

## **Study and analysis of the 10S Program as a quality tool in an industry in the furniture sector**

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### **Abstract**

The definition of quality, before anything else, is the property of classifying something and can be related to the way people use it when they are doing their analysis, where they take into account internal and external factors, the different types of cultures that exist, whether they are local, regional or nationwide, as well as the different types of services that are provided to their customers.

**Keywords:** 10s Program, Quality tool, Furniture sector.

### **INTRODUCTION**

The definition of quality, before anything else, is the property of classifying something and can be related to the way people use them when they are carrying out their analyses, where they take into account internal and external factors, the different types of existing cultures, whether these are local, regional or national, as well as the different types of services that are provided to their customers.

In the words of Menegolo et al. (2015), companies currently find themselves in a competitive and dynamic environment, where it is necessary to use work methodologies that can allow industries, whatever their field of activity, to differentiate in terms of prices, customers and finished products, whether through reliability, which can come through the total quality inserted throughout the production processes, or by seeking quality tools that help the organization remain in the competitive market, while at the same time achieving satisfaction with the to your client's requirements, whether internal and/or external.

Organizations nowadays seek to work more efficiently in order to obtain a higher quality work environment, so that they can obtain higher quality products. Therefore, the tool used by companies to achieve this difference is based on the implementation of quality programs, which will help to increase the quality of their products and/or services, keeping corporations, as a result, at a high level in the market. competitive, according to Pinheiro and Loos (2016).

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From the point of view of Domingues (2011), the 5S methodology is closely related to the concept of total quality and has been used in order to assist the cultural changes that are being made necessary during preparation for the implementation of a quality management system within the organization.

This philosophy, that is, the “5S Program”, granted to companies by quality programs is of paramount importance, since each of the five senses has its characteristics and particularities, which helps companies to analyze their problems of in a critical, clear and objective way, checking failures directly at their root causes, because when this analysis is done competently and effectively, waste becomes evident and, as a result, easier to solve, allowing the organization, a guide forever seek continuous improvement.

In order to add even more value to services, processes and finished products, the idea of quality has been improving more and more.

To this end, five more senses were added, now called “10S Program”, which from the point of view of Silva (2004), comes with the purpose of re-educating people, recovering values, seeking further improvements in work environments, such as modernization of companies, in addition to greater productivity, health and safety, but mainly a greater awareness of people regarding citizenship.

This work was conducted in a company in the furniture sector, as it felt the need to restructure the organization, based on quality tools, and which, through the “10S Program”, aims to achieve the most close to the sense of total quality control.

According to Mendonça et al (2010), the furniture industry in Brazil develops as the economic part of the country also grows, resulting in products manufactured increasingly more efficiently, that is, with higher quality, which makes the furniture market more competitive, where quality control ends up becoming a requirement on the part of customers in this scenario.

To collect the data, some historical data and operational procedures carried out in the company were used, which will be detailed later. To achieve its objectives, the work first establishes the theoretical framework, followed by the methods and techniques adopted, empirical results and, finally, its conclusions.

## **GOAL**

This article aims to implement the first 5S of quality management: use (Seiri), ordering (Seiton), cleaning (Seiso), health and hygiene (Seiketsu), and self-discipline (Shitsuke), in a furniture industry, so that each of its concepts comes to support and assist the organization throughout its production chain, from programming the drawings in the initial design of custom furniture to the installation of the final finished product at the client. Furthermore, this work also comes with the purpose that after implementing the first part of the program, people are prepared for future applications of other senses of quality within the company: determination and unity (Shikari Yaro), training (Shido), economics and combating waste



(Setsuyaku), moral and ethical principles (Shisei Rinri), and social responsibility (Sekinin Shakai), which have been widely disseminated in various production areas, currently known as the “10S Quality Program”.

## **METHODOLOGY**

The article being presented has the purpose of structuring the stages of the custom furniture manufacturing process, through the implementation of the 10S Program, using the Ishikawa diagram as a quality tool, from an empirical point of view, comparing the results field with current theory.

The work described below was developed based on the methodological approach of the case study, which, according to Yin (2015), can be the study of a single case or several cases, and their approaches can be quantitative and qualitative. According to the author, the case study represents an investigation based on experience and covers the planning, collection and analysis of data in a clear, objective and logical way.

To collect data, tools such as flowcharts, cause and effect diagrams, internal documents of the organization were used, as well as on-site observation of processes, always focusing on the key points for the implementation of each of the senses of quality.

The data evidenced was interpreted and analyzed, looking for negative and positive situations, relating theories with practical information collected in the company, through which the case study was proposed, as reported below.

## **COMPANY HISTORY**

The work described below was developed in a small, family-owned industry, intended for the manufacture of custom furniture. Currently the company is called “Costarte Móveis”, and is located in the city of Jandaia do Sul, in the north of the state of Paraná.

In 1952, a family from Minas Gerais settled in the city of Jandaia do Sul and decided to undertake a new business in the furniture sector, officially starting its activities in 1953 in a rented shed. The first service provided was in a guesthouse, producing doors, shutters and windows, where they became known in the city for this specialty.

At that time, there was no electricity yet, and in order to operate the machinery, it was necessary to use a diesel generator – financially, this generator was worth more than the entire enterprise.

The owner's initial idea was to leave the business as an inheritance to his son, but as there was no interest on his part, the company was passed on to his nephew, Emenegildo Cassemiro da Costa, who was already part of the team of employees, officially taking over the company in 1955.

In 1957, with the money obtained from sales profits, it was possible to buy land and build a wooden shed. It was also possible to install electric light in the shed, with the help of a dynamo, a machine that was turned by a crank and was responsible for transforming mechanical energy into electrical energy, thus increasing another work shift.

In 1966, the organization underwent its first modernization with the purchase of new machinery, now motorized, thus eliminating the need for a diesel generator. That same year, the wooden shed was replaced by a masonry one, in addition to the inclusion of new partners, Armando and Italo Cassemiro da Costa, these being brothers of the owner.

They stood out in the furniture industry, as they were handcrafted furniture, made with good quality wood and with excellent resistance.

The second modernization came in the 70s, with the purchase of a pickup truck, making it possible to deliver furniture to more distant locations. The company in question now had the corporate name “Emenegildo Cassemiro da Costa LTDA”. At the same time, other, more modern machines were acquired, such as the “Band Saw”, shown in figure 1, which according to Wikipedia (2018) is a machine in which the saw band moves through flywheels. and pulleys which are driven by an electric motor, and which have great work versatility and can make straight or irregular cuts such as circles or corrugations.

In the 80s, it was possible to purchase a truck, thus extending furniture sales and deliveries to other states such as São Paulo and Mato Grosso. At this time, the company already had the corporate name “Irmãos Casimiro da Costa LTDA”.

