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# Study For The Implementation Of A Costing Method In The Monitoring Sector Of A Security Company In The City Of Torres – RS, Brazil

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***Abstract:***
***Background****:Knowledge about costs is important for any company that aims to remain competitive and grow in the market. Analyzing fixed and variable costs is important for decision-making, especially in determining the selling price of products. The objective of this study is to apply the ABC costing method to calculate the cost of electronic monitoring services for a security company. The specific objectives were to: i) map the processes of interest in order to separate activity costs; ii) identify the indirect costs of the company; iii) allocate indirect costs to processes; and iv) define cost drivers and allocate costs to products.*
***Materials and Methods****: The research is of an applied nature and is considered quali-quantitative, and regarding its objectives, it can be considered descriptive. The study was conducted in a private security and 24-hour electronic monitoring company in the city of Torres-RS, southern Brazil. A flowchart was developed to better understand the activities that make up the service. Subsequently, the costs that vary from client to client were analyzed.*
***Results****: The results showed how the ABC costing method forms a cost pattern that helps the company price its product. It was possible to form the final prices of the products from the cost drivers. Thus, the selling price was calculated and provided greater security to the company owner when negotiating with customers.*
***Conclusion:*** *Conclusion: The ABC costing method was applied to identify the cost of electronic monitoring services for a security company. The costs of common and auxiliary sectors were allocated to productive sectors according to their use in order to calculate the total cost. It is understood that to correctly price the product, it is necessary to establish an average number of services that may be required by the customer, in addition to properly considering the variable cost. Rigorous cost control is also important to ensure that all costs are taken into account when pricing products.*
***Key Word****: Costs; ABC costing method; electronic monitoring; price; standard.*

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## I. Introduction

According to the Brazilian Association of Electronic Security Companies (2008), the private security sector grew by 8% in 2018 compared to 2017, generating approximately R$ 6.52 billion in 2018. In this industry, the constant increase in technology and the desired sense of security and tranquility by consumers keep Brazilians increasingly interested in investing in these products. The sector's growth in 2019 was 10%, and in 2020 it was 13%, exceeding the expected growth rate of 12%. Despite a difficult economic year, the industry proved to be extremely necessary in facing the pandemic, which brought strong physical contact restrictions, thus making intelligent equipment highly useful in various sectors.

Despite the growth recorded in 2020, it is believed that this market still has many potential customers. There are numerous residences and businesses that are expected to adopt equipment and security service systems in the coming years. Among these services, there is 24-hour electronic monitoring, which works based on signals emitted by the alarm system and sent to the company's base, which dispatches an external monitor to check the location. In this type of service, customers pay a monthly subscription to have security coverage.

According to Racy, Moura Jr., and Scarano (2004), a company is an economic unit with the objective of intelligently distributing the means of production in order to maximize its profits, seeking over time a constant evolution so that its market share and existence are sustained. Almeida (2003) highlights a new perspective for

companies regarding their surroundings, with concerns that go beyond the accumulation of profits and encompass the responsibility of generating collective benefits with private goods.

Most countries have service-providing companies as the most representative in their GDP. In the 90s, the economy shifted from predominantly manufacturing to the service sector, with a tendency for growth over the years. Service-providing companies differ from manufacturing industries in that they do not have inventories, their products are intangible, thus emphasizing the weight of the relationship with the customer in the quality of the consumed goods. Therefore, based on this relationship, the company takes its directions and guides its processes. Thus, the organization should use a service approach that precisely benefits its customers. (Morgan and Rosa 2006; Souza, 2016)

The service sector encompasses all those companies whose economic activities are not focused on a physical product. While manufacturing companies sell products that their customers use, service companies sell products that their customers experience. Another important point to consider is that the difference between one company and another becomes more significant, making it more difficult to compare the organization with its peers, who cater to different audiences and compete with the sale of something intangible. (Morgan and Rosa, 2006).

