

# **The Qualification of Manpower and Its Effects on Productivity of Civil Construction in Manaus - Amazonas**

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## **Abstract**

*Construction has been growing in recent years in Brazil and the state of Amazonas was no different, however, there are major difficulties in the industry when it comes to skilled labor in this segment, so the overall goal is to analyze the qualification of labor and its effects on productivity in the city of Manaus. And as specific objectives: to highlight the civil construction in Brazil and Amazonas; show the effects of unskilled labor on construction productivity; To verify the qualification of the workforce in the city of Manaus, Methodology, the work was performed first with bibliographic basis and in the second moment a field research was carried out. Obtained as results, the study showed that skilled labor is a problem to be faced by construction companies in Manaus, because it was realized that some professionals accept the proposal to qualify, but some do not, given the positions, It is clear that the sector needs to charge more for a qualified workforce, as well as the company MRV, which is committed to motivating its workers to seek specialization in this segment.*

**Keywords:** Construction; Skilled labor; Productivity.

## 1. Introduction

Construction has grown in recent years in Brazil and the state of Amazonas was no different, however, it is perceived great difficulties of the industry when referring to skilled labor in this segment.

For [1] the skilled labor is never constant if we consider the different characteristics of each region of our country, according to the authors, even different legislations and bureaucratic barriers can lead to a postponement in the conclusion of the project or its unfeasibility. In some cities, for example, the construction of multi-storey buildings is not allowed.

Thus, for [2] indicates that the reality of the construction industry, there is a difficulty in finding qualified labor, high turnover rates in companies. Given this situation, this sector needs to propose solutions with regard to unskilled labor.

The research is of great relevance to the construction sector, as well as to academia and society in general, as it is information about the qualification of the workforce in the construction industry, which has been growing increasingly in the city of Manaus- Amazonas.

Given the above the present research has as its general objective: To analyze the qualification of labor and its effects on productivity in the city of Manaus. And as specific objectives: to highlight the civil construction in Brazil and Amazonas; show the effects of unskilled labor on construction productivity; verify the qualification of the workforce in the city of Manaus.

This is a bibliographic and field research, which sought to answer the objectives proposed in this work.

For a better reading, the work was divided as follows: at first a brief contextualization of civil construction in Brazil and civil construction in Amazonas, giving segment the effect of unskilled labor on productivity, after analysis and discussion of the result of field research on skilled labor in the city of Manaus and finally the considerations obtained in the work done through the theoretical framework and field research.

## 2. Bibliographical Review

### *2.1 Brief Contextualization of Civil Construction in Brazil*

The construction industry has grown in recent years, as it is a sector that develops activities not only with small constructions, but also with large infrastructure works.

According to [3] the sector includes major infrastructure works such as highways, airports, ports, dams, bridges, viaducts, among others, and real estate construction that involves the entire production chain. Thus, the construction of the property to rent income and building maintenance also drive the Brazilian economy. The civil construction sector in Brazil was marked by two characteristics, the informality of labor contracts and the instability of these service posts. These and other factors directly contribute to the workers' lack of interest in qualifying [4].

Still regarding the construction sector [3], it indicates that due to the fact that this is a multisectoral sector involving several sectors of the economy and being market oriented, real estate construction is highly related to the macroeconomic aspects of the country, contributing to the growth of the sector. industry in this segment.

Civil construction is marked by macroeconomic changes, as these indices directly influence this sector, which is one of the main ones in the composition of GDP - 5.7% of Gross Value Added in 2015 (Brazilian

Chamber of Construction Industry - CBIC, 13 2017) - this data influences the development of a country in various ways, not only economically but socially because it is one of the sectors that employs the most, approximately 7 million [5].

The construction industry consists of: construction companies, manufacturers and traders of materials, machinery and equipment, specialized technical services, real estate services and project consultancy, engineering and architecture, thus constituting one of the most important sectors for the country [6]. The activity of building moves, different areas and causes significant impacts on the Brazilian economy.

According to [2], signals that incentive programs for this investment will be more successful the more stable the macroeconomic environment and, according to the authors, the lower the degree of uncertainty about those variables, whose impacts on construction can be strong. .

