

# A CASE STUDY ABOUT CIRCULAR ECONOMY AND SUSTAINABILITY IN A SMALL BUSINESS

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Sustainability is a term that has gained considerable notoriety in the last few years, being applied in many different ways, within a vast variety of fields. It is not rare to see ministers of finance talking about economic sustainability, or soccer teams affirming the need for sustainability in their efforts to expand their fanbases.

The truth is that the word possesses, one might say, an open enough meaning that it may be used in a number of different contexts. However, its fame and, therefore, the reason for its usage by the aforementioned parties derives from its origin, associated with ecology, with the environment and with industrial environmental management.

But what is the real origin of this term? How does it overlap with the previous concept of sustainable development? And, most of all, is it possible to apply this concept to the reality of the industry? Currently, it is possible to find well-structured actions towards corporate sustainability, but they are usually associated with big, multinational companies, which have a much wider array of resources. In this case, the question that remains is whether or not sustainability can also be integrated and incorporated by medium-sized and small companies.

Before presenting this case study, one must first go back a few years into the past in order to understand the creation of the concept of sustainability and its origins and principles, so that it is possible to understand the potentiality of its application.

## THE EVOLUTION OF THE CONCEPT OF SUSTAINABILITY

The inception of the concept of sustainability dates back to the end of the 18<sup>th</sup> century, when, in 1798, Thomas Malthus, a British economist, statistician, pastor and demographer, published the series of ideas later termed the Malthusian theory of population.

The Anglican scholar, after observing population growth between the years of 1650 and 1850, highlighted that the improvements in quality of life enabled by increased food production, basic sanitation and indoor plumbing, medical advancements towards combating illnesses, among other urban improvements from that period, caused the correlation to the means of subsistence to become unbalanced.

According to Malthus (1809), population grows in geometrical progression while the means of subsistence grow in arithmetic progression. Therefore, the author concludes that unless methods of limiting population growth were implemented, society would be on its way to collapse. This construct, which would later be named Malthusian theory of population, was indeed supported by World Commission on Environment and Development (WCED, 1987) through his affirmation that the planet could not bear economic development as it occurred then.

However, after countless international conferences and in the attempt to strike a balance between development at all costs and zero development, the first interferences based on the modern concept of sustainability emerged, which were later compiled and synthesized by Elkington (1994).

**Figure 1 – Sustainability tripod**



Source: Adapted from Elkington (1994).

In this context, it is important to highlight the actions taken by the United Nations and, most of all, by the World Commission on Environment and Development, which published, in 1987, a series of measures, guidelines and proposals, preceding the agenda 21. This document, titled the Brundtland Report or *Our Common Future*, was one of the first to rework the thesis of zero development into what we now call sustainable development.

It is possible to see considerable evolution from the scenario faced by WCED (1987) on the sustainability approach. According to Elkington (1994), sustainability must be seen three-dimensionally, which is to say that a developmental model or activity must not be measured by itself, but through the means of its execution. Nevertheless, one of the biggest challenges of sustainability as a managerial model was in its measurement or, in other words, it was not then employed as an indicator, but only as a support for legal requirements within organizations.

According to Callado (2010), sustainability is still seen, by some, as an ecological concept, far-removed from the reality of organizations, which only adhere to it with the aim of attending to the principles of social, legal and governance responsibility. However, the author states that the concept related to sustainability may also be understood as a new possible managerial and commercial approach, given that it promotes social responsibility and efficient consumption of natural

resources, preserving the planet's integrity and, still, maintaining the economic and financial rentability of the enterprise.

Seeking to better understand the correlation between environment and economic development, as promoted by sustainability, Alberton and Costa Junior (2007) evaluated the existence of a bond between financial performance and the ISO 14001 certification, which is considered one of the expressions of business sustainability.

For Alberton and Costa Junior (2007), the relation does not present itself as easily measurable, nor can it be simply associated with financial performance, as it is closer to providing productive and operational gains. Even so, the authors identified that the companies evaluated during the study showed gains in their financial indicators after the environmental certification.

