected, only 28.76 % of medium-sized enterprises and 71.42 % of large enterprises use methods to make the decision to locate the enterprise.

Table 5. Percentage to evaluate the location of the enterprise

Type of enterprise	Opportunity	Customer access	Costs	Resource
Micro	23.70	26.80	30.30	18.20
Small	27.20	35.50	36.70	0.00
Medium	28.40	40.20	29.90	0.00
Large	30.80	39.60	28.60	0.00

Note: own elaboration.

With regard to the forms of relationship with suppliers (Table 6), the bargaining power of micro and small companies is very low. In the case of micro, only 9.74 % have a supplier evaluation mechanism and only 5.53 % have a contract that regulates the relationship. Although, small companies improve both percentages: they evaluate suppliers (9.74 %) and have a contract (23.55 %). Medium and large enterprises show a better level of interaction with suppliers. Although less than 50 % of medium-sized companies do not use evaluation and selection methods or consider themselves in a position to select suppliers. Large enterprises do show greater power of relationship in relation to their suppliers.

Table 6. Relationship with suppliers

Type of enterprise	Supplier selection method	Select suppliers	Evaluates suppliers	Contracts
Micro	0.00	0.00	9.74	5.53
Small	0.00	0.00	26.61	23.55
Medium	47.42	47.42	40.72	70.10
Large	83.52	100.00	73.63	96.70

Note: own elaboration.

In existing contracts, not always all the parameters that may be necessary are regulated, with aspects relating to the quantity, quality, term and price of purchases being the most frequent object of regulation. In the case of micro and small enterprises, aspects referring to the evaluation methods of the delivered merchandise and the methods or ways used to resolve discrepancies do not constitute part of the contract. Table 7 shows the behavior of each of these aspects in correspondence with the size of the enterprise.

Table 7. Percentage of existence of aspects subject to regulation in contracts

Type of enterprise	Quantity	Quality	Price	Term	Evaluation methods	Discrepancy solution method
Micro	49.74	28.16	100	57.11	0.00	0.00
Small	69.72	52.29	100	69.72	0.00	0.00
Medium	75.26	60.31	87.63	75.26	32.99	20.62
Large	87.91	90.11	84.62	90.11	15.38	9.89

Note: own elaboration.

It was evidenced that the supply frequency varies in correspondence with the size of the enterprises (Table 8), verifying that as the size of the enterprises increases, the size of the period between supply tends to increase. Which is related to variables such as: purchase volume, size or availability of the warehouse, storage conditions, level of inventory turnover and negotiating power with suppliers.

Table 8. Percentage in which various provisioning frequencies are used

Type of enterprise	Daily	Weekly	Monthly	More than a month
Micro	41.99	40.16	17.85	0.00
Small	43.43	33.03	23.55	0.00
Medium	0.00	21.65	34.02	44.33
Large	0.00	19.78	42.86	37.36

Note: own elaboration.

About 80 % of micro and small enterprises make their purchases with a frequency equal to or less than a week, while medium and large companies make their purchases with a frequency equal to or greater than a week, and as the size of the enterprise tends to increase the provisioning period.

On the other hand, the reaction time of suppliers (Table 9) tends to grow as the size of the enterprises increases, which is understandable from the fact that these types of organizations generally make high volume purchases that require more time for their coordination and assurance.

Table 9. Percentage in which different supplier reaction times are used

Type of enterprise	Less than a day	One day	Less than a week	More than a week
Micro	27.78	43.92	28.31	0.00
Small	29.45	35.89	34.66	0.00
Medium	0.00	28.98	42.40	28.62
Large	0.00	35.16	40.66	24.18

Note: own elaboration.

Regarding the prevailing supply system (Table 10), it was observed that regardless of the size of the enterprise, about 70 %, in all cases have established a supply request system according to the level of stocks available in their warehouse, and the remaining percentage is carried out periodically or more frequently. From which it is inferred that these organizations have a stable production and demand rhythm that allows them to apply this type of system.

