

Identifying causes of waste in the quality department of a personal hygiene products company

Identificação de causas de rejeitos, no setor de qualidade, em uma indústria de produtos de higiene

Marco Aurélio Sanches Fittipaldi¹ⁱ

Orcid: <https://orcid.org/0000-0002-8880-5529>

Jociane Sampaio²ⁱⁱ

Orcid: <http://orcid.org/0000-0003-2101-1430>

Abstract

This study presents the case of a personal hygiene products company, which produces sanitary pads and is the market leader in Brazil. There was a significant rise in the number of rejected products between 2016 and 2017. This technical paper, therefore, identifies the causes for rejects in the quality department due to nonconforming finished products. An action research was carried out with data sourced from the quality, process, and production departments. There were 473,280 sanitary pads that were rejected because of tears between January and April 2017. Possible causes of this problem are lack of operational knowledge of quality, failure in machine performance, and nonconforming raw material. Nonconforming raw material was found to be the main trigger of the problem, causing waste and loss amounting to R\$176,398.00 in raw materials and finished products. Losses were remedied after negotiation with the supplier and by changing the supplier.

Keywords: quality; nonconformity; raw material.

Resumo

A empresa, objeto deste estudo, atua no segmento de higiene pessoal produzindo absorventes e é líder de mercado no Brasil. Entre os anos de 2016 a 2017 teve um crescimento expressivo na quantidade de produtos rejeitados. Assim, o objetivo deste artigo tecnológico foi identificar as causas de rejeitos encontrados no setor de qualidade, oriundos dos produtos acabados não conforme. Realizou-se uma pesquisa-ação com fonte de dados nos setores de qualidade, processo e produção. Entre janeiro e abril de 2017 houve 473.280 unidades de absorventes rejeitados por rasgos. Possíveis causas do problema: ausência de conhecimento operacional referente à qualidade, falha no desempenho da máquina e matéria-prima não conforme. Constatou-se que a causa da matéria-prima não conforme era a principal causadora do problema fato que causava rejeitos e perda de R\$ 176.398,00 com matéria-prima e produtos acabados. Após a negociação com o fornecedor e a troca deste e as perdas foram sanadas.

Palavras-chave: qualidade; não conformidade; matéria-prima.

1 INTRODUCTION

Large-scale production is based on standardization, which, in principle, would not present quality problems. However, it is not always possible to obtain identical products because of production line factors that may result in variations in goods (DE

BRITO; BRITO, 2020) and productivity loss.

By improving quality, productivity, and operational efficiency, organizations expect to realize greater profitability (CAETANO; LOBOSCO, 2016). This continuous improvement process is not just a way for companies to outline their

¹ Centro Paula Souza - FATEC - Itaquaquecetuba - SP – Brasil. E-mail: marcoafittipaldi@yahoo.com.br

² Centro Paula Souza - Fatec Itaquaquecetuba - SP – Brasil. E-mail: jociane23@hotmail.com

We/The authors thank Crimson Interactive Pvt. Ltd. (Ulatius) – www.ulatius.com.br for their assistance in manuscript translation and editing.

management guidelines but also instrumental to success in a highly competitive environment.

To be successful, companies need to continually prepare themselves for the challenges of maintaining production quality. For this, they must innovate, improve their performance, and add value to their products; that is, they must optimize the production process. To do so, they must minimize costs, reduce defects, and eliminate failures (PALADINI, 2012; BRODBECK; HOPPEN; BOBSIN, 2016; MARQUES; SANTOS; VINOTTI, 2018). Therefore, they need to understand and constantly improve their processes.

This work is relevant because the company under study faced the issue of finished products being rejected because of quality because they did not conform to specifications. In 2016, 40,320 sanitary pads units were rejected for quality, and in 2017, there were 473,280 units. This caused waste of raw material and costs, which could generate loss of consumer preference for the brand and, consequently, loss of competitiveness in the market. One of the authors worked at the company in the quality department and did not understand why the organization did not seek to solve the problem. This inaction on his superiors' part caused him both great discomfort and curiosity about the possible causes of the problem.