According to [7], the construction industry sector has been looking for more efficient construction systems in order to increase productivity, according to the authors, the intention is to reduce waste and meet a growing demand, in this sense the search for new means to increase overall productivity.

To [8], says that allied to facts that the construction market is constantly evolving and companies are increasingly looking for professionals who meet productivity levels and what they find is high-cost labor. However, they do not have the necessary attributes to perform the intended work, due to qualification.

According to [9], the Civil Construction sector was the main highlight of July / 2019. There were 131,726 admissions and 113,005 dismissals, implying a balance of 18,721 jobs, equivalent to a + 0.92% increase over the previous month. The most prominent activity classes were:

- Construction of Highways and Railways (+3.542 posts), mainly in Minas Gerais (+1.079) and Pará (+776)
- Building Construction (+ 3,230 posts), especially in São Paulo (+630) and Pará (654)
- Works for Electric Power Generation and Distribution and Telecommunications (+ 3,182 posts), highlighting Minas Gerais (+641) and Bahia (+549)

In several segments, the construction industry stands out, with its small and large works, not only in the southern states, but also in the other states including the Amazon.

## ***2.2 Civil Construction in Amazonas***

In Amazonas, in recent years, the construction industry has stood out with regard to large buildings, ie, this segment has influenced the state's economy, and in the capital of Amazonas are the largest projects in this sector that directly influence the natural resources [10].

Civil construction is known for moving the sector that demands the use of large amounts of natural resources, thus, as one of the most environmentally impacting activities. Due to this, several actions have been established with a view to make this industry less harmful to the environment [11].

The Amazon has several areas under construction, however the exploitation of natural resources and deforestation needs to be carefully analyzed so that it can be successfully carried out.

According to [10], the investments made in the last decades, the construction industry has obtained a significant growth in the infrastructure sector in the Amazon, directly implicating in the use of natural resources. According to the authors, the consequences are imminent in the medium and long term, mainly due to the rapid process of expansion of cities through housing programs such as Minha Casa, Minha Vida. According to the [12] National System of Costs and Indices Research of Civil Construction highlights the

average cost m<sup>2</sup> on the currency related to civil construction, in Brazil in August 2019, which can highlight the placement of the state of Amazonas in the table 1 rank:

Table 1: Average Cost m<sup>2</sup> in currency and percentage changes in the month, year and twelve months  
Variable - Average Cost m<sup>2</sup> - currency (Reais).

#	Federation unity	Month: August 2019
1	Sergipe	987,89
2	Rio Grande do Norte	1034,52
3	Pernambuco	1039,88
4	Espírito Santo	1043,67
5	Alagoas	1044,42
6	Ceará	1052,15
7	Bahia	1070,35
8	Piauí	1081,85
9	Mato Grosso do Sul	1090,50
10	Minas Gerais	1092,31
11	Paraíba	1095,67
<b>12</b>	<b>Amazonas</b>	<b>1102,38</b>
13	Maranhão	1108,09
14	Amapá	1115,78
15	Goiás	1131,83
16	Pará	1136,53
17	Mato Grosso	1140,43
18	Rio Grande do Sul	1160,51
19	Tocantins	1174,13
20	Paraná	1187,16
21	Roraima	1205,79
22	Rondônia	1217,21
23	Distrito Federal	1224,14
24	São Paulo	1246,72
25	Rio de Janeiro	1258,84
26	Acre	1271,62
27	Santa Catarina	1320,67

Source: adapted from [12]

It is possible to observe that Amazonas is in the 12th position of the cheapest states to build in Brazil, that is, compared to the 1st place, state of Sergipe, the construction expense in Amazonas is inexpensive. On the other hand, when we analyze Figure 1, it is possible to observe the economic comparison in the two-

year period of the currency in relation to the average cost of civil construction per m<sup>2</sup> in the state of Amazonas, which increased the costs, mainly between August and September 2018.

