

Influence of the Acquisition of Technology in Construction Contractor Companies

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Abstract

The objective of this research was to analyze the acquisition of technology in contractor companies to highlight its importance and identify shortcomings when performing this procedure. It was defined as quantitative because statistical procedures were used to interact with the data, thus, a questionnaire was used with 27 items oriented to obtain information related to the study variable. As a result, relative and absolute frequencies and averages were obtained, by means of which it was deduced that the variable Technological Acquisition was inclined towards the Never trend, indicative of the lack with respect to the same in companies in charge of elaborating micro-aqueducts, because there are weaknesses in the identification, selection and assimilation of new technologies that contribute to the increase of the competitive level in the construction sector.

Keywords: Micro-aqueducts, Technology, Construction, Companies

Introduction

Technological advances have increased at a competitive level, where companies

face national and international challenges [1]. Technological advance has increased worldwide competitiveness, where companies face national and international challenges [2], in order to survive in the market. In this way, the relevance of using technology is that it supports the provision of services and allows the management of imposed demands [3]. Therefore, it is essential to acquire technologies in order to renew, increase knowledge and acquire more appropriate technological products, in the same way, to guide resources and capacities in the development of basic skills regarding technology [4].

In addition, it must be borne in mind that acquiring technology supposes benefits for corporations, which is evident in the innovative business performance, in the same way, it is important to consider the knowledge of the companies in this process [5]. In the study of [6], technological acquisition is defined as a group of specific assets that enable the procurement, understanding and use of new technologies strategically to achieve the expected effects. On the other hand, in [7] it is conceptualized as the obtaining of advanced devices, found in the market, which provide improved and innovative processes and services to the company. Alternatively, [8] specifies that technological acquisition is the skill that organizations have to verify technological sources they possess and those existing in the market in order to implement new relevant technologies to execute their operation in an appropriate manner.

Due to the above, technological acquisition has been used as a benchmark for advancement at a competitive level in different business sectors, in this way has been used in various studies. Evidence of application is the research of [9] where mobile technology is implemented to reduce educational shortcomings. Also, the study of [10] details the implementation of electric stations that allow the charging of electric vehicles in order to meet the demand for electricity without causing damage to the electricity grid. On the other hand, in [11] is expressed the importance of the appropriation of social networks as a technological means in companies to generate profits in relation to sales. Additionally, the study of [12] sets out that acquiring radio frequency identification technology in construction sectors suggests optimizing quality by managing processes, machinery and materials.

Taking into account what has been described, there are different strategies for appropriating new technologies such as: obtaining technology licenses from foreign or local companies, cooperating with companies located in developed countries, and hiring workers with work experience in foreign companies [13]. However, even with the existing strategies, there is little efficiency with which new technologies are acquired and assimilated in a manner consistent with the labor entity, which is fundamentally due to the lack of knowledge and technological skills, as well as to the hurried progress of the technology, risks, purchase options in the market and guidelines to take into account [14]. Therefore, this research aims to analyze the acquisition of technology in contractor companies to highlight its importance and identify shortcomings when performing this procedure.

Methodology

The research was approached from the quantitative point of view, because variables, dimensions and numerical indicators were measured [15] using statistical tools. Similarly, with non-experimental cross-sectional descriptive design because variables were determined, which were not deliberately modified; specific moment was established in which it was possible to collect all the data; and what was obtained by collecting data is described in a detailed and scientific manner [16] [17] [18].

According to the above, the researchers identified the variable Technology acquisition, with its dimensions and these in turn with their respective indicators. As stated in the Table 1.

Table 1: Variables, dimensions and indicators

Variable	Dimensions	Indicators
Technology acquisition	Technological needs	Information detection
		Information sources
	Criteria for the selection and evaluation of technologies	Profitability
		Technological obsolescence
		Risk acquisition
	Forms of negotiating technologies	Technology purchases
		Technology contracting
		Technology assimilation

Population and sample

The population was composed of 75 contractor companies located in the department of the Guajira in Colombia, which work in the technology sector and make acquisitions of new technologies. Likewise, convenience sampling was used, because the sample elements were deliberately selected [19]; where the geographical location in the department, the access to information and the availability of informants in the companies were taken into account. Therefore, it was decided to establish a sample made up of corporations specializing in the construction of micro-aqueducts, where employees were chosen as key informants (Table 2): project director, financial advisor, legal advisor and work resident.

