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SUSTAINABILITY: FLOOR WATERPROOFING FEASIBILITY STUDY AND RAINWATER REUSE IN A TEXTILE INDUSTRY

SUSTENTABILIDADE: ESTUDO DE VIABILIDADE DE IMPERMEABILIZAÇÃO DE PISOS E REUTILIZAÇÃO DE ÁGUA DE CHUVA EM UMA INDÚSTRIA TÊXTIL

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ABSTRACT

This work addresses the importance of the conscious use of water in the business environment, a theme that has been the target of great repercussion in the organizational environment, focusing mainly on the aspects of rainwater reuse and the reduction of its consumption in the process through waterproofing. The objective of the work is to minimize production costs with environmental responsibility. Through meteorological studies, a satisfactory rate of rain was identified in the region where the company is located, allowing rainwater harvesting to be used in production. Subsequently, the study was carried out to make the catchment project viable, which, after management approval, a pilot test was developed to measure the results of rainwater reuse. A small area of the floor was waterproofed to assess the infiltration rate. It was thus identified that, in the months of greater precipitation, the company becomes self-sufficient in the use of water, this is due to the waterproofing of the floor with epoxy paint, which had significant and consistent effects as expected. As a result of satisfactory testing, training was provided to raise employee awareness. The project is undergoing simulations and it is estimated that the results are significant for the company.

RESUMO

Este trabalho aborda a importância do uso consciente da água no ambiente de negócios, tema que tem sido alvo de grande repercussão no ambiente organizacional, com foco principalmente nos aspectos do reuso de águas pluviais e na redução de seu consumo no processo através da impermeabilização. O objetivo do trabalho é minimizar os custos de produção com responsabilidade ambiental. Através de estudos meteorológicos, foi identificada uma taxa satisfatória de chuva na região onde a empresa está localizada, permitindo que a captação de água da chuva fosse utilizada na produção. Posteriormente, o estudo foi realizado para viabilizar o projeto de captação que, após a aprovação da gerência, e o teste piloto foram desenvolvidos para medir os resultados do reuso da água da chuva. Uma pequena área do piso era à prova d'água para avaliar a taxa de infiltração. Identificou-se, assim, que, nos meses de maior precipitação, a empresa se tornou autossuficiente no uso da água, devido à impermeabilização do piso com tinta epóxi, que apresentou efeitos significativos e consistentes conforme o esperado. Como resultado de testes satisfatórios, foi fornecido treinamento para aumentar a conscientização dos funcionários. O projeto está passando por simulações e estima-se que os resultados sejam significativos para a empresa.

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1. INTRODUCTION

The search for new sources of water supply is considered urgent across the planet. The water cycle promotes its renewal; however, the amount of existing water is always the same, and its consumption increases every day, which makes it a finite natural resource. The UN - United Nations emphasizes that water is the most degraded natural resource by man. It also refers to the need for governments, companies, and society to reassess their criteria for economic growth taking into account the impacts on the environment (Bhushan, 2019; Missimer, & Maliva, 2018).

Saving water is no longer just a healthy habit. Currently, it is a big responsibility for the future. Water has been a widely studied resource today, mainly with the objective of optimizing its use not only in production processes but in all activities where it is needed (Verplanken & Roy, 2016). The constant search for improving the quality of products and production processes of industrial companies has required the development of new production practices and activities that meet the needs desired by customers, however, if these are not carried out in an economically and environmentally correct manner, they can be harmful to the company itself generating unnecessary costs to the company (Rauter, Jonker, & Baumgartner, 2017).

In addition to being one of the main sources of life, water is also one of the main resources for the sectors of production of goods, such as agriculture and industry. As quoted by Carmo Pereira, et al., (2019), the Brazilian agriculture can be considered an activity where the use of drinking water is most needed, which added to the livestock and steel industry represents around 95% of the export activities that use water in their processes.

According to data from CNI (2013), the Brazilian industry uses high water demand in its activities or used as a productive input mainly in refrigeration and boiler systems. Unfortunately, due to the lack of information on water use in the sector, this is a subject that has not been studied in Brazil. The Brazilian textile industry is among the industrial activities with the highest environmental priority, due to the large generation of chemical effluents in the environment (Rodrigues, et al., 2019; Sanjulião, & Godinho, n.d.), not only for the environment but also for the production process itself.