Figure 1: Band Saw Machine



Source: “Emenegildo Cassemiro da Costa LTDA” (2018)

Over the years, the company grew and improved its products. As a result, the clientele increased, even taking into account limited production, as they were handcrafted furniture, older machinery and where the production process was much more complex.

The children of the families grew up following, working and learning from the teachings passed on by the previous generation, knowledge related to the carpentry trade.

The three brothers (Emenegildo, Armando and Italo Cassemiro da Costa, represented in figure 2) remained working together in the family business until the death of one of the partners Armando, in 2005. The other two brothers continued in the company, however with a drop in production, due to their advanced age. Until in 2007, one of the partner's sons (Armando) acquired his uncle's shares, taking over the business and keeping it in the family.

Figure 2: Cassemiro Brothers



Source: (Personal collection, 70s)

Upon taking over the company, the new owner Fabio Cassemiro da Costa (figure 3) began investments by purchasing new machinery, and working together with his brother Anderson Cassemiro da Costa, changed the name of the company to “Costarte Móveis”, staying in the old building until 2011, when work on the new facilities was completed and where they are located to this day. Many customers who request the services of “Costarte Móveis” compare the good quality of the products delivered today with the quality that the family already used in their furniture in the past.

Figure 3: Cutting Machine



Source: “Costarte Móveis” (2007)



## FURNITURE MARKET

According to Sebrae (2018), Brazil is the fifth largest furniture producer in the world, ranking 32nd in the ranking that most exports, and has already faced major challenges with the impact of economic instability in recent years. According to Tammela et al. (2005), we live in a globalized world, where there are several types of businesses active, which makes companies increasingly seek their space within the competitive market, bringing strategies that they can attribute to organizations, products with higher quality, and that are keeping up with constant changes in the markets.

Azevedo and Nolasco (2009), also point out that companies that work with custom furniture need to constantly shape production processes, the development of new products, the customs of the organization, the management model, the challenges that are imposed daily as a result sustainability, environmental projects, which are always focused on conserving natural resources.

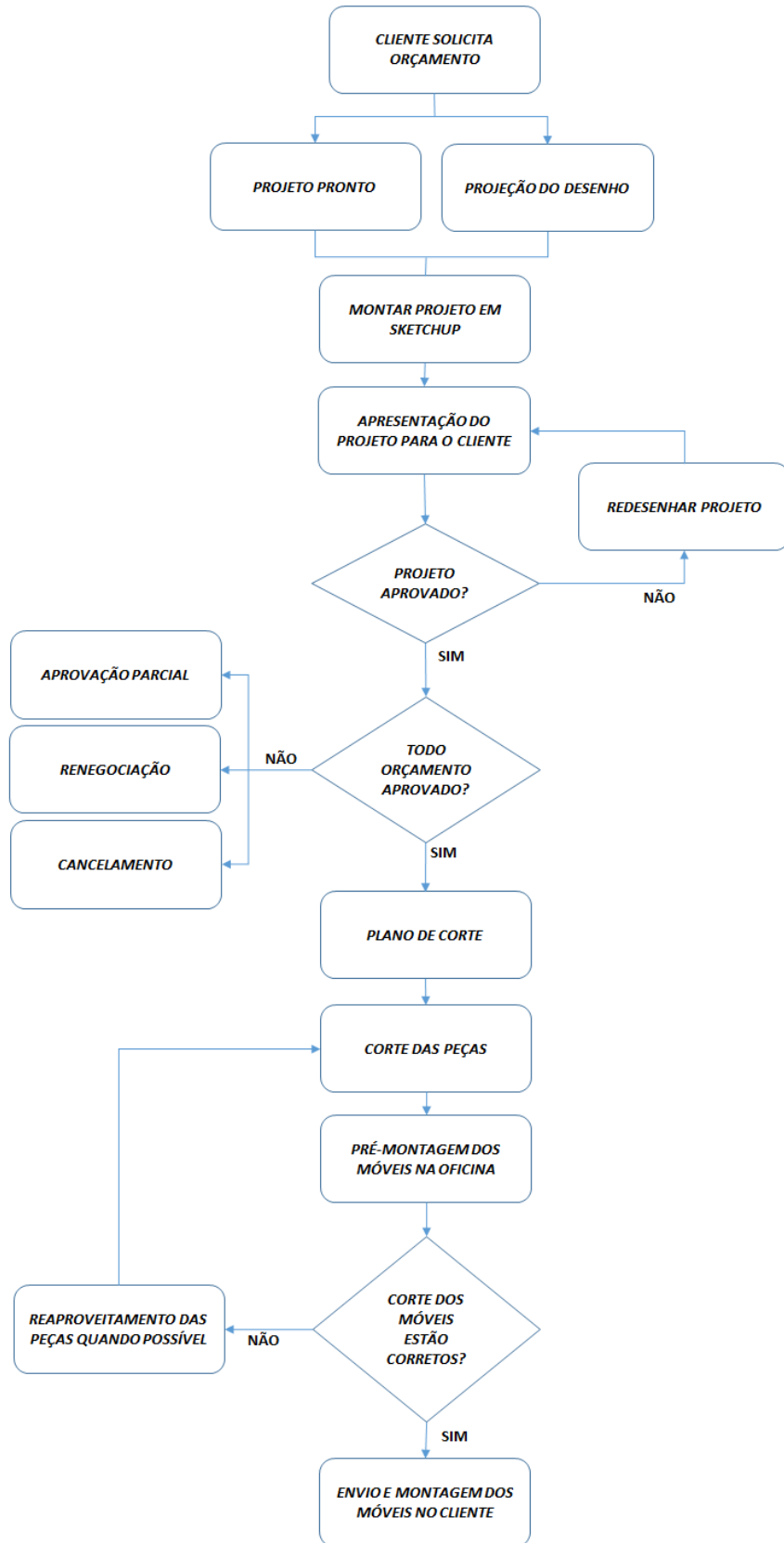
## PROCESS FLOWCHART – “COSTARTE FURNITURE”

The process flow for manufacturing custom furniture, which is described in figure 4, begins with the customer requesting a quote for the desired furniture. Here, either the client can bring a previously prepared project, or they can ask the company to create a project according to their preferences and needs, where measurements are then taken of the environment in which the client's furniture will be assembled once finished.

As a relevant part of the budget, the customer's choices are taken into account, such as the type of wood used, colors, individualized finishes, such as the application of glass, mirrors, different handles, among others.



Figure 4: Process Flowchart



Source: The Author (2018)

The custom furniture is developed in the “Sketchup” program, which is a tool designed to create drawings and images in a 3D (three-dimensional) plan according to PlataformaCAD (2018), as shown in figure 5, and which allows the customer to get a sense of very close to what the furniture would look like in real life.

Figure 5: Kitchen Project in Sketchup



Source: “Costarte Móveis” (2018)

The project is presented to clients so that they can approve or not the drawings. The budget is then passed on, and, on the part of the customer, there may be full approval, partial approval, price renegotiation or cancellation of the order.

