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Samuel; Vieirada Silva, Luiz Henrique; Siani, Sergio Ricardo
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Study of sustainability practices in large chemical companies in the metropolitan region of Campinas/SP

Estudo das práticas de sustentabilidade em grandes empresas químicas na região metropolitana de Campinas/SP

Daniella Ribeiro Pacobello¹ⁱ

Orcid: <https://orcid.org/0000-0003-3937-1864>

Samuel Carvalho De Benedicto²ⁱⁱ

Orcid: <https://orcid.org/0000-0002-4591-6077>

Luiz Henrique Vieira da Silva³ⁱⁱⁱ

Orcid: <https://orcid.org/0000-0002-7793-4923>

Sergio Ricardo Siani^{4iv}

Orcid: <https://orcid.org/0000-0002-2182-8873>

Abstract

This article aimed to diagnose the degree of involvement of chemical companies in the Metropolitan Region of Campinas/SP with the issue of sustainability. The study is justified by the need to fill gaps regarding the involvement of companies in this segment with the Sustainability Tripod. The research is qualitative, descriptive and exploratory in nature. Five large companies were researched, and data were collected in their respective Sustainability Reports. The results of the research indicated that the companies implement actions aimed at meeting the requirements of the "Sustainability Tripod" in addition to presenting an advanced understanding about issues of a social and environmental nature. Thus, it is believed that this research filled a gap not yet done in the chemical industries of the Metropolitan Region of Campinas/SP.

Keywords: sustainability; sustainable development; chemical industry; metropolitan region of Campinas.

Resumo

Este artigo teve como objetivo diagnosticar o grau de envolvimento das empresas químicas da Região Metropolitana de Campinas/SP com a questão da sustentabilidade. O estudo justifica-se pela necessidade de se preencher gaps sobre o envolvimento das empresas desse segmento com o Tripé da Sustentabilidade. A pesquisa é de natureza qualitativa, descritiva e exploratória. Foram pesquisadas cinco grandes empresas e os dados foram coletados em seus respectivos Relatórios de Sustentabilidade. Os resultados da pesquisa apontaram que as empresas colocaram em prática ações voltadas para atender as exigências do "Tripé da Sustentabilidade" além de apresentarem uma compreensão avançada acerca de questões de natureza social e ambiental. Assim, acredita-se que a pesquisa ocupou uma lacuna ainda não atendida por um trabalho feito nas indústrias químicas da Região Metropolitana de Campinas/SP.

Palavras-chave: sustentabilidade; desenvolvimento sustentável; indústria química; região metropolitana de Campinas.

¹ Pontifícia Universidade Católica de Campinas - PUC - SP – Brasil. E-mail: danix_pacobello@hotmail.com

² Pontifícia Universidade Católica de Campinas - PUC - SP – Brasil. E-mail: samuel.benedicto@puc-campinas.edu.br

³ Pontifícia Universidade Católica de Campinas - PUC - SP – Brasil. E-mail: vieiraluiz77@gmail.com

⁴ Universidade Federal do Sul e Sudeste do Pará (UNIFESSPA) - Marabá - Pará – Brasil. E-mail: sergiosiani@unifesspa.edu.br

1 Introduction

Excessive degradation of the environment and excessive depletion of natural resources has generated great concern among environmentalists and authorities. This concern reached the organizational environment, leading decision makers and organizational strategists to a change of approach regarding the environment (DE BENEDICTO et al., 2015).

With the passing of the years, society's concern for the environment and causes that have less and less impact on it, has been gradually increasing (SENADO, 2012). Therefore, companies, seeking profitability, competitiveness and aiming to have a distinction within the market, in relation of their consumers, have been taking conscious and sustainable measures to meet their expectations, thus contributing to a better society and a better world (DIEKMANN; HENZEL, 2010).

It is not now that environmental degradation is one of the most relevant and controversial issues worldwide. Organizations, in this scenario, have progressively applied the term sustainability or sustainable development in their workplace (BARBIERI, 2013).

According to Araújo et al. (2012, p. 28-56), "the current trend is that from the implementation of sustainable development through the exercise of the company's social function, these institutions (companies) become more involved in social and environmental issues, without, however, moving away from the main function of obtaining profits and generating wealth. If they do the opposite, they face the risk of being penalized by society and the market, which has increasingly marginalized functionally unsustainable companies. In addition, the risk of being penalized by the judiciary and the state."

Thus, the issue of sustainability in companies is of paramount importance,

since the lack of action can cause the company to be defamed and be looked upon with distrust by society (BORGES; TACHIBANA, 2005).

Therefore, the present study deals with the issue of sustainability in chemical companies, which have a diversified branch and is also considered as one of the sectors that raise a greater environmental concern, due to several factors. From the resources that are used, what happens within the organization, to what is generated by it (BORELLI, 2017).

The chemical industry plays a fundamental role in the history of Brazilian industrialization, and specifically in São Paulo's industrialization. Many regions and municipalities showed economic growth due to the presence of this industrial sector. However, the literature reports a high number of chemical accidents, revealing the perverse side of this industrialization, with the generation of environmental impacts (SOUZA; OAK, 2014).

According to Veyret (2013), the chemical industry represents a dangerous activity to the environment in all its processes: the production, transport of hazardous materials and the storage of toxic products. Its risks can reach people, soil, flora, fauna and buildings. Such risks can occur by leakage, explosions, fires, burns, intoxications and various forms of pollution.