Table 10. Percentage of use of different provisioning systems

Type of enterprise	Against stocks	Periodical
Micro	75.40	24.60
Small	69.72	30.28
Medium	73.71	26.29
Large	78.02	21.98

Note: own elaboration.

As had already been inferred, from the analysis of the forms of relationship with suppliers and available contracts, in Table 11 it can be seen that the perception of bargaining power grows proportionally to the size of the company, considering it high by about 50 % of large and medium-sized enterprises and under the same proportion of micro and small enterprises.

Table 11. Percentage of perception of different Bargaining power with suppliers

Type of enterprise	Low	Medium	High
Micro	48.95	40.26	10.79
Small	50.46	34.56	14.98
Medium	23.71	23.20	53.09
Large	29.35	25.00	45.65

Note: own elaboration.

In general, micro-enterprises receive supplies on commission (Table 12). That is, they do not pay for the purchase until after their sales materialize, and if there are no sales, some of them return the product to their suppliers, this responds to that many times they work as supplier's points of sale and do not have a financial flow that allows them to make the payment in advance. On the other hand, as the size of the companies grows, procurement is generally assumed by purchases, and those received in commissions come from small companies that seek to insert their products in the market.

Table 12. Percentage in which different forms of purchase are applied

Type of enterprise	Commission	Purchase
Micro	48.95	51.05
Small	79.02	20.98
Medium	79.90	20.10
Large	76.92	23.08

Note: own elaboration.

In general, micro-enterprises do not have a warehouse, only 19.74 % have one. On the other hand, more than 75 % of small (77.98), medium (84.54) and large companies (86.81) have a warehouse, and in the case of medium and large companies that do not have these, they are service companies. Micro-enterprises that do not have a warehouse have their merchandise or raw materials without organization in the same work or sales area, and generally with low volumes of inventory.

The size of the available warehouse is generally proportional to the size of the enterprise. As can be seen in Table 13, micro and small companies only have small warehouses, while medium and large warehouses predominate in large enterprises.

Table 13. Percentage of existence of the warehouse size typology

Type of enterprise	Small Warehouse	Medium Warehouse	Large Warehouse
Micro	19.74	0.00	0.00
Small	77.98	0.00	0.00
Medium	65.46	23.20	0.00
Large	0.00	41.76	50.55

Note: own elaboration.

Regarding the available warehouses, 50 % of the micro and small companies do not have a defined storage area, and the other 50 % have only established the area that is destined for the warehouse. On the other hand, medium and large enterprises in addition to the storage area define a reception and dispatch area, as can be seen in Table 14.

Table 14. Percentage of existence of warehouse areas

Type of enterprise	Reception & Dispatch	Storage	Not Defined
Micro	0.00	19.74	19.74
Small	0.00	77.98	77.98
Medium	89.17	89.17	75.26
Large	91.21	91.21	0.00

Note: own elaboration.

In general, enterprises operate with low levels of safety inventories (10.82 % on average). Although, as regularity it tends to be greater as the size of the enterprise increases, which corresponds to the behavior of other variables such as the frequency of supply, the reaction time or the existence of warehouses. Similarly, the high representation of companies in the service sector influences this behavior, since their dependence on warehouse stocks is less.

Regarding inventory control (Table 15), it is striking that in the different sizes of enterprises there are entities that do not carry out inventory control, although their representativeness tends to decrease as the size of the organization increases. Only large and medium-sized enterprises have daily inventory control systems implemented, these are companies that generally carry out sales through automated systems. The micro and small enterprises that carry out inventory control do so on a weekly and monthly basis, although 18 % of the micro and 30 % of the small companies do not carry out inventory control.