When the request is approved, with the measurements of the environment and the data collected during the project carried out, calculations are carried out for the cutting plan of the furniture parts. The sheets are then cut and pre-assembled inside the workshop according to initial planning.

This pre-assembly is of fundamental importance, as this avoids possible errors, and allows necessary adjustments and/or changes to be made, reusing the parts whenever possible, before the furniture is assembled at its final destination, depending on availability. of the customer.

## ANALYSIS OF THE CAUSES

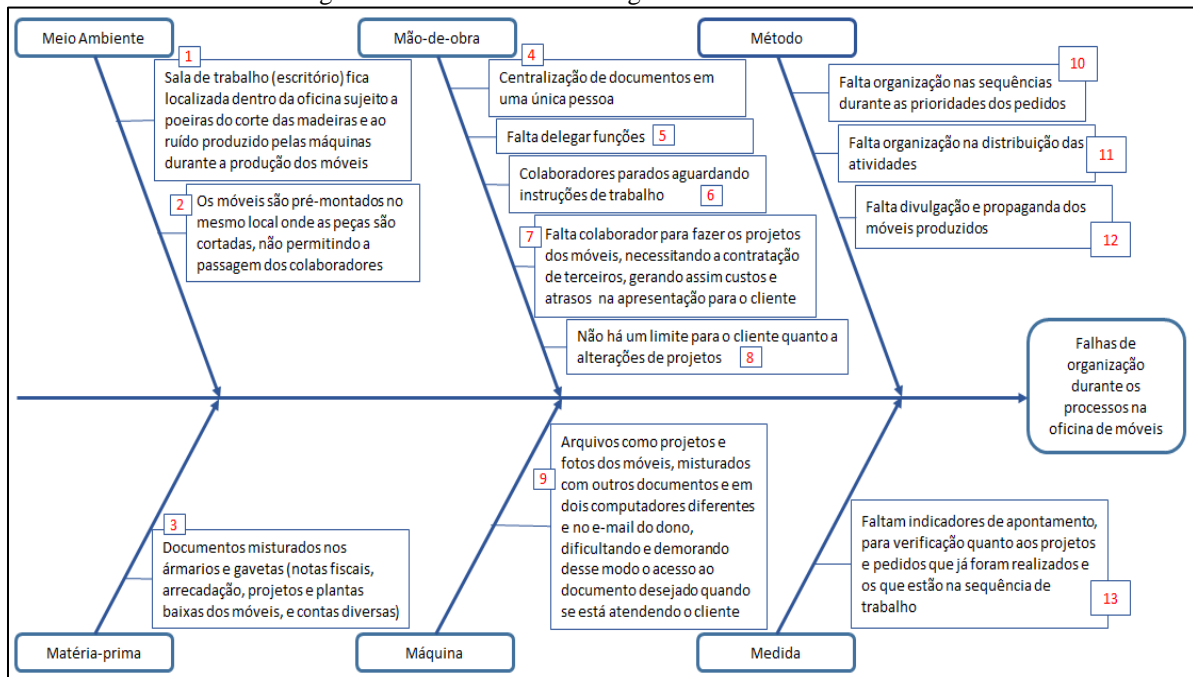
According to the studies and monitoring carried out during the production processes of custom furniture, several analyzes were carried out within the sectors, where the Ishikawa diagram was used as a quality tool for a better and more detailed examination of each situation highlighted, as per figure 6, in order to identify possible situations that could cause failures, possible delays in the delivery of projects and furniture after completion.

The cause and effect diagram or Ishikawa diagram or "fishbone" diagram, was developed by engineer Kaoru Ishikawa, with the aim of helping to identify the root causes of a given problem. The diagram allows the breakdown of causes until it is possible to reach a solution for that particular occurrence. Here the difficulty highlighted in six groups (or 6M) can be worked on: environment; labor; method; feedstock; machine and measurement. In the analyses, the diagram can provide the following



advantages: 1) the assembly is done in an educational way, and must be done by a team of people who are aware of the situation through brainstorming, that is, a storm of ideas that help in solving the problems problems; 2) the focus must be entirely on the case, where the most varied possible causes are worked on; 3) the need for real research to reach the points of origin; 4) the need for data and facts that prove the veracity of what was identified; 5) establishes the correct understanding of the situation that occurred, since the exchange of ideas between those involved leads to real conflict; and 6) it is a tool that can be used in the most diverse work environments, as explained by Lins (1993).

Figure 6: Cause and Effect Diagram – “Costarte Móveis”



Source: The author (2018)

According to what was determined and evaluated during data collection, several points were observed that should be worked on, since there are many opportunities for improvement within the company and which were highlighted in the development of the cause and effect diagram.

## DEVELOPMENT

In accordance with what was proposed as the objective of this article, this literature review will present concepts, definitions and particularities of each sense of quality of the “10S Program”.



## 10S PROGRAM

The 5S program was created in Japan, with a focus on people's quality of life in their work environment, which allows for greater productivity, with higher quality, whilst having as little waste as possible, always drawing here that a “zero waste” goal is possible.

According to Campos et al. (2005), in the post-war period, Japan found itself in a very problematic situation, where it needed to overcome the scarcity of its natural resources, in addition to having to face industrial barriers. According to the authors, exports were also restricted, as their products were inferior to those of Europeans and Americans. However, despite all the difficulties, they found the solution to the difficulties experienced in the crisis: investing in “Quality Programs”.