The studies conducted by Callado (2010) include an attempt to develop indicators which could precisely measure the dimensions of sustainability. For the author, indicators can be considered essential tools in the monitoring of variables of interest to the company, as well as allowing for action planning and performance improvement.

Regarding the sustainability indicators, Veleva et al. (2003) highlight that the architecture is simple, given that they seek only to identify, objectively, the position of the organization in relation to the three-dimensionality of sustainability.

Complementing the aforesaid points, Lamborghini and Sukoharsono (2012) offer an understanding that sustainability indicators are the means through which the organization contributes or intends to contribute to the improvement of its own dimensions, economic, environmental and social, within the scope of three levels, local, regional and global.

Despite the importance of using these indicators, Callado (2010) highlights that most organizations apply them only quantitatively, thus reducing their analytical and descriptive potential. He, therefore, calls for the application of qualitative indicators as well, which offer a more holistic view into the process as a whole and into its causes and effects.

A series of studies were conducted on the formulation of sustainability indicators, later synthesized by Callado (2010), facing its perspectives and models of measurement. Callado himself conducts an extensive overview, ranging from the beginnings of sustainability to current days, in order to compile and assemble his line of indicators.

In this sense, it concludes that the evolution underwent by the concept of sustainability is associated to the growing perception of a need to establish limits, which were initially conceived for a macroeconomic context. From Malthus (1809) to Stockholm in 1972, the core of this issue was focused in nation level, not going down to corporate level.

It is impossible to dissociate the economic development of nations from corporate economic activity, given that the first is regarded as a composite; a sum of the units referred to in the latter. Even so, the field of debate unfolded generically, seeking solutions in terms of public policy and not specifically in the business environment. However, the approach proposed by Elkington (1994) results from a construct which has revealed itself as one of the pillars of modern sustainability theory. Known through its tagline, “acting locally, thinking globally”, it demonstrates that macroeconomic governmental policies cannot be misaligned or unsynchronized with the business environment, since one results from the other. It is in face of this construct that the Elkington (1994) approach brings the sustainability level of action down, from that of the nations to that of business, showcasing, thus, the need for sustainability concepts and guidelines to be followed within the corporate arena. That way, the advancement of sustainability gained a new steam, becoming an issue of wide discussion by major administrative theorists, such as Kotler, Porter and others, who identified, in sustainability practices, a new administrative paradigm. Consequently, sustainability began to occupy significant space in the financial market, which started to see it as an instrument of distinction, creating rules, procedures, limits and specific check-lists, bringing the sustainability approach closer to corporate governance and other management practices and creating, as a by-product, what is now known as corporate sustainability.

## **TRENDS AND MOVEMENTS TO CONTEST THE TRADITIONAL CAPITALIST MODEL**

In the heels of the movements of contest to the traditional capitalist model, there have emerged several trends which have sought to balance the outputs of the conventional industrial process, such as the field of green chemistry, which seeks to reduce the complexity of chemical compounds, easing its degradation process. Cleaner production might have been a pioneer in gaining reach within the industry.

The notion of cleaner production and its central concept, based on industrial emissions, used to be referred to as end-of-pipe technique. This characterization was used to illustrate the by-products of the production process for which the industry could no longer find use or which it did not have the capacity to process.

Cleaner production was largely responsible for introducing the industry to the concept of emissions and for showing that such phenomena are, in fact, a mere portrait of its incompetence in guaranteeing the complete processing or utilization of resources. Cleaner production projects are nothing more than a way of reducing this imbalance, thus increasing the environmental efficiency of productive processes. Perhaps, what the concept lacked was expansion and integration with the other corporate processes, which could have led it to gain the coverage and seduction seen in the modern concepts of social responsibility and sustainability, which eventually supplanted cleaner production.