Table 15. Percentage of application of different frequencies of inventory control

Type of enterprise	Daily	Weekly	Monthly	More than a month	Not controlled
Micro	0.0	0.0	17.9	33.2	48.9
Small	0.0	0.0	29.7	32.4	37.9
Medium	25.3	14.4	21.1	21.6	17.5
Large	37.4	0.0	44.0	0.0	18.7

Note: own elaboration.

As predicted, all micro and small enterprises and most medium (89.2 %) and large enterprises (67.0 %) carry out manual inventories and only a limited percentage of medium and large enterprises have automated inventory systems.

The existence of inventory levels, especially when there are no good storage or inventory control conditions and policies that ensure a good inventory rotation lead to the generation of losses. The behavior of the losses tends to decrease with the increase in the size of the enterprises: Micro 81.1 %, Small 56.6 %, Medium 33.3 % and Large with 14.5 %. Since, to the same extent, they improve their conditions storage, inventory control systems, relationship power with suppliers, among other aspects.

The percentages of losses tend to decrease as the size of the enterprise increases (Table 16). Micro and small enterprise have products with losses in all the evaluated intervals, while in large enterprises their levels of losses do not exceed 1 % and in medium enterprises 5 %.

Table 16. Percentage of losses according to the size of the companies

Type of enterprise	<1 %	5 %	5-10 %	>10 %
Micro	27.89	32.89	20.26	18.95
Small	29.36	27.22	0.00	43.43
Medium	21.13	3.09	0.00	0.00
Large	16.48	0.00	0.00	0.00

Note: own elaboration.

The causes of losses vary depending on the sector in which the organizations operate. Similarly, the causes are varied and range from low bargaining power, poor storage conditions, excess inventory or slow turnover, as can be seen in Table 17.

Table 17. Causes of wastage

Productive sector	Slow inventory turnover	Excess inventory	Improper storage	Lack of control	Low bargaining power
Agriculture	14.80	20.40	22.20	29.60	13.00
Production	21.10	17.50	15.80	31.60	14.00
Commerce	21.70	21.30	18.30	20.40	18.30
Construction	30.00	20.00	20.00	10.00	20.00
Services	20.70	20.70	17.40	16.10	25.20

Note: own elaboration.

Internal storage media are not very varied in enterprises (Table 18), with a predominance of shelves. The type of unitizing means used is conditioned by the type of production process that exists in the enterprise, as can be seen there is a variety in the types of unitizing means according to the sector in which the enterprise operates. In construction and commerce there are shelves for long loads, while in services there are only shelves.

Table 18. Percentage of unitizing means by type of enterprise and productive sectors

Variables		Direct Stowage	Fractional Load	Long Load	Shelves
Type of enterprise	Micro	63.42	30.79	18.42	74.74
	Small	13.15	5.20	7.95	53.52
	Medium	0.00	0.00	0.00	47.94
	Large	0.00	0.00	0.00	48.35
Productive sector	Agriculture	46.38	27.54	0.00	20.29
	Production	9.90	23.96	16.67	31.77
	Commerce	78.06	23.38	16.55	87.05
	Construction	80.00	20.00	90.00	25.00
	Services	0.00	0.00	0.00	48.69

Note: own elaboration.

Table 19 shows the composition by sector of the different types of internal transportation means. It can be seen that the sector with the greatest variety of internal means of transportation is that of construction and the one with the least variety that of services.

Table 19. Percentage of composition of internal transportation means by sectors

Productive sector	Manual	Wheelbarrow	Lift Truck	Specialized
Agriculture	100	72	0	0
Production	82	26	15	7
Commerce	100	10	0	0
Construction	100	80	70	25
Services	54	0	0	0

Note: own elaboration.