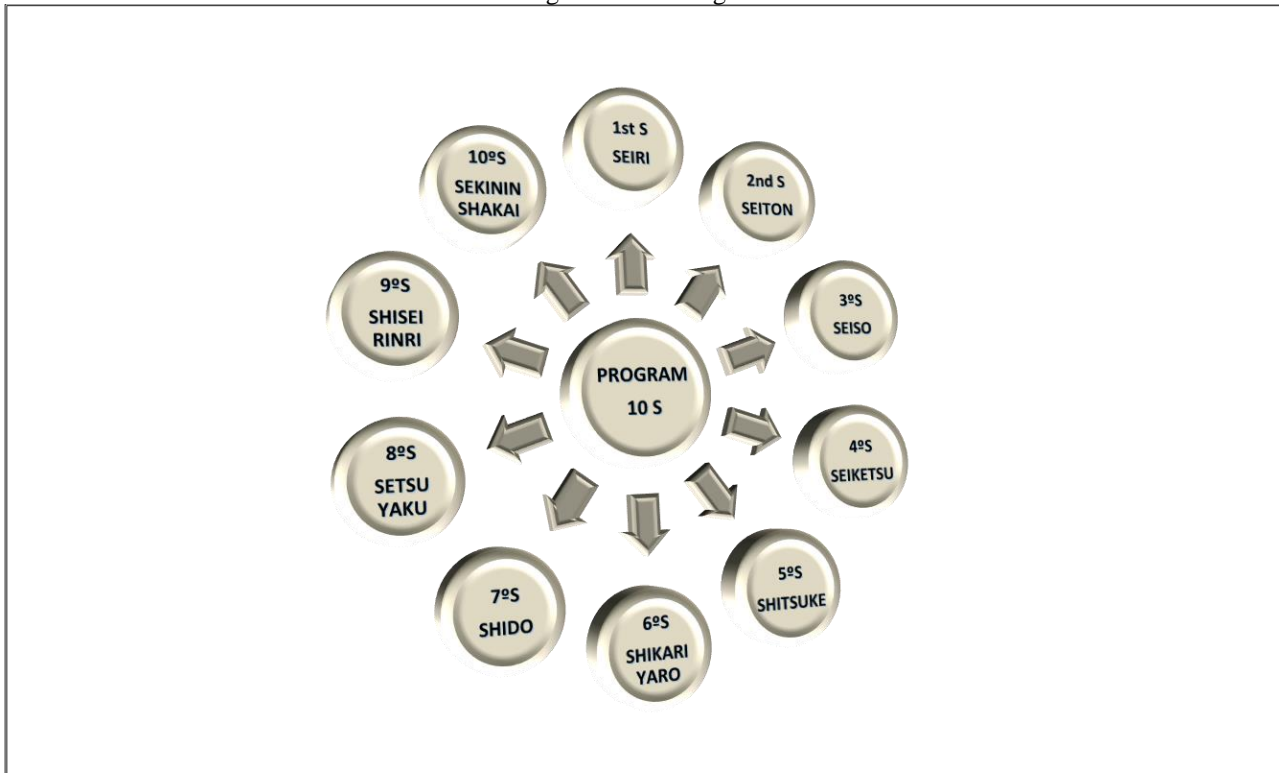
According to Domingues (2011), with the development of industries, there was a need to standardize and add increasingly more quality to products, in addition to presenting new challenges such as options for choosing new suppliers, thus instigating competitiveness, increasing in turn, the need to develop products with differentiated quality.

The 5S philosophy is a tool capable of achieving the desired level of quality, through continuous learning and the generation of an environment favorable to the development of business processes. These processes, worked together with the “5S Program”, are also related to various improvement initiatives, such as productivity, safety, as well as waste reduction, states Campos et al. (2005).

In the words of Menegolo et al. (2015), as the changes provided by 5S were being absorbed and practiced by organizations, the emergence of other factors was observed that showed companies the need to worry about the external environment, so that environmental preservation and responsibility social activities became part of the daily lives of companies, with the main consequence of this being the need to change people's behavior, which in turn generated the evolution of the 5S methodology into the “10S Program”.

The union of all senses of quality, “10S Program” allows a connection, that is, an association of quality management, as described in figure 7, which aims to improve the work environment, in the physical, logical sense and mental. Its basis is educational, and has the purpose of preparing people for critical observation of the reality that surrounds them, acting on waste, disorganization, dirt, and factors that can bring illnesses, conflicts and other anomalies in the environment, according to the words by Zimmer and Klein (2007).

Figure 7: 10S Program



Source: The Author (2018)

## SENSES

Each sense has specific characteristics, which will be described below, and which, in turn, independently add value to the production chain as a whole, and which, when combined, help the organization in all possible types of growth, whether professionally and/or or personal.

### SENSE OF USE (SEIRI)

In agreement with Naves (2013), the first sense of quality, Seiri , refers to using without wasting. Campos, et al (2005), also considers that the “Sense of Use” consists of leaving in your work environment, only what is strictly necessary for the proper operations, using the available resources with common sense, identifying yourself materials, equipment, tools and information, always giving the correct destination to each item according to its real need and usefulness after its use.

Pires (2014) adds that for separation, as the first stage of this quality program, it is necessary to pay attention to the items that will be discarded, so that important information and/or documents are not lost during the disposal of what is unnecessary to the station. of work.

This sense also calls for a general analysis of the work environment as a whole, so that not only material waste can be eliminated, but also unnecessary tasks, thus considering all stages of the production



chain, thus avoiding, efforts that may be unnecessary, and that in most cases, only increase the workload, and do not add value to the process itself or the final finished product.

The first sense implies that in addition to identifying excessive and/or wasteful processes, it is also necessary to remember “the reason for the excess”, so that preventive measures can be implemented, so that there are no exaggerations again, according to Campos, et al. al (2005) draws attention.

## SENSE OF ORDERING (SEITON)

Once the first sense is implemented, we can then proceed with the next step, with the second sense of quality, “Sense of Order”, which is nothing more than organizing the work environment in the most functional way possible, that is, positioning all resources efficiently and effectively, in a way that facilitates the flow of people, materials and information, which can be generated through a visual control system, in accordance with Campos, et al (2005).

Domingues (2011) argues that Seiton is defined as a sense of order, tidiness or organization, being in a way a complement to the first sense, which aims to seek facilitation and promptness in the work environment. Here the environment is prepared to become organized with the correct arrangement of materials, tools and equipment necessary to carry out the work.

Campos, et al. (2005), further exemplifies this sense by establishing that people must create daily routines such as: “if you turn it on, turn it off; if you get messy, tidy it up; If you use it, leave it as it was before; If you need it, make it easy to access.” Therefore, the adoption of systematic or daily routines can be quite efficient and effective, such as reorganization of the environment, classification and identification either by names and/or colors, informative tables, practices such as FIFO (first in, first out), as well as maps of risks.

The habit of practicing this sense takes the steps along the following path: it allows you to organize the necessary items, identify each one of them visually, where each type of item has its defined place, always taking into account the frequency of use, the type of material, ease of access to work instruments as well as the necessary information, together with better use of the space occupied, paraphrasing Barbosa et al. (2009).

Standardizing and identifying environments makes the company easier to sustain. Materials must be allocated in easily accessible places, so that stock control, use and storage become simple, so that the item in question can be readily located and thus handled by anyone in the company, in the view of Domingues (2011).

One of the advantages in relation to standardization is the fact of equalizing and including all employees in the same environment, working operations in the same way, where everyone socializes, without running the risk of disrespect and discrimination towards workers within of the organization.



## SENSE OF CLEANLINESS (SEISO)

According to Pires (2014), if the environment is organized, orderly and more spacious, you can move on to the third step of the program, which refers to the actual cleaning of the environment, the “Sense of Cleanliness” – Seiso. Company employees are responsible for cleaning and also maintaining cleanliness in the workplace. This sense addresses the practice of not wasting materials, not forcing equipment or machines, not throwing leftover rubbish and debris on the floor, always sending each item to its respective facilities after use.

It is important to highlight that it is not enough to just locate the dirt and clean it. Here you must identify the type of dirt, analyze and attack the origin of what is causing it. When carrying out this assessment, you may end up verifying other situations that must be remedied, before working on the cleaning issue itself.

Seiso also focuses on the agents that pollute the environment, from dirt from trash bins, to dirt from noise, poor ventilation, and bad smells, as Domingues (2011) adds.