Table 2: Sample

Companies object of study	Key informants			
	Project director	Financial Advisor	Legal adviser	Work Resident
Hidrosfera Ltda.	1	1	1	1
Mega Obras SAS	1	1	1	1
DICON Ltda.	1	1	1	1
Asoagua	1	1	1	1
Amzoreagua	1	1	1	1
Bioguajira SAS	1	1	1	1
A&E Aguas y Energía EU	1	1	1	1
Servicios de Dragados y Construcciones S.A.	1	1	1	1
Puccini y Cia. S en C.	1	1	1	1
Constructora Yacaman Vivero S.A.	1	1	1	1

As described, 10 companies were identified, of which 4 workers were selected, correspondingly, for a total of 40 key informants.

Data collection techniques

To obtain the information, the techniques Documentary review and Survey were used; the initial, in order to address different sources of information such as indexed databases, journals, and scientific documents; the following, to obtain data from key informants in a detailed and consistent manner with the objective of the research, where a Likert-type questionnaire was used, configured with 27 items and 5 response options with different assigned scores: Always (5) , Almost always (4), Sometimes (3), Almost never (2), Never (1).

Validity and reliability of the instrument

For the validation of the instrument, the expert judgment technique was used, where the help of a group consisting of 5 experts in the subject in question was taken, who reviewed and diagnosed the coherence of the same in relation to the objective of the research. On the other hand, to verify the reliability, a pilot test was carried out on 12 people, who work in contractor companies of the department of the Guajira, with similar characteristics to the corporations belonging to the population. Likewise, it was processed through the application of the statistical process known as Cronbach's Alpha coefficient (Formula 1), because it allows to measure it accurately, in instruments with Likert-type scales.

$$\alpha = \left[\frac{k}{k-1} \right] \left[1 - \frac{\sum_{i=1}^k s_i^2}{s_t^2} \right] \quad (1)$$

In this way, categories with ranges were defined to interpret the coefficient: Very high (0.81 - 1), High (0.61 - 0.80), Moderate (0.42 - 0.60), Low (0.21 - 0.40) and Very low (0.01-0.20). Then the coefficient was determined, which was 0.92, therefore, the reliability was categorized as Very high.

Data analysis

The data was tabulated in tables to facilitate the analysis of the information. Likewise, trend, relative frequency (rf) and absolute (af) calculations were made, taking into account the variables, dimensions, indicators, and the scores that were obtained by item and by subject. Additionally, the rf and the different alternatives were taken into account to determine the trend of the dimensions: Always (with the alternatives Always and Almost always), Sometimes (Regarding the alternative of the same name) and Never (With the alternatives Almost never and never).

Results

The information acquired was analyzed from a general point of view, with respect to the established dimensions as shown in the Table were examined 3.

Table 3. Evaluation of the variable Acquisition of the technology

Dimensions	Indicators	Alternatives of answers										Total	
		Always		Almost always		Sometimes		Almost never		Never			
		af	rf%	af	rf%	af	rf%	af	rf%	af	rf%	af	rf%
Technological needs	Information detection	2.3	5.8	6.3	15.8	10.3	25.8	10.7	26.7	10.3	25.8	40.0	100.0
	Information sources	1.7	4.2	4.7	11.7	14.0	35.0	13.7	34.2	6.0	15.0	40.0	100.0
	Total	4.0	10.0	11.0	27.5	24.3	60.8	24.3	60.8	16.3	40.8	80.0	200.0
	Average	2.0	5.0	5.5	13.8	12.2	30.4	12.2	30.4	8.2	20.4	40.0	100.0
	Tendency	18.8%				30.4%				50.8%			
Criteria of selection and evaluation of technologies	Profitability	2.0	5.0	8.7	21.7	12.3	30.8	10.3	25.8	6.7	16.7	40.0	100.0
	Technological obsolescence	4.0	10.0	7.0	17.5	12.3	30.8	13.3	33.3	3.3	8.3	40.0	100.0
	Risk acquisition	2.0	5.0	8.7	21.7	12.7	31.7	12.3	30.8	4.3	10.8	40.0	100.0
	Total	8.0	20.0	24.3	60.8	37.3	93.3	36.0	90.0	14.3	35.8	120.0	300.0
	Average	2.7	6.7	8.1	20.3	12.4	31.1	12.0	30.0	4.8	11.9	40.0	100.0
Tendency	26.9%				31.1%				41.9%				
Forms of negotiating technologies	Technology purchases	3.3	8.3	7.0	17.5	12.0	30.0	11.3	28.3	6.3	15.8	40.0	100.0
	Technology contracting	2.0	5.0	6.0	15.0	12.0	30.0	13.3	33.3	6.7	16.7	40.0	100.0
	Technology assimilation	1.3	3.3	6.0	15.0	12.3	30.8	12.3	31.0	8.0	20.0	40.0	100.0
	Total	4.0	10.0	11.0	27.5	24.3	60.8	24.3	60.8	16.3	40.8	80.0	200.0
	Average	2.0	5.0	5.5	13.8	12.2	30.4	12.2	30.4	8.2	20.4	40.0	100.0
Tendency	18.8%				30.4%				50.8%				
General Tendency		22.4%				30.6%				47.0%			