Figure 3. Percentage of existence of internal means of transport
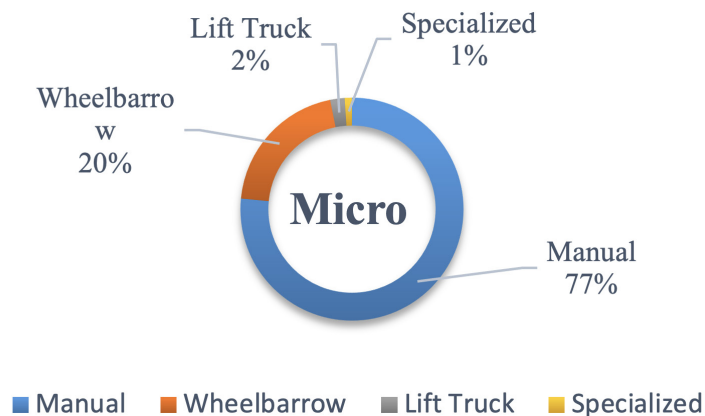
Figure 3. Percentage of existence of internal means of transport (Continuation)
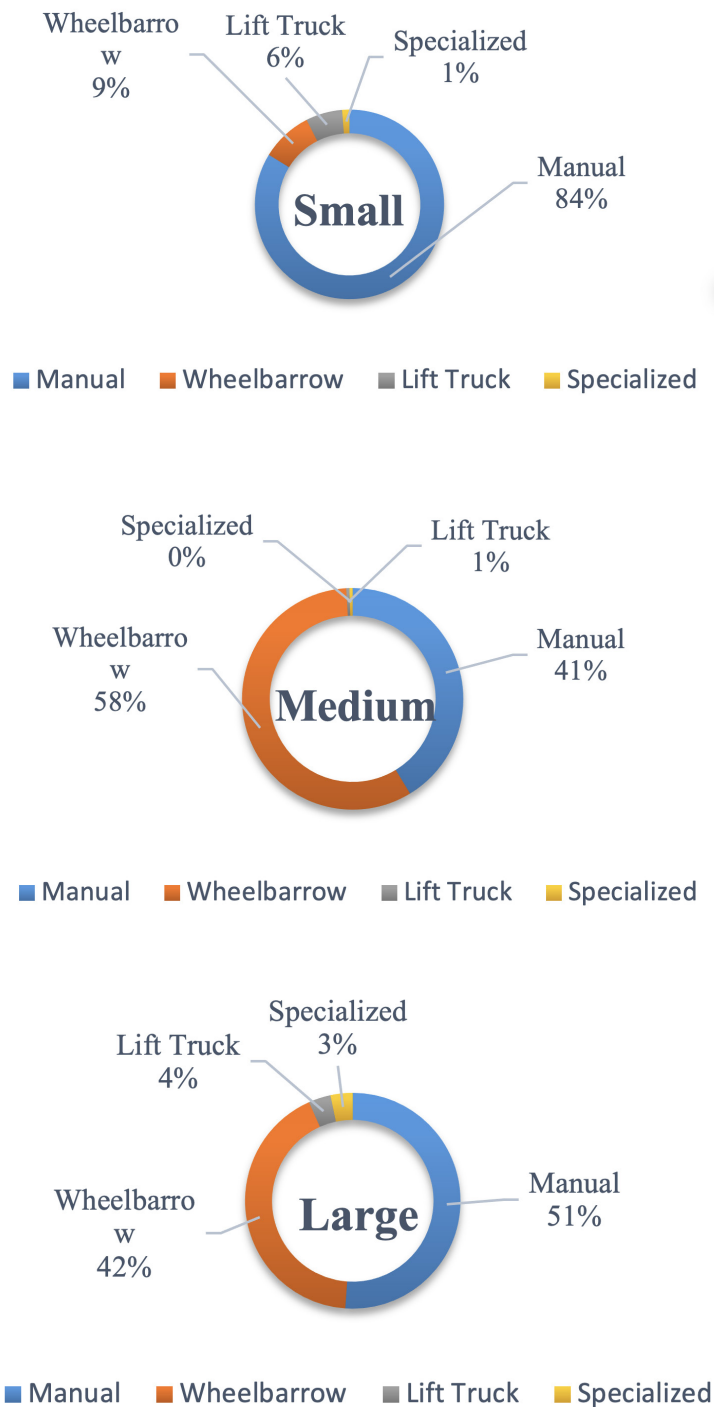
Note: own elaboration.