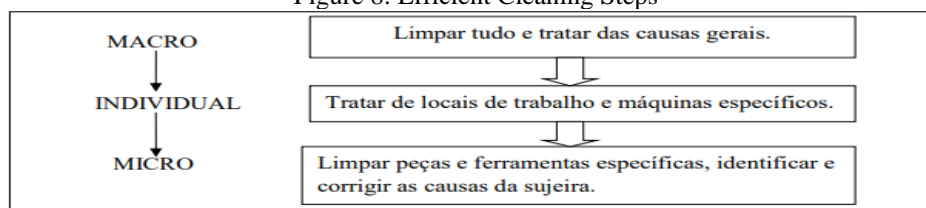
Barbosa et al. (2009), adds that in this sense, in addition to eliminating physical dirt, it is also necessary to check other irregularities such as insufficient lighting, unpleasant odors, noise and vibrations that refer to ergonomic aspects of the environment, checking the causes that gave rise to each of the situations mentioned. According to the authors, carrying out this stage brings an increase in productivity, as it makes the place a more pleasant environment to work in, in addition to keeping equipment and materials in optimal working order, thus increasing their useful lives.

Domingues (2011), also draws attention to the point in which this sense must adapt to the reality where the quality program is being applied in the organization and to possible existing standards, whether regulatory, internal or external.

In the words of Osada (2010), to proceed to the next phase, appropriate cleaning must encompass three stages, as described in figure 8:

- Macro Level: clean everything and check the best way to treat the general causes related as a whole;
- Individual Level: clean workplaces more thoroughly and with machines that are capable of cleaning specific types of dirt;
- Micro Level: where the cleaning carried out is specific and where the causes of dirt are identified and repaired, in areas that are most difficult to access.

Figure 8: Efficient Cleaning Steps



Source: Osada (2010)

## SENSE OF HYGIENE (SEIKETSU)

As described by Campos et al. (2005), the fourth Seiketsu sense, is called “Sense of Hygiene”, health and integrity, and can be acquired through the constant practice of the previous senses. Naves (2013) adds that after the solidification of the first three senses, the fourth “S” will be exercised when there are conditions favorable to physical and mental health, where there is no aggressive environment and which is free from polluting agents of any form, including even the visual form.

Compliance with this sense is essential for the three initial senses to be maintained, as it improves quality of life at work and encourages unity within the organization. To implement this sense, some steps must be taken: 1) have the first three senses in operation; 2) valuing personal and corporate exteriority; 3) prevent different types of pollution; 4) work on visual control; 5) pay attention to the health of workers, be it food, physical activities, carrying out periodic exams, as well as the use of safety equipment, as described by Campos et al (2005).

This sense also allows the worker to be concerned about the state of their personal hygiene, hair, teeth, beard, nails, clothing and footwear, so that the employee can present themselves in the work environment or outside it, without embarrassment, in addition to working your mind, raising your own self-esteem.

Pires (2014) explains that this stage requires perseverance, as there must be changes in people's behavior and routines so that there is no risk of returning to the starting point, before the implementation of the first sense. At this stage, standards need to be prepared so that the operations of the senses are fulfilled with discipline, as well as the responsibilities of each employee. According to the author, this is one of the most difficult measures to implement, as it requires the involvement of all employees, as it is at this point that it is clear whether the implemented program was accepted and whether it was successful.

The fourth S requires the creation of easy-to-understand manuals with necessary instructions for production, inspections and cleaning with drawings or photos with the necessary criteria, to ensure compliance with operations. This sense comes with the objective of standardizing all stages of each process, which could be in production, maintenance or general or specific cleaning. Here you can have a great result, with the cooperation of the people involved in the process and the discipline in practicing it, according to the words of Barbosa et al. (2009).



## SENSE OF SELF-DISCIPLINE (SHITSUKE)

This sense works in the sense that employees must follow the rules and procedures already disseminated previously, in order to keep the quality program in perfect operation, argues Naves (2013).

Barbosa et al. (2009), believes that the goal established in the fifth sense is to encourage discipline and culture in voluntarily maintaining all other stages. Ribeiro (1994) argues that: “being disciplined means strictly complying with the rules and everything established by the group. Discipline is a sign of respect for others.” Compliance with this sense allows constant analyzes to be carried out in search of improvements.

The sense of self-discipline contributes to the verification, based on criteria, goals and objectives, of the correct execution of other senses, as it makes the activities carried out a habit, as Barbosa (2009) draws attention.

Domingues (2011) adds that the techniques of this sense come with the aim of continuing the applications of what was previously worked on and that it is necessary to discipline employees to embrace the teachings of the program. According to the author “the search for quality starts from the first steps”.

Self-discipline, as Silva (2004) argues, requires constant improvement: “If it’s good, it can get even better. Creating a disciplined work environment is the most important measure to ensure Quality.”

## SENSE OF DETERMINATION AND UNITY (SHIKARI YARO)

According to the words of Zimmer and Klein (2007), the sixth sense, “Determination and Union”, is the sense that unites senior management with employees and that seeks continuous improvement and increased productivity, with key elements being motivation, leadership and communication. Corroborating the authors' thoughts, the application of this sense can take place through proposals and expectations from employees such as a suggestion box, idea bank, or awareness-raising actions.

Pasquini (2017) explains that the Shikari sense Yaro managed to improve relationships between employees, thus increasing their commitment to achieving results.

In the Quality environment, a fundamental point that must be paid close attention to is the transparency with which the organization's management is conducted, since this way a good relationship between work teams is achieved. This ensures that all employees are committed to achieving the desired results. Here it is up to managers to work on their ideas, to define ways and methods in order to encourage everyone to engage inside and outside the process, encouraging and instigating people towards established practices. The true meaning of the sixth sense of quality refers to the exercise of teamwork, which is carried out at all hierarchical levels of the organization, as argued by Silva (2004).



## TRAINING SENSE (SHIDO)

According to the need to have more qualified people within organizations to carry out certain operations, which must be carried out efficiently and effectively, companies are increasingly investing in the seventh sense “Training Sense” – Shido, or that is, in the development of its own employees, according to Menegolo et al. (2015).

As Silva (2004) argues, the Shido sense makes a link between the training carried out in the organization and the education of professionals, since the consequence of this set qualifies the employee, and according to Zimmer and Klein (2007) it empowers, aiming to improve the professional side enhancing him as a human being.

Still according to Silva (2004), this training educates and makes the worker grow as a person, so that his knowledge increases job opportunities in the competitive panorama in which he lives. According to this author's position, the organization must invest in the development of people, since it itself depends on the performance of these professionals to achieve the stipulated results and production goals, in addition to frequently qualifying the professional. In the words of Silva (2004), the proposal of the Shido sense is to “create the knowledge environment and develop talents”.