Furthermore, standardization is more difficult in the commercialization of services, making its management also more complex. In this type of company, usually the workforce is the determining resource for the effectiveness of the company. The service market has been driven by companies and people who seek to have activities performed by third parties. In the private security segment, these companies directly take care of the security and guarantee of other people's assets. (Oliveira, 2022; Santos Júnior, 2010)

Regarding the definition of electronic monitoring, Houaiss (2008) states that monitoring refers to taking care of (some equipment, machine, or other), watching; while electronic refers to the electronic parts that compose the equipment with the objective of transmitting and storing information, signals. That is, electronic monitoring can be defined as the activity in which an operator actively controls and monitors, through technological equipment, goods, people, alarm signals, and images.

Until the 1970s, it was common for the predominant factors of production to be summarized in direct labor and direct material costs. With the development of technology and the advancement of new business techniques, other costs began to emerge, which are indirect costs. Investments in product development, marketing, cutting-edge technologies, training, customer service, and engineering are part of these types of costs. (Abbas; Gonçalves; Leoncine, 2012).

Furthermore, it can be mentioned that direct costs are those directly related to the production of the product, while indirect costs are those that are not related to the product itself but are part of its production process. It can be highlighted that the more competitive a particular sector is, the more important it becomes to use a costing method that allows the company to know its costs, thus being prepared ahead of its competitors. (Silva et al., 2015; Abbas, Gonçalves, Leoncine, 2012).

Costing methods are essential for obtaining information that influences the decision-making of companies. This shows how important it is that costs are known and aligned with the objectives and peculiarities of the organization. The literature presents several costing methods that serve both manufacturing and service companies, with or without profit goals. Cost control aims, among many others, to reduce costs, determine the value of costing objects, cut waste, decide whether to increase or decrease the production line of a particular product, decide between in-house production or outsourcing, and improve processes. (Abbas, Gonçalves, Leoncine, 2012).

Among these various cost accounting methods are absorption costing, activity-based costing, the homogeneous sections method, and variable costing. Excluding the activity-based costing method, the other methods are considered traditional, working predominantly with direct labor and direct materials costs. These methods also have a strong relationship with the concept that the behavior of costs varies according to the quantity of production practiced. (Rodrigues, 2018).

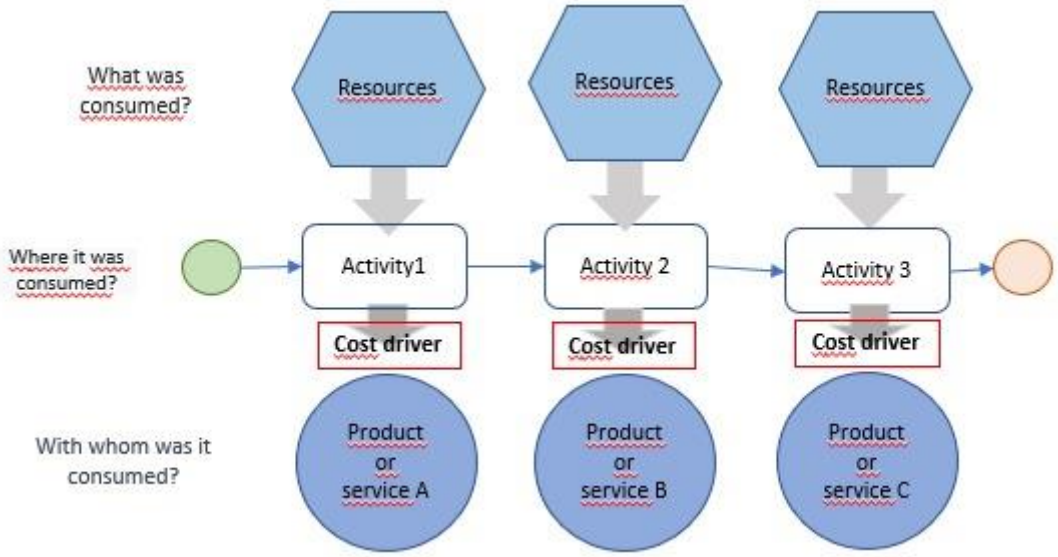
The activity-based costing method (ABC) is considered a contemporary method that aims to meet a more competitive environment, being more appropriate in aiding decision-making. Among the main reasons for the creation of the method is dissatisfaction with traditional methods, whose costs of goods or services often end up being distorted, with indirect costs being allocated to products through arbitrary allocation bases, such as direct labor hours, machine hours or material costs. The application is based on the principle that it is not the goods that consume resources, but rather that the resources are consumed by activities, which are subsequently consumed by goods or services. (Bornia 2010; Abbas; Gonçalves; Leoncine, 2012).