2 INVESTIGATED CONTEXT

The company (hereafter “Z Brasil”) operates in the personal hygiene sector. It is a market leader and is present in more than 140 countries with operations in 37 of them. It offers good quality products that meet the needs of nearly 1.5 billion people globally. It has been present in Brazil since 1996 and offers products that are already a part of the daily lives of Brazilians.

Since its foundation in 1872, the company has valued the quality of its products and services as a way to ensure profitability and growth. Its policy has been to design, manufacture, and deliver

products that meet or exceed customer and consumer expectations regarding quality, performance, and value. The manufactured products are sanitary pads, designed to keep the skin dry and ensure women's comfort and safety. The manufacturing practices ensure that the process is in optimal hygienic conditions.

The quality area that will be studied ensures the conformity of the products, and it is a support area. Its function is to measure and report the results of the quality of finished products through the evaluation of attributes (qualitatively evaluated characteristics) and variables (quantitatively evaluated characteristics). It is a multiplier agent of quality concepts; it supports production through actions aimed at improving products and processes. The area's role is to define reference standards for product quality and follow up on complaints and suggestions from consumers through customer service. All these activities are documented through standard operating procedures and work instructions, which are accessible to employees involved in the activities.

In April 2017, Z Brasil had a higher reject rate than during the same period in 2016, out of nonconforming finished products, which led to lack of quality losses and impacts on the company's results. The lack of quality of the finished products generated costs, losses in machine efficiency, reduced performance, rework, reinspection and overtime. Aiming to reducing the volume of rejected products, the authors developed an investigation to identify the possible causes of rejects, taking necessary actions to optimize the process.

This article describes the problem-solving process that occurs in companies with the support of scientific research and employs the CIMO logic (Context: problem situation, Intervention: proposal to solve the problem, adopted Mechanisms: description of how the problem was solved, and obtained Outcomes (BIANCOLINO *et al.*, 2012; MACHADO; FITTIPALDI, 2021)). Thus, theoretical gaps are not sought to be

resolved like in scientific studies, considering that problems presented are practical and specific to the companies under study.

The question that guided this research was how to reduce the volume of rejects due to nonconforming finished products. The objective was to identify the causes of rejects found in the quality department, originating from nonconforming finished products. This work discusses a management case, presenting a possible solution to the problem, implementing it, and verifying its results (BIANCOLINO *et al.*, 2012; MACHADO; FITTIPALDI, 2021).

A descriptive study was carried out to achieve the objectives, which describes the characteristics of relevant groups, such as consumers and organizations (MALHOTRA, 2012). As for the procedures, action research was used—a procedure in which the researcher is involved in solving the research problem (GIL, 2010); that is, he/she makes practical interventions throughout the research process (ENGEL, 2000) with the purpose of intentionally modifying the situation. Therefore, the study diagnoses the situation and suggests the implementation of changes to improve the observed practice, unlike participatory research, in which the researcher observes facts, records them, and makes his/her analysis and considerations (SEVERINO, 2013). Because one of the researchers worked at the company, in the quality department, he was able to verify the problem, propose solutions, and test them to verify the results. The survey was conducted from April 2017 to April 2018. The data sources used were from the quality, process, and production departments.

3 THEORETICAL FRAMEWORK

Quality refers to enforcing control and conformity to specifications in production to ensure customer satisfaction (SLACK *et al.*, 2013). It can be understood as standardization, continuous improvement, and obtaining significant

performance indexes that benefit and please the buyer (FEITEN; COELHO, 2019), which can become a determining perspective for the consumer's decision because it can increase their satisfaction. In this respect, it also includes inspection, control, assurance, and management in production (BIANCHI; FERRAZ Jr., 2020).