In the market, there are several types of paints thanks to the development of better resins, pigments, and varied and computerized formulation made available by most manufacturers. Technological advances have made it possible to launch increasingly innovative products where it is possible to find products that have special technical functions such as reducing water absorption, improving aspects of hygiene, abrasion resistance, resistance to the growth of fungi, anti-aesthetics, thermal comfort, among others (de Oliveira Cunha, 2011).

The companies where the case study is applied have problems in the production process due to the dust resulting from daily activities. A few years ago, companies started wetting the floor to reduce the problem. Therefore, due to the roughness of the floor, water infiltration occurs easily, making water consumption a new problem. Thus, this work assesses the first hypothesis that the waterproofing of industrial soil, preventing water penetration, will reduce consumption. A second hypothesis would be that the capture of rainwater to be used in this process would eliminate the costs of water to humidify the floor, directly assisting the costs of the product. In

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view of this, the purpose of this work is to verify the feasibility of waterproofing the floor and analyzes of rainwater capture for use in the manufacturing process, aiming at cost reduction and improvements in the productivity and quality of the company's products.

The company in question does not necessarily need drinking water in its process, so the reuse of water and the use of rainwater would greatly reduce its consumption. The use of rainwater is being used by industries, schools, gas stations and in activities that consume a large volume of water for non-potable purposes, as they represent savings in the consumption of treated water and, consequently, a reduction in expenses. Bearing in mind the need to preserve water resources, this study contributes by showing the importance of using rainwater as a way to reduce the consumption of treated water, reduce costs, save energy and promote the recharge of groundwater through the hydrological cycle, proposing its applicability in both commercial and residential buildings.

2 THEORETICAL REFERENCE

2.1 CONCEPT OF RAINWATER USE

According to Unicef (2017) three quarters of the world is covered by water, which corresponds to more than 354000 km³ of the entire globe, and it is divided into rivers, lakes, wetlands, mangroves, polar ice caps and glaciers. Having the equivalent of 1386 km³ accessible, only 2.5% is fresh water, and because 68.9% are in the appearance of glaciers, only 0.3% of the planet's total water is reachable and can be digested by humans (Alencar, 2018).

The amount of fresh, clean water is decreasing throughout the world. The excessive consumption of the natural water supply by industries, the increase in the population, which is growing more than nature can yield and the pollution caused by man, which is affecting and lowering these reserves more and more. According to Unicef (2017), almost 750 million of the population, especially the poorest and most fragile, still lack this essential human right today. "According to the United Nations (UN), about 70% of all accessible drinking water in the world is applied for irrigation, while industrial practices use 20% and 10% attributed to domestic use (Barbosa, 2018; Pedrangelo, 2017).

Brazil retains water idleness estimated at 35732 m³ / inhab / year, being highlighted as a country “rich in water”. In addition, in relation to the global water potential, Brazil accounts for 12% of the total freshwater on the planet (Panini, & Tavares, 2016; Souza, Neto, Souza, & Veneu, 2016). Among the South American regions, Brazil stands out for having an average water flow of 177900 km³ / year, which corresponds to 53% of the total average flow of South America (Table 1) (Melo, & Costa, 2018).

Table 1. Average water flow in Brazil compared to other countries in South America

South America	Flow (Km³ / year)	Percentage (%)
Brazil	177.900	53
Other countries	156.100	47
Total	334.000	100

Source: Adapted Tomaz (2003).

Brazil's water idleness is mostly located in hydrographic basins. The important hydrographic basins in Brazil are those of the Amazon River, Tocantins Araguaia, São Francisco, North

Atlantic North, Uruguay, East Atlantic, South Atlantic, and Southeast, Paraná and Paraguay Rivers (Coelho, 2019). The world's top hydrographic network is that of the Amazon Basin, which contains a drainage space of the order of 6112000 km², covering about 40% of the surface of the Brazilian extension, extending further from the border of Venezuela to Bolivia (ANEEL, 2007).