Despite the importance of the chemical sector for the national economy, there are still gaps that need to be filled regarding the involvement of companies in this segment with the Sustainability Tripod. In the Metropolitan Region of Campinas, there are no studies that reveal the level of involvement of companies in this sector with sustainability issues. A study conducted by Silva, Costa and Kniess (2022) points to the need for further studies in order to better understand sustainability in the context of companies in the Brazilian chemical sector, which is

consistent with the purpose of this research.

Given the context presented, the question arises: what is the level of involvement of the chemical industry of the Metropolitan Region of Campinas in the issues related to sustainability? Therefore, it aims to diagnose the degree of involvement of chemical companies in the Metropolitan Region of Campinas with the issue of sustainability.

It is worth mentioning that the city of Campinas was elected by the consultancy Urban Systems as the smartest and most connected in Brazil, with emphasis on the areas of economics, technology and innovation (PORTAL RMC, 2020).

The research is considered qualitative, since statistical techniques are not used to obtain answers to the question raised previously. It is classified as exploratory and descriptive, as it has the idea of seeking information and broadening the debate about a phenomenon still little studied, as well as explaining the issue being addressed.

2. Theoretical foundation

This topic presents aspects related to the Sustainability Tripod. Next, there is a rapid historical overview of the chemical industry in the state of São Paulo and in the Metropolitan Region of Campinas/SP.

2.1 The Sustainability Tripod (The Triple Bottom Line)

The concept of sustainability has origins in ecology that is associated with the capacity of replacement and regeneration of ecosystems but cannot be limited only to environmental conditions. Sustainability should be considered in three dimensions: social, environmental and economic. The expression is also known as "3Ps" – *People, Planet and Profit* – in reference to the results of a company measured in social, environmental and economic terms (SOUZA et al., 2018).

In this same idea, according to Silva, Santinelli and Silva (2014, p. 797):

A more sustainable performance in the business sector is presented and discussed around three fundamental pillars: social, environmental and economic. These pillars are known as the three dimensions or Triple Bottom Line of sustainability, which reflect the need for companies to consider their strategic decisions regarding economic sustainability, when managing profitable and value-generating companies; social sustainability, while stimulating education, culture, leisure and social justice to the community; and ecological sustainability, by maintaining living ecosystems, with diversity and life.

The scarcity of various natural elements and the excesses caused by large and medium-sized companies led the idea of sustainability to be redesigned generating the Triple Bottom Line that required more responsibility of all and urgent sustainable actions. This change forced companies to become more flexible and adapt to market changes (SANTOS; BAPTISTA, 2016).

Given this scenario, the concept of sustainability has been widely discussed in recent years, being increasingly present in business discourses (SILVA; SANTINELLI; SILVA, 2014). Also according to Souza et al. (2018), the sustainability discourse has been constantly employed by organizations, governments and non-governmental organizations around the world in order to present a way out of crises in modern society.

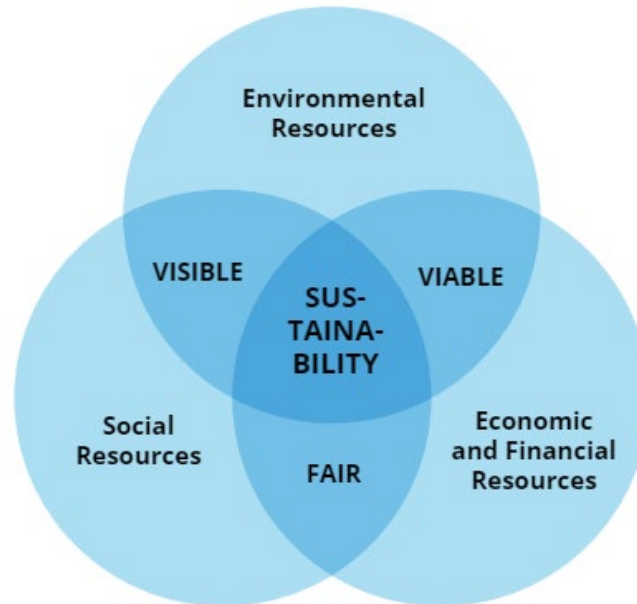
However, it is important to emphasize that the term sustainability has been increasingly used in companies, not only due to the awareness of society or prominence in the competitive market, but also because of the legal requirements that are taking on a large dimension (DE BENEDICTO et al., 2015).

For a company to be considered sustainable, it is necessary to have a

planning for reduction of inputs and not only concerns and actions with fauna and flora, which are called as social action and not ecological cost (SANTOS; BAPTISTA, 2016). For an organization to

be fully connected and aligned with its clients, it is necessary that its strategies address the economic, social and environmental areas as described in Figure 2 (PAZ; KIPPER, 2016).

Figure 2 – Sustainability in its environmental, social and economic-financial dimensions.



Source: Paz and Kipper (2016)

According to Jacobi (2007, p. 180), “The notion of sustainability implies a necessary interrelationship between social justice, quality of life, environmental balance and the need for development with support capacity”.

According to Gonçalves-Dias et al. (2007) the notion of sustainability is derived from the concept of sustainable development, the result of reflections and intense debates that have occurred since the 1960s. At that time there was already a very strong polarization between the different social segments interested in the environment, which persists today. On the one hand, the preservationists or conservationists wanted nature to remain untouched and on the other, developmentalists saw economic progress as the priority on the path towards development.

Sustainability can be defined as the quantitative and qualitative maintenance of the stock of environmental resources, using

resources without damaging their sources or limiting future supply capacity, so that both current and future needs can be equally met (AFONSO, 2006).