Thus, it is important to verify the problems that can impact both production and customer satisfaction and correct them. Innovations can help a lot in this context. For innovations and improvements to work, it is essential to control “products and processes, so that they meet the established conformity standards and requirements through the application of techniques and tools” (ROLDAN; FERRAZ, 2017, p.2) so that they can identify possible future failures or those that have already happened. Further, the company must be prepared to act promptly to prevent the recurrence of failures. All this ends up being translated into a process called “quality management,” which encompasses the actions to produce, run, and control the quality of products, including the determination of a policy and objectives, using indicators and targets.

Organizations that do not have adequate quality control measures for their operational structure are likely compromising the continuity of operations and the achievement of satisfactory results. If they cannot ensure the quality of processes, they might lose competitiveness (VENANZI *et al.*, 2018). In this context, it is necessary to restructure processes so that the flow runs in an optimized way.

The products resulting from a process have quality parameters that can be met if the basic characteristics are in accordance with what was planned (MOREIRA, 2015). Thus, quality control can be understood as a process that allows measuring the quality of a product and comparing it with a defined standard. This is necessary to reduce costs, errors incidence, delays in making, and repairs (PAVÃO *et al.*, 2018). Some tools can be

used to measure quality, such as the 5W2H (What, Why, Where, When, Who, How, How much), cause-and-effect diagram, and Pareto diagram, among others (VIERO; TROJAN, 2020).

Quality defines the specific criteria for visually inspecting product attributes and variables for acceptance into the production line. Product attributes are the quality characteristics evaluated through senses and visual patterns; they are classified as “present” or “not present.” Any dirt on the product or tear is an example of a visual attribute. Variables are product characteristics evaluated through a standard testing method using a measuring instrument. Product weight and thickness are examples of variables.

Thus, the continuous search for process improvements allows companies to achieve their goals and satisfy customers (MANNES, JF *et al.*, 2018). They must, therefore, know their processes, searching for failures that will impact manufactured products.

Processes

Processes can be understood as a sequence of steps, from product design until delivery to the consumer—interdependent and executed in a logical sequence with a well-defined start and end. They aim to produce a good or a service for a specific customer (GONÇALVES, 2000; CARVALHO; SOUSA, 2017; MANNES *et al.*, 2018).

They receive inputs that are transformed and generate outputs intended for consumers. Thus, they involve external factors such as customer satisfaction, service levels, and quality, among others, and internal factors such as loss identification and cycle time reduction, among others (CARVALHO; SOUSA,

2017). If they are executed well, they can bring reliability and durability to the product and ensure customer satisfaction (LONG *et al.*, 2015).