In this way, cost centers are identified through departmentalization, and these resources are then allocated among the activities that, depending on the service, are performed or not, causing the cost to be attributed to that service or not. What's interesting is that this practice doesn't just apply to the manufacturing process and can also be used, for example, to calculate support actions for operation or even for planning. (Bornia, 2010)

According to Bornia (2010), the ABC costing method can be summarized as follows: activities consume resources that generate costs, which are used to compose products, thus absorbing these costs. The idea is to correctly understand how these activities work and proportionally calculate the costs involved in them. From there, activities are distributed among products based on the intensity in which they are used.

It can also be said that the ABC method aims, through the use of multiple cost allocation bases and a thorough analysis of processes (which can be very positive for possible restructuring and improvements in these processes), to change the way these allocations are made. This is achieved by using a model that distributes costs by activities and then assigns these activities to goods. (Pereira, 2015). The Figure 1 show scheme of the ABC method.

**Figure 1:** Scheme of the ABC method.




Still on ABC, Abbas, Gonçalves, and Leonice (2012) also point out some disadvantages of the method, including: it has a difficult data collection and interview process, which is long and costly; the data used in the calculations can be highly subjective and difficult to validate; it usually focuses on specific parts of the process, which may lack a broad and integrated view of profit opportunities for the company; it does not have an easy and quick adaptation and update in the face of new conditions, among other possible factors.

Based on this context, the objective of this work is to apply the ABC costing method to calculate the cost of electronic monitoring services for a security company. The specific objectives of this research are to map the processes of interest in order to separate activity costs, identify the indirect costs of the company, allocate indirect costs to processes, define cost drivers, and distribute costs to products.

Knowledge of the costs involved in any product or service is important for companies that want to remain in growth, allowing the company to set the selling price according to what will be worked on and the market absorption conditions regarding the benefit provided. In the company under study, the service costs are divided into fixed and variable costs, with variable costs such as gasoline expenses varying according to the distance from the base to the customer's residence, and fixed costs such as internet, water, and electricity expenses. Through this study, the use of cost control spreadsheets will be proposed, which can be of great use to optimize this cost x work relationship, with the aim of creating quality in the pricing method of this service.

Thus, the study will be beneficial to the company because it will be analyzing the monitoring service process, identifying fixed and variable costs of the operation, and subsequently developing a costing method to standardize the pricing of the service.

## II. Material And Methods

Research, in a simplified way, means seeking answers to proposed questions. It can be described as the act of science in analyzing and discovering reality. It is a constant search, forming an intrinsically unfinished and permanent process. It is an everyday activity, being systematically critical and creative, aiming at solving a problem.

Moresi (2003) also states that research can be classified in a quantitative and qualitative way, which differ by the following characteristics: quantitative research aims to translate information and opinions into numbers, requiring the use of statistical resources and techniques, such as mean, standard deviation, percentage,

correlation coefficient, among others. Qualitative research, on the other hand, considers that there is an inseparable link between the objective world and the subjectivity of the subject, and cannot be translated into numbers.

Therefore, this study is classified as both quantitative and qualitative, since it will work with both exact and purely numerical aspects, as well as subjective and difficult to quantify aspects.