**Average cost m<sup>2</sup> in currency and percentage changes in the month, year and twelve months**

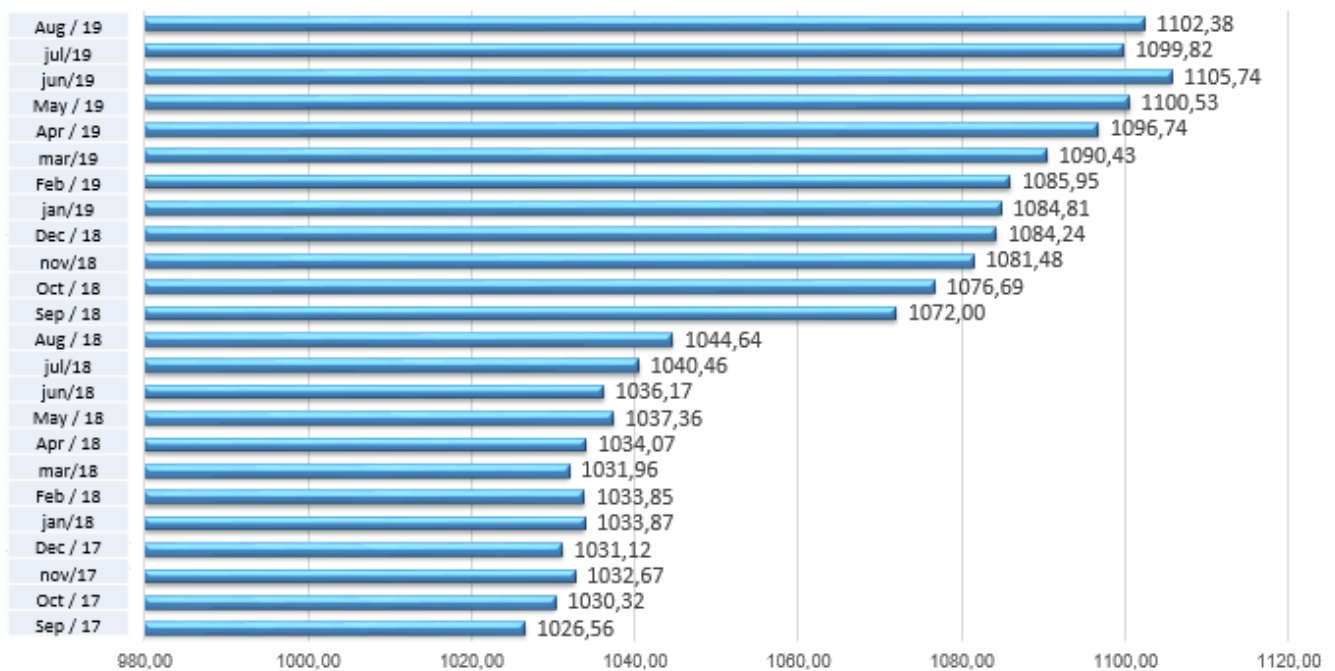


Figure 1 - Average cost in m<sup>2</sup> in currency and percentage changes in the month, year and twelve months  
Source: Adapted from [12]

The cost in the construction industry is a consequence of several factors such as value of material sold by suppliers, weather conditions, waste disposal policy, labor. Looking deeper into the labor factor, we can highlight that the qualification of contracted workers is fundamental, directly influencing productivity and costs.

For [13], the development of the construction sector, generated by the country's economic growth, requires greater labor productivity. According to [13], civil construction is characterized by intense hiring of unskilled labor that, combined with the often precarious conditions of the work environment, reflect the sector's lack of commitment to the category, as well as productivity.

The productivity that is directly related to the qualification of the professional, that is, the higher and better the qualification of the worker, the bigger and better is his production. Thus, it is observed that unskilled labor will directly influence the productivity of construction.

**2.3 The Effect of Unqualified Labor on Productivity**

According to [14], civil construction for a few years was the main employer of labor, the demand for workers in the industry (masons, servants, electricians and hydraulic installers) was immense, extrapolating supply, a fact that served to reduce the requirements with qualification and experience in general.

The clients of large companies expect quality in the works, but [13], the reality in the construction site goes against this quality aspect, considering the low education level and the lack of technical training on the part

of the workers, being they servants and masons, most.