The use of rainwater for urban purposes is an old action in our country (namely, in the Algarve and the Azores) and it has been abandoned over time, due to the greatness that the public water supply systems have been expanding. At the present time, we are witnessing a return to the valorization of this action in the context of the naturalization of the urban stage of water, the preservation of water, and the search for more sustainable resolutions (Rodrigues, 2018).

According to Ahmed et al. (2020), the use of rainwater is recommended as far as re-training or use of water of a lower PNUEA characteristic, with mention also being made of measures for the use of rainwater in gardens and the like and the application of rainwater in lakes and water reflections, and can be determined as the procedure for capturing and piling up rainwater collected from established surfaces (for example, roofs, parking lots, terraces) and its use in beneficial uses for people (Li, Sun, Pu, & Jayas, 2017).

The rainwater can be conserved in many ways, from dams and ponds to water tanks, reservoirs, and cisterns with waterproofed and covered walls. The former may indicate greater losses through infiltration and evaporation. In addition, they do not maintain water quality as there is a risk of introducing organic matter and other substances. The latter has the benefit of lower losses and, occasionally, of maintaining water of a higher quality. These results are also used to capture surface water in public supply systems, but at a different scale, away from consumption sites and including processes in order to guarantee its quality for human consumption (Sayl, Mohammed, & Ahmed, 2020).

2.2 ADVANTAGES AND DISADVANTAGES OF USING RAINWATER

According to Perdomo, et al., (2010), the use of rainwater is a technique widely presented in countries such as Australia and Germany that allows the reach of good quality water, in a simple and effective way. This technique allows (Thomé, Santos, & Fisch, 2019; Xu, et al., 2018):

• Favor water conservation;

• Reduce the dependence that exists on groundwater reserves, which, being very exploited, deplete;

• Limiting the use of public water and the aggregate cost;

• Reduce the costs of operating water supply systems;

• Avoid using potable water incompatible uses with inferior quality, such as washing floors, watering gardens and gardens, etc.;

• Contribute to controlling flooding, conserving part of the water responsible for runoff.

The technologies necessary for the capture and storage of rainwater are usually simple to install and easy to use. Inhabitants can be trained to use these technologies and construction materials or ready-to-install solutions are available on the market. Regarding disadvantages, these are mainly associated with the temporal variability of precipitation and the quality of the water, which, if not properly treated, could endanger human health and the functioning of system components (Almeida, Lopez, & Abreu, 2019).

The use of rainwater must have a correct treatment (filtration and disinfection), more or less demanding according to the quality of the water and the intended use. PNUEA also mentions two problems that may appear as a result of this technique, specifically, social acceptance due to people's contact with water, which can affect their health and the system, implying a significant investment and some maintenance. In general, the negative impacts of these applications are negligible (Loureiro et al., 2018).

2.3 BASIC COMPONENTS OF A RAINWATER HARVESTING SYSTEM

In accordance with TWDB (2017), rainwater recovery systems are formed by basic components that serve each of the following functions:

• Catchment: includes the surface on which the rain falls, that is, the collection or catchment surface;

• Transport: it is formed by components that conducts water from the roof to the tank, specifically downspouts or gutters and fall pipes;

• Filtration: includes devices that remove debris and dust from rainwater collected before it goes into the tank, such as leaf screens, first flow diverters and filtration devices;

• Storage: conglomerates one or more storage tanks that can also be called cisterns;

• Distribution: it is the rainwater conduction system for its final use through pumping or gravity;

• Treatment: although it is relevant in the case of portable systems, for non-potable uses, this step usually includes only the removal of solids.

2.4 FEASIBILITY OF IMPLEMENTING RAINWATER RECOVERY SYSTEMS

Based on the bibliographic review carried out previously, the SWOT analysis is recalled to condense the essential aspects for the analysis of the feasibility of placing rainwater harvesting sets. SWOT is a figure used for Strengths, Weaknesses, Opportunities and Threats. The SWOT survey is a method of diagnosis and strategic elaboration that makes it possible to make an assessment of teams, companies, organizations or individuals, as well as their respective surroundings, directly in relation to their Strengths, Weaknesses, Opportunities and Threats (TWDB, 2017).

