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Environment

The sustainable practices in service companies covered by the ALI program, in RN, Brazil

As práticas sustentáveis em companhias prestadoras de serviço atendidas pelo programa ALI, no RN, Brasil

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ABSTRACT

The present study aimed to evaluate the sustainable practices adopted in 53 companies operating in the service sector which have concluded the ALI Program in the cities of Natal, Mossoró and surroundings, in the state of Rio Grande do Norte. The study was characterized as exploratory and observational, with a quali-quantitative approach, using standardized interviews for the application of an Innovation Radar. The results showed an evolution in the sustainability dimension, with improvement and innovations in the subdimensions of energy management and waste reduction, however, with subtle improvements in water management. It was also found that adopting sustainable practices by companies in the solar energy sector can be a marketing action to attract new customers. Furthermore, it is very important to intensify actions to raise awareness of these micro and small companies on the theme of sustainability focused on water and solid waste management, encompassing their impacts on the economy and natural resources, in order to make them competitive and aligned with global changes and requirements.

Keywords: Innovation radar; Nature conservation; Sustainable development

RESUMO

O presente estudo teve como objetivo avaliar as práticas sustentáveis adotadas em 53 empresas do setor de serviços que concluíram o Programa ALI nas cidades de Natal, Mossoró e adjacências, no estado do Rio Grande do Norte. O estudo caracterizou-se como exploratório e observacional, com abordagem quali-quantitativa, utilizando entrevistas padronizadas para aplicação de um Radar de Inovação. Os resultados mostraram uma evolução na dimensão da sustentabilidade, com melhorias e inovações nas subdimensões de gestão de energia e redução de resíduos, porém, com melhorias sutis na gestão da água. Constatou-se também que a adoção de práticas sustentáveis pelas empresas do setor de energia solar pode ser uma ação de marketing para atrair novos clientes. Além disso, é muito importante intensificar as ações de conscientização dessas micro e pequenas empresas para o tema da sustentabilidade com foco na gestão

de água e resíduos sólidos, contemplando seus impactos na economia e nos recursos naturais, de forma a torná-las competitivas e alinhadas com mudanças e requisitos globais.

Palavras-chave: Conservação da natureza; Desenvolvimento sustentável; Radar de Inovação

1 INTRODUCTION

In a globalized market, which is also highly competitive and increasingly aware of the need to promote sustainable development, it is essential that companies can integrate sustainability concepts into their production chain (Brazilian Service of Support to Micro and Small Companies [SEBRAE] [1], 2019).

Sustainability is the ability to meet the needs of the present without compromising the ability of future generations to meet their own needs (United Nations [UN], 1987, p. 25). This issue was discussed widely by the countries present at the United Nations Conference on Development and the Human Environment.

In addition to the three pillars of sustainability - environment, economy and social -, known as the Triple Botton Line (TBL) model, Barbosa (2008) included the pillars of ecology and politics. Its principles were created from conferences held by the UN and can be applied to the business world by methodologies defined by the Global Compact, Sigma Project and Sullivan Global Principles (Gomes, Bernardo & Brito, 2005).

According to SEBRAE (2014), it is necessary to learn to undertake, considering that natural resources are finite, especially in the 21st century, where innovation and sustainability can no longer advance alone. Business leaders usually become aware of sustainability issues gradually and disorderly (Pereira, Silva & Carbonari, 2011). Knowing this, the Local Innovation Agents Program [ALI Program], recently linked to *Brasil Mais* Program, includes the dimension of sustainable practices in its diagnostic tool, which aims to measure the degree of innovation of 18 themes in the company and, from this, guide possible changes.

[1]A Brazilian private social service entity that aims to train and promote the economic development and competitiveness of micro and small companies.

In Brazil, in 2019, the service sector accounted for 76.3% and 61.4% of businesses led by entrepreneurs at an early stage and established, respectively. Countries such as Germany, Australia, China and the USA also had a greater number of entrepreneurs involved in the sector (GEM, 2019). According to the research, the services can be oriented to the final consumer or business.

Services for the final consumer have low costs and few entry barriers, but can face highly competitive environments with little profit margin and considerable turnover due to high entry and exit rates. Business-oriented services tend to have more intensive technology or knowledge compared to services oriented to the final consumer, which makes replication difficult and provides longer longevity for the enterprises. One of the major transformations in developed countries in recent decades has been the growth of business-oriented services and the (relative) decline of consumer-oriented services (GEM, 2019).

Given the representative number of companies providing services in the country and its growth potential, this study aimed to evaluate the sustainable practices adopted by 53 companies in the sector which have concluded the ALI Program in the cities of *Natal*, *Mossoró* and surroundings, in the state of *Rio Grande do Norte*. For this, the specific objective was to evaluate the actions aimed at energy management, water management and waste reduction in companies.

