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PROCUREMENT AND LOGISTIC PROCESSES

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ABSTRACT

Nowadays, managing procurement processes in companies and supply chains facilitates competitiveness among actors. In this study, the objective was to evaluate the performance of procurement processes in Ecuadorian companies. To achieve this, a modified verification instrument was used, composed of the dimensions: the importance of procurement and its relation to supply chains, procurement, suppliers, cycle, cost and human talent training. The instrument evaluated the performance of procurement areas in 162 Ecuadorian companies. The instrument was validated and the data was processed using descriptive and inferential statistics. The results of this study show a low performance level in the procurement areas in the observed companies. The weakest variables were: procurement, demand and providers. The study contributres with relevant data that can be used to create strategies to improve the procurement performance in Ecuadorian companies.

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I. INTRODUCTION

Procurement is a very relevant process for supply chains and logistics. It allows linking demand forecasts with the material needs expressed to suppliers. Thus, procurement is a strategic leverage for organizations. This process becomes costly because it is dependent on multifunctional equipment, relations with suppliers, and contract management [1].

In this context, procurement performance is a factor that influences the sustainability of an organization. Some studies [2] focus their research on green procurement. They have emphasized the environmental impact that results from purchasing non-polluting resources, and how this is related to positive social en economic performance.

Other studies mention the need for applying technologies to procurement, to decrease time and costs. At the same, digitalization influences data training and treatment, which facilitates decision-making [3]. In this sense, it allows to have a data set that helps to identify the organization's client in relation to the demand forecasts, as well as decreasing logistic costs and projecting its niche into the market. Moreover, the use of AI to optimize [4] inventories, provider management, demand forecasts, demand provision, cycles, and costs.

In the Ecuadorian context, the country's logistic performance was analyzed [5]. The goal was to identify the sector's main issues in 2023, and provide useful information to the National Logistic Planning for the following years [5]. As a result, the following logistic estimations were defined: 40% belongs to transport, 23% to storage, 9% to procurement and supplies, and 12% to costumer service and order processing, and 9% to planning and inventory management. On the other hand, the logistic services related to procurement and provider management from companies is distributed as such: 79,1% is executed directly, 18,6% is executed by hiring external companies, and 2,3 % do not execute or apply them. Nonetheless, there are not many analysis of this

kind, that promote data registration at a national level in terms of logistic, and that contribute to decision-making.

On the other hand, the index of logistic performance of competitiveness and service quality defined by the World Bank (1= lowest and 5= highest) for Ecuador was 2.75 in 2018; this is the last available data. This implies that the logistic performance is average, despite a low growth of 0.11 since 2007. When comparing this value to those of neighboring countries such as Colombia and Peru in 2022, Ecuador's growth is lower. Both countries have had regulations based on supply chains for more than a decade. This shows the need for regulations that support logistic development and supply chains in Ecuador.

Thus, the objective of this study was to evaluate the performance of the procurement process in Ecuadorian companies.

This work is structured as such: section 1 is composed of the introduction, section 2 of materials and methods for evaluating procurement; section 3 includes the results and discussion; and lastly, section 4 presents the conclusions of the study.

The motives of this study are:

✓ The identification of the relevant characteristics of procurement in Ecuadorian companies.

✓ The stimation of procurement cycles in Ecuadorian companies.

II. MATERIALS AND METHODS

Data Collection

Quantitative methodologies with a positivist approach were applied to the study [6]. The period for the study carried out between 2022-2024 on Ecuadorian companies. The study was descriptive, explicative and correlational because it characterized the procurement variables. The procurements were diagnosed following the criteria from the checklist [7]. A questionnaire on Google Forms was used and distributed all around the country.10 questionnaires were used for tests that were subsequently removed from the final sample. The sample contained 162 respondents. The questionnaire was in Spanish and the respondents were informed of their anonymity.

Questionnaire content

The objective of the questionnaire was to evaluate the performance of procurement in Ecuadorian companies. The questionnaire was organized into 7 dimensions and 57 items to fulfill the objective: general characteristics of the companies, the importance of procurement and its relation to the Supply Chain (SC), demand, suppliers, procurement, cycle, cost and human talent training.