When the organization qualifies an employee for a certain purpose, they feel valued and motivated to want to continue learning more and more, in order to acquire new skills, experiences as well as new knowledge, whether for their area of activity or as a gateway entry point for adaptation to possible new positions.

In the words of Marras (2002), the sense of training brings to the employee both individual and organizational appreciation as well as an increase in the quality of products and services.

The author also works on the idea that training generates changes as a whole, that is, in the set of knowledge, skills and attitudes of each employee.

## SENSE OF ECONOMY AND COMBATING WASTE (SETSUYAKU)

The eighth sense, Setsuyaku, refers to transformations and improvements carried out within the organization, which can combat waste, while reducing costs and increasing productivity, as argued by Silva (2004). According to this author, avoiding waste in the workplace is essential to help the company's results.

Arnold (1999) also adds that the use of anything beyond the minimum necessary to produce can be understood as waste, always taking into account planning for correct and sufficient use of equipment, parts, space, material and hours of work.

Zimmer and Klein (2007) also preach that employees should be encouraged so that each one has their own initiatives to create new ideas for quality work, in order to reduce losses of materials and





services, or according to Silva (2004), carry out, evaluate and use during the processes, recycling wherever possible, always raising awareness and contributing to the non-degradation of the environment.

It is essential that companies control their materials so that there is no waste, so that the organization becomes more efficient in its search for total quality, as highlighted by Silva (2004).

#### SENSE OF MORAL AND ETHICAL PRINCIPLES (SHINSEI RINRI)

By definition, moral principles are related to honesty, kindness, respect, virtue, these being determinants of each individual's moral sense, according to Meanings (2018). These are values that govern human conduct and healthy and harmonious relationships. Ethics, according to Google Dictionary (2018), can mean a set of rules and norms referring to values and morals, whether of an individual, a social group or a society, according to Meanings (2018). The union of these two terms is classified in the ninth sense of quality, Shisei Rinri, “Sense of Moral and Ethical Principles.”

Silva (2004) defines that being ethical is related to organizational management efforts, such as increasing productivity, efficiency and the quality of products or services. The company must define standards of behavior for its employees, generating responsibilities in each of their attitudes and behaviors, where each employee must know how to evaluate what can or cannot be done within their functions, always seeking to be loyal to internal and external customers, as well as within the company itself.

Adding ideas to the statement above, Zimmer and Klein (2007) add that employees must take initiatives regarding their work environment, that is, they must not only be limited to the tasks proposed to them, but must also provide new opinions and concepts for the growth of work, even if it is temporary. The authors also work on the concept that the sense of moral and ethical principles must interrelate with the company's mission, vision and values.

Almeida et al. (2002) emphasize that ethical responsibilities are involved in various actions, rules and conduct, with the aim of serving the different audiences with which the organization interacts.

The main benefit with implementing this sense, Shisei Rinri, according to authors Zimmer and Klein (2007), is to make the organization's employees more committed to results, and to always act ethically towards everyone involved, whether internal or external. For Gadioli et al. (2006), “business ethics is the basis for social responsibility”.

#### SENSE OF SOCIAL RESPONSIBILITY (SEKININ SHAKAI)

Completing the “10S Program” cycle, we have the tenth sense of quality, “Sense of Social Responsibility”. Social responsibility is understood when companies voluntarily decide to contribute to a fairer society and a cleaner environment, according to Eon (2018).



For Zimmer and Klein (2007), social responsibility goes beyond paying taxes or complying with labor and environmental legislation. For the authors, the company and its employees must commit to society.

Silva (2004) complements the above idea, arguing that the Sekinin sense Shakai , aims to disseminate within the organization the importance of practicing social responsibility, of developing voluntary work, where the company and the people belonging to it can carry out actions that aim to always contribute to improving quality life of society.

Social responsibility can also be understood as the commitment that an organization must have towards society, through actions and manners. Organizations need to adopt a more present role within society, as their decisions affect a community more broadly or specifically Almeida et al. (2002).

As mentioned previously, each of the senses has its characteristics, that is, its own benefits, according to the explanations in table 1.

Table 1: Benefits - 10S Quality Program

SENSE	JAPAN	BRAZIL	MEANING	BENEFITS	
1st S	SEIRI	SENSE OF USE	Separate the useful from the useless and eliminate what will not be used.	Greater organization and savings	Reuse available resources
				Free up spaces for different purposes	Increase productivity of the people involved
				Lower risk of accidents in the workplace	Avoid unnecessary purchases
				Fight bureaucracy	
2nd S	SEITON	SENSE OF ORDERING	Identify the locations where materials and equipment are located.	Reduce the time spent searching for what you need to use	Reduce the need for inventory control
				Facilitate internal movement	Avoid unnecessary purchases and damage to stored objects
				Increase productivity	Rationalize work
				Reduce physical and mental fatigue	Quickly evacuate the area in case of danger
3rd S	SEISO	SENSE OF CLEANLINESS	Eliminate any and all dirt, always keeping the environment in good condition.	More pleasant and healthy environment	Help prevent accidents
				Improve the preservation and useful life of equipment	Reduce waste
				Improve the company's internal and external image	Prevent pollution



4th S	SEIKETSU	SENSE OF HEALTH AND HYGIENE	Ensure people's physical and mental health and well-being.	Prevent accidents	Raise levels of personal satisfaction and motivation
				Prevent and control stress	Improve the life quality
				Fight diseases (preventive approach).	
5th S	SHITSUKE	SENSE OF SELF-DISCIPLINE	Create the habit of following standards, procedures and specifications in the workplace.	Be aware of responsibilities in all tasks, no matter how simple they may be	Comply with established rules and procedures
				Perform services within Quality requirements	Develop personal and professional
				Increase the possibility of results according to plan	Increase the general quality of services and interpersonal relationships
6th S	SHIKARI YARO	SENSE OF DETERMINATION AND UNION	Seek improvement and increase productivity through the participation of senior management in partnership with all employees.	Increase employees' trust in the organization	Greater commitment from employees in the pursuit of results
				Improve interpersonal relationships	Retain talent
7th S	SHIRO	TRAINING SENSE	Promote the training and development of employee activities effectively, as well as enhance human beings, both professionally and personally, increasing their creativity and motivation.	Greater employability	Develop talents
				Increase productivity and results	
8th S	SETSUYAKU	SENSE OF ECONOMY AND COMBAT WASTE	Develop the organization's awareness of the issue of preservation and conservation of available resources, so that they are used in the best possible way without harming nature.	Save money for the company by reducing waste of materials and services	Reduce overtime
				Re-educate material acquisition practices	To preserve the environment
9° S	SHISEI RINRI	SENSE OF MORAL AND ETHICAL PRINCIPLES	Adopt the business code of ethics (sum of principles and values), the	Greater commitment between employees and the company's results, with ethical attitudes towards customers, shareholders, suppliers and the work teams of which they are part.	

			mission, vision and values of the company.		
10° S	SEKININ SHAKAI	SENSE OF SOCIAL RESPONSIBILITY	Demonstrate awareness on the part of organizations and people, through a transformation process that will bring expected and satisfactory results.	Improve image in society and government bodies	Greater employee productivity
				To preserve the environment	Participate in the socioeconomic growth of the population
				Greater transparency in actions with customers, employees, shareholders, suppliers and society	

Source: The Author (2018). Based on the work of: Menegolo et al. (2015); Campos et al. (2005), Zimmer and Klein (2007)

## PRESENTATION AND DISCUSSION OF RESULTS

When trying to implement a quality program, such as 10S, you need to keep in mind that the work and support must occur in all areas of the company, together with the support of all employees, including the Board, a since without team collaboration, the final objectives cannot be achieved.