This work was composed of a bibliographical survey on the subject addressed, followed by the construction of the methodology, which was based on the experience of the *Brasil Mais* Program[2]. Following that, the results raised by the Agent were organized and discussed, and some final considerations were presented.

[2]*Brasil Mais* is an initiative of the Federal Government to increase the productivity of Brazilian micro, small, and medium-sized companies by improving management and production practices and through digital transformation.

2 THEORETICAL FOUNDATION

2.1 Reality of micro and small companies in Brazil and *Rio Grande do Norte*

By Complementary Law n° 123 (2006), known as General Law, are considered microenterprises or small companies, those duly registered and with gross revenue of up to R$ 360,000.00 (three hundred and sixty thousand reais) and up to R$ 4,800,000.00 (four million and eight hundred thousand reais), respectively.

Microenterprises are vital for Brazilian socioeconomic development (Jesus et al., 2019), accounting for almost 60% of formal jobs and up to 30% of the country's GDP (Banterli & Manolescu, 2007; Melles, 2021). According to data generated by DataSebrae (2020), Brazil has more than 19 million companies, 9,417,542 (48.97%) of which are micro and small businesses, and 101,071 (1.07%) of them are in *Rio Grande do Norte* (Federal Revenue of Brazil [FRB][3], 2020).

The entrepreneur tends to be a person capable of inducing a new conception or invention in a successful innovation (Alves, Luz & da Silva, 2019), something quite challenging in the face of an intensely changing economic-social scenario (Carvajal Júnior & Kawamoto Júnior, 2017). According to Amaral (2019), these individuals have behavioral characteristics such as commitment, persistence, search for opportunity, initiative, planning, systematic monitoring, persuasion and contact networks.

There is a high dynamicity in the process of creating a company (Picheth, 2018). When studying the entrepreneurial process in a particular sector of the economy, Oliveira and Borges (2018) identified four phases: idea, identification of opportunities, exploitation of opportunities and opening of the business.

Thus, the ideas tended to arise from family influence, experience or professional training. The entrepreneurs identified opportunities through market study and demand, while the exploitation of these happened through the innovation of products

[3]Institution responsible for the administration of federal taxes and customs control.

and processes, attendance and provision of services. The opening of the business started without planning when connected to the family branch, with the help of SEBRAE or by experience in the area.

The main difficulty affecting them is mortality in the first years of life. The main factors of this occurrence are low education and qualification, lack of knowledge of the market, lack of strategic planning, difficulty in winning customers (Pinheiro & Ferreira Neto, 2019), management failures, economic factors, excessive expenses, lack of market knowledge and, especially, the entrepreneur's resistance to seek consulting (Pereira & Sousa, 2019), factor confirmed by the entrepreneurs served by the *Brasil Mais* Program, either by the complexity in finding specialized professionals or by the high cost of the service.

Carvajal Junior and Kawamoto Junior (2017) point out the importance of having a good prior planning to follow the counterflow and maintain longevity. In turn, Araújo et al., (2018) indicate that managers should see the company in its entirety, seek external training, maintain a solid relationship with suppliers and others involved in its operations (customers, employees, collaborators). In addition, it is important to recognize the latent causes of the crisis and the reason that triggers them to find a solution. In view of the monitoring by the ALI, it is noticeable the absence of supervision in the actions carried out in the company, which makes it difficult to become aware and eventually solve the most pertinent problems.

Therefore, the role of SEBRAE, to promote the development of micro and small companies, is strategic for the development of Brazil, especially in a time of post-pandemic crisis, which presented a growth of 75% in the rate of potential entrepreneurship (Melles, 2021). In addition, it is necessary for the intervention of the State and inherent public policies, with a strategic vision for microenterprises (Jesus et al., 2018), mainly financial, as tax burdens and access to credit.

Knowing this and the importance of renewal to maintain competitiveness, the federal government, with the Ministry of Economy and SEBRAE, created the Brazil Plus

Program, a public policy which aims at improving managerial capabilities, innovating processes and reducing waste (Brazil Plus, 2021). According to the data, the participating companies of Brazil Plus had an invoicing result 42% better than the MPE in general (SEBRAE, 2021).

2.2 Reality of micro and small companies in Brazil and *Rio Grande do Norte*

Sustainable practices have the intention to promote the rationalization and optimization of the use of available resources, as well as to promote the awareness of the population when it comes to reducing the waste of these resources (Brazil, 2019). The adoption of sustainable practices can be reactive when associated with legal requirements or proactive when performed voluntarily by companies, with the finality of improved environmental and social performance (Alves and Nascimento, 2016).

According to Calazans and Silva (2016), large companies tend to use innovations in their production processes that enable greater integration with sustainability and the preservation of the environment, *i.e*, they seek "greener" processes, and promote technologies that assist in reducing environmental impacts.