✓ General characteristics of the company: this dimensión is focused on describing the companies on broad terms, specifically location, activity[8], and some demographic data [9].

✓ The importance of procurement and its relation to the supply chain: this dimensión included ítems such as evaluation of the procurement section's role, the strategic importance of procurement in the supply chain, and the reasons why it is crucial. The criteria were obtained from [10-13].

✓ Procurement: This dimension comprises 24 out 57 items. The ítems aim to describe the type of procurement, the process, the services they offer, and indicators. The criteria were obtained from [14-17].

✓ Demand: It is composed of 13 items, which are focused on forecasts, information, coverage, and product sales. The criteria were obtained from [16],[18],[19].

✓ Suppliers: This dimension included 9 items such as selection, classification, policies, evaluation, and logistic services. The criteria were obtained from [10],[19],[20]. Cycle: This dimension has three items that help to determine the timeframe from the identification of demand, to the moment arrives at the warehouse and unit. The criteria were obtained from [19].

✓ Cost: This dimension was comprised of questions 47 and 52, based on the application of the Activity Based Costing, and aims to estimate how much the procurement section can help to reduce costs in the supply chain. The criteria were obtained from [19], [21],[22].

✓ Human Talent Training: This dimension had 3 items, which aim to describe the traning and education of the workers from sales, demand management, and suppliers. The criteria were obtained from [19].

Instrument validation and reliability

With the goal of estimating the internal consistency of the instrument, the following were used: Cronbach's Alpha and McDonald's Omega [23]. Cronbach's alpha was interpreted from the intervals: $\alpha > 0.9$ excellent, $\alpha > 0.8$ good, $\alpha > 0.7$ questionable, $\alpha > 0.5$ poor and $\alpha < 0.5$ unacceptable [24].

Statistical Analysis

This instrument has several scales, so the statistical analysis was performed based on them.

✓ Descriptive statistics were applied to the dichotomous scale items, specifically the mode and frequency estimation.

✓ The frequency was estimated for the open-ended result items.

✓ Descriptive and inferential statistics were applied to the items with a Likert scale (1-5). In the first, the mean per variable and the cycles and their corresponding deviation were estimated.

✓ In the second, the Spearman's Rho correlation was applied to define the relationship between variables. And significant correlations were taken with a value greater than 0.5 [25], [26]. The chi-square test was applied to demonstrate the hypothesis that there is a relationship between staff training (university or not), the assessment of the function of the purchasing area in your organization (p8) and the number of people dedicated to logistics. These analyses allow for the evaluation of purchasing processes in Ecuadorian companies. Based on this analysis, strategies are identified to improve these processes in the companies under study.

IV. RESULTS AND DISCUSSIONS

The companies under study are classified by type and sector. Of these, 72.8% are classified as services and the rest as industries. This demonstrates the global trend, where services predominate over production. The most analyzed sector is the food sector (53.7% of the sample), followed by commerce (27.8% of the sample), Table 1.

Table 1: Classification of companies in the study.

Classification	Element	Frequency	Percentage	Valid Percentage	Cummulative percentage
Tipo	Industry	44	27.2	27.2	27.2
	Service	118	72.8	72.8	100
Sector	Food	87	53.7	53.7	53.7
	Artisan	9	5.6	5.6	59.3
	Commerce	45	27.8	27.8	87
	Logistics	3	1.9	1.9	88.9
	Chemicals	4	2.5	2.5	91.4
	Services	6	3.7	3.7	95.1
	Public Services	1	0.6	0.6	95.7
	Services	6	3.7	3.7	99.4
	Transport	1	0.6	0.6	100
	Total	162	100	100	

Source: Authors, (2024).

In the case of the location of the companies in the study, 65.4% are in Manabí, followed by 21.6% in Pastaza, Table 2. This infers that 67.8% belong to the Coast region of Ecuador, 27.8% are in the Amazon region and 4.3% in the Highlands region. This provides an opportunity for further in this area. At the same time, the research was developed in the country, demonstrating its importance.