Thus, the term sustainability is entirely related to the concern of meet the present needs without harming future generations.

In this same line of thought, Araújo et al. (2012) state that it was from the concerns about the well-being of society, especially on issues related to the environment and the reduction of social and regional inequalities, as well as the constant concern of the company fulfilling its social function, which was first outlined at the United Nations Conference on the Human Environment held in Stockholm in 1972, the concept of sustainable development.

However, it was only in 1987, from the World Commission for Environment and Development, that the concept of sustainable development gained more

delineated contours. The Commission has produced a report, named the "Brundtland Report", which defined sustainable development as one that "meets the needs of the present without compromising the ability of future generations to meet their own needs".

Still according to Keinert (2007) recognizing that although the social dimension came into play in 1987 with the Brundtland Report (Our Common Future), it did not immediately conquer business brains, and it was only from the conception of the term "Triple Bottom Line" that this language was incorporated into the business world dealing with its accountability in financial terms, environmental and social issues.

The continuous degradation of the environment aroused the interest and awareness of society about the relevance of protecting the environment, making the population increasingly demanding from industries, proactive attitudes for the benefit of this cause.

In this sense, Gonçalves-Dias et al. (2007, p. 2) state that "as a result of the movement around sustainable development, companies, at least those with the greatest potential for environmental degradation, have become more concerned" and become more concerned" to raise awareness among some stakeholders. Given this scenario, "environmental legislation has grown in quantity, severity and complexity." At the same time "consumer groups have emerged more willing to consider environmental characteristics of products and services in their choices. "Many investors have also begun to worry about environmental liabilities, among other sociocultural phenomena linked to the environmental problem."

In addition to being used strategically demonstrating operational competence, this tool stimulates the creation of sustainable ideas, improvements in its operations and business growth generating competitive

advantage and awareness of society that results in high standards (SANTOS; BAPTISTA, 2016).

What began as an obligation to reduce the damage caused to the environment has become a model of business, personal and environmental growth even though there are still many obstacles to overcome (SANTOS; BAPTISTA, 2016).

Therefore, for a company to be considered sustainable, it is essential that the three pillars mentioned above are in balance and not just one or two. In the current context, it can no longer be conceived and accepted that an organization presents only financial results. It is expected that they also show attitudes that relate the social issue and the protection of the environment.

2.2 The chemical industry of São Paulo and the Metropolitan Region of Campinas

The Brazilian chemical industry had its development in the early twentieth century, tied to foreign investments, with capital coming mainly from Germany and the United States. In the 1940s, there were large investments in the chemical and petrochemical sectors in Brazil, but it was in the 1950s that the national chemical industry presented its highest growth due to the creation of *Petrobras* in 1953 (SOUZA; OAK, 2014).

In the late 1950s, during the government of Juscelino Kubitschek (1957-1960), the "Goals Plan" was implemented, with incentives directed mainly to the "chemical" and "automotive" sectors. These two industrial areas were simultaneously driven by the petrochemical industry in Brazil (SOUZA; OAK, 2014).

The installation of petrochemical centers in Brazil was a milestone for the national chemical industry. In the 1970s, 13 Petrochemical Poles had been installed in many Brazilian states, 4 of them in Rio Grande do Sul; 3 in São Paulo, 2 in Rio de

Janeiro; 1 in Bahia, 1 in Amazonas, 1 in Ceará and 1 in Minas Gerais (SOUZA; OAK, 2014).

Since the 1970s, there has been an increase in the participation of the São Paulo chemical industry, especially in the interior of the state. Since the beginning of the 20th century, the São Paulo chemical industry has concentrated in the Metropolitan Region of São Paulo, with São Paulo city being the largest representative of the chemical industry in the state (SOUZA; OAK, 2014).

In the following decades, the São Paulo chemical industry remained prominent, being, in 1985, responsible for one third of the national chemical production, and at the end of the 1990s, it was considered as the most important sector in the state's industrial production (SOUZA; OAK, 2014; SELINGARDI-SAMPAIO, 2009).

The chemical industry includes companies from various branches, such as pharmaceuticals, cosmetics, petrochemicals, cleaning products, among many others. Then, it can be verified that:

The chemical industry is a means to the different activities of the economy, supports agroindustry through fertilizers and agricultural pesticides. In extractive activity it is present in minerals, oil and steel itself. In the manufacturing industry, chemistry is the essence of petrochemicals, pharmaceuticals, cosmetics and cleaning products, besides contributing to construction materials and being the major supplier of the textile sector (ANTUNES, 2013, p. 1491).