Regarding the objectives, according to Nascimento & Sousa (2016), it is considered a descriptive research because it exposes particularities of a specific phenomenon or population. Additionally, it can also be classified as a methodological research, as it is associated with ways, methods, forms and procedures to achieve a specific goal, developing an instrument to determine the cost of a specific service.

As for the procedures, it is considered a bibliographical and case study research. Bibliographical research is a study developed based on articles, books, electronic networks, newspapers and material accessible to the general public. And the case study refers to examining a real case, such as a security company, and seeking the application of the developed material. (Moresi, 2003; Nascimento & Sousa 2016)

Furthermore, the research instruments used are documentary data, where cost data, number of clients, and other statistics used in the study are found, as well as interviews, to better evaluate and understand the dynamics of the work, existing variables and subjective aspects involved in the case.

The data was collected at the headquarters of a company in Torres-RS in May 2021. The costs of salaries, water, electricity, telephone, internet, property tax, cleaning, software, social media marketing, accounting, legal advice, certifications, printer ink, IPVA, vehicle insurance, employee insurance, occupational medicine, and printing were collected by requesting them from the company's management, who keep records of these costs. Values that vary frequently, such as water, electricity, and telephone, were obtained for March and April and an average was used for these bills.

Other data, such as costs for celebrations, cleaning products, other marketing investments, property maintenance, equipment maintenance, gifts, office supplies, and vehicle maintenance were estimated by the company's partners and specialists in each area to which the cost is directly related, thus making the values as close to reality as possible, taking into account the experience of the professionals in question to make their projections.

Other costs, such as uniforms and personal protective equipment, were also calculated according to annual requests from employees, in conjunction with the company's directors and based on requests from recent years.

The depreciation value of the property, equipment, and vehicles was established according to the standard of the federal revenue agency. The valuation of the property and equipment was done by specialists who were consulted, and the valuation of the vehicles was established according to the FIPE table of June 2021. The FIPE table is a table that shows average prices of vehicles advertised by sellers in the national market. It is developed by the Institute of Economic Research Foundation. The percentage of electricity usage by sector was also estimated by the company directors.

To better understand the service process, conversations were held with people in the company who work in different sectors. This made it easier to ensure that all the most important variables were addressed in the method, as well as obtaining feedback on the costing methodology that was being developed. In addition, the values indicated in this study were multiplied by a coefficient that ensures the confidentiality of the data for the company. However, the proportion of costs and information is genuine.

## III. Result

This section covers the results obtained in the proposed study, which consists of developing a costing method for the electronic monitoring service of a security company in the city of Torres-RS, based on the ABC method. To classify the company's departments, the existing sectors were identified according to Table 1.

**Table no 1:** Identification of departments and their respective activities

| Department | Activities |
|---|---|
| Vendas | Atendimento aos clientes; venda dos produtos; venda dos serviços. |
| Technical | Installation of alarms, CCTV, fences, and other products; Equipment maintenance; Purchase and sale of goods; Warehouse. |
| Finance | Billing customers; issuing invoices; issuing bills; Human Resources. |
| Monitoring | Monitoring of occurrence triggers; Handling of occurrences. |
| Administrative | Activities that serve all sectors: Receptionist. |

As can be seen, there are five departments within the company, namely: sales, technical, financial, monitoring, and administrative. In the next step, the costs to which the company is exposed will be presented, divided according to their usage in the respective departments, as determined by the ABC costing method. Each cost will have a different allocation base, which will be explained subsequently.

The distribution of costs to departments was identified through interviews with managers and consulting the company's financial history. Some costs were also estimated by managers, considering an average annual expenditure, as shown in Table 2.