Regarding unskilled labor [14], in construction sites, this problem translates into high rates of absence and turnover, consequently, resulting in low productivity and quality of works and generating high costs for construction companies, ie the consequence of hiring workers with Low skilled demand has triggered higher expenses for construction companies and productivity at the construction sites.

According to [7], says that unskilled labor to perform the service promotes low productivity, which consequently makes the work costly and prolonged. Also according to the authors, on the other hand, a skilled workforce promotes an increase in productivity. However, to attract skilled workers, it is essential to reduce informality in the construction sector and to change the technological base.

According to [7], the qualification of the workforce ranges from basic education of workers to training on materials, equipment, production processes, assembly, quality and productivity. Only with the qualification of professionals will yield great results in productivity, however few companies make such an investment in their workers.

According to [1], unskilled labor has many difficulties identifying construction materials, climate, and even the labor involved, all of which are related to the amount of debris that is generated in a work. Thus, a skilled workforce knows how to differentiate all these contexts in which their activity is involved, as well as perform their activities without any difficulty.

The unskilled labor can bring to the company several inconveniences due to the accomplishment of the small or large work, for the company that is in charge of the project. Thus, it is necessary to seek greater knowledge and specific training for this branch of construction, aiming at the success of the work in final productivity.

### **3. Methodology**

The literature review was conducted from August to September 2019, focusing on the qualification of labor in the construction industry and its effects on productivity.

The research was done in the academic websites, books, magazines and articles that portray the theme and the following descriptors were used: civil construction, skilled labor.

The inclusion criterion was through literature and abstracts for the classification of eligible articles, also in this stage were paid articles and articles in foreign languages. Articles found 26, articles used in this work 8, discarded articles 18.

In the second moment the field research was carried out, where it was possible to collect important data for this research (application of a questionnaire), as well as to bring the researcher closer to his research object. This is a qualitative research, this method of scientific investigation focuses on the subjective character of the object analyzed.

### **4. Application of Study**

In Brazil, the construction industry has shown significant growth, as well as its contribution to the country's economy. In this sense, companies in this segment have been very concerned about providing quality services.

According to [7], indicates that the city of Manaus already has a history of industrialization process, due to the industrial development of Manaus Free Zone. According to [8], says that, due to the rapid demographic and economic increase, the city started to enhance the construction industry and the market expanded mainly to the functions of masons, master builders, engineering professionals, architecture, among others. Over time, unskilled labor has become a bottleneck for civil construction in the city of Manaus, that is, today the market increasingly demands professional qualification, as this influence directly on the final delivery of services, ie on productivity.

The purpose of this study is related to the qualification of the workforce in construction, where it will be presented the verification of the results obtained through a questionnaire applied to the construction professionals, itself at MRV Engenharia e Participal SA in Manaus-AM.

#### ***4.1 Company Characterization***

MRV Engenharia e Participal SA, is dedicated to the construction and incorporation of popular residential development throughout Brazil. With a focus on three concepts, location, price and payment methods, MRV is the only builder present in more than 160 Brazilian cities, generates more than 6,000 jobs per year and has already launched more than 400,000 properties.

#### ***4.2 Characterization of activities***

Storeroom: The storeroom is the professional responsible for receiving, identifying and checking materials recording the incoming and outgoing movements of materials or products, and is responsible for receiving and checking the return of equipment on site, and must keep track of minimum inventory. .

Grouting: Lining the walls and ceramic floors of the apartments.

In charge: Supervises the employees, their services, reading and execution of projects, monitors schedule and measurements of work.

Assembler: He is responsible for the assembly and disassembly service of suspended scales.

Electrician: The electrician installs the entire electrical structure, as well as switches and sockets, and is responsible for installing the wiring passage inside the walls of the building.

General Services Assistant: Responsible for fine and coarse cleaning of apartments after the end of services.

Servant: The servant is responsible for taking care of the heaviest part of the work, such as making the cement masses, arranging and transporting materials, removing and transporting rubble.