The technologies and actions adopted with the possibility of being replicated in micro and small companies were process changes, the Adoption of preventive and mitigation measures, awareness campaigns and training aimed at energy management, water and waste reduction (Brazil, 2019).

Calazans and Silva (2016) mentioned the reduction of idle time, increase in quality, better organization of production, change of layout, specialized human resources, and enlargement of knowledge to create an organizational climate aimed at the thematic and utilization of a framework of goals aligned with the business strategy.

While Alves and Nascimento (2016) highlighted actions of the tripod of sustainability (social, economic and environmental) with environmental plans, environmental risk assessment, indicators, planning and control of production with reduction and reuse of materials, water reuse system, reduction of energy consumption and waste generation, preparation and publication of sustainability reports, among others.

2.2.1 Energy management

In the scope of energy management, companies seek to apply cleaner production practices to reduce the consumption of this resource, aiming to stand out in the market and obtain new customers (Tucci et al., 2020). In Brazil, electrical energy is produced mostly by hydroelectric plants, matrix complemented by thermoelectric plants and renewable energies (wind and solar). This way, the water crisis significantly influences the price increase (Nascimento, Costa & Mendonça, 2017).

In view of this, many managers and researchers seek sustainable alternatives to achieve energy efficiency and reduce greenhouse gas emissions in the atmosphere. In addition to the adoption of public policies to encourage the rational use of energy, one of the alternatives is the construction of sustainable buildings or buildings with energy efficiency aimed to have rational consumption with higher productivity and lower waste (Altoé et al., 2017; Shukla & Sharma, 2018).

Among the main actions to reduce the consumption of electric energy in companies, the following stand out: installation of polycarbonate translucent corrugated tiles for the use of natural light, replacement of incandescent lamps in administrative departments with led lamps and installation of presence sensors (Tucci et al., 2020).

In countries such as China, the strategies adopted by the companies were thermal insulation on external walls and roofs, glazing on the windows, internal thermal comfort, shading systems to prevent sunlight from shining through windows and improvement of architectural design (Wang & Zhao, 2018).

In a survey in Spain about the purchase of equipment that influences energy efficiency, it was clear that consumers prefer to spend their budget on paying light bills that tend to grow than incur the additional cost of purchasing energy-efficient goods because they suspect that consumption will not decrease due to end-user behaviour. In this case, the authors state that more effective labels with information energy saving in cash could be more effective for decision-making (Ayala et al., 2021).

It is important to mention that Brazil has public policies to encourage energy efficiencies such as the National Energy Plan 2030, the National Energy Efficiency Plan and the Brazilian Labeling Program (Altoé et al., 2017). Among the actions that the authors point out as paramount to increase energy conservation, we highlight the modernisation of industry, diversification of the transport mesh, implementation of policies to save energy and strict standards for energy efficiency. Improving legal instruments to encourage the rational use of energy in the country, along with actions that promote medium and long-term planning, and the diversification of the national energy matrix, is essential to reduce the risk of energy scarcity in the country, as has already occurred in the past.

To avoid such scarcity, Brazil is potentializing growth in renewable energies such as solar energy. This growth was possible after the establishment of normative resolutions of the National Agency of Electrical Energy (ANEEL), which established the Electricity Compensation System for individuals and legal entities. This system allows the generation of credit with the distributor for production surpluses, as well as the creation of credit for use in real estate with the same CPF / CNPJ (Monzoni & Vendramini, 2017).

There was a more significant concern to reduce costs in the face of the water, social and environmental crisis amid the pandemic and uncertain times, mainly economic, so solar energy emerged as a promise to reduce the value of electricity consumption, in the long term, by up to 95% (Costa et al., 2020). Moreover, the solar energy sector is one of the solutions for sustainable development, both for its ability to generate self-sustaining energy from a clean, renewable and low-cost source and for the possibility of producing it in a shared way (Antoniolli et al., 2018).

In the case of commercial enterprises, the choice of alternative energy goes beyond cost reduction and includes increased competitiveness. (Feitosa, Mesquita & Severo, 2020).

Solar energy uses the sun as a source; its potential is converted into electrical energy and is strongly influenced by abiotic factors such as meteorological conditions and astronomical factors. Currently, its generation is considered environmentally sustainable and can add this value to places that adopt it. For Brazil, adopting this energy means complementing the national energy matrix and contributing to the reduction of 43% of greenhouse gas emissions by 2030. (Pereira et al., 2017).

The installation of the first solar power plants in the country occurred in 2011 (Beigelman, 2013), and since then, they have generated several opportunities for the local market, especially for micro and small businesses. According to CNN Brasil Business (2021), in the last three years, the growth of centralized solar energy (generated by large plants) was 200%, while distributed solar (small generation plants) passed 2.000%.