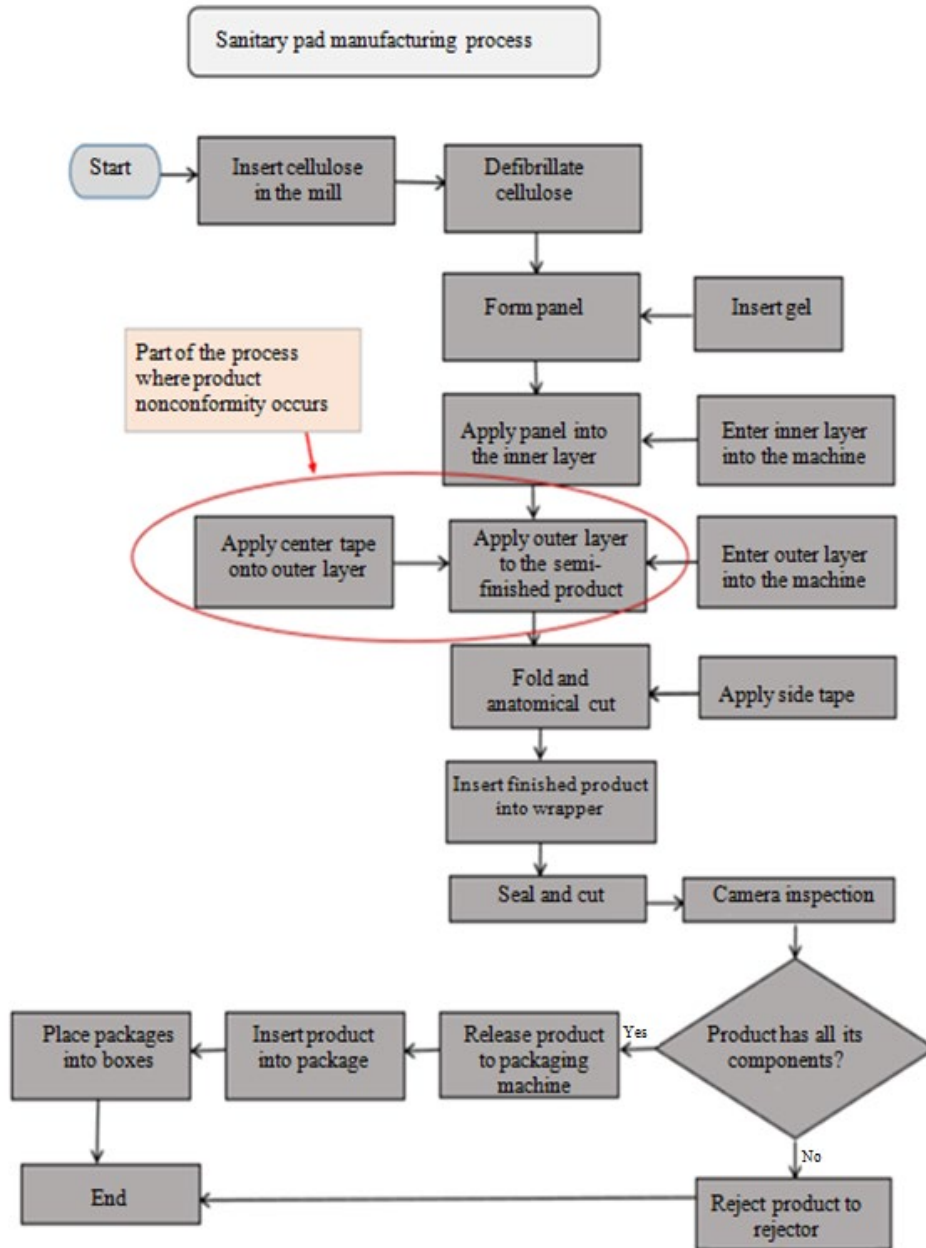
For better control and supervision of the organizational process, it is necessary to map it through designing, executing, documenting, monitoring, and controlling improvements in the process to achieve the organization’s objectives (COSTA; MOREIRA, 2018). An examination of the mapping of a process—understood as its design—based on its solid steps can help in recognizing quality problems and reasons for waste, which is essential for standardization and its subsequent understanding (BONFATTI JR.; LENGOWSKI, 2018).

The graphical representation demonstrates activities and departments, their relationships, and what they do but not how they do it (AMARILLA; IAROSINSKI NETO, 2018). The generated map can be used as an aid for managers; it identifies potential areas of improvement (BUENO, 2020).