Table 2: Socio-demographic characteristics.

Provinces	Frequency	Percentage	Valid Percentage	Cumulative Percentage	Regions
Chimborazo	3	1.9	1.9	1.9	Highlands
Cotopaxi	1	0.6	0.6	2.5	Highlands
Esmeraldas	2	1.2	1.2	3.7	Coast
Guayas	2	1.2	1.2	4.9	Coast
Manabí	106	65.4	65.4	70.4	Coast
Napo	10	6.2	6.2	76.5	Amazon
Pastaza	35	21.6	21.6	98.1	Amazon
Pichincha	2	1.2	1.2	99.4	Highlands
Tunguragua	1	0.6	0.6	100	Highlands
Total	162	100	100		

Source: Authors, (2024).

The results from the instrument's consistency were a Cronbach's Alpha of 0.945 and an Omega value of McDonald's of 0.943. These values demonstrate that the checklist is reliable because the internal consistency values are greater than 0.9, which are considered excellent.

On the other hand, the variables are estimated with an average between 2.18 and 3.54 (low and medium on the Likert scale). The variable with the greatest challenge is purchases and the one with the greatest strength is purchases and their relationship with the chain, Table 3.

Table 3: Results from the variables and their items.

Variables	Items	Median	Variable median
Procurement and its relation to the SC	p8	3.83	3.54
	p38	3.3	
Demand	p15	3.03	2.71
	p16	2.18	
	p17	2.96	
	p18	2.88	
	p19	2.52	
	p20	2.37	
	p21	3.15	
	p22	2.75	

	p23	2.92	
Suppliers	p31	2.05	2.18
	p36	2.08	
	p35	2.22	
	p34	2.4	
	p49	3.26	
Cost	p52	3.5	3.09
	p47	2.77	
Procurement	p48a	2.04	2.449
	p48b	2.17	
	p48c	1.72	
	p48d	2.16	
	p48e	2.73	
	p48f	2.48	
	p48g	2.71	
	p48h	2.9	
	p48i	2.59	
	p48j	2.74	
	p48k	3.14	
	p48l	3.01	
	p48m	2.89	
	p48n	2.05	
	p48p	2.84	
	p48q	1.78	
	p48r	2.53	
	p54	3.34	
	p55	3.33	
	p56	1.84	

Source: Authors, (2024).

In this sense, the weakest items: the degree to which credit purchases are used, the degree to which purchases are taken into account for the management of customs procedures, and the presence of a logistics operator service to carry out procurement activities. Despite this, there are another 27 items with values lower than 3, which are also weaknesses for the companies under study. Based on the results, the variables show the following behaviors in relation to the average: the importance of purchases and their relationship with the SC (3.54 average value), cost (3.09 average value), purchases (2.449 low value), demand (2.71 low value) and suppliers (2.18 low value).

In the case of the importance of procurement and their relationship with the supply chain, both questions present average values, despite the fact that this variable presents few items. In the demand dimension, questions p16; p17; p18; p19; p20; pp22 and 23 have low values. In suppliers, questions p31; p36; p35, and p34 have low values. In costs, question 47 has low values. In the procurement dimensipon, there are three questions with very low values (p48c; p48q and p56). At the same time, most of the questions have low values, with medium values for questions 48k; 48L; 54 and 55). These elements show that in companies, performance in terms of purchases is between low and very low. Although some items are located in the middle, none of their values are located high or very high.

In this context, the relationship between staff training (university or not), the assessment of the function of the purchasing area in the organization (p8) and the number of people dedicated to logistics; it is concluded that there is a relationship between staff trained in logistics skills and the assessment with the purchasing function (Table 4). This is due to the rejection of the null hypothesis in the chi-square tests.

Table 4: Results from the chi-squared test.

	Value	df	Asymptotic significance (bilateral)
Pearson's squared-chi	13.833a	8	.086
Likelihood ration	14.542	8	.069
Linear association	8.492	1	.004
N of valid cases	328		
a. 6 checkboxes (40.0%) had a count lowe 5. The minimum expected count is .20.			