**Table no 2:** Allocation of costs to departments

| Items | Sales (R$) | Finance (R$) | Technical (R$) | Monitoring (R$) | Administrative (R$) |
|---|---|---|---|---|---|
| Salários | 7.414,89 | 9.055,11 | 18.034,31 | 32.492,67 | 1.830,00 |
| Water | 27,78 | 34,73 | 55,57 | 104,19 | 6,95 |
| Celebrations | 98,59 | 123,23 | 197,17 | 369,70 | 24,65 |
| Uniforms | 62,74 | 78,42 | 125,48 | 235,27 | 15,68 |
| Building Depreciation | 614,07 | 643,75 | 721,43 | 1.063,03 | 1.448,34 |
| Property Tax | 110,70 | 116,06 | 130,06 | 191,64 | 261,11 |
| Cleaning Lady | 83,41 | 87,45 | 98,00 | 144,40 | 196,74 |
| Cleaning Products | 45,04 | 47,22 | 52,92 | 77,98 | 106,24 |
| Electricity | 397,81 | 397,81 | 397,81 | 2.317,36 | - |
| Equipment Depreciation | 119,97 | 202,32 | 88,45 | 468,68 | 241,97 |
| Equipment Maintenance | - | - | - | - | 183,00 |
| Invoicing Software | - | 97,60 | - | - | - |
| Inventory Software | - | - | 97,60 | - | - |
| Monitoring Software | - | - | - | 3.387,54 | - |
| Radio Software | - | - | 345,16 | 721,70 | - |
| Social Media Marketing | 492,76 | - | - | - | - |
| Balloon Marketing | 406,67 | - | - | - | - |
| Marketing | 366,00 | - | - | - | - |
| Legal Advice | - | - | - | - | 195,20 |
| Accounting | - | - | - | - | 1.403,00 |
| Phone | - | - | - | - | 1.914,92 |
| Internet | - | - | - | - | 486,66 |
| Gifts | 183,00 | - | - | - | - |
| Building Maintenance | - | - | - | - | 463,60 |
| PPEs | - | - | - | 244,00 | - |
| Certifications | - | - | - | 231,45 | - |
| Office Supplies | 24,40 | 73,20 | - | 24,40 | - |
| Printer Ink | 6,10 | 73,20 | 42,70 | - | - |
| Printing | - | - | - | 317,20 | - |
| Occupational Medicine | - | - | - | - | 854,00 |
| Employee Insurance | - | - | - | - | 228,51 |
| Vehicle Maintenance | 507,82 | - | 655,24 | 1.136,00 | 172,83 |
| Vehicle Depreciation | 2.732,62 | - | 1.400,78 | 2.916,00 | 803,76 |
| Vehicle Tax | 390,95 | - | 208,06 | 364,22 | 139,19 |
| Vehicle Insurance | 497,69 | - | 382,18 | 355,73 | 161,35 |
| Totals | 14.583,01 | 11.030,10 | 23.032,92 | 47.163,25 | 11.193,19 |

To better understand how each cost was allocated to each department, the following is analyzed: salary costs include the salary of each employee plus all social and labor charges, as well as thirteenth salary and vacations. The costs of each department are proportional to the income of each collaborator who performs their activities within the department in question.

The cost of water, celebrations, and uniforms are allocated according to the number of employees in each department. Therefore, the total monthly cost is divided by the number of employees in the company and then multiplied by the number of employees in each department, as they are used by all employees and with similar usage levels.

Other common costs, such as depreciation of the property, property tax, cleaning, and cleaning products, are in turn divided among the departments based on the occupied area. The total cost is divided by the total area of the company, and the result is multiplied by the area of the department.

The cost of property depreciation, according to the Federal Revenue, is calculated by dividing the value of the property by 20 years. The valuation of the property value was based on the square meter valuation of the region, according to a specialist consulted, and multiplied by the property area. After that, the value was divided by 12 months to reach the monthly cost.

The cost of electricity was based on the electricity bills for March and April 2021 and allocated according to usage by department, with 66% allocated to the monitoring department and 11.33% to the sales, financial, and technical departments, according to the company's managers. The cost of the radio software used by the technical

and monitoring department was allocated according to the number of employees who use the equipment in each department.