4 DIAGNOSIS OF THE PROBLEM SITUATION

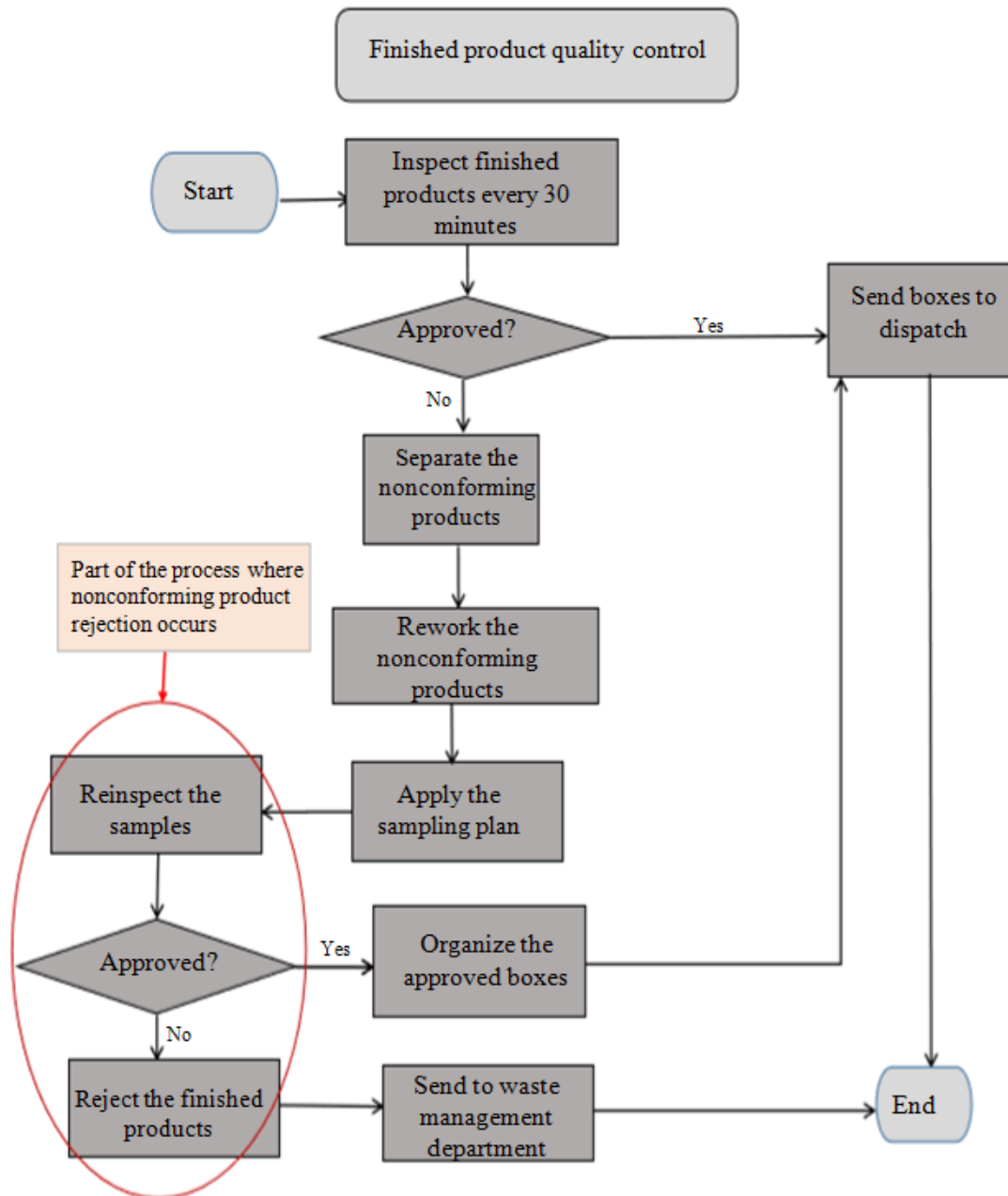
For a better understanding of the activities, a mapping of the production process of sanitary napkins and the quality control of the finished product was carried out, as shown in figures 1 and 2. The areas highlighted in red represent the part of the process in which the product’s nonconformity and, consequently, rejection occurred (GONÇALVES, 2000; CARVALHO; SOUSA, 2017; AMARILLA; IAROSINSKI NETO, 2018; BONFATTI JR.; LENGOWSKI, 2018; MANNES *et al.*, 2018; BUENO, 2020).