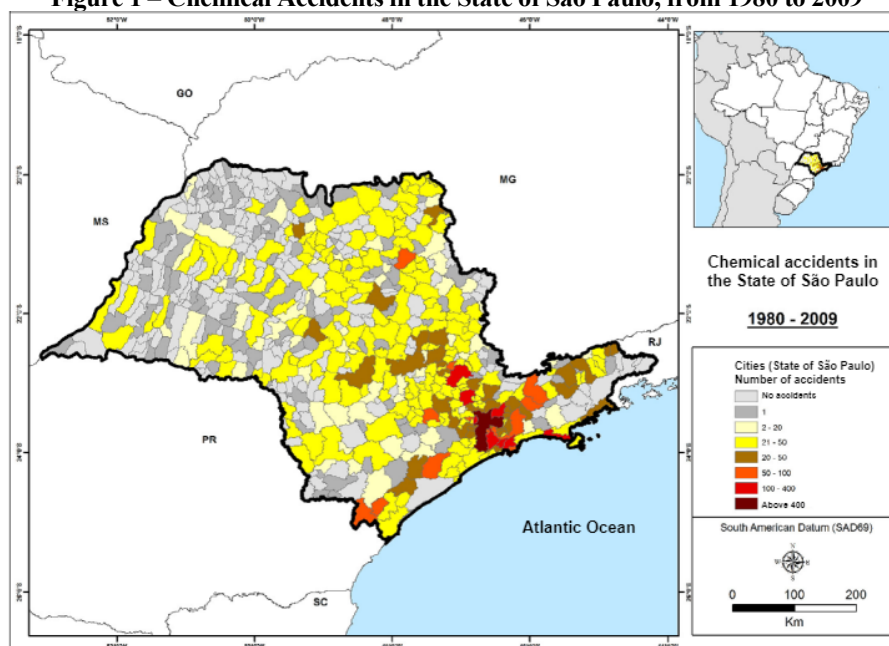
The chemical industry plays a fundamental role in the history of Brazilian industrialization, and specifically in the industrialization of São Paulo, many regions and municipalities showed economic growth due to the presence of this industrial branch (SOUZA; OAK, 2014).

The chemical industry is present in the social, environmental and economic vectors. The basis of the industrial vector is knowledge, since, in terms of indicators of sustainable development, it is a measure of capacity building, science & technology, information and cooperation present in a country (ANTUNES, 2013).

However, despite the contributions of the chemical industry to the social and economic development of the state of São Paulo, according to Souza (2013), in the period from 1980 to 2009, the SIEQ recorded 8,006 chemical accidents in the state of São Paulo.

Figure 1 shows that the occurrence of chemical accidents followed the geographic distribution of the chemical industry in the state of São Paulo (SOUZA, 2013). The state of São Paulo, from 1980 to 2009, presented the highest chemical industrial concentration in the Metropolitan Region of São Paulo and in the Administrative Regions of Campinas, São José dos Campos, Santos and Sorocaba, showing a relationship between the concentration of chemical industrial production and the occurrence of chemical accidents (SOUZA, 2013).

Figure 1 – Chemical Accidents in the State of São Paulo, from 1980 to 2009



Source: Souza (2013).

Chemical industrialization, in the Metropolitan Region of São Paulo and in the Administrative Regions of Campinas, São José dos Campos, Santos and Sorocaba, in addition to collaborating with the territorial development of these regions, also caused the municipalities located in these regions a series of chemical accidents, as perverse effects of this industrialization (SOUZA; OAK, 2014).

The Metropolitan Region of Campinas (MRC), created by State Complementary Law No. 870 of June 19, 2000, is one of the most dynamic metropolitan regions in the Brazilian economic scenario. Its Gross Domestic Product (GDP), in current values, was R\$ 142.3 billion in 2013, representing about 8.3% of São Paulo's GDP and 2.7% of national GDP (OM, 2018).

The MRC presents the most expressive industrial concentration of the interior of São Paulo, characterized by housing modern sectors and industrial plants articulated in large and complex production chains. Out of the total GDP of the MRC, 57.06% comes from the industry, especially the Petrochemical Pole of Paulínia and other large companies in the sector with plants in several cities of

the MRC. As an industrialized region, with a peculiar economic strength and presenting a trend of population expansion, environmental issues will certainly become important in the near future in the MRC (EMPLASA, 2018).

In the Metropolitan Region of São Paulo, 50% of the chemical accidents registered by the SIEQ occurred in the period from 1980 to 2009, being the first region of São Paulo in the number of chemical accidents. It is worth mentioning that this region has the highest state chemical production. The city of São Paulo presented 2,593 records of chemical accidents, corresponding to 32% of all accidents reported in the period (SOUZA, 2013).

The Administrative Region of Campinas is ranked as the 2nd region in number of chemical accidents in the state, with 12% of the total records during the period from 1980 to 2009. The city of Campinas was responsible for 154 chemical accidents during this period (SOUZA, 2013).

A chemical accident can contaminate water (rivers, ponds, groundwater) and soils, due to leakage of

chemical substances, causing irreparable damage to the environment; in addition to causing serious damage to human beings, including deaths (when fires, explosions and exposure to chemicals occur, for example) (SOUZA; OAK, 2014).

The *Companhia Ambiental do Estado de São Paulo* - CETESB operates in emergency situations caused by chemical accidents in the state of São Paulo. Through the Chemical Emergencies Information System (SIEQ), started in 1978, CETESB provides information about the services made from that year to the present day. The information on chemical accidents provided by the SIEQ refers to the causes (packaging drop, tipping, fire, among others); activities (transportation, industry, storage, among others); the product; the amount leaked; the affected areas; and the number of victims (SOUZA, 2013).

The chemical industry is committed to creating high standards of conduct and providing sustainability, driving Brazilian economic growth, creating new technologies, generating advanced solutions, increasing management, fiscal responsibility and productivity standards, and constantly promoting the qualification of chemical industry employees (PINTO et al., 2012).

3. Methodology

The methodology of the research was qualitative, descriptive and exploratory, as outlined by Collis and Hussey (2005). For Barr (2004) the qualitative method is appropriate when those who apply it deal with issues that require a deep understanding of the processes, involve poorly understood phenomena, or seek to understand unspecified variables, badly structured relationships, or variables that cannot or should not be studied through experimentation.