It is important to highlight that, among these concepts, the idea of circular economy is one of the large contestation movements, which has gained prominence due to the significant and relevant support of the Ellen MacArthur Foundation. It is fundamental to emphasize that while circular economy cannot be considered a new movement, its approach harkens back to the necessity of rethinking the linear format of the traditional economy of industrial processes. Basically, it predicates itself on an economic format capable of, indeed, interconnecting the ends-of-pipes, understanding that complete efficiency in any industrial process may be utopic, but its usage by another process does represent a unique possibility for reducing the exploration of resources and a better utilization of the outputs, of the residues, thus reducing the environmental impacts of the industry and of humanity as a whole.

Circular economy and sustainability are not competing trends, but rather complementary to one another, especially under the light of shared concepts of value, based on purpose. Still, it is important to highlight that significant cases associated both to sustainability and to circular economy are always connected to large enterprises, or orbiting around large industrial complexes. In this sense, the case-study presented below has enormous value because it deals with a simple, yet very significant model, presenting an example of the application of the concepts of sustainability and circular economy to a medium-sized company in Brazil's countryside.

## THE SAMAMBAIA SERRARIA DE GRANITOS EXPERIENCE

The Samambaia Serraria de Granitos, a medium-sized granite mill, was founded in 1982 by Teodoro Samambaia, known in the region as Mr. Samambaia, a pioneer in the granite extraction and beneficiation field in the state of Minas Gerais and by his daughter, Norma Pereira.

The company, which used to act in the field of mining, is now geared towards granite beneficiation with the commercialization of polished granite slabs. Through the business to business (B2B) sales system, that is, by selling to marble factories and construction companies, it has been recognized in the market due to its products high quality and its operational delivery capacity.

Currently, the company's management is under the responsibility of Marcio Pereira, who has become an important partner and trusted advisor to Teodoro, who recognized potential in the young man, dating back to the company's mining days.

## A PRODUCTIVE PROCESS WITH HIGH WATER CONSUMPTION

The granite beneficiation process is marked by its massive water consumption during both the cutting stages and the polishing stages. The granite is cut through multiwire looms, which gets this name from the set of diamond-coated wires that cut the slabs by moving up and down the block until the slab is formed.

For the cut to be made, in addition to the diamond-coated wire, a significant quantity of water is needed to guarantee that the cut is highly efficient and that the thread sustains as little damage as possible. In the past, simpler threads were used and the cut of a granite block took around seven days to finish, with work spanning three production shifts. Currently, with the multiwire looms, the process takes only seven hours. In some cases, depending on the material's hardness, it may take less than it.

After the cut, the metal plates must go through a polishing stage, in which the material receives superficial treatment in automatic polishing machines and it is sawn with the aid of circular saws. The final product, cut slabs of granite, is used by the civil engineering sector, mainly in floors and building façades.

As a result, it must be noted that the productive process, besides its considerable water consumption in both stages, also generates two major kinds of industrial solid waste. The first, with a high content of water in its composition, is referred to as 'mill mud', and it is composed of granite dust, some wire residue

and, in some cases, a mixture of quicklime or another similar product which aids the cutting process. The second kind of residue is the result of the polishing stage, in which the slabs are cut, thus generating a material called *casqueiro*, comprised of small pieces of granite slabs that cannot be sold as full slabs.

Samambaia, in its constant search of managerial improvement, identified that the processes high-water consumption represented a considerable fragility, given that the 120 m<sup>3</sup>/day were a significant enough quantity that they could pose a high risk to the business continuity.

Such a way of thinking makes enormous sense nowadays, since this region has already endured an ill-fated crisis in water supplies. Samambaia Serraria de Granitos already held this concern in the beginning of the 2000s, almost 16 years ago. The company, through the principle of circular economy, sought to close the water consumption loop, reusing the water of the industrial process as much as possible.

The company's biggest challenge, however, consisted of the solids from the mill mud, as well as the quality of the water that would be reused, especially for the polishing process.

To reuse the water, it was necessary to separate it from the residues that compose the mill mud. Faced with this obstacle, the company chose to install a filter press, followed by an effluent treatment system. The effluent treatment system (ETS) implemented by the company is comprised of a fast-mixing zone, where the coagulant is added, and of a decantation tank, where the separation of solids and liquids occurs. The decanted mud is pumped to a lung tank, which temporarily stores it, and later pumps it into the filter press. The filter press extracts the highest possible fraction of liquid from the material and produces, at the end of this process, a mud containing approximately 85% humidity. The treated effluent returns, then, to the production process, alleviating pressure on the company's water consumption levels.

