



THE RELATIONS BETWEEN SUSTAINABILITY AND QUALITY IN AN ORGANIZATIONAL CONTEXT

As relações entre sustentabilidade e qualidade em um contexto organizacional

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ABSTRACT

Organizations aim at productivity equal to or greater than their competitors in order to ensure long-term survival. Therefore, the performance of the Quality and Sustainability departments is relevant to organizational strategies by creating sustainable competitive advantages. In this context, this study aims to analyze the relationship of the three dimensions of sustainability with the occurrence of nonconformities. The process of argumentative construction presented here begins with the theoretical articulation. The results point to the theoretical approximation of sustainability and quality management dimensions through the assessment of non-conformities. As a contribution, the article proposes sustainability parameters as a criterion for the implementation of corrective actions for quality in production processes.

Key-words: Sustainability; Triple Bottom Line; Quality Management; Quality; Corrective Actions.

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AS RELAÇÕES ENTRE SUSTENTABILIDADE E QUALIDADE EM UM CONTEXTO ORGANIZACIONAL

The relations between sustainability and quality in na organizational context

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RESUMO

As organizações visam uma produtividade igual ou maior do que seus concorrentes, a fim de garantir a sobrevivência a longo prazo. Portanto, a atuação das áreas de Qualidade e Sustentabilidade é relevante para as estratégias organizacionais por meio da criação de vantagens competitivas sustentáveis. Nesse contexto, este estudo tem como objetivo analisar a relação das três dimensões da sustentabilidade com a ocorrência de não conformidades. O processo de construção argumentativa aqui apresentado começa com a articulação teórica. Os resultados apontam para a aproximação teórica das dimensões da sustentabilidade e da gestão da qualidade por meio da avaliação das não conformidades. Como contribuição, o artigo propõe parâmetros de sustentabilidade como critério para a implementação de ações corretivas para a qualidade nos processos produtivos.

Palavras-chave: Sustentabilidade; Resultado Triplo; Gestão da Qualidade; Qualidade; Ações corretivas.

INTRODUCTION

Organizations have been seeking solutions to address the challenges of sustainability by understanding that, as well as quality, sustainability should be treated as a constantly developing concept and fundamental to organizational survival and competitiveness. According to Deming (1990), good manufacturing of a product and a better service provision provide a chain reaction with lower costs, better competitive position, happier people at work, and job creation. Such issues become possible, with the establishment of quality in the manufacturing process and service provision, since quality, in this context, is a benefit, because according to Slack, Jones, and Johnston (2016, p. 519), high-quality products or services can provide a considerable competitive advantage to an organization.

Elkington (2001), by defining sustainability as a principle that should ensure that our current actions do not limit the social, environmental, and economic options of future generations, disseminated the Triple Bottom Line (TBL), which is made of the dimensions People, Planet and Profit (3P). The TBL should be the basis for sustainable actions in the face of organizational management, so its compression is important because it is a tool to support decision-making (Maia and Pires, 2011; Conti, 2021). As Slack, Jones, and Johnston emphasized (2016, p. 37), many of these decisions seem largely economic in nature, but they also reflect environmental and social aspects.

The occurrence of non-conformities in the manufacturing process of a product implies, for example, costs arising from non-quality and costs resulting from not producing properly from the first time, affecting productivity and profitability. Therefore, it is understood that the economic aspect of the organization may have its performance impaired. As for the environmental and social aspects, this theoretical essay seeks to relate them to the occurrence of non-conformities in the context of industrial operations.

According to Maranhão (2001), quality management systems are based on standardization and technical regulations aimed at ensuring the quality of the product or service offered to protect the consumer, society, and the environment. Deming (1990) points out that quality management contributes to increased organizational productivity. As stated by Slack, Jones, and Johnston (2016, p. 46), quality has an external impact that influences customer satisfaction and internal impact that leads to stable and efficient processes, in order to reduce costs and increase reliability.

Maranhão (2001) defines that quality is no longer a competitive differential and has become a prerequisite for the market. In this context, understood as added value, quality management becomes relevant to organizational strategies. In parallel and with similar characteristics, the same understanding has been applied to sustainability, with respect to its relevance to organizational strategies, since it is also a comprehensive concept, developing throughout history and which today has its importance recognized by organization.