2.2.1 water resource management

The water footprint (WF) concept was introduced as an essential indicator of human water consumption and management, defined as the total volume of water used during the production of goods and services, as well as the direct consumption of this resource by humans. This indicator can monitor the human impact on the environment and guide the sustainable use of freshwater. (Silva et al., 2013; Saraiva et al., 2019).

According to Maracajá et al. (2012), most water used by humans comes from the products they use and not from daily consumption, as most think. For Silva et al. (2013), the indirect water footprint, linked to the production process of goods and services, is higher than the direct water footprint, the one related to human and domestic consumption; despite this and for being “invisible”, it is usually neglected. In the case of a product, its water footprint can be its “virtual water content,” that is, the amount of water used in its production chain.

Knowing that countries with water scarcity have high virtual water consumption contained in the products consumed by those countries, it is essential to consider both the size of the footprint and its impact in a given location. This way, it is possible to provide more explicit guidance on which parts of the supply chain to focus on and how to prioritize environmental actions by analyzing the water used in their supply and manufacturing chain. This information can help quantify and reduce freshwater expenditures. (Maracajá et al., 2012).

In 2020, the Ministry of Agriculture, Livestock and Supply [MAPA] stipulated goals for reducing water consumption by adopting actions such as reducing water pressure and the volume of water output in toilet flushes and urinals, storing and reusing water from air conditioning, and using a high-pressure machine, regularly checking colors and faucets to avoid leaks, and continuing to disseminate sustainable practices for water use. (Brazil, 2020).

2.2.1 Reduction of waste

The product and service chain has processes that may contain waste, so it is necessary to map their sources and eliminate them. This system was created by Toyota and is known as Lean production (Dante, Silva, & Piacente, 2019). According to Socconini and Martín (2019), in this system, there are ten significant sources of waste: overproduction, unnecessary processes, handling, transportation, waiting and searching time, over inventories, defects and rework, energy, talent, and contamination. Besides these, it is also necessary to consider the importance of the correct disposal of the materials that make up the activities according to the application of law 12.305/2010, which regulates the National Solid Waste Plan (Brazil, 2010).

When analyzing the construction chain, Fontanini (2010) reinforced the importance of considering the global effects on manufacturing processes, such as climate change, pollution, and deforestation, in view that these climate changes motivate the redirection of product and process designs since it is plausible to note

the impact they have on the manufacture of substances that promote changes in the system in general.

According to the author, innovations, especially in supply chain processes, can become essential alternatives for achieving sustainable and lean supply chains. Improvement projects for lean operations include the Six Sigma methodology, which has steps such as defining, measuring, analyzing, improving, and controlling (Socconini & Martín, 2019).

In the case tracked by Dante et al. (2019), the achievement of improvements was possible through a PDCA cycle, where it was possible to plan, execute, do, monitor, and apply corrective actions to the processes. In addition, the company also adopted a layout change to reorganize and optimize the process, changed the process logistics, and started monitoring production indicators.

Such actions were also identified by Calazans and Silva (2016), in addition to others, such as idle time reduction, quality increase, better production organization, and use of a goal framework aligned with the business strategy.

Public institutions like MAPA are adopting sustainable logistics management plans by reducing the consumption of printing paper and the use of photocopies in front and back, promoting selective collection, and adopting preventive maintenance and evaluation of the results achieved. In addition, they are reducing mileage in the displacement of vehicles and fuel consumption in transport that meets daily delivery demands (Brazil, 2020).

2.3 Sustainable practices in the service sector

In Brazil, many micro and small businesses perform services for the final consumer or businesses with low cost or high added value; among them are health companies, coffee shops, beauty salons, logistics and delivery, consultancies, and others (GEM, 2019). According to Silva and Lucena (2019), environmentally sustainable

investments are important factors for companies to be competitive, and they can reflect better corporate economic-financial performance. The study found that it is advantageous for companies to invest their resources in corporate social responsibility activities directly, with practices within the organization and by sponsoring philanthropic institutions that operate in this area of sustainable development.

When assessing sustainability in companies providing services in the printing industry, Diniz and Callado (2017) observed that institutions tended to perform more effective actions in the economic and social dimensions but were not fully committed to the environmental aspects required by the Environmental Sustainability Grid Model (GSE). However, achieving a satisfactory result in the environmental dimension depends on the organization. The points that need to be improved are the ISO 14001 framework, sources of resources used, amount of water used, processes arising from environmental violations, employee training and education, energy saving, product life cycle, waste reduction, and toxic waste production.

At Dental Jr, a consulting firm helped identify the main environmental problems regarding suppliers, production process, service use, and post-consumed service, in which was identified a high energy consumption in equipment, high water consumption in cleaning environments, equipment, and materials. In addition, the generation of contaminated solid waste from services and mixing between organic and recyclable waste in common areas (Kieling & Leripio, 2019).