Dimension: Technological needs

According to the data, the contractor corporations of the department of the Guajira have sometimes used strategies that supply technological needs to contribute to the improvement of micro-aqueduct construction processes.

Similarly, it was evidenced that in a few occasions technological needs are evaluated since there is no clarity of the information sources that allow the study companies to choose technologies that satisfy their needs. In addition, this activity is considered in relation to minimum adjustments corresponding to the sources of information, without considering the detection of important information that contributes to the enrichment of the processes regarding the construction of micro-aqueducts. According to the above, [20], state that there are obstacles that hinder contractors to apply information acquisition technologies in construction, due to the lack of proven benefit related to emerging technology and the incompetence of the contractor organization to take advantage of the information obtained.

Dimension: Criteria of selection and evaluation of technologies

It was found that the contractors do not make a good acquisition of technology. This does not allow to optimize micro-aqueduct construction processes and generates a technological delay compared to its competitors. The previous, was complemented by [21] who express that the technological acquisition is beneficial for companies that wish to carry out successfully the innovation in products and processes, through which it obtains competitiveness to corporate and technological level.

Furthermore, it could be deduced that the Criteria for selection and evaluation of technologies is not applied optimally in the contractor companies. On the other hand, the risks of acquisition of technologies are not considered, due that it was shown that the contractor companies in charge of the construction of micro-products use obsolete technologies to carry out their work activities. However, [22] express that although there is a risk in obtaining new technologies, it is possible to generate significant benefits for the organization.

Dimension: Forms of negotiating technologies

With respect to the first indicator, the purchase is based on the specific needs of each project and is not usually done. In this way, [23] state that the development of technology, the lack of capacity to perceive its benefits and the effect of sales in the market, make the cost become a barrier to acquire new technologies in construction companies.

Regarding the second indicator, the contracting of wrong technology has a negative influence on the productivity of the contractor companies located in the Guajira. Taking into account the last indicator, there are deficiencies in relation to the training of workers, since the full potential of the new technologies for the construction of micro-aqueducts is not used.

Taking into account the above, the dimension presented shortcomings due to the training shortage of the worker for the acquisition of new technologies to improve the construction processes; and the frequency with which it is purchased.

Summary

The previous results show that the variable Acquisition of the technology presents an inclination towards the alternatives Almost Never and Never, which indicates that the contractors responsible for the construction of micro-aqueducts, present a negative tendency towards the acquisition of technologies, due to the existence of weaknesses in the identification and adaptation of new technologies that allow to increase the competition in the construction sector. The described is supported by [24], who argue that the essential time for the acquisition of technology changes in each construction company, since there are components that affect the transformation performance and adaptation of the new technologies acquired by the companies.

Conclusions

Based on the analysis carried out, it was possible to conclude: 1) The corporate entities specialized in construction, do not apply strategies to carry out an acquisition of the technology in an adequate manner which allow to determine technological needs in the companies; 2) The lack of information sources negatively impacts these companies, because the technological products that circulate in the market and the reliability of the manufacturers are unknown, which leads to the wrong selection of technologies to buy; 3) Contractor companies do not adequately train personnel, which prevents them from taking advantage of the potential offered by new technologies; 4) The contractor companies make purchases of technologies only in necessary cases, due to the lack of relevant information or obtaining the wrong technologies, this causes working with obsolete technologies.

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