Source: Authors, (2024).

As for the procurement area playing a strategic role in SC, a mode of 1 was estimated (which means Yes), with Yes being the most frequent response. It is stated that the information on the product demand is not generated automatically (mode of 2 which means No). This refers to the need for automation in the sales processes to obtain reliable data for decision-making and for there to be a relationship between the client's needs and the purchases made. At the same time, the procurement process is carried out by product type and not by ABC classification. This shows that in most cases products are purchased that do not guarantee the profits that come from A products and this can generate shortages of them; which causes losses.

In this sense, with a mode of 1 (which means No), they do not present any procedure for in-store purchases. At the same time,

with a mean of 1 (which means No), a procedure is not defined to incorporate new products into the purchasing system. With a mode of 1 (meaning No), it mentions that there is no record of the suppliers or their selection, qualification, or compliance processes. In the case of orders to suppliers, it mentions that in 55% of the cases, buyer visits are used and 27.1% are by telephone. This influences the need for buyers to travel and the increase in costs in this activity. In the case of the evaluation of suppliers, there is no trend, 16.6% affirm that it is done by product availability.

Spearman's Rho coefficient was used to determine the bivariate correlations between the dimensions of the scale, determined for the evaluation of the procurement processes. Significantly different coefficients are obtained from zero to 1%. Within the results, the strong significant correlation between p48n and p19 stands out with a value of 0.758**. This shows that in the sample there is a direct relationship between the purchasing processes in import management and the coverage to generate demand [27]. On the other hand, there is a strong significant correlation between p48l and p48k with an estimate of 0.700**. This affirms that there is a direct relationship between the control of accounts payable and negotiation with suppliers, both elements of the purchasing process.[28].

At the same time, there are other significant correlations with values between 0.609** and 0.683**. Regarding demand, there are p16 and p20 with a correlation of 0.623** and; p17 and p20 with a correlation of 0.637**. In the former, there is a direct relationship between the goods in transit and the packaging as a parameter to generate demand. In the latter, there is a relationship between the average daily sales of the product and the packaging as a parameter to generate demand. In both cases, the packaging is taken into account to generate demand [29].

On the other hand, purchases are correlated between the items of the same variable and the cost. For example: p48e and p48f (with a correlation of 0.609**) where contracting is interrelated with the evaluation and selection of suppliers; p48f and p48i (with a correlation of 0.630**) where contracting is related to customer information; p48g and p48e (with a correlation of 0.648**) monitoring and control with orders to suppliers together with evaluation and selection; p48g and p48i (with a correlation of 0.646**) monitoring and control with orders to suppliers and with customer information; p48g and p48m (with a correlation of 0.617**) monitoring and control with orders to suppliers with the management of merchandise transport influences purchases; p48g and p48p (with a correlation of 0.643**) monitoring and control with orders to suppliers and inventory management; p48l and p48e (with a correlation of 0.645**) negotiation with suppliers and evaluation and selection of suppliers; p48n and p48m (with a correlation of 0.603**) how import management influences the management of merchandise transportation; p48l and p48m (with a correlation of 0.620**) how negotiation of suppliers influences the management of merchandise transportation; p48p and p48h (with correlation of 0.683**) how inventory management affects the planning of needs, p48r and p54 (with correlation of 0.610**) management and control of credits affects the capabilities of the purchasing area for the identification of reliable and quality suppliers and; p48m and p47 (with a correlation of 0.622**) the management of the transportation of goods affects the application of the ABC costing technique.

In addition, there are 65 correlations with significance and values greater than 0.500**. Within these there are some of the interest, for example: p16 and p31 (with a correlation of 0.548 **) the merchandise in transit is a parameter to generate the demand with the selection and evaluation of the suppliers in a systematic way, p20 and p31 (with a correlation of 0.527 **) the packaging of merchandise is a parameter to generate the demand with the selection and evaluation of suppliers systematically, p8 and p34 (with a correlation of 0.509 **) how much they value the procurement areas in the supply chain and the organization uses in its processes the same identification of the loads, p38 and p48r (with a correlation of 0.543 **) the level of involvement of the purchasing area in the strategic decision making in the SC and the management and control of credits in the purchases, p52, and p23 (with a correlation of 0.502 **) to what extent the procurement area contributes to reducing costs in the SC with the sales forecast for the generation of demand. These elements demonstrate the strong interaction between the variables of the questionnaire.