Painter: Responsible for internal painting of apartments and hall, external painting of buildings.

Bricklayer: Responsible for the execution of the walls, sidewalks, tactile floor.

#### ***4.3 Application of the questionnaire***

The questionnaire was applied to 25 construction workers, 22 male and 3 female, belonging to MRV Engenharia e Participal SA. The same was carried out from September 15 to 25, 2019. With the objective of analyzing the profile of labor and its effects on civil construction in the city of Manaus.

**Professional Profile Questionnaire**

Name: \_\_\_\_\_

Gender: ( ) F ( ) M

Age: \_\_\_\_\_

Marital Status: ( ) Single ( ) Married ( ) Other

Name of Company Working: \_\_\_\_\_

2- What is your level of education?  
 ( ) Elementary School ( ) High School  
 ( ) Undergraduate ( ) Specialization ( ) Master ( ) Doctorate

3- How long have you been working at this construction company?  
 \_\_\_\_\_

4- How long have you been working in the construction industry?  
 ( ) 0-4 ( ) 5-9 ( ) 10-14 ( ) more than 15

5- How many employment bonds do you have?  
 ( ) 1 ( ) 2 ( ) 3 ( ) Over 3

6- What is your work shift?  
 ( ) Daytime ( ) Nighttime

7- What is your monthly income?  
 ( ) 2-4 minimum wages ( ) 5-7 minimum wages ( ) over 8 minimum wages

8- What is your weekly workload?  
 ( ) 20 ( ) 30 ( ) 40 ( ) Over 40

9- What do you mean by qualified labor profile?  
 \_\_\_\_\_

10- Have you taken any course in your area?  
 ( ) Yes ( ) No - If so, what courses?

11- Are you interested in leaving?  
 ( ) Yes ( ) No

12 - Do you want to qualify?  
 ( ) Yes ( ) No - If so, what prevents you from doing?

Figure 2 - Professional Profile Questionnaire

Source: Author

## 5. Results and Discussions

The questionnaire was applied to construction professionals, obtained a result that will be presented through graphs, as well as individualized speeches according to the research objectives. Twenty-five (25) construction professionals from the MRV Company participated in the survey, with an average age of 40 years.

Twenty-five people were interviewed, 22 males and 3 females.

The questionnaire was also applied to some companies that provide services to the MRV company, being 12 employees of the same company (MRV), the others are outsourced companies by MRV itself, being 2 from RP Máquinas, 4 from RD Pinturas, 3 from ACS, 2 from JC and 2 from J. Batista.

When asked about schooling the answer was: of the 25 workers, only 13 employees have completed high school, another 11 only elementary school and 1 have completed higher education.

Regarding marital status: 11 employees have marital status of married, 10 with marital status of single and 4 did not respond.

When argued about how many salaries do you get? All employees receive about 2 to 4 minimum wages.

Regarding working time in construction: 6 workers responded from 0 - 4 years; 8 workers from 5 - 9 years



old; 5 workers are 10 - 14 years old; 6 workers aged 15 and over working in construction, as shown in Figure 3.