The strengths and weaknesses are basically correlated to the internal context. Opportunities and constraints are especially associated with the external context. Analyzing the table, it is possible to verify that the exploitation of rainwater is a procedure with many strengths when compared to the weak points and just as it can be assumed that its placement could offer enormous advantages to the solution of problems having, for example , the absence of drinking water, without serious effects on the environment and people (Grm, Štruc, Artiges, Caron, & Ekenel, 2017).

2.5 EPOXY PAINT

Epoxy paint is an example of paint that shows high characteristic and thickness in parallel among other types of paint. The use of it is not limited only to the floor being able to be used on walls and other types of surfaces. It is a simple and practical paint, its curing period is very accelerated and its application on the floor allows high resistance, sustaining strong traffic and temperature variations. Other attributes of epoxy paint are impenetrability, a smooth finish, intense shine (there are other types of finishes) and the ability to clean and maintain the exterior (Zmozinski, et al., 2018).

Epoxy paint is a dye in its own right and will give the floor a good coating, and it is not necessary to match the floor before application, such as the grouting of the ceramic armor for example. Of course, with this artifice it is significant to take into account that the defects, reliefs and grooves of the surface will remain apparent - and even clearer if the paint used has a brilliant taste. Epoxy paint proves to be a great possibility, cheap and easy, in order to brush tiles and ceramic floors from the bathroom and kitchen, appropriate to their resistance to water, and also the wooden floor (Torknezhad, Khosravi, & Assefi, 2018).

The use of waterproofing paint for floors is very popular in the industrial segment, as well as for renovations and projects in shops and homes (dos Santos et al., 2019; Rodrigues, de Jesus, & Oliveira, n.d.). The main purpose of this example of paint is to directly waterproof the floor of the area, preventing moisture from overflowing the counter floor from one direction to another. The recommendation for the use of paint is also able to be given not only by the circumstance of providing an impenetrable floor but also to transform the design, color or some other characteristic of the area in order to carry out the renovation. Epoxy paint has composites such as resins that are impenetrable, that is, they do not suck water and also do not allow moisture to transcend from side to side of the coating in which it is applied (Han, & Kang, 2018; Zmozinski, et al., 2018)

2.6 ADVANTAGES OF EPOXY PAINT

According to Hardy Floor (2017), the benefit of using waterproofing paint is that it adapts to the structure where they are being placed, constituting the plasticity of the base material coming together, leveling the porosities. Another very important issue is that the waterproofing paint for flooring is widely used on outdoor floors and wet areas of homes and businesses, such as bathrooms and kitchens exactly by the property it owns.

Cost-effective and quick application compared to the coating makes epoxy paint the most suitable option for those who want an agile application at a low cost. However, it is important to highlight that only an experienced and trained professional can indicate which is the best option for each reality to which it is exposed, such as the type of floor already installed, the appropriate type of use of space, among others (Han, & Kang, 2018; Hardy Floor, 2017) .

3 METHODOLOGY

A pesquisa foi realizada em uma empresa textile localizada no sudoeste de minas gerais, Brasil. In order for the objective to be achieved, this work was structured according to the steps described by Miguel (2007). Divided into six stages, the proposal to conduct research through a case study is related to the activities presented in Table 2.

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Table 2. Proposal to conduct research through a case study

Activity	Description
Define a theoretical conceptual framework	Map the literature on the topic, outline the propositions, delimit the boundaries and degree of evolution;
Plan the cases	Select the units of analysis and contacts, choose the means to collect and analyze the data, define means to control the research;
Conduct pilot test	Test application procedures, verify data quality, make necessary adjustments;
Collect the data	Contact the cases, register the cases, limit the effects of the researcher;
Analyze the data	Produce narratives, reduce data, build a panel, identify causality;
Generate report	Draw theoretical implications, provide structure for replication.

Source: Adapted Miguel (2007).