Barbieri (2007) emphasizes that companies that systematically address environmental issues and social responsibility issues in their processes add value to their business by creating sustainable competitive advantages. Sustainability has become a need and comparative advantage to demonstrate to customers, since consumers began to prefer environmentally friendly products produced by companies concerned with environmental issues (Carvalho et al. 2012, p.177).

The performances of the Quality and Sustainability departments are relevant to organizational strategies by creating sustainable competitive advantages. Quality is present throughout a company's production chain, from product design to after-sales, planning, controlling, and improving products and processes in order to foster business excellence and ensure the required quality standard. The dimensions of sustainability or the Triple Bottom Line, in turn, guide the development of sustainable actions.

Thus, if observed in a joint action, one can induce that the synergy between the quality and sustainability areas can bring significant gains to a company. A possibility of synergy occurs through the corrective action process, which although it is one of the processes of the quality area, its execution implies the involvement and performance of more departments. This is an approach that aims to eliminate errors at their source, which can be of great interest

to sustainability. When an organization avoids production errors, waste is also avoided and, consequently, unnecessary costs, among other results, which favor the productivity and profitability of the organization.

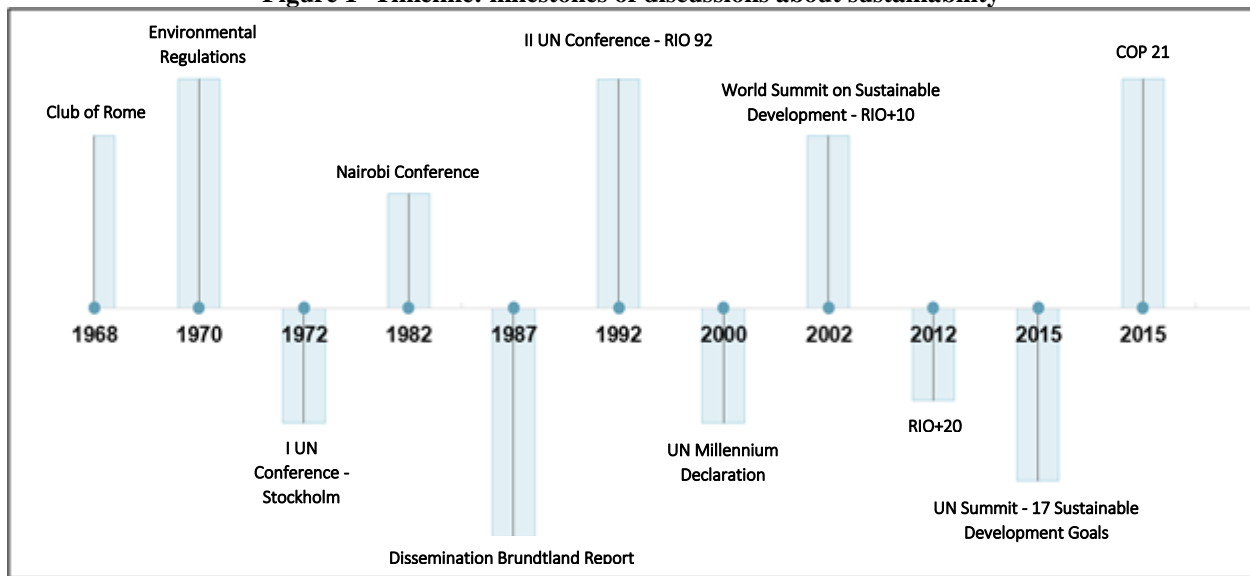
Based on such conceptualizations and with the motivation to highlight characteristics of the role of quality management guided by sustainability, promoting this interdisciplinary, this study aimed to analyze the relationship of the three dimensions of sustainability with the occurrence of nonconformities. The study was built from critical and reflective reading of relevant literature on the proposed theme. The works were analyzed and selected to constitute a coherent conceptual framework for the presentation of the research arguments and theoretical articulation. The authors and works surveyed represent important sources of evidence on the subject.

1. LITERATURE REVIEW

1.1 Sustainability

Discussions on sustainability became widespread with the publication of Rachel Carson's *Silent Spring* (1907-1964), in which the risks that the excessive use of pesticides in the U.S. could cause to human and animal health were presented (Bonzi, 2013). Since then, successive events have triggered discussions on sustainability and sustainable development, milestones evidenced by figure 1.