According to the reports given by Sabin Laboratory employees in the study by Mazza, Isidro-Filho, and Hoffman (2014):

> "Sustainability practices promoted the exit of the comfort zone, added criteria of care, responsibility, review, and analysis in the company's activities and proved beneficial to all in the long term. In addition, it represented increased brand vision, the opening of new business opportunities, market differential, formation of new partners and strategic alliances (our translation)".

In addition, there was a financial return based on cost and waste reduction, economy, and practicality of the processes.

According to the cases reported, the essential tools used in searching for sustainable practices in the service sector were hiring specialized consultants, in-depth studies, monitoring, and 5W2H plans. Among the actions taken or outlined to achieve sustainability were implementing the policy of saving resources such as water and energy, searching for suppliers with environmental certification, environmental education, proper disposal, a best practices booklet, and environmental management system (EMS). Adjustment to standards and legislation, water reuse, monitoring of actions outlined, selective collection, monitoring, and management of the fleet and fuel use, and environmental compliance plans (Mazza, Isidro-Filho & Hoffman, 2014; Diniz & Callado, 2017; Kieling & Leripio, 2019).

3 METHODOLOGY

The present research comprehends a group of 182 micro and small companies from industry, commerce, and services, that graduated in the Brazil Plus Program, located in the mid-region of the West *Potiguar*, more precisely in the cities of *Areia Branca*, *Grossos, Mossoró*, and *Tibau*. The study comprised a target public of 53 service companies (E1 to E53) in *Natal, Mossoró*, and surrounding cities in the state of *Rio Grande do Norte* and participants of the Local Innovation Agents Project of SEBRAE in partnership with the National Council for Scientific and Technological Development [CNPq].

The investigation was categorized as exploratory and observational. Exploratory research defines objectives and seeks more information on a given subject, with precise descriptions of situations to discover existing relationships between its elements and components (Cervo, Bervian, & Silva, 2007), while observation is suitable for exploratory studies, since it favors the approximation of the researcher with the researched phenomenon, following a plan to guide the collection, analysis and interpretation of data (Gil, 2017).

As for the nature of the data, the research method was defined as qualitative-quantitative, since it was research developed from non-numerical data, such as opinions, speeches, and observations, using an interview script with open questions, and numerical, using a questionnaire with closed questions (Marcondes et al., 2017) known as innovation radar, the main tool used in the ALI Program for the survey of information by standardized interviews.

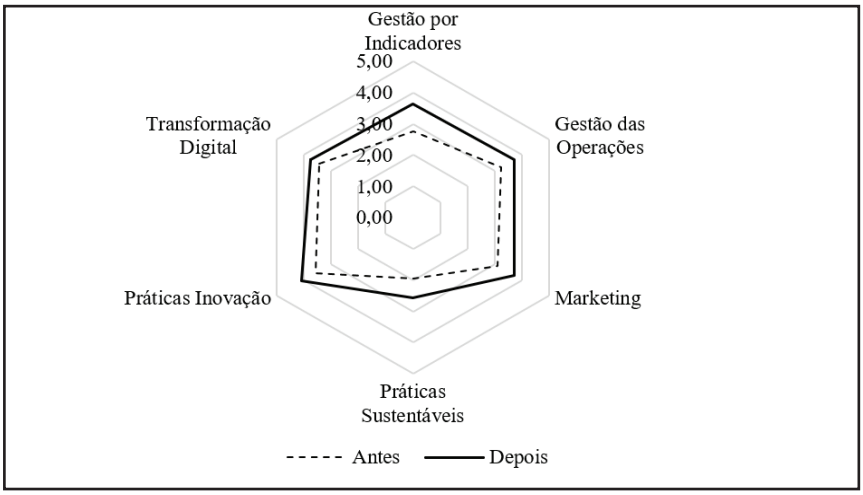
The Innovation Radar, obtained during the diagnosis conducted in the company with the business owner, assessed 18 subdimensions. This instrument was created by Sawhney, Wolcott, and Arroniz (2006) and adapted for the context of EMSs by Bachmann and Destefani (2008). According to Carvalho et al. (2015), this tool points out the dimensions that companies in a given sector have innovated or have been little explored and that, therefore, may differentiate concerning its sectoral competitors.

The values obtained with the Innovation Radar, the most relevant tool and delivery used in the ALI Program, were collected and processed with the help of Excel software from the office 2016 package. Finally, the values obtained in the diagnostics have been organized into graphs representing the average results of the 53 companies and by sub-dimension.