The phase of defining a theoretical conceptual framework implies research and foundations in the various literature referring to the theme to be addressed in scientific works. The main means of research were: articles, monographs, websites, standards, among others. Articles from the last 10 years were analyzed. Then, a bibliographic survey was made regarding the works related to the theme of reuse of rainwater and waterproof paint for application on industrial floors. Through this research, it was possible to perceive the degree of importance of the application of this concept in improving the productive efficiency of the production line of the analyzed company.

For the planning of the case, the problems around the studied case were raised, clearly demonstrating the reason for developing the study. In this phase, the objectives desired by the researcher are also defined. Initially, the company was analyzed, focusing on the research problem. Then, an analysis of the process was carried out, trying to understand how the floor humidification was carried out.

The third step will be carried out in a space of 1 m² where the floor absorption time will be calculated. It is also intended to conduct a study of the economic viability of the investment, which will be carried out using the NPV method (Net Present Value). If the feasibility of installing the project is proven, an implementation proposal will be prepared, where all the necessary data and information will be available for the company to carry out the rainwater harvesting project.

Data collection was performed by measuring the water in the water measurement control records and the number of parts in the defective press sector. To analyze the data obtained, the Microsoft Office Excel 2016 software will be used, where the results will be inserted in spreadsheets and calculated. Still, in Excel, graphs and tables will be developed to monitor the results obtained, showing the development and the return of the activities carried out. Also using the Microsoft MS Project software, to manage the schedule of activities to be carried out during the project, where it will be possible to insert all information since its completion.

Immediately after the proposal is drafted and the execution activities are completed, performance monitoring resulting from the changes implemented will be monitored. This monitoring will take place through performance indicators, which are:

- Contamination index of parts in the press sector;

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- General Factory for general water consumption.

Finally, using Excel spreadsheets, and in a textual form of the present work, the results obtained with waterproofing the floor and collecting rainwater were presented.

4 RESULTS AND DISCUSSIONS

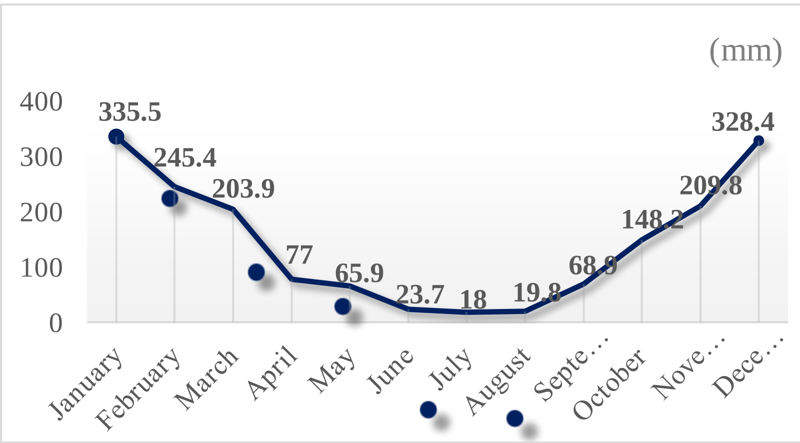
In the textile company object of the research, a large amount of water is used as a resource to mitigate losses in the production process. One of the impacts that directly influence the quality of products is the generation of textile soot due to the processes of cutting fabrics and foams, where the pieces cut when directed to the next sectors can be contaminated due to the presence of textile soot in the air.

The initial solution to the problem of contamination of the parts, was the humidification of the industrial floor, so that the textile soot is fixed in the water and does not disperse in the air, allowing the occurrence of the problems already mentioned. Due to the need to keep the floor always moist, a large amount of water is used daily, which causes a considerable cost for the company, in addition to environmental impacts. This cost changes according to the incidence of rainfall in the place and, in drier seasons, it increases the periodicity of the humidification process.

Due to the improper floor the water is absorbed quickly, needing to wet the floor several times a day. For this reason, we intend to study the use of paints that waterproof the floor, reducing water absorption. Since then, an action plan has been developed, using MS Project, to control the actions, resources and deadlines of the project. Initially, through meteorological studies, a satisfactory rate of rain was identified in the region where the company is located, allowing rainwater harvesting to be used in production. This use of rainwater can totally eliminate the water costs of the process.