Figure 1- Timeline: milestones of discussions about sustainability



Source: Prepared by the authors (2021)

Veiga (2008) presents that the first environmental regulations occurred in the 1970s and emerged as reactions to major environmental accidents, arousing in consumers a preference for environmentally friendly products and making sustainability then to be a necessity and a comparative advantage for companies by demonstrating environmental concern aligned with the rest of society (Carvalho et al., 2012, p.177).

According to Veiga and Zatz (2008), until the late 1970s, sustainability was related to 'biology'. Nascimento (2012, p.51) emphasizes that the biological origin occurs through ecology, when referring to the ability to recover and reproduce ecosystems (resilience) in the face of anthropic aggressions (misuse of natural resources, deforestation, fire etc.) or natural (earthquake, tsunami, fire etc.).

Nascimento (2012, p.51) also emphasizes that the second origin of sustainability is based on the economy and is related to the perception of the finitude of natural resources and their gradual and dangerous depletion. Similarly, the author emphasizes that the idea of sustainability gains body and political expression in the adjectivation of the

term 'development', product of the perception of a global environmental crisis (Nascimento, 2012, p.52). Thus, the expression 'sustainable development' appears for the first time amid the debate on environment and development.

The term 'sustainable development' first appeared in August 1979 at a United Nations symposium on environment and development. At that time, environmentalists were systematically accused of being against development. And in one of these discussions, one of them said: We are not against development; we just want it to be sustainable. This was enough for the expression to enthrall immediately and became known worldwide when it was adopted as the main slogan of 'Our common future', better known as the 'Brundtland report' (Veiga and Zatz, 2008, p.38).

The Brundtland report highlighted that environmental protection, economic growth and social equity are key components for sustainable development (Brundtland, 1987). According to Veiga and Zatz (2008, p.56), there is no sustainable development possible without harmonizing social, environmental, and economic objectives. Thus, the three aspects of sustainability emerged: environmental, economic, and social, which were initially disseminated by Elkington (2001).

Sachs (2008, p.36) argues that sustainability is a concept that obeys the double ethical imperative of solidarity with present and future generations and requires the explicitness of criteria of social and environmental sustainability and economic viability. This is a vital issue for the establishment of long-term plans and actions aimed at the perpetuity of the planet.

Addressing the issue from an organizational perspective, Elkington (2001) argues that the Triple Bottom Line (TBL) should be the basis for decisions and actions related to organizational management. Slack, Jones, and Johnston (2016, p. 37) emphasize that many of these decisions seem largely economic in nature, but they also reflect environmental and social aspects. Therefore, the TBL is considered an important tool to support decision making (Maia and Pires, 2011, p.188-189).

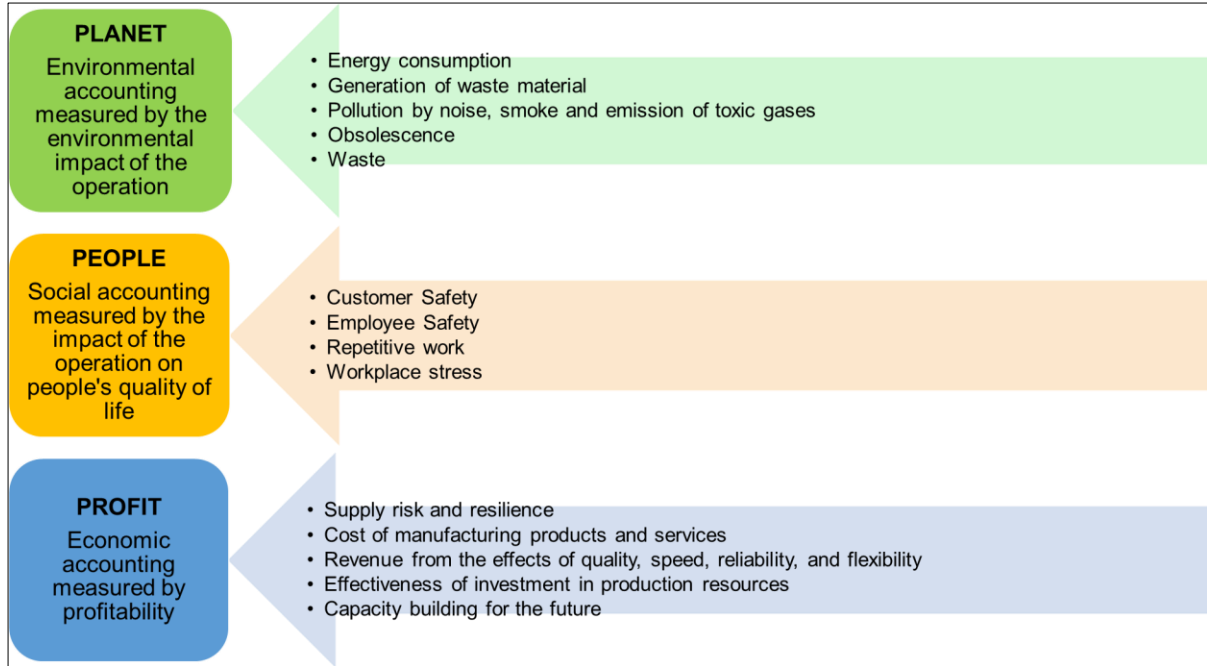
In relation to each of the dimensions, according to Elkington (2001), the social dimension or 'people' is related to human capital, community, and society. The environmental dimension or 'planet' addresses the natural capital of society or organization, and the economic dimension or 'profit' refers to positive organizational results.