4 RESULTS AND DISCUSSION

The companies in the scope of this study provided food, architecture, health, fitness, consulting, engineering, maintenance, repairs, hotels, beauty salons, tourism, teaching, water, gas, and fuel services. Figure 1 illustrates the model presented to the managers, with the average results of the 53 companies that completed the monitoring of the Brasil Mais Program.

Figure 1 – Average results per dimension obtained in the Innovation Radar of the 53 companies in the services sector before and after participation in the *Brasil Mais* Program



Source: Authors (2022)

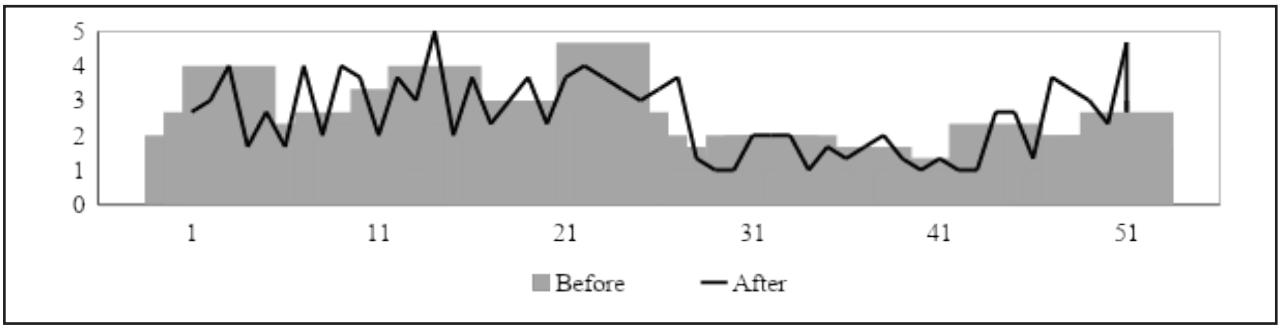
Among the six dimensions analyzed, sustainable practices had the lowest performance. Although, when assessing the evolution of the radar after the monitoring by the local innovation agent, we observed that sustainable activities were optimized by 31%, along with management by indicators, as the areas of operation management, marketing, innovation, and digital transformation evolved between 14% and 19%.

Sustainable practices are considered a cost and not a long-term investment. On the other hand, these practices aim to promote the rationalization and optimization of the use of available resources, along with raising awareness about the waste of these resources (Brazil, 2019).

According to Calazans and Silva (2016), large companies seek to use innovations in their production processes that allow for greater integration with sustainability and environmental preservation. That is, they seek “greener” processes and promote technologies that help reduce environmental impacts.

The micro-companies studied here carry out their activities in the services sector aimed at final consumers and businesses, and their indicators of sustainable practices before and after the monitoring by the ALI Program are shown in Figure 2.

Figure 2 – Advances between the initial and final diagnosis in the sustainable practices dimension of the 53 companies served in the *Brasil Mais* Program



Source: Authors (2022)

Previously, 37.8% of the companies studied did not adopt or implement specific actions of sustainable practices in their processes or facilities, such as reducing energy consumption, water, and waste, but without monitoring indicators. After three months of ALI monitoring, 62.3% of the companies sought solutions and adopted improvements in the sustainable practices dimension. The companies that sought improvements increased by 12.4% to 267.0%.

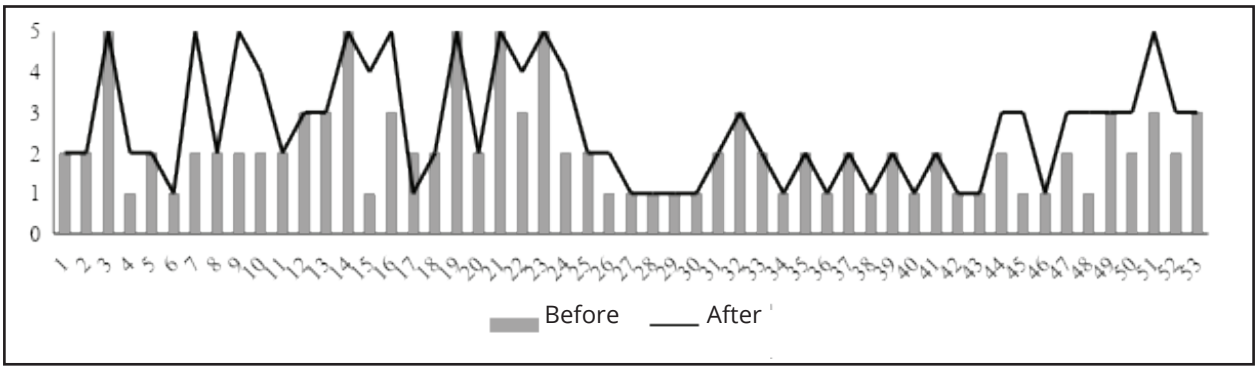
The companies have chosen to take actions for environmental risk assessment, indicators, production planning, and control. With the reduction and reuse of materials, adoption of own energy production, environmental licensing, layout changes, and awareness and training campaigns focused on energy, water, and waste reduction management, as well as addressed in the studies by Alves and Nascimento (2016), Calazans and Silva (2016), and Brazil (2019).