Using spreadsheets, in Excel, the water requirement in the studied process was calculated and the company's rain catchment capacity was compared, based on the roof area. The calculations made, showed that in the months of greatest precipitation in the region the sector becomes self-sufficient in the use of water, due to the demand of the target company of the study being lower in the first months of the year, the water stored in this period is also able to be used in months with less rain. Figure 1 shows the city's precipitation rate in 2017.

Figure 1. City's precipitation index in 2017



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After identifying the rainfall in the region, a calculation was made to simulate the Roof Capture (L), using Formula 1. Then the company's historical data was analyzed to identify how many times the floor is humidified per day, note It is noted that in the months of drought the Occurrence of humidification is greater than the months of greatest rain. This occurrence was multiplied by the Workdays to find the Occurrence of Humidification per month (Formula 2). This has been multiplied by Liters by humidification (L) of water used to meet the monthly need (Formula 3). Finally, the Monthly requirement was subtracted from that month's precipitation. Thus identifying the months that would be self-sufficient in non-drinking water. These calculations are shown in Table 3.

(1) precipitation x catchment area = Roof Capture
(2) Occurrence x Workdays = Occurrence of Humidification per month
(3) Occurrence of Humidification x Liters by humidification = Monthly requirement

Table 3. Monthly need in the sector and the fundraising capacity

Month	Precipitation (mm)	Roof Capture (L)	Occurrence	Workdays	Occurrence of Humidification per month	Liters by humidification	Monthly requirement (L)	Left	Aggregate balance
January	335,5	1.610.400	7	15	105	5400	567.000	1.043.400	1.043.400
February	245,4	1.177.920	8	18	144	5400	777.600	400.320	1.443.720
March	203,9	978.720	8	20	160	5400	864.000	114.720	1.558.440
April	77	369.600	8	21	168	5400	907.200	-537.600	1.020.840
May	65,9	316.320	8	20	160	5400	864.000	-547.680	473.160
June	23,7	113.760	9	22	198	5400	1.069.200	-955.440	0
July	28	134.400	9	20	180	5400	972.000	-837.600	0
August	19,8	95.040	9	22	198	5400	1.069.200	-974.160	0
September	68,9	330.720	9	18	162	5400	874.800	-544.080	0
October	148,2	711.360	8	18	144	5400	777.600	-66.240	0
November	209,8	1.007.040	8	20	160	5400	864.000	143.040	143.040
December	328,4	1.576.320	7	15	105	5400	567.000	1.009.320	1.152.360

Note that the months of January, February, March, November, and December are self-sufficient in water and the left of the initial months covers April and May. It is worth remembering that this analysis was simulated with data from 2017 for application in 2018, and the lefts from November and December can be used in the following year. Subsequently, a pilot test was carried out to measure the results of rainwater reuse, through the capture of water from the roof, through gutters and storage in drums.

A test with epoxy paint was also carried out, which according to studies, proved to be the most suitable for the waterproofing process. This epoxy paint was applied to a small area of the floor to assess the infiltration rate, which was humidified with the same percentage of water as the sectors without waterproofing and under the same temperature conditions. It was then observed that according to the data collection to identify the need for water used daily, waterproofing the floor generated encouraging results, a 60% drop in floor humidification, Figure 2. According to the calculations performed and the tests carried out, it is estimated that combining the process of capturing water and waterproofing the floor, the sector will become self-sufficient throughout the year. As shown in Table 4.

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Figure 2. Reduced need (Comparison of water use)