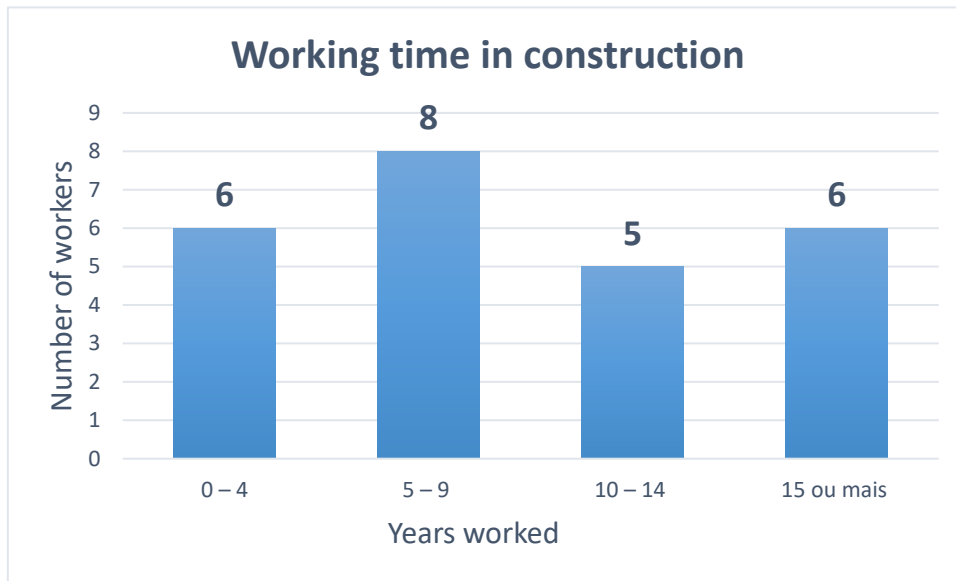


Figure 3 - Working time in construction

Source: Author

When asked about your work schedule? All responded that they work during business hours, totaling a workload of approximately 40 hours worked weekly.

Regarding working time in the company the answers were as follows:

MRV Workers: 6 MRV employees have more than 1 year of relationship with the company, and the others had an average of 6 months working with the company; RP Machinery Workers: Both have more than 2 years of ties with the company; RD Pinturas Workers: The employees have on average 4 months of services rendered to the company; AC Workers: Employees have an average of only 1 month and 15 days with the company; JC Workers: The employees have an average of 4 months of bond with the company; J.Bastita Workers: Employees have an average of 2 months of bond with the company.

Regarding the functions in the Company, MRV employees have the following functions: Warehouse - 1; Grouting - 1 Charge - 2; Assembler - 2; Electrician - 3; General Services Assistant - 3; Servant - 4; Painter - 4; Mason - 5, as shown in Figure 4.

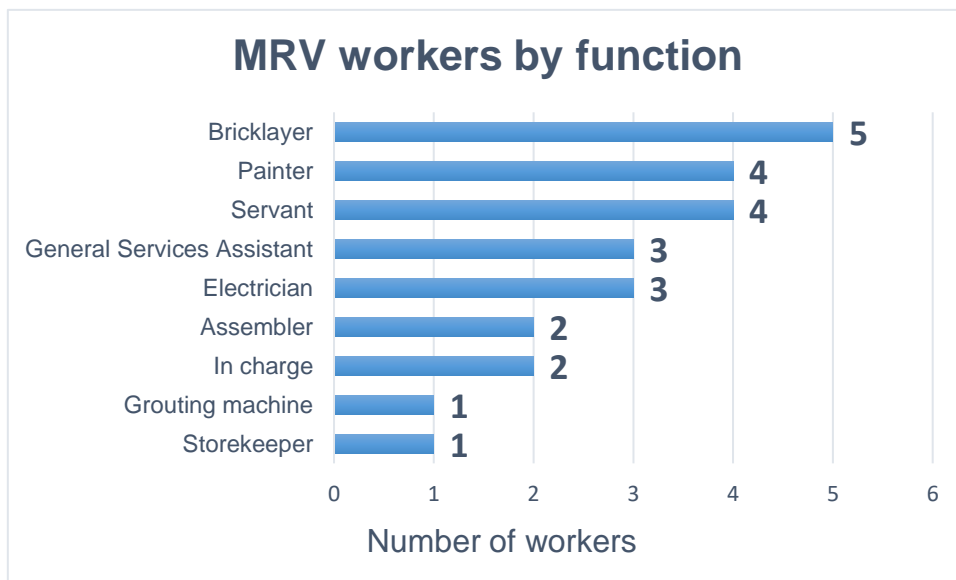


Figure 4 - MRV workers have the following specific duties

Source: Author

Faced with the question “What do you understand by qualified labor profile?” The workers answered that: “qualified labor profile is the worker being qualified and having time of experience with the area of expertise, and having courses and training offered to them to have more training in their services rendered to the company, and thus develop new constructive techniques for their professional growth and in view of increasing productivity on the construction site”.

Faced with the question “Have you taken any course in your area?” 10 respondents answered yes and 15 answered no, as shown in Figure 5.