On the environmental dimension, Nascimento (2012, p.55) argues that the organization must assume that its production and consumption models are compatible with the material basis on which the economy is based. Therefore, production and consumption must guarantee the resilience of ecosystems. On the economic dimension, Nascimento (2012, p. 55) emphasizes eco-efficiency, which supposes a continuous technological innovation that leads us to leave the fossil energy cycle (coal, oil, and gas) and to expand the dematerialization of the economy.

According to Slack, Jones, and Johnston (2016, p.38) the business that is guided by the triple bottom line (called "sustainable business") is more likely to remain successful in the long term than the one focused only on economic goals. Thus, Romeiro (2012, p. 66), emphasizes that the concept of sustainable development should incorporate the adoption of sustainability parameters considering environmental risk.

The figure 2 illustrates parameters involved in achieving the triple result. According to Slack, Jones, and Johnston (2016), for a company to account for the full cost of managing its operations, such aspects must be in balance. Otherwise, they may reflect ways in which production can impact each of the TBL dimensions of sustainability.

Figure 2 - Ways in which production can impact each element of the triple bottom line

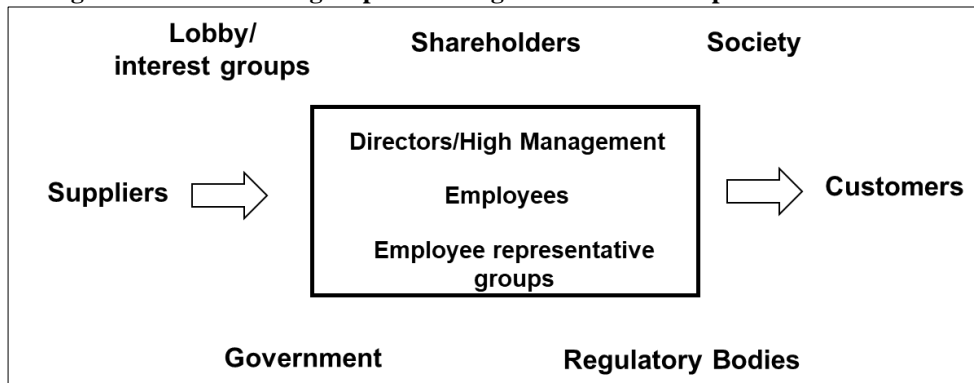


Source: Adapted from Slack, Jones, and Johnston (2016, p. 39)

Slack, Jones, and Johnston (2016, p. 42) warn that while the triple bottom line (TBL) is an approach increasingly adopted to achieve the broad assessment of production performance, it is also important to assess the impact an operation has on its stakeholders to the extent that they have legitimate interests in production activities.

Freeman (2001, p.41) explains that stakeholders are the groups or individuals who are benefited or harmed by business actions. According to the author, it is a concept that emerged from a "generalization" of the concept stockholder or shareholder. The author emphasizes that, just like shareholders, other interested parties can also make claims or complaints so that interests require actions of a certain kind, and conflicting interests require methods of resolution. In such a way, Slack, Jones and Johnston (2016, p.42) emphasize that in any kind of organization, it is the responsibility of the production function to understand the objectives of its stakeholders and to set its objectives appropriately.