Regarding purchasing performance, the purchasing cycle was estimated in several processes., Table 5.

Table 5: Results from the procurement cycles.

Cycles		Demand. Warehouse	Demand Delivery	Imports	National
N	Valid	162	161	162	162
	Lost	0	1	0	0
Median		20.00	19.66	9.19	7.20
Standard error deviation		.891	.838	1.177	.667
Dev. Devation		11.339	10.638	14.978	8.491
Percentiles	25	15.00	15.00	.00	1.00
	50	15.00	15.00	3.00	5.00
	75	15.00	15.00	15.00	10.00

Source: Authors, (2024).

The results from these elements are as follows:

✓ The time elapsed from when demand is detected until the product arrives at the warehouse is an average of 20 days.

✓ The time elapsed from when the demand is detected until the product reaches the unit is an average of 19.66 days.

✓ Expresses approximately in days what the cycle of an import procurement is, which is an average of 9.19 days. (From the moment the order is prepared until the merchandise is received in the warehouse).

✓ Expresses approximately in days what the cycle of a national procurement is, which is an average of 7.20 days. (From

the moment the order is prepared until the merchandise is received in the warehouse).).

These values show a similar performance from the study by [30] even though the objectives of the two studies are different.

As a result of the weaknesses that are identified and the poor state of the purchasing processes, improvement strategies are developed that contribute to reducing these gaps. Among the strategies that can be implemented, the following stand out:

✓ Automate the procurement process to reduce costs for the company and become more competitive.

✓ Develop blockchain to have more safety in logistic transactions.

✓ Implement other management philosophies that could improve these processes, such as CRM (Client Relations Management), ERP (Enterprise Requirement Planning), VMI (Vendor-Managed Inventory), and, CPFR (Collaborative Planning, Forecast and Replenishment).

✓ Provide training for the staff to optimize logistic operations.

✓ Implement forecast systems according to the ABC classification.

✓ Promote the hiring of logistic operators for some activities in these processes to reduce costs and improve client's satisfaction Fomentar la contratación de operadores logísticos para algunas actividades en estos procesos para la mejora tanto de los costos como de la satisfacción del cliente.

✓ Value the use of credit purchases as a surplus of income through financial planning in the company.

V. CONCLUSIONS

This research focused on the evaluation of procurement processes in Ecuadorian companies. The results obtained reveal specific patterns and challenges faced by these companies in the country, offering valuable implications for both theory and practice in the field of logistics and procurement management. The predominance of the companies under study is centered in the service sector (72.8%) over industry (27.2%) reflecting a global trend towards the outsourcing of economies.

The behavior of the procurement role was evaluated through several key dimensions: the relationship of procurement with the supply chain, demand, suppliers, the procurement cycle, cost and human talent capabilities. The results indicate that the procurement area in these companies presents several challenges. The means obtained on a Likert scale from 1 to 5 vary between 2.18 and 3.54, suggesting a performance ranging from low to medium. In particular, the relationship between procurement and the supply chain is the most highly valued dimension (average of 3.54), which highlights the strategic importance that these companies attach to their integration in the supply chain. However, specific aspects such as the management of credit purchases, attention to customs procedures, and the use of logistics operators show significant weaknesses (values below 3 on the Likert scale), which indicates critical areas for improvement.

The cycle times for import and domestic purchases were analyzed. The results show an average time of 20 days for a product to reach the warehouse from the detection of demand and 19.66 days for it to reach the requesting unit. These times, together with the import (9.19 days) and domestic (7.20 days) procurement cycles, reveal a moderate efficiency in the purchasing processes, highlighting opportunities to optimize these operations and reduce waiting times.

VI. AUTHOR'S CONTRIBUTION

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