By the end of the process, Samambaia managed to reduce its water consumption by almost 80%, taking into consideration that, now, water is only used in order to make up for losses due to evaporation. Moreover, the volume of the residues generated was reduced by about 50% after the extraction of the water therein contained.

Such achievements would be sufficiently impressive, given that they allowed the company to see a significant productivity increase, as well as a significant reduction of its environmental impacts. Nevertheless, the path of environmental management is one way, as claimed by the entrepreneur himself. As soon as the



company finished the installation of its water reuse system, another aspect began to draw attention. What to do with the mill mud after pressing? Yes, the volume had been significantly reduced, but it was still there.

In this search, several solutions were evaluated and tested, such as passing it on to a business that performed mud extraction and which, therefore, could use the product for pit recompositing, further increasing the circularity of the production process. Through lab analysis, the residue was found to be neither dangerous nor inert, and therefore, it could be used as pit covering. However, after a few attempts, Samambaia realized that the selected partner did not share the same sustainability and management values, leading the company back to the drawing board in search of a new solution.

It was then that an idea emerged of manufacturing blocks for civil engineering and construction, a product also known as the ecological brick. For this end, the company acquired the Eco Premium 2600 machine, whose production capacity stands at 6,000 brick units every eight hours of uninterrupted work. The raw materials used to manufacture the bricks are: mud, sand, cement and water, in the proportion of four portions of mud, two of sand and one of cement.

After drying, the mud is sent into a grinding and sifting process. Afterwards, the material is mixed with sand and cement, and sent to be pressed in the Eco Premium 2600 equipment. Finally, the bricks dry in the open air for three days and then are sent for painting.

It is important to highlight that, for the implementation to work, it was essential that the process was economically viable, this being, indeed, one of pillars of sustainability. The costs of implementation, from equipment purchases to environmental regularization of the activity, was around R\$ 75,000. There were no costs related to the acquisition or renting of a space for the activity, since it was conducted in an already existing space in the company. The manufacturing of bricks from the mud generated during the ETS prevented 966 tons of mud/year from being forwarded to the industrial landfill, generating significant savings.

Considering only the shipping fees incurred in transporting the material to an industrial landfill, or, in other words, not counting the costs of destination charged by the landfills, the payback period for this investment would be 12 months. Still, the market for the bricks was not that incipient, which represented a meaningful potential revenue stream for the business.

The average price for manufacturing each brick is R\$ 0.40 and each brick is sold for R\$ 0.52. The initial idea was to produce between 6 and 8 thousand bricks a day, depending on the demand for the product and, most of all, on the

generation of mud, connected to the company's productive activity. Thus, the projected revenue for the manufacturing of the bricks was, in a best-case scenario, R\$ 4,160.00/day.

The company's initiative was not only successful, it was also evaluated and considered by the Federação das Indústrias de Minas Gerais (FIEMG), in partnership with Fundação Estadual do Meio Ambiente (FEAM) the state foundation for the environment, in 2016, as a good environmental practice, recognized at the state's Banco de Boas Práticas Ambientais.

## THE EXPERIENCE AND ITS APPLICABILITY

The Samambaia experience is interesting because it illustrates that sustainability and circular economy as corporate practices are not restricted to companies listed at the stock markets. The movements of contestation to traditional economy and to the linear capitalist system must mirror themselves on and understand their applicability to small and medium-sized business owners, given that they not only represent nearly 90% of Brazilian businesses, but they also present themselves as proof of concept for the simplicity of the concepts themselves.

Translating the essence and the concept of these trends is crucial, not only to the companies, as John Elkington did with such success, but also to society as a whole, reflected on consumption patterns and certifications. It is also crucial that people are capable of translating complex contestation theories to small and medium entrepreneur, who are now considered some of the biggest engines to the current economy.

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