The composition of the means of transport for internal handling also varies depending on the size of the enterprises (Figure 3). In all of them there is a predominance of manual transportation or the use of forklifts, which is interpreted as a low level of

automation and development of storage technology. Specialized transportation is only identified in large enterprises that are not part of the service sector.

The analysis of the actions of planning, organization and control of the production process that the organizations apply allowed to know (Table 20) that these are very scarce in small and medium-sized enterprises. On the other hand, medium and large enterprise have a projection of their level of service, a domain of their productive capacities, they state that they carry out work organization studies aimed at improving productive performance and evaluate aggregate planning actions and forecasting. However, the percentages of medium and large enterprises that apply these actions in none of the cases exceed 82 %, although it is evident that large companies have a greater tendency to apply these actions than smaller enterprises.

Table 20. Percentage of application of planning and organization actions of production processes or service provision.

Type of enterprise	Company's Capacity	Study Work Organization	Aggregate Planning	Service Level
Micro	0.00	0.00	0.00	0.00
Small	0.00	0.00	0.00	0.00
Medium	59.28	59.28	59.28	59.28
Large	68.48	68.48	65.22	65.22

Note: own elaboration.

Similarly, the variety of indicators used to control operations increases with the size of the organizations. Micro-enterprises limit themselves to the analysis of financial indicators and it should be noted that in this sense they are not very varied either, they generally only control costs and income. Some of the small companies, in addition to financial indicators, use production indicators such as production volume, inventory levels or defective production. Medium and large companies additionally incorporate indicators associated with human resources management, fundamentally regarding salaries and quality indicators, and above all failure analysis and customer dissatisfaction. The behavior of these indicators is shown in Table 21.

Table 21. Percentage of enterprises using different types of indicators for control

Type of enterprise	Financial	Production	Quality	HRM
Micro	100	0.00	0.00	0.00
Small	100	66.97	0.00	0.00
Medium	100	57.73	69.59	24.23
Large	100	49.45	57.14	61.54

Note: own elaboration.

The distribution process is very scarce in the organizations that are analyzed. In general, micro and small enterprises do not carry out distribution and if they do it

through third parties because they do not have their own means, so the costs are assumed by the customer. The percentages in which medium and large enterprises undertake the distribution process are not very significant either, although these percentages tend to increase with the size of the organization. The means of transportation that enterprises own are not always used in distribution and those that are used rarely do so from an analysis of optimization of distribution routes. Similarly, although with a trend towards better performance, they do not have indicator systems for analyzing the performance of the fleet of available equipment (Table 22).

Table 22. Percentage of use of variables to improve distribution by type of enterprises

Type of enterprise	Distribution	Own means	Distribution route design	Transport control indicators
Micro	7.37	7.37	0.00	0.00
Small	21.10	22.94	0.00	0.00
Medium	30.93	44.33	8.76	39.18
Large	40.66	74.73	24.18	61.54

Note: own elaboration.

The application of reverse logistics actions (Table 23), shows a similar behavior to the distribution process, they are scarce. This application tends to increase as the size of the enterprise increases. The action that is most applied is carrying out some type of recycling, generally as a way to generate additional income or reduce costs. The percentage of organizations that carry out disassembly actions to be able to reuse the raw material in all cases is low.

Table 23. Percentage of enterprises that apply reverse logistics actions

Type of enterprise	Recycling actions	Raw material rework	Disassemble for reuse
Micro	42.11	7.37	0.00
Small	50.46	23.24	3.98
Medium	58.76	36.60	9.79
Large	65.93	46.15	6.59

Note: own elaboration.