Here the work stages that were developed in this article will be presented and discussed, based on the case study carried out at the company “Costarte Móveis”.

### ACTIONS IMPLEMENTED

In the understanding of Know.net (2018), in the area of quality management, a corrective action refers to and must be implemented at certain points, in order to eliminate the causes of a non-conformity, defect or some highlighted situation, in a so that it doesn't happen again.

In the case study worked at the company “Costarte Móveis”, for each item analyzed in the “fishbone” diagram, corrective actions were proposed based on the studies carried out in this article, as described in table 2, in an attempt to remedy as many problems as possible. items in a short to medium term of time, before starting future deployments.

Each of the proposed corrective actions were carried out based on the understanding and philosophies applied to each of the 10 senses of quality. As each sense has its own particularity, the application of each of them had an effect on specific points in the problems highlighted. To this end, for each item identified in the “fishbone diagram” in figure 6, it was verified which senses would bring benefits and, from this point, the corresponding actions were proposed.



Table 2: Implementation – Corrective Actions

ISHIKAWA DIAGRAM ITEM	APPLIED SENSES	ACTIONS IMPLEMENTED
1	3rd Sense – SEISO	Set up a cleaning schedule for the room.
	4th Sense – SEIKETSU	
	5th Sense – SHITSUKE	
two	2nd Sense – SEITON	Establish a new Layout, in a U format, in order to organize the inputs and outputs of the entire production chain.
	5th Sense – SHITSUKE	
3	1st Sense – SEIRI	Separate, organize, identify and discard documents, according to their importance criteria.
	2nd Sense – SEITON	
	3rd Sense – SEISO	
	4th Sense – SEIKETSU	
	5th Sense – SHITSUKE	
	10th Sense – SEKININ SHAKAI	
4, 5, 6	5th Sense – SHITSUKE	Hire employees, in order to divide and delegate functions, so that in any urgency or need, neither the process nor the employees stand still.
	6th Sense – SHIKARI YARO	
	7th Sense - SHIDO	
	9th Sense – SHISEI RINRI	
7	5th Sense – SHITSUKE	Hire a professional, train him and enable him to work in the “Sketshup Program”, to design the custom furniture, in order to save on costs with outsourced services, and thus deliver the projects in a timely manner for the client's approval.
	6th Sense – SHIKARI YARO	
	7th Sense – SHIDO	
	8th Sense - SETSUYAKU	
	9th Sense – SHISEI RINRI	
8	5th Sense – SHITSUKE	Stipulate for the client a maximum limit of three changes to the furniture design, before production begins, in addition to imposing a fine of 10% on the final agreed value, after the contract is signed or the furniture is produced.
	8th Sense - SETSUYAKU	
	9th Sense – SHISEI RINRI	
9	1st Sense – SEIRI	Save photos of email projects, assemble, identify and date folders on the computer according to the update performed.
	2nd Sense – SEITON	
	5th Sense – SHITSUKE	
10, 11, 13	1st Sense – SEIRI	Organize on the “Production Order” wall, located inside the office, the sequence with the updated dates of each client, so that the priority of production and delivery is easy to access and view for all employees.
	4th Sense – SEIKETSU	
	5th Sense – SHITSUKE	
	9th Sense – SHISEI RINRI	
12	5th Sense – SHITSUKE	Create a website to publicize photos of the furniture that was produced as a way of attracting a larger clientele to the company.
	9th Sense – SHISEI RINRI	
	10th Sense – SEKININ SHAKAI	

Source: The Author (2018)

## FUTURE ACTIONS

During the analyzes carried out on site, within the processes and analysis of causes, future actions that are already under negotiation were also analyzed, expected to be implemented and completed by the year 2020.

Each of the preventive actions already approved was also evaluated and inserted within each sense of quality in the same way as the corrective actions.

- New machinery: acquisition of new wood cutting machines. Since these are computerized machines, the objective of this acquisition is to reduce process time, reduce the issue of cutting errors to the standard of “zero defects”, since, after carrying out the project, the drawings and measurements of the pieces, they are passed on to the equipment's cutting program, which will search the sheet for the best angles to cut the wood, always seeking the greatest use with the least possible waste;
- New workshop: a project was carried out to build a new warehouse to install the workshop, at the back of the land, the area where the parking lot is currently located, so that in this new project, for the distribution of the new carpentry layout, the machines can be arranged in a functional way so as to be considered the appropriate storage location for raw materials and inputs, always evaluating ergonomic issues of work, movement of people and products, as well as loading and unloading of finished products;
- Store: it was also proposed for the future project, the creation of a decoration store for the sale of fine furniture, which should be installed in the environment where the furniture workshop is located today, where investment will be made in functionality and in the decoration itself of a home, since customers will have the convenience and a variety of other furniture to choose from, from sofas, armchairs, dining tables, among other products, without having to look in other establishments. The intention here is to increase sales based on the quality already offered of the planned products, in addition to providing more value to the customer, investing in their accessibility, with the building being built with a setback in order to offer private parking for customers, in addition to the project regarding bathrooms complying with accessibility standards;
- Show Room: on the mezzanine, which was built over the workshop building, a Show Room must be installed to display the furniture designed within environments, such as bedrooms, kitchens, in order to publicize and draw the attention of customers to the idea of how the finished products would remain inside their homes;
- Logo: a logo was created for the company, as shown in figure 9, so that it can standardize, identify and publicize the organization's work wherever it is seen;

Figure 9: “Costarte Móveis” logo



Source: “Costarte Móveis” (2018)

- Standardization: it was proposed to make different uniforms, such as shirts, t-shirts and caps for employees, with the company logos in order to standardize, identify and publicize the company;
- Website: creation of a website, [www.costarte.com.br](http://www.costarte.com.br) to expand and publicize the custom furniture, as well as the company's contact with a possible new clientele;
- Publicity: creation of folders, business cards, stickers for the windows on the store's facade, as shown in figure 10, and for the company's cars, always with the aim of publicizing and drawing the attention of new customers to the differentiated products.

Figure 10: Design of the “Costarte Móveis” store facade



Source: “Costarte Móveis” (2018)

In view of the various projects presented as future actions, one can see the importance of continually working on the implementation of quality senses, since each of the senses has its own characteristics and when they are worked on in a constant and disciplined way to achieve improvements continuous, the proposed goals will always be achieved.