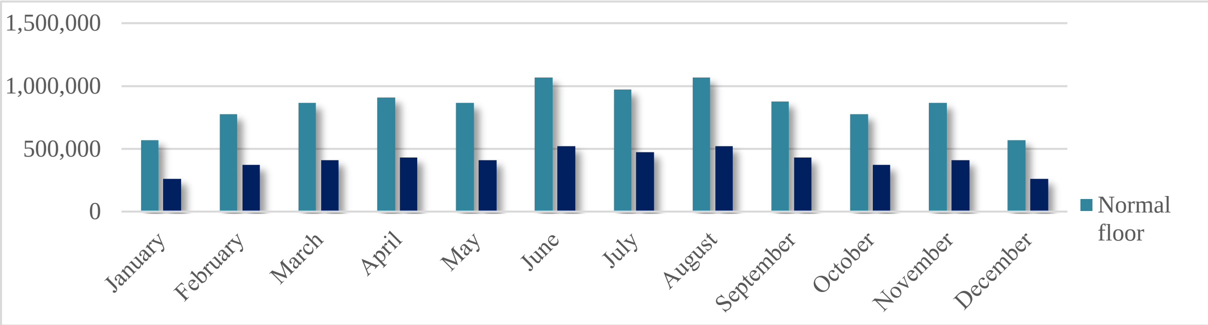

Table 4. Monthly need in the sector and the fundraising capacity

Month	Precipitation (mm)	Roof Capture (L)	Occurrence	Work days	Occurrence of Humidification per month	Liters by humidification	Monthly requirement (L)	Left	Aggregate balance
January	335,5	1.610.400	3	15	45	5400	243.000	1.367.400	1.367.400
February	245,4	1.177.920	4	18	72	5400	388.800	789.120	2.156.520
March	203,9	978.720	4	20	80	5400	432.000	546.720	2.703.240
April	77	369.600	4	21	84	5400	453.600	-84.000	2.619.240
May	65,9	316.320	4	20	80	5400	432.000	-115.680	2.503.560
June	23,7	113.760	4	22	88	5400	475.200	-361.440	2.142.120
July	28	134.400	4	20	80	5400	432.000	-297.600	1.844.520
August	19,8	95.040	4	22	88	5400	475.200	-380.160	1.464.360
September	68,9	330.720	4	18	72	5400	388.800	-58.080	1.406.280
October	148,2	711.360	4	18	72	5400	388.800	322.560	1.728.840
November	209,8	1.007.040	4	20	80	5400	432.000	575.040	2.303.880
December	328,4	1.576.320	3	15	45	5400	243.000	1.333.320	3.637.200

It is noted that the 60% reduction in the occurrences of floor humidification led to a 100% use of water in the sectors, making the analyzed sectors self-sufficient in non-potable water resources. It foresees that this reduction will reduce the costs of the process by R$ 32,500.00 per year.

As a result of the tests being satisfactory, the training to raise awareness among employees will be carried out in sequence and will be carried out through leaflets and awareness presentations. It is estimated that there will be a return on investment in the first year in which the change is made. It is worth mentioning that the painting has a two-year depreciation period, and its maintenance costs 30% of the total project value. Thus, this project appears viable for the company.

Finally, the focus of this work is to demonstrate that ecologically correct attitudes, in addition to ensuring the survival of the planet for future generations, can bring benefits to organizations, making them more competitive, reducing costs, and, in some cases, generating revenue.

Final Considerations

Based on the results presented, it can be said that the project for the use of rainwater for non-potable purposes, proposed in this work, has shown to be applicable, both in various industries and residential segments, considering that it is effective in the use of water Of rain. In view of the scarcity of water resources, the project is of great importance, due to the range of possible applications for rainwater, which can be used in the company's production and cleaning processes.

The main barrier to the implementation of the project, can be considered the negativity of some employees and the doubts of the top management in relation to the investment can lead the project to failure. However, because there is no need for water treatment, the only filtration, for the process of humidifying the floor the investment was more accessible than expected. And due to the quality of research, calculations and tests carried out to demonstrate the benefits of reusing water, the barriers have become motivating and the perception of benefits that can be obtained leads to the success of the project.

The project demonstrated satisfactory results, obtaining a 100% reduction in the consumption of drinking water in the sector studied, using only the rainwater captured and reducing consumption by waterproofing the factory floor.

For future work it would be the application of the project in other sectors of the studied company, using the water captured also for discharges and the application in other companies. Finally, the focus of this work is to demonstrate that ecologically correct attitudes, in addition to ensuring the survival of the planet for future generations, can bring benefits to organizations, making them more competitive, reducing costs, and in some cases generating revenue.

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