To verify the existence of statistically significant differences in the variables observed depending on the type of enterprise, a comparison test of means was carried out for independent samples, using the Kruskal-Wallis statistician. The results obtained corresponded with the observed behaviors. Most of the observed variables showed significant statistical differences, with a confidence level of 95 % and a significance level of less than 0.05. With the exception of the following variables: Selection of the location of the business, considering the opportunities and cost criteria, the existence of safety inventories, the non-availability of warehouses with special conditions, the use of forklifts as internal means of transportation and the use of financial indicators. These variables showed a similar behavior, regardless of the types of enterprises.

In the same way, the test allowed to verify the validity of the assumptions regarding the existence of statistically significant differences between sectors considering the variables: internal means of transport, use of unitizing means and the existence of losses in the storage process.

Discussion and Conclusions

The research carried out corresponds to the results and proposal of Gélinas and Bigras (2004), in the sense that it analyzes the behavior of the variables proposed by the author for the study of small and medium-sized companies and characterizes them in the context of companies in Ecuador, while comparing its behavior with larger enterprises.

The results achieved show that the functions associated with logistics management, although they vary in their level of presence or degree of maturity, are present to a greater or lesser extent in most companies regardless of their type. Tending to grow its level of formalization in proportion to the size of the companies.

In general, the level of application of the basic functions of management: planning (Sudarto, et al., 2016), organization of production (Qamar and Hall, 2018) and quality control (Gissin et al., 2019) tend to be very limited in micro and small enterprises.

The procurement process (Alzate Rendón and Boada, 2017; Suriyajaroen and Sopadang, 2018), presents an incipient degree of maturity. Power is concentrated in suppliers, those who are rarely evaluated, selected and with whom the organizational power of micro and small enterprises is low, causing the existence of high levels of inventories and losses. Likewise, the level of development of the warehousing process is relatively low in smallest organizations. Regarding the production process and its improvement, micro and small enterprises generally do not carry

out studies regarding the level of service (Chromčáková et al., 2018), they ignore their real productive capacities (Pongpanit and Sornsaruht, 2019), and perform few demand forecast studies (Kačmáry et al., 2019).

The distribution processes (Gružauskas et al., 2018; Oey and Nofrimurti, 2018) are also scarce. In general, micro and small enterprises do not have their own means of transportation and do not carry out distribution and if they do, they do it through the provision of the service by a third party, who increases the cost of the service and transmits this impact to the end customer. For their part, actions related to reverse logistics (Pinheiro et al., 2019; Starostka-Patyk and Bajdor, 2019) are scarce and are limited to waste collection and recycling as another possible source of income.

All of the above, as a generality, allows us to affirm that the level of development of logistics management in the case of micro and small enterprises is not characterized by presenting a successful development of a system approach (Shvartsburg and Zaborowski, 2019).

The boundaries that limit this research arise based on the definition of the population under study whose behavior is in correspondence with the socio-economic and legislative characteristics where enterprises operate. Therefore, it is feasible to recommend evaluating whether the reported results correspond to the characteristics of similar organizations that operate in other contexts.

Another limitation associated with the research arises from the access imposed by various enterprises under study to the information, based on which it was not possible to delve into other aspects related to the behavior of financial indicators that could have served to quantify the impact positive or negative of the degree of development of logistics management.

The managerial implications that can be recognized, associated with this re-

search, are linked to the need to continue developing a body of theoretical knowledge that serves as a guide to entrepreneurs operating in enterprises of a limited size with few workers and with a low level of employment, infrastructure and equipment, which for these same reasons should not extrapolate the administrative approaches created for organizations with a higher level of complexity. For this reason, it is recommended that micro and small enterprises take on the task of creating management instruments that respond to their own reality.

As a final conclusion of the research, it can be stated that there are significant differences in the degree of development of the logistics activity according to the type of enterprise. The level of development of this activity in micro and small enterprises is very limited. Reason why it is considered that the body of knowledge and the methodological instruments available for business administration should be adapted with caution when applying it in the context of small organizations.

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