Depreciation of equipment also followed the percentages established by the Federal Revenue for each type of machine and equipment. For example, for computer equipment, depreciation is 20% per year. Thus, the price of each equipment was also obtained, which was established based on the evaluation of a specialist. Additionally, depreciation was attributed to each department according to the number of these equipment in that department. This value was also divided by 12 months to reach the monthly value. Other costs were directly attributed to their respective departments of use, such as the cost of software for issuing invoices to the financial department.

For the sales department, costs were added for social media marketing, company balloon marketing, sponsorships, advertising signs, customer gifts, and other forms of marketing. The company balloon is a brand promotion equipment through a tourism vocation in the region, which includes gas balloon flights.

For the administrative sector, costs for internet and phone were directly added, which serve all sectors with similar usage. Maintenance costs for the property and equipment, which are unpredictable and can serve any sector, were also added to the sector. Costs for occupational health, employee insurance, which do not vary according to the number of employees, were also added to the sector. In addition, the cost of company accounting was also directed to the administrative sector, given that its efforts serve the entire company.

For monitoring, all costs for personal protective equipment - since the sector is the only one in the company that uses them - as well as costs for software and certifications that the company needs to perform this service were directly added. Printing costs for occurrence record materials were also added to the sector.

Moreover, office supplies and printer ink costs were estimated and assigned by sector usage. Vehicle costs, however, were assigned to departments according to each vehicle's usage. Two cars and a motorcycle are used by the sales department, three cars and a motorcycle by the technical department, five motorcycles and two cars by monitoring, and one car by administration. Thus, depreciation, maintenance, IPVA, and insurance are specifically distributed to departments according to each vehicle's specifications. Maintenance is a value stipulated by the company's managers, and depreciation is stipulated by the revenue agency, which points to an annual devaluation of 20%. This percentage was deducted from the vehicle value consulted in the June 2021 FIPE table.

The allocation of administrative departments to productive departments was carried out after identifying costs and their respective departmental allocation methods. The next step in allocating indirect costs to revenue-generating activities is to allocate administrative departments that do not work directly producing products and services that will be sold to customers. In tables 3a, 3b, and 3c, one can understand how these costs are passed on to the monitoring and technical departments, which are the productive sectors of the company.

**Table no 3a:** Apportionment of the administrative department

| Departments | Sales | Finance | Technical | Monitoring |
|---|---|---|---|---|
| Percentage of administrative utilization | 25% | 25% | 25% | 25% |
| Cost to add | 2.798,30 | 2.798,30 | 2.798,30 | 2.798,30 |
| Total | 17.381,31 | 13.828,40 | 25.831,22 | 49.961,55 |

**Table no 3b:** Apportionment of the administrative department

| Departments | Finance | Technical | Monitoring |
|---|---|---|---|
| Percentage of administrative utilization | 0% | 39,29% | 60,71% |
| Cost to add | - | 6.829,12 | 10.552,19 |
| Total | 13.828,40 | 32.660,34 | 60.513,74 |

**Table no 3c:** Apportionment of the financial department

| Departments | Technical | Monitoring |
|---|---|---|
| Percentage of administrative utilization | 40,95% | 59,05% |
| Cost to add | 5.662,73 | 8.165,67 |
| Total | 38.323,07 | 68.679,41 |

To define the consumption proportions shown in Tables 3a, 3b, and 3c, different criteria were used. For the allocation of the administrative sector, the amount was divided equally among all sectors, due to the fact that administrative costs are mostly used by other sectors in a similar and sometimes unpredictable way, such as legal advice or property maintenance costs. For the sales sector, the criteria of division were established according to the number of sales for each sector, considering the months of March and April 2021. For the financial sector, the criteria of division were established according to the number of invoices issued to the other sectors, based on records also in the months of March and April 2021.

After allocating the costs of the auxiliary departments to the productive departments, it is possible to verify the monthly final cost of the monitoring department of the company. It is observed that the fixed cost calculated for the monitoring service after allocation was R$ 68,679.41.