Perovano (2014) states that the descriptive process aims at identifying, recording and analyzing the characteristics,

factors or variables that relate to the phenomenon or process studied, allowing to establish relationships between the variables, for a subsequent determination of the resulting effects in a company, production system or product.

Exploratory research allows the researcher to increase the experience around a certain problem that has not yet been studied or known (TRIVIÑOS, 2010).

Gil (2019) points out that qualitative, descriptive and exploratory research is the most used in the field of social research that has relations with practice, which is consistent with the objectives of this research.

An exploratory study was carried out in five large companies operating in the chemical sector in the Metropolitan Region of Campinas. The sampling of this research is non-probabilistic and intentional, as instructed by Richardson (2017), considering the accessibility of the researcher to the data. Based on this criterion, the five largest companies that operate in the chemical sector and whose data are available to be accessed by the researcher were selected. Companies were identified based on the list of the largest companies in Brazil according to the ranking published by *Estadão Portal* (2019).

Regarding the dimension of time, the research is characterized as cross-sectional, considering that the study was conducted only once and reveals the situation of a given moment (COOPER; SCHINDLER, 2016). It portrays, therefore, the sustainability stage of the respective companies only in the year in which it was analyzed: 2019.

In this research, the techniques used for data collection are bibliographic and documentary research. For Gil (2019) bibliographic research and documentary research are important techniques in qualitative studies, either complementing information obtained by other techniques, or showing new aspects of a theme or problem. The author establishes a

difference between the two data collection techniques stating that bibliographic research uses sources consisting of material already finished, while documentary research uses primary sources, that is, data and information that have not yet been proven in a scientific or analytical manner.

In this study, data were collected in the sustainability reports of 3M, Ambev, Basf, Bayer and Braskem. Data already published in scientific articles, dissertations and theses on the subject were also analyzed. Therefore, the investigation did not involve research with human beings.

The analysis of the data of this research occurred through the technique called "content analysis", based on Bardin (2016). It is an analysis technique that has been frequently used in qualitative research, as it is relevant to organizational studies, and it is expanding in the field of administration in Brazil. Content analysis is a rich technique of data analysis, important and with great potential for theoretical development in the field of administration, especially in studies with a qualitative approach. However, researchers should work in a coherent, ethical, reflexive, flexible and critical way (MOZZATO; GRZYBOVSKI, 2011). The study followed the phases of content analysis, as recommended by Bardin (2016): (i) pre-analysis, (ii) exploitation of the material, and (iii) treatment of the results, which involves inference, interpretation and description of the relevant findings of the research.

4. Results

Through the data collected from the five companies chosen (3M, AMBEV, BASF, BAYER and BRASKEM), it was possible to see more specifically how each of them puts into practice sustainability within their work environment. The data were found in the most recent Sustainability Reports available on their respective websites. The following are the

highlights in the three dimensions of the *Triple Bottom Line*.

4.1 Company 3M - Sustainability Reports 2017 and 2018 (3M, 2019):

Environmental Dimension: The preservation of the environment is part of 3M's values and is present in all its actions, with the objective of raising awareness among employees, partners, customers and society. 3M is part of a series of programs/projects such as:

3M Reverse Oil & You: Starting in 2015, the initiative reverses the cooking oil used in the employees' home, which would be discarded. After collection, it is sold to an approved supplier, who reuses the material in the manufacture of glass. All the money collected is intended for the acquisition of cleaning and hygiene products, such as gallons of detergent, softener, alcohol and soap, which are given to partner entities of the 3M Institute. In 2016, 10,000 kg of oil were collected (one liter of oil is the equivalent of approximately 900 grams) and six institutions benefited, chosen by vote among the employees.

National Sponge Recycling Program: Brazil is the first and only country in the world to recycle household sponges, an action that is the result of the National Sponge Recycling Program of the Scotch-Brite brand, created in 2014, in a partnership between 3M and TerraCycle. In two years, more than 500,000 sponges (the equivalent of 4.3 tons) have been collected, mobilizing 350,000 people and 2,800 collection points nationwide. By offering an environmentally correct solution to used sponges of any brand, it transforms waste into raw material, used to manufacture new products, such as buckets, vases, trash cans and garbage shovels, among others.

Energy Efficiency Project: 3M aims to improve its energy efficiency by 3% per year, which will cause, by 2025, a 15%

reduction in consumption. Over the last three years, the Energy Efficiency Project aimed at balancing greenhouses, under the coordination of the Energy Efficiency Committee and the Energy Champion, has been in operation. Constant management allows them to map energy usage and possible improvements.

Ecoteca: The Ecoteca project, a partnership of the 3M Institute and the Educare Network, has been building ecological libraries within municipal schools in Manaus and São Paulo. The mobile spaces are made of galvanized steel and recycled material and house a collection of 500 books of international and national literature. In addition to stimulating a taste for reading, the initiative, which is supported by the Brazilian Rouanet Incentive Law, plays an important role in the education of hundreds of citizens, raising awareness among children and adolescents about sustainability. This happens in a fun and playful way, such as with the aid of a bicycle that, when pedaled, generates energy for internal lighting. Solar energy plates for the external area and internal coating made with boxes cartons of food and beverages and integrate the spaces. In addition to the programs/projects mentioned above, which 3M participates in, there are others, such as: "Give your hand to the future", "Aterro Zero" and the "3P Program".