Figure 3 - Stakeholder groups with a legitimate interest in production activities



Source: Adapted from Slack, Jones, and Johnston (2016, p. 43)

According to the Brazilian Business Council for Sustainable Development (CEBDS, 2020), several companies have difficulties in defining action fronts for the challenges of sustainability and how to measure the results and report the information. Bellen (2006) argues that in terms of understanding the progress in sustainable development, the use of sustainability indicators is fundamental.

Veiga (2010, p.40), sustainability requires a trinity of indicators, because it can only be well evaluated if there are simultaneous measures of the environmental dimension, economic performance, and quality of life (or welfare). Thus, Bellen (2002) emphasizes that the 1987 'Brundtland Report' had already highlighted this need for the assessment of sustainability (Bellen, 2002, p. 63).

Conceição, Dourado and Silva (2012) emphasize that an alternative to triple result reporting is the Global Reporting Initiative (GRI), which is characterized as an international organization that establishes a set of guidelines for corporate sustainability reports covering the economic, social, and environmental dimensions. According to CEBDS (2020), the GRI defines a global model of indicators, which has helped many companies around the world, especially Brazil, in standardization of sustainability reports by relying on the quantitative and qualitative description of socio-environmental risks and impacts related to the operation of a company" and in order to suit the needs and interests of all parties involved and related to the business.

Conceição, Dourado and Silva (2012, p. 19), present that companies are interested in contributing to issues related to corporate sustainability, considering meeting the growing demands of external stakeholders pertaining to use of natural resources and the environmental impact of economic activities, notably aspects concerning the emission of pollutant gases, industrial waste, exposure to environmental risks and the use of biodiversity resources.

Therefore, it is understood that companies are interested in expanding disclosure in corporate sustainability because they realize that they can also obtain benefits that, according to Conceição, Dourado, and Silva (2012, p. 22) facilitate the achievement of their organizational and economic goals.

GRI report standards create a universal language for organizations when it comes to communicating about the impacts on sustainability and how their management occurs. This allows for consistency and global comparability to emphasize the transparency and accountability of organizations on this issue (GRI, 2021).

According to GRI (2021) the standardization of the sustainability report also favors meeting the needs of the stakeholders of the business, who can use these sustainability indicators of the organization in their decision-making processes. Another aspect is that, as highlighted by the GRI (2021), this standardization also increases transparency and accountability for the issues and drive actions help improve the impacts of the sector and increase the contribution of the sector to sustainable development, to the extent that the GRI Standards are strongly aligned with the UN Sustainable Development Goals (GRI, 2021).

According to Conti (2020, p.4) in an interview with Fritjof Capra, the greatest challenges for sustainable development are currently related to problems that cannot be understood in isolation: they are systemic problems, which means that they are all interconnected and interdependent. According to Carvalho et al. (2012, p.417) proactive companies also observe a systemic concern with sustainability that is generally unfolded to the management systems, so as to present an integration between quality management, environmental management, health, safety and social responsibility.

1.2 Quality

According to Slack, Jones and Johnston (2016) in addition to promoting customer satisfaction, the good quality of a product or service generates a reduction in costs from rework, scrap, complaints or returns, i.e. costs associated with the existence of nonconformities. According to Carvalho et al. (2012, p. 08) quality is a term that although it is used daily, we will hardly reach a consensus if asked to several people. Although there are several definitions of quality, this essay will be based on the definition of conformity consistent with customer expectations (Slack; Jones; Johnston, 2016, p. 521).

NBR ISO 9000:2015, presents that conformity is the fulfillment of a requirement, which in turn is defined as being need or expectation that is stated, usually implicit or mandatory. According to Slack, Jones, and Johnston (2016, p. 521), ensuring that a service or product complies with the specification is the key task of operations, so that quality requirements must be used to design and direct the processes that produce services or products.

If an organization understands the needs of its numerous customers, it should be able to design goods and services that are suitable for this purpose, but to do so, it is important to know the characteristics that satisfy them to avoid mistakes, because errors or failures have a strong impact on costs and can cause a perception of low quality by customers (DeFeo; Juran, 2015).