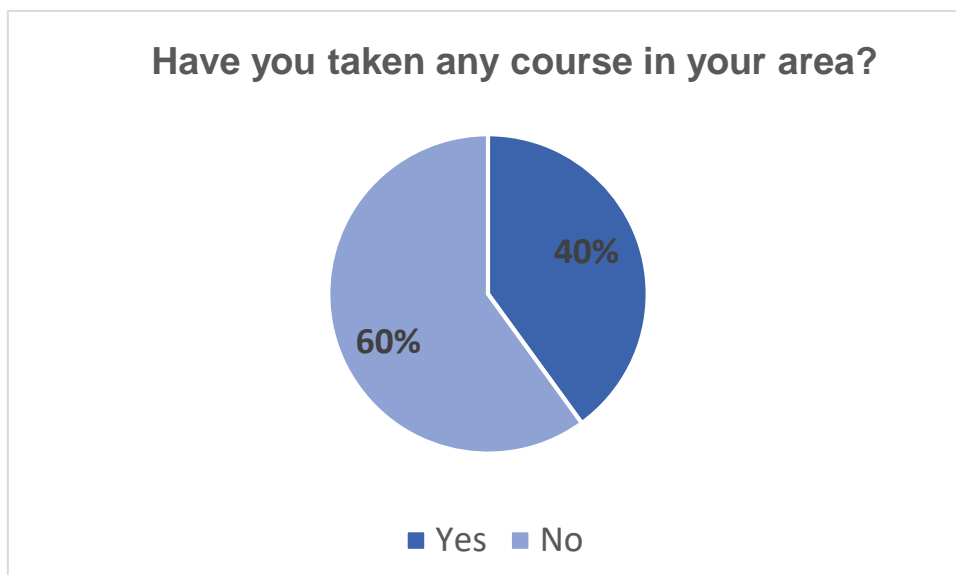


Figure 5 - Course in the area of expertise

Source: Author

Faced with the question having the answer: yes, which courses? the most cited courses were: In charge: Tec. Electric, residential and building electric, master of works;

In charge: Tec. Electric, Residential and building plumber;

Bailiff: bailiff course;

Electrician: Building electrical course;

Bricklayer: bricklayer and carpenter course;

Bricklayer: bricklayer course, tile;

Painter: course for painter

Painter: painter of works;

Painter: painter of works;

Grouting: Grouting.

Faced with the question “Are you interested in leaving?” 22 respondents answered yes and 3 no. Faced with the question “Do you want to qualify?” 17 answered yes and 8 answered no. If so, what prevents you from doing?

58.82% answered that, what prevents is the lack of time and 41.18% who is unable to afford the courses.

In the studies Silvia et al. (2015), economic development favored the employment of low-educated professionals who had experience with construction. The professional training of masons and builders among other professionals is recent in Manaus through vocational courses. For the most part, for many years, these professionals learned the craft of mason and builder transgenerationally or by “spouting” to make money in their teens. The author also points out that such development and urbanization policies have boosted the economy and the labor market in Manaus / Amazonas. Construction advanced and employed young and veteran masons who made up the mass of construction in the city, as well as contributing to the economy of Manauara.

## **6. Conclusion**

The study showed that skilled labor is a problem to be faced by construction companies in Manaus, because it was noticed that some professionals accept the proposal to qualify, but some do not, in view of the positions, it is clear that The industry needs to charge more for a skilled workforce, as it directly influences the bottom line, which is the company's productivity.

Regarding education, it was observed that most have only elementary school, which makes the workforce disqualified due to the lack of knowledge of both studies and professional practice.

Regarding workers taking courses, most accept to qualify to even grow in the company occupying other positions, as well as earning more. However, it was observed that the lack of time and money makes workers in this sector no longer seeking knowledge.

A proposal for the owner of the company is that, when hiring such professionals, courses are required, as well as 6 months of experience in the segment they want to work with. Another was that the company itself could offer this qualification, in this sense, the company MRV has committed to motivate its workers to specialize more in the activities they perform, thus, all come out winning, especially society, because the requested services end up being delivered before the deadline.

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