Social Dimension: In order to structure social actions and initiatives and the volunteering of 3M, the 3M Institute for Social Innovation was born in 2006. The 3M Institute operates based on four pillars: Education, Science and Technology, Social Technology and Social Development. The Institute has 465 registered volunteers; 10 projects in progress; 8,000 beneficiaries in the last three years; 1,210 Christmas baskets for 17 institutions; 300 experiments enrolled in the IV Science and Technology Exhibition; 120 participants in

World Volunteer Day 3M; 50 volunteers and 400 children attended at *Mão na Massa*; 77 graduates from Formare School; 104 students guided by Sou Protagonista.

Economic Dimension: In 2016, Manufacturing & Supply presented the following data: 36 disruptive technology projects; 1.4% reduction in the cost of bad quality; 4.76% less energy per production unit; US\$30 million invested in the second phase of expansion in Manaus (AM); \$1.2 million less material losses; 3.2% less volatile organic compound emission.

4.2 AMBEV Company - Sustainability Reports 2017 and 2018 (AMBEV, 2019):

Environmental Dimension: In the last 16 years, the Company has reduced by 46% the average volume of water required for the production of beverages. The Cities for Water Coalition is a collective action initiative led by *The Nature Conservancy* (TNC), in partnership with Ambev Brewery, other actors in the public and private sectors and civil society. Its focus is to increase water security with nature-based solutions, such as conservation or forest restoration, which have a positive impact on the quality and quantity of water. In 2018, the Coalition developed other important fundraising work, training of rural producers for the preservation of environmental areas and studies for the implementation of new initiatives in the cities of Belo Horizonte, Curitiba and Espírito Santo. By the end of the year, 33,000 hectares had been conserved and restored from six metropolitan regions of Brazil, which corresponds to more than 100 municipalities. More than 2,600 families were benefited. The Basins Project was created in 2010, in Gama (Federal District), in partnership with the non-governmental organization WWF. Subsequently, it was expanded to other municipalities with the support of the TNC and aims to recover the soil and riparian forest in Permanent Protection Areas (PPAs) on the banks of rivers and other

bodies of water. Among the initiatives of this project are partnerships with farmers who live around important sources or springs. This is what happened, in 2018, in the work carried out on the Jaguari River, in Jaguariúna (SP), which established the milestone of 1,600 hectares benefiting from water conservation practices in joint action with the PCJ Basin Agency, Embrapa, ANA (National Water Agency) and the Jaguariúna City Hall (SP). In 2018, investments in projects based on AMA mineral water, the first social business of a large company in Brazil, launched in 2017 with the aim of impacting positively and lastingly on the lives of people living the harsh reality of water scarcity were expanded. Through the Saveh Platform (Water Efficiency Self-Assessment System), they share their expertise in reducing water consumption with other companies that use the resource in their production process. In 2018, they consumed about 7.84 billion megajoules (MJ) of non-renewable energy. This means that consumption has been reduced by more than 300 million MJ compared to 2017. Direct and indirect CO² emissions were reduced by 13.65%. Also in 2018, it was possible to reduce the average waste generated per hectoliter (hl) produced. In 2017, they had a waste generation index of 15.13 kg/hl. In 2018, this index was 14.70 kg/hl. They achieved 33% of their PET production from recycled materials (this number has grown 725% in the last 6 years). The Recycle Through Brazil platform is the result of a partnership between Ambev and Coca-Cola of Brazil. Created in 2017, it aims to invest in the development of waste pickers' cooperatives in Brazil. In 2018, the average income of waste pickers grew 25% in 11 months.

Social Dimension: Launched in 2017, AMA water reverses 100% of the profit obtained from its sale to projects that bring drinking water to needy regions. The entire process is verified by the KPMG audit. The revenue reached R\$ 2.9 million and

more than 26,000 people benefited in 2018.

Economic Dimension: 2018 closed with a growth of 9.4% in EBITDA – *Earnings Before Interest, Taxes, Depreciation and Amortization*, totaling R\$ 21.099 billion, and 6.9% in net revenue, totaling R\$ 50.23 billion.

4.3 BASF Company - Sustainability Reports 2017 and 2018 (BASF, 2019):

Environmental Dimension: BASF, in 2017, received 25 recognitions throughout South America for its performance in innovation and sustainability, granted by customers, the press and different institutions. Among them are the Sustainability Exam Guide, Epoch – Green Company and Innovation Value (BASF Annual Report, 2018, p.46). About 60% of its investments in research and development are destined to the development of more sustainable products and improvement of its production processes. Even with the increase in production volume, there was an increase in energy efficiency by 2.6%, compared to 2016, a result supported by initiatives of Triple E (Excellence in Energy Efficiency), which aims to increase the organization's competitiveness through greater energy efficiency, promote the sustainable improvement of energy costs and reduce environmental impacts.

Social Dimension: BASF's social projects focus on scientific and environmental education, employability and protection of natural resources and biodiversity. They act in the communities where we are inserted. In 2017 BASF selected 12 projects that were carried out in Argentina, Brazil and Chile. In 2018 there were 11 projects. Also in 2017, BASF restructured the way diversity and inclusion worked, proposing actions and changes in the way of recruiting and preparing the company to create a more inclusive environment. One of the initiatives adopted is groups of

employee affinities, which work for inclusion at all levels of the organization.

Economic Dimension: In 2017, BASF Group sales were 64.475 million euros. In the same year, the value of BASF's shares rose 3.9%, trading at 91.74 euros at the end of the year (BASF Annual Report, 2018, p.18).