Quality-focused management can be defined as a set of managerial methods that successful organizations have employed to ensure that their products, goods, services and information meet customer requirements (DeFeo; Juran, 2015, p. 15). The concept 'Quality Management' arises with the need to manage the set of activities related to quality, regardless of the focus (Carvalho et al., 2012, p. 90). With the implementation and management of these activities, it becomes possible to achieve the quality of a given product or service in its various dimensions, presented in table 1.

Table 1- Quality Dimensions

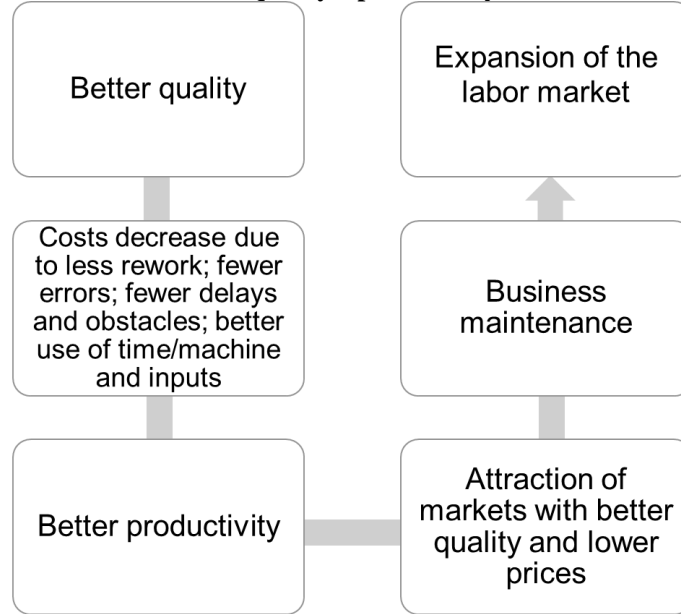
NUMBER	DIMENSION	MEANING
1	Performance	Basic operational characteristics
2	Features	Secondary operational characteristics, additional functions
3	Time	Standby time, cycle time, time to complete a service
4	Reliability	Period of operation without failure
5	Durability	Extent of use before replacement is preferable to repair
6	Uniformity	Low variability among the results of a process
7	Consistency	Agreement in documentation, predictions, or standards
8	Maintenance	Problem solving and complaints
9	Aesthetics	Related to sense perception. Such as color, fragrance and fit
10	Personal Interface	Punctuality, courtesy and professionalism
11	Flexibility	Willingness to adapt, customize, or accommodate change
12	Innocuousness	Relative to health, safety, or the environment
13	Perceived quality	Inferences about other dimensions; reputation
14	Usability	Relative to logical and natural use; ergonomics

Source: Langley et al. (2011, p. 263)

Slack, Jones, and Johnston (2016), in order to keep costs both low and compatible with the levels of quality, speed, reliability, and flexibility required by the customer, operations use productivity as a measure to indicate the success of an operation. Thus, it is understood that productivity is the resulting index from what is produced by an operation, divided by what is required for that operation (Slack; Jones; Johnston, 2016, p. 54).

Deming (1990) highlights that quality improvement transfers wasted working hours and machine-time to the manufacturing of a good product and better service delivery. Therefore, productivity increases as quality improves because there is less rework and less waste (Deming, 1990, p. 01). The chain reaction promoted by the relationship between quality and productivity is presented by Deming (1990) in figure 4.

Figure 4- Relation between quality x productivity: chain reaction



Source: Adapted from Deming (1990)

According to DeFeo and Juran (2015, p.37), customer satisfaction and loyalty are only achieved when both dimensions of quality fault elimination are managed efficiently and effectively. According to Slack, Jones and Johnston (2016, p.46), quality increases reliability and reduces costs: the fewer errors made in each process of the operation, the less time will be needed to correct the mistakes and the less confusion and irritation will be spread.

2. COMPARATIVE ANALYSIS

As presented, the definition of quality that supports this article is conformity consistent with customer expectations (Slack; Jones; Johnston, 2016, p. 521). From the literature review, positive aspects and negative aspects that can be obtained with the provision of a product or service consistent or not to the requirements or expectations of the customer are verified. Table 2 presents some positive and negative factors arising from assured quality or its absence.