## FINAL CONSIDERATIONS

Given the arguments presented in the introduction and literature review, it can be confirmed that the application of the 10 senses really brings a difference to any type of business.

In the case study described, it was possible to implement some of the approaches that resulted in better quality of service and customer service, as well as improvements in the work environment.

It was evident that the sense of organization and cleanliness were necessary and were well accepted, as it made everyone's work easier, which paved the way for the implementation of other senses, once the owner realized the results that the 10S Program brought and even can bring.



## REFERENCES

- Arnold, J. R. T. (1999). *Administração de Materiais: uma introdução [Materials Management: An Introduction]*. (C. Rimoli & L. R. Esteves, Trans.). São Paulo: Atlas.
- Azevedo, P. D., & Nolasco, A. M. (2009). Requisitos ambientais no processo de desenvolvimento de produtos em indústrias de móveis sob encomenda. In B. F. Giannetti, C. M. V. B. Almeida, & S. H. Bonilla (Eds.).
- Barbosa, R. A., da Costa, F. N., Ferreira, L. M. L., Nunes, C. E. D. C. B., & Alves, I. B. S. (2009). Elaboração e implementação de um plano de manutenção com auxílio do 5S: metodologia aplicada em uma microempresa [Elaboration and implementation of a maintenance plan with the aid of 5S: methodology applied in a microenterprise]. In Encontro Nacional de Engenharia de Produção.
- Campos, R., Oliveira, L. C. Q., Silvestre, B. D. S., & Ferreira, A. D. S. (2005). A ferramenta 5S e suas implicações na gestão da qualidade total [The 5S tool and its implications in total quality management]. In *Simpep–Simpósio de Engenharia de Produção*.
- de Almeida, P. A., & Govatto, A. C. M. (2002). Ética e responsabilidade social nos negócios [Ethics and social responsibility in business]. *Comunicação & Inovação*, 3(5).
- da Silva, E. M., & Santos, F. C. A. (2005). Análise do alinhamento da estratégia de produção com a estratégia competitiva na indústria moveleira [Analysis of the alignment of production strategy with competitive strategy in the furniture industry]. *Production*, 15(2), 286-299.
- Domingues, M. A. (2011). A importância do Programa 5S para a implantação de um sistema da qualidade [The importance of the 5S Program for the implementation of a quality system].
- Gadioli, B. C. (2006). Responsabilidade Social Empresarial: “Ética ou Estética?” uma análise do setor automobilístico Brasileiro [Corporate Social Responsibility: "Ethics or Aesthetics?" an analysis of the Brazilian automotive sector]. In A. I. Chamusca et al. (Eds.), *Responsabilidade Social das Empresas: a contribuição das universidades*.
- Google Dicionário. (2018). Retrieved from <https://www.google.com.br/search?q=Dicion%C3%A1rio#dobs=%C3%A9tica> - Access on April 7, 2018.
- Know.net (2018). Retrieved from <http://know.net/cienceconempr/gestao/acao-correctiva/> - Access on April 13, 2018 (Paulo Nunes).
- Lins, B. F. (1993). Ferramentas básicas da qualidade [Basic quality tools]. *Ciência da Informação*, 22(2).
- Marras, J. P. (2002). *Administração de recursos humanos: do operacional ao estratégico [Human resource management: from operational to strategic]*. Futura.
- Mendonça, M. D. S., Pinheiro, S. S., Da Hora, H. R. M., & Costa, H. G. (2010). Análise da eficácia da implantação do programa 5s: um estudo de casos em uma indústria moveleira [Analysis of the effectiveness of implementing the 5s program: a case study in a furniture industry]. *Perspectivas Online*, 4(13), 20-35.





- Naves, P. V. P. (2013). Aplicação dos conceitos de 5S em um sistema de gestão de estoques de uma indústria de móveis e seus impactos na racionalização de recursos [Application of 5S concepts in an inventory management system of a furniture industry and its impacts on resource rationalization].
- Osada, T. (2010). Housekeeping, 5 s's: seiri, seiton, seiso, seiketsu, shitsuke [Housekeeping, 5S's: sort, set in order, shine, standardize, sustain] (4th ed.). São Paulo: Instituto IMAN.
- Pasquini, N. C. (2017). Implantação do 10S como ferramenta de gestão de qualidade em hospital [Implementation of 10S as a quality management tool in a hospital]. *Revista Qualidade Emergente*, 6(1).
- Pinheiro, R. G. L., & Loos, M. J. (2016). Proposta de implantação de metodologia de avaliação do 5s em uma empresa alimentícia [Proposal for implementing a 5s evaluation methodology in a food company]. *FFBusiness – Fortaleza – V.14, – No 17 – Jan. 2016 – Pag. 261.*
- Pires, C. J. M. (2014). Aplicação do programa 5S visando a melhoria contínua da qualidade [Application of the 5S program aiming at continuous quality improvement] (Master's thesis, Universidade de Aveiro).
- PlataformaCAD. (2018). Retrieved from <https://www.plataformacad.com/o-que-e-sketchup/> - Access on April 13, 2018 (Cleber Reis).
- Ribeiro, H. (1994). 5S: A Base para a Qualidade Total [5S: The Foundation for Total Quality]. Salvador, BA: Casa da Qualidade.
- Sebrae. (2018). Retrieved from <http://blog.sebrae-sc.com.br/moveis-planejados-como-oportunidade-de-mercado/> - April 10, 2018 (Priscilla).
- Significados. (2018). Retrieved from <https://www.significados.com.br/responsabilidade-social> - Access on April 7, 2018 (Fábio Eon).
- Significados. (2018). Retrieved from <https://www.significados.com.br/moral> - Access on April 7, 2018.
- Silva, J. A. B. (2004). *Revista Bannas Qualidade*. Programa 10S. Retrieved from <http://www.ebah.com.br/programa-10s-doc-a37600.html> - Access on March 2, 2018.
- Tammela, I., & Canen, A. (2005). A competição baseada no tempo: um estudo de caso na indústria moveleira do Rio de Janeiro [Time-based competition: a case study in the furniture industry in Rio de Janeiro]. *Revista Produção Online*, 5(1).
- Wikipédia. (2018). Retrieved from [https://pt.wikipedia.org/wiki/Serra\\_de\\_fita](https://pt.wikipedia.org/wiki/Serra_de_fita) - Access on April 22, 2018 (Wikipédia).
- Yin, R. K. (2015). *Estudo de Caso: Planejamento e Métodos* [Case Study: Planning and Methods]. Porto Alegre: Bookman.
- Zimmer, L., & Klein, C. (2007). Cartilha programa 10S: orientações para implementação [10S program booklet: implementation guidelines]. Embrapa Suínos e Aves-Folder/Folheto/Cartilha (INFOTECA-E).