With the number of occurrence attendances in the month, estimated by the company at 1.566, it is observed that an occurrence attendance has a cost of R$ 43.86, without yet considering the variable costs. To arrive at this cost per attendance, we divided the total monthly cost of the sector by the number of attendances. It is also necessary to take into account that the same customer may require more or less than one attendance in a month, so the following calculation should be made: considering that the company has 1,464 customers in its database and obtained an average of 1,566 occurrence attendances per month, it can be concluded that a customer has an average of 1.07 occurrences per month. This coefficient is of great importance for the composition of the final product cost.

With these values, the cost of an attendance should be multiplied by the average number of attendances expected from a customer in a month. It should be noted that different types of customers may present variables that increase or decrease the average number of occurrences, such as the region where they are located, whether it is more dangerous or safer, or the type of location being monitored: residences, businesses, or vacation homes.

Before multiplying the average cost per occurrence by the average number of occurrences, however, variable costs such as gasoline, the most important of them, should be added. To illustrate, consider an attendance to a customer located 12 kilometers from the company's base, which requires a round trip displacement of 24 kilometers. Considering that five motorcycles and two cars are used for monitoring, an average of kilometers per liter for the attendances is calculated. Considering that motorcycles can travel 36 kilometers per liter and cars can travel 11 kilometers per liter, an average of 28 kilometers per liter for attendances is reached. Considering an average gasoline price of R$ 5.50/liter, the cost per attendance for the customer in question is R$ 4.70.

In addition to gasoline, other possible variable costs should also be considered. Depending on the location of the attendance, there may be a toll cost of R$ 4.20, already considering the round trip. In this example, however, only the cost of gasoline is considered. Adding the fixed cost to the variable cost, it can be concluded that one occurrence for this customer would cost R$ 48.56.

Therefore, by multiplying the cost per occurrence by the average number of monthly occurrences, the total cost is R$ 51.96/month. Later, the other variable costs of the operation need to be added. Table 4 includes these costs in the product.

**Table no 4:** Adding variable costs

| Items | Items Monitoring (in R$) | Markup calculation (in %) |
|---|---|---|
| Initial cost | 51,96 | |
| Boleto cost | 1,99 | |
| Tax rate | | 3,60 |
| Total | 53,95 | 57,55 |

As shown in Table 4, there are variable costs such as tax rates and billing fees. This results in a final cost of R$ 57.55 for the customer in question. It is important to note that the cost of gasoline should be calculated on a customer-by-customer basis, and it is ideal to also have a good estimate of the expected number of service requests per customer per month. This way, the cost can be lower to ensure a lower price for the consumer, or it can be higher to ensure greater security for the company in terms of its operating costs.

## IV. Conclusion

The study aimed to apply the ABC costing method in a security and electronic monitoring company. It was possible to conduct a relevant research on how the company works and to survey the costs involved in the processes, as well as other important data for pricing. From there, using cost management tools and the ABC costing method, it was possible to calculate the price of the services. Indirect and direct costs were identified and distributed to departments according to cost drivers, based on their usage. Common and auxiliary sector costs were also distributed to productive sectors according to their usage, and the total cost was calculated based on the variables that make the company have more work, from client to client.

It is understood that in order to correctly price the product, an average number of customer service interactions that may be necessary for a particular client should be established, in addition to the appropriate variable cost. A rigorous cost control is also important to ensure that all costs are taken into account in pricing.

The monitoring processes were mapped and indirect costs of the company were identified, which were necessary to calculate the final prices of activities. Cost drivers were determined and defined and distributed to products. The research objectives were certainly achieved. However, future studies should include control of the number of customer service interactions that the company performs, considering the variables that make certain clients require more interactions than others. This coefficient was established based on records of electronic signals received by the monitoring program and the experience of area managers. However, not all signals received actually require service, and a more careful analysis of service data could ensure greater accuracy in pricing.

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