Therefore, it is possible to notice that the action of the ALI Program in terms of orientation was efficient for the increase of sustainability actions in the companies, considering that the innovation radar was relevant in this recognition of the importance of the dimension, the latent causes of the problems, and the effective corrections.

4.1. Energy Management

Regarding this sub-dimension, service sector companies recognize the importance of conscious energy use as one of the main ways to reduce company costs (Figure 3).

Figure 3 – Advances between the initial and final diagnosis in the energy management sub-dimension of the 53 companies served in the Brasil Mais Program



Source: Authors (2022)

The indicators before and after the monitoring by the ALI Program indicate that, at first, 75.5% of the companies had an absence or adopted fez actions immediately in energy management. According to the entrepreneurs, the main reasons were the lack of an office, low energy costs, or a plan for installing solar panel systems in the future. The remaining companies (24.5%) have implemented solar energy in their offices, benefited from shared generation, purchased energy-efficient equipment, or adopted policies to reduce consumption in the company.

For Tucci et al. (2020), the application of cleaner production practices to reduce the consumption of electricity, besides reducing the consumption of this resource, generates a highlight in the market and the reach of new customers. As reported in Spain, some entrepreneurs suspect that consumption will not decrease due to end-user behavior.

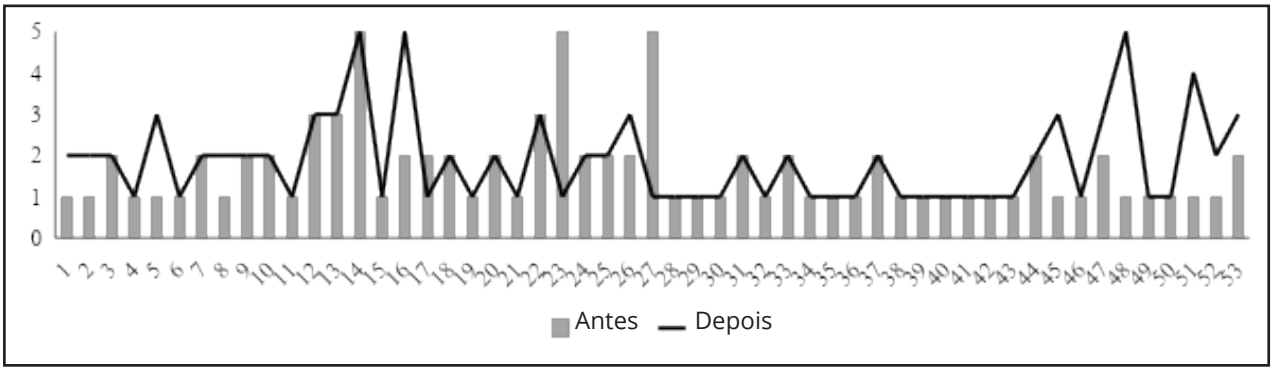
Until the last meeting, 69.8% of the companies had not evolved in energy management, while 30.2% had an increase of up to 300% by implementing specific actions, monitoring the results, and meeting consumption reduction targets. Besides this, the main actions adopted were the rotation of employees in the office, the adoption of home office work, the establishment of schedules for the use of air conditioning, use of led lamps and presence sensors.

4.2 Water management

The rational use of water is a much-discussed topic in the Northeastern municipalities, mainly due to the recurring water shortage. However, this was the sub-dimension with the lowest index of sustainable actions adopted by the solar companies in this study (Figure 4).

In Brazil, electricity is produced mainly by hydroelectric plants, a matrix complemented by thermoelectric plants and renewables (wind and solar), so the hydro crisis greatly influences the rise in prices (Nascimento et al., 2017).

Figure 4 – Progress between the initial and final diagnosis of the water management sub dimension



Source: Authors (2022)

Inicialmente, only 11.3% of the service companies adopted actions such as decentralization of activities from the headquarters, adoption of home office work, water reuse, rotation of employees, or awareness campaigns. The primary justification

for not adopting actions to reduce water consumption was the low cost of water consumption, which in *Mossoró (RN)* is around R$ 46,71 per 10 m³, or because the charge is included in the office rent.