4.4 Bayer Company - Sustainability Reports 2017 and 2018 (BAYER, 2019):

Environmental Dimension: Bayer has more than 60 initiatives in Brazil that are part of the *Food Chain and Sustainability Program* of the *Crop Science division*. They are projects for sustainable agriculture linked to strategic crops such as soybeans, corn, coffee, fruits and vegetables and sugarcane. Bayer maintains a series of partnerships with members of the value chain, bringing together producers, traders and retailers, stimulating stronger ties and promoting sustainable agriculture in more than 30 countries. With this, the company has helped to improve the quality of the harvest and increase productivity, benefiting partners and the environment. In 2017, Bayer launched another innovative initiative, *Made in Farm*, a digital platform that connects the coffee grower and the buyer, generating new business opportunities and enabling direct commercialization between them through a safe and transparent environment. Bayer promotes internal environmental education actions to sensitize employees about their responsibility in the conscious use of natural resources. For example: Environmental Week, Bayer *Reuse*, Environmental Facilitators and *Green Office Program*. On the issue of natural resource management, a set of measures ensures the correct treatment of waste generated at Bayer. The actions range from generation, collection, transportation, treatment to the disposal or final disposal of waste and tailings, ensuring the correct disposal under the premise of sustainable

and responsible development. In addition to everything that has been described, Bayer also maintains urban mobility programs that, among other benefits, contribute to reducing greenhouse gas emissions, such as ride-hailing and electronic meetings.

Social Dimension: Bayer has been committed to improving social conditions in all countries in which it is present. Thus, the company contributes to a more conscious society on health care. Among the various health-related issues that Bayer believes, follow and support, are, for example, the implementation of Bayer Man's Week and Bayer Women's Week. To reinforce this mission, the company promotes programs and maintains partnerships to support patients, such as: Support to the Patients Association *Retina Brazil*, Screening Project, Patient Program Time to Live, among others. Aligned with Bayer's philosophy of fostering and encouraging science, innovation and education, Bayer Brazil has been a sponsor of the *Museu Catavento Cultural e Educacional* since 2013. To celebrate World Food Day, Bayer took a mini farm of oranges into the city of São Paulo. Bayer's Volunteer Group, created in 2013, promotes a series of actions with partner institutions, collecting donations, providing assistance, support and fun activities to children and the elderly in São Paulo. The Stronger Than Zika project is a partnership between the Positive Fund and Bayer, which disseminates knowledge about the importance of using contraceptive methods to combat Zika virus infection.

Economic Dimension: In fiscal 2014, Bayer recorded sales of 42.2 billion euros. Capital expenditures totaled 2.5 billion euros, and investments in R&D totaled 3.6 billion euros.

4.5 Braskem Company - Sustainability Reports 2017 and 2018 (BRASKEM, 2019):

Environmental Dimension: Braskem is part of CDP water's "A List", which recognizes the best publicly traded companies in the world in relation to the management of the use of natural water resources, being the only Brazilian and Latin American company to obtain the highest score in this ranking. The company participates in the 13th portfolio of B3's Corporate Sustainability Index (ISE), which recognizes Brazil's publicly traded companies in sustainable development management and brings together those with the best rates of economic efficiency, environmental balance, social justice and corporate governance. Braskem has several projects and targets linked to the reduction of water consumption and constantly carries out evaluations to avoid any impact of a possible shortage. Among the main initiatives are the processes of improvements for the reuse of water from the production units, a percentage that has been growing in the last three years. In 2017, 25.8% of the total water consumed in the operations came from reuse processes, 15.4% of which were results of process improvement (effort) and 10.4% inherent to the original operation of the plant (born with the plant project). The eco-efficiency in the generation of liquid effluents (1.06 m³/t) improved by 4.2% compared to 2016 and was 7.9% better than the 2017 target for improving the Company's water efficiency. Braskem's energy consumption (10.56 GJ/t) in 2017 increased by 3.0% compared to 2016, but still 2.4% better than the 2017 target. This increase in the indicator is due to the entry of Braskem Idesa (Mexico) in the accounting of eco-indicators, and the new plant has an energy consumption intensity higher than the Braskem average. In 2017,

the generation of solid, liquid and pasty waste (2.13 kg/t) had a reduction of 1.4% compared to 2016, being 4.5% better than the 2017 target, thanks to plant initiatives in the discovery of new ways of reusing waste and changes in treatment, in addition to improvements in cleaning and maintenance processes.

Social Dimension: Braskem, in 2017, continued to evolve with diversity practices with the formation of three working groups focused on each of the fronts on which they operate: Gender, LGBTQIA (Lesbian, Gay, Bisexual, Transgender, Queer, Intersex and Asexual), Race and Ethnicity. Also, the first matrix of risks of violation of human rights was defined, thus facilitating the immediate inclusion of the theme in the corporate risk matrix accompanied by executives and the Board of Directors. Among the themes worked on this year, his work with the logistics, ethanol and recycling chains in favor of the protection and promotion of human rights stands out, in addition to compliance and business ethics in their relationships.

Economic Dimension: BRASKEM ended 2017 with an EBITDA (Earnings Before Interest, Taxes, Depreciation and Amortization) record both in Reais and dollars: 12.334 billion reais and 3.872 million dollars, representing, respectively, an increase of 7% and 17% compared to the previous year. Consolidated net revenue was R\$ 49.3 billion, up 3% from 2016. Out of this total, the operations generated by the international units and exports of Brazil corresponded to 47% of revenue.

Table 1 lists each of the companies above with the dimensions of sustainability, highlighting the actions found in each company.