Table 2 - Aspects of the presence or absence of quality

POSITIVE ASPECTS QUALITY ASSURED	NEGATIVE ASPECTS LACK OF QUALITY
Internal and external customer satisfaction	Complaints
Increase in productivity	Waste, rework and scrap
Cost preservation	Strong impact on costs
Business maintenance	Unstable demand and perception of poor quality
Increased reliability	Product returns and defective products
Protection of human safety and the environment	Unsafe product and potential harm to the environment
Expansion of the labor market	Loss of customers

Source: Adapted from Deming (1990) and Slack, Jones, and Johnston (2016)

The occurrence of nonconformity in operations may result in the negative aspects presented in Chart 02. In order to establish a correlation between nonconformities and sustainability dimensions, this study proposes the use of sustainability aspects that can be sensitized by the absence of quality. To this end, based on the literature review on

sustainability, parameters were extracted that present ways in which production can impact each of the elements of the triple result (Figure 02).

Thus, the matrix represented by table 3 can be established, relating such research elements: sustainability dimensions and examples of nonconformities.

Table 3 – Example of Nonconformities x parameters matrix classification

TBL Dimension	Sustainability parameters	Example of Non-conformities sensitized
ENVIRONMENTAL	Energy consumption	System operating outside specification
	Generation of waste material	Scrap material
	Pollution by noise, smoke and emission of toxic gases	Absence of maintenance and calibration of machinery
	Obsolescence	Purchase and storage of surplus raw material
	Waste	Leaking product
SOCIAL	Customer safety	Recall - defective products or services by the supplier.
	Employee safety	Personal protective equipment not used or incorrectly used
	Repetitive work	Work instructions with insufficient guidance
	Workplace stress	Non-functional organizational policies
ECONOMIC	Supply risk and resiliency	Risk management not practiced in supply chain management
	Cost of manufacturing products and services	Unplanned labor and material costs for performing rework due to detected non-conformities
	Revenue from the effects of quality, speed, reliability, and flexibility	Occurrence of nonconformities impacts revenue due to delivery delays and quality issues
	Effectiveness of investment in production resources	The occurrence of non-conformities implies additional costs for not having produced correctly the first time. Costs that could be directed towards investment in production resources, such as human capital, technology, research and development, equipment.
	Capacity building for the future	The time taken to deal with non-compliances could be directed towards training and development of technical competences and professional skills.

Source: Adapted from Slack, Jones, and Johnston (2016)

The objective of the matrix classification is to assist in the analysis of influence between the occurrence of nonconformities in a production environment and possible impacts on the dimensions of sustainability. Therefore, it intends to evaluate whether these nonconformities can sensitize aspects beyond economic/financial, in order to investigate possible influences on social and environmental aspects as well. This is an initial proposal, but it can be the basis for the development of an impact measurement tool between these elements. Regarding the analysis of the influence on the impact, there are opportunities for the establishment of a method that allows this evaluation in an organizational environment so that nonconformities can be collected and evaluated in relation to sustainability aspects.

CONCLUSION

Based on the theoretical foundation, it is understood that the productivity of the organization is affected by each occurrence of nonconformity. To the extent that its treatment implies time and cost, needed to redo what could have been done right the first time. It is observed that in most organizations, the economic aspect predominates in decision-making in the face of numerous issues. It is understood that other factors besides the economic aspect can also be sensitized to the occurrence of nonconformities, such as environment factor (examples: disposal material, increased energy consumption, pollution emission, waste) and social (examples: repetitive work, stress). Therefore, presenting the three dimensions of sustainability (TBL) as a criterium for dealing with nonconformities also reflects the opportunity to disseminate the environmental and social aspects.

Thus, the study aimed to analyze the relationship of the three dimensions of sustainability with the occurrence of nonconformities. Therefore, it reflects an opportunity to eliminate errors in their root cause from decisions based on sustainability. Favoring the sustainability approach for the organizational environment, making processes more sustainable and promoting interdisciplinarity between two areas that, although they have their attributions well defined, may have opportunities to act together aiming at long-term organizational survival in a sustainable and productive way. Therefore, the synergy between the two areas can bring significant gains.

It is also worth emphasizing the importance of preventive actions in order to anticipate the occurrence of non-conformities and, above all, the importance of quality-oriented planning, so that it is inserted in all stages of the production chain.

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