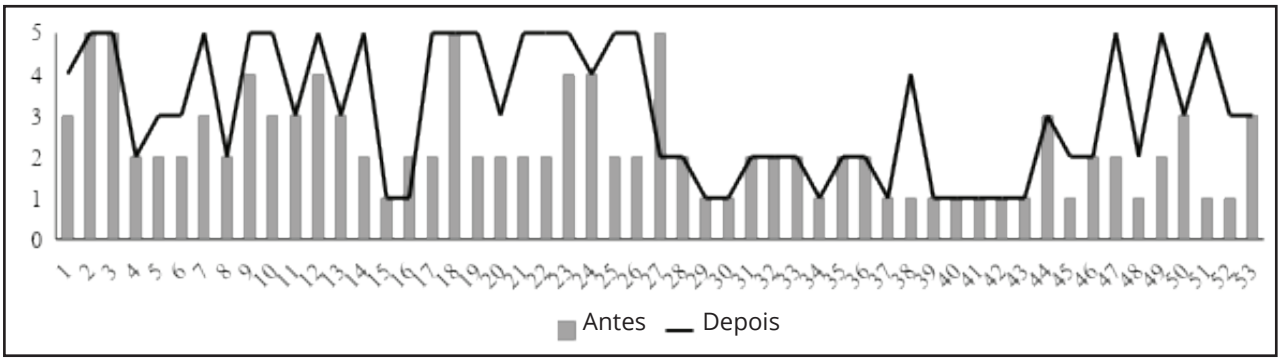
According to Maracajá et al. (2012), most of the water used by humans comes from the products they use and not from daily consumption as most think. For Silva et al. (2013), the indirect water footprint, linked to the production process of goods and services, is higher than the direct water footprint, the one related to human and domestic consumption; despite this and for being "invisible", it is usually neglected. In the case of a product, its water footprint can be its "virtual water content", *i.e.* the amount of water used in its production chain.

In this aspect, one of the companies innovated in the sub-dimension of water management after optimizing the process of washing photovoltaic panels, where it was estimated the use of about 10 liters of water per square meter. With this improvement, the company showed an evolution of 200.0% in its water management indicator after participating in the ALI Program.

4.3. Waste reduction

As for waste reduction, it was considered the management of waste from the activity and seven of the ten major sources of waste were: overproduction, unnecessary processes, handling, transportation, waiting and searching time, over inventories, defects, and rework (Socconini & Martín, 2019). The results of the waste reduction indicators are in Figure 5.

Figure 5 – Progress between the initial and final diagnostics of the waste reduction sub dimension



Source: Authors (2022)

Regarding the sub-dimension treated, 56.6% of the companies already adopted specific actions to reduce waste, but did not adopt specific targets or indicators to monitor results. After the ALI's monitoring, 43.4% of the companies had improvements in their waste reduction indicator, adopting specific actions, targets, or indicators for waste reduction.

The main actions adopted were scheduling installations, inventory of tools used by construction sites, adoption of systems for budgeting and project management, use of the cloud for sharing digitized materials, adopting of a day-to-day system, monitoring the number of tools used, lost, and broken in the field, investments in inputs, planning, defining the amount of materials needed for installation, advance purchases, and preventive forecasting of cars and equipment.

In addition, a solar energy company innovated in the supply chain process by adopting the reuse or donation of defective panels, or panels that are broken during handling and operations, to smaller systems and partners. While an inn invested in the purchase of quilts to reduce the recurrence of the washing of the prices, reducing the demand for trips to the laundry and the resources used in the process. According to Fontanini (2010), innovations, especially in supply chain processes, can be important alternatives to achieve sustainable and lean supply chains.

5 CONCLUSIONS

In view of the above, it is understood that sustainable practices in the service sector are associated with improvements in production processes aimed at optimizing the use of natural resources and reducing waste. Besides considering the internal production processes, it is important to consider all the links in the production chain and their social, environmental, and economic impacts.

From the radar generated during the visits of the ALI Program and from the analysis of the data presented in the results and discussion, it is possible to conclude that, despite the short time of operation, the companies studied have shown evolution in the dimension of sustainable practices.

In the services sector, the adoption of a solar system of their own may be an opportunity to achieve a large reduction in costs, with the potential to generate a differential in the market in terms of improved profit margins and competitiveness.

Water management was the sub-dimension with the lowest index of adoption of sustainable actions by the companies studied. Generally, service companies tend to have low water consumption in their facilities. However, when analyzing the production chain and its inputs, "invisible" water may be indirectly involved in the activity, which needs to be better studied to ensure the reduction of the organization's water footprint.

In the issue of waste reduction, the sub-dimension most worked on by the institutions in this sector, the focus was on improving processes aiming at lean operation, optimization, agility, and cost reduction through the adoption of inventories, adoption of management systems, monitoring indicators, and preventive maintenance.

Given the current scenario, it is of utmost importance to intensify awareness actions for micro and small companies on the theme of sustainability focused on the management of water and solid waste, encompassing its impacts on the economy and natural resources, in order to make them competitive and aligned with the changes and global requirements.

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