Table 1 - Performance of the five companies surveyed in the dimensions of the "Sustainability Tripod"

	Environmental	Social	Economic
3M	Its Corporate Environment Policy was issued in 1975, when it began to be practiced in all the company's plants in the world. Current projects and programs: "3M Reverse Oil & You", "National Sponge Recycling Program" and "Energy Efficiency Project".	3M Institute is supported by four pillars: Education, Science and Technology, Social Technology and Social Development. It operates in social and educational projects, impacting children in the communities surrounding the company's units in Brazil.	In 2016, Manufacturing & Supply: US\$30 million invested in the second phase of expansion in Manaus and \$1.2 million less from material losses. About the details of the Height Work Training Center: \$200,000 total investment.
AMBEV	Improvement in issues of gas emissions, water use, energy consumption and waste generated. Projects and partnerships with institutions such as WWF, TNC and public agencies such as PCJ Basin Agency, Embrapa, ANA (National Water Agency) and Jaguariúna City Hall (SP).	26,000 people benefited from projects made possible by AMA mineral water. The revenue reached R\$ 2.9 million and more than 26,000 people benefited in 2018.	In 2018, net revenue grew 6.9% in the year, totaling R\$ 50 billion. EBITDA (Earnings before interest, taxes, depreciation and amortization) grew 9.4%, totaling R\$ 21 billion.
BASFF	Recognition in Innovation and Sustainability by the Exame Sustainability Guide, Epoch - Green Company and Innovation Value. Investments in research and development of sustainable products. Optimization of production processes. Increased energy efficiency compared to 2016.	In 2017, 12 projects carried out in Argentina, Brazil and Chile in the areas: Scientific and environmental education, employability and protection of natural resources and biodiversity. In 2018, the program received the registration of 116 projects. Focus on diversity (different genders, sexual orientation, ethnic groups and ages).	2017: Sales resulted in 64.475 million euros. Stock value was 91.74 euros, an increase of 3.9%.
BAYER	Support for sustainable agriculture. In 2017: Launched Made in Farm. Internal environmental education actions. Measures to ensure the correct treatment of waste generated. Urban mobility programs.	Support and it is part of various projects for society's benefits. Sponsor of the <i>Museu Catavento Cultural e Educacional</i> .	In 2014, sales resulted in 42.2 billion euros. Capital expenditures totaled 2.5 billion euros. Investments in Research & Development around 3.6 billion euros.
BRASKEM	A List-CDP Water. 13th ISE portfolio - B3. Projects and goals linked to the reduction of water consumption. Eco-efficiency in the generation of liquid effluents. An increase of 3.0% in energy consumption in 2017 compared to the previous year. Reduction in the generation of solid, liquid and pasty waste in 2017.	Diversity practices (focused on gender issues, sexual orientation and ethnic groups). First matrix of risks of human rights violations.	EBITDA (Earnings before interest, taxes, depreciation and amortization) record compared to 2016. Net revenue of R\$ 49.3 billion, a 3% increase compared to the previous year.

Source: Elaborated by the authors, based on the research data.

Looking holistically, all the companies surveyed contribute to the issue of sustainability in its three dimensions: environmental, social and economic. This shows that there is no preference only by the environmental pillar, since

sustainability seem to be erroneously reduced only to this area of activity.

5. Final considerations

The present work sought to highlight how some companies in the chemical sector of the Metropolitan Region of Campinas exercise sustainability. Through the Sustainability Reports of each of the organizations surveyed, it was possible to understand how they work this issue in the light of the three dimensions that make up the "Tripod of Sustainability": environmental, social and economic.

It was found that the companies analyzed are committed to robust sustainability standards, as they support and promote projects for the environment and society, besides worrying about topics such as eco-efficiency and waste management, for example.

The present study demonstrates that the organizations studied put into practice the "Tripod of Sustainability". From the above, it is notorious that their concerns go beyond the economic dimension, because the practices found in the reports prove that there is an advanced understanding about issues of a social and environmental nature. Thus, we tried to fill a gap in the literature, presenting information and discussions related to the Metropolitan Region of Campinas in São Paulo.

In addition, it is worth mentioning that the actions based on these dimensions of sustainability directly interfere in the valuation – or devaluation – of their images before the market and its consumers, that are increasingly more demanding regarding corporations' socio-environmental responsibility. This can become a stimulus for companies to progressively act in this direction, ensuring the health of their business while generating a positive impact for the planet and for people.

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ⁱ Mestranda em Sustentabilidade na PUC-Campinas. Bolsista da CAPES. Foi bolsista de Iniciação Científica com bolsa do CNPq.

ⁱⁱ Doutorado em Administração pela Universidade Federal de Lavras, Brasil(2011) Professor Titular - Categoria A3 da Pontifícia Universidade Católica de Campinas , BrasilDocente da Pontifícia Universidade Católica de Campinas (PUC-Campinas), Centro de Economia e Administração, Programa de Pós-Graduação Stricto Sensu em Sustentabilidade.

ⁱⁱⁱ Doutorando em pela Universidade Estadual de Campinas (UNICAMP). Mestre em Sustentabilidade pela Pontifícia Universidade Católica de Campinas. Foi bolsista CAPES.

^{iv} Pós-doutor em Sustentabilidade pela Pontifícia Universidade Católica de Campinas (PUC-Campinas), Doutor em Administração pela PUC-SP. Docente da faculdade de Administração da Unifesspa – Universidade Federal do Sul e Sudeste do Pará.