Figure 1 - Sanitary pad manufacturing process



Source: Survey data

Figure 2 - Finished product quality control

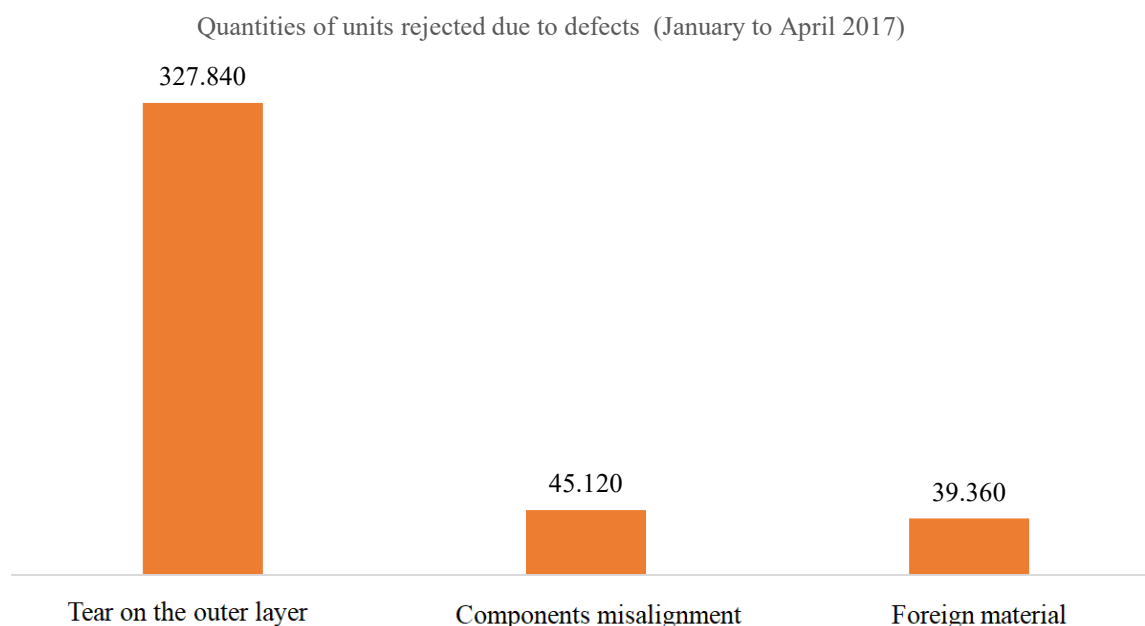


Source: Survey data

Initially, the study aimed to identify the amount of waste from a nonconforming finished product and classify the defect with the highest rejected quantity. Through the quality software, a Pareto diagram was created; it is a statistical quality tool (VIERO; TROJAN, 2020) that identifies and organizes based on priorities—the main cause is found on the left side of the graph and less relevant causes are displayed decreasingly to the right of the graph, as can

be seen in Graph 1. Also known as the 80/20 principle, 80% of problems cause 20% impacts and 20% of problems cause 80% impacts (CÉSAR, 2011). The tear defect on the outer layer represents 79.51% of the total rejected units due to defect, thus having the greatest importance because it causes the greatest impact (CÉSAR, 2011).

Graph 1 - Quantities of finished products rejected for defects



Source: Survey data

The defect is the result of a deviation between what was planned and what was produced. It is the effect of some incorrect action performed, such as a mistake made by people or equipment or material failure. Therefore, the defect is the nonconformity of a certain quality characteristic based on specifications (PALADINE, 2012; SLACK *et al.* 2013; ROLDAN; FERRAZ, 2017; BIANCHI; FERRAZ Jr., 2020). The defects shown in Graph 1 are described below.

Tear on the outer layer: facilitates product contamination and impairs use. If the product has holes, it will allow fluids to flow onto clothes, thus not performing its main function of isolating and protecting the user's clothes, as well keeping them clean and dry.

Components misalignment: refers to the lateral or longitudinal displacement of any component of a product. The components must be well placed in the product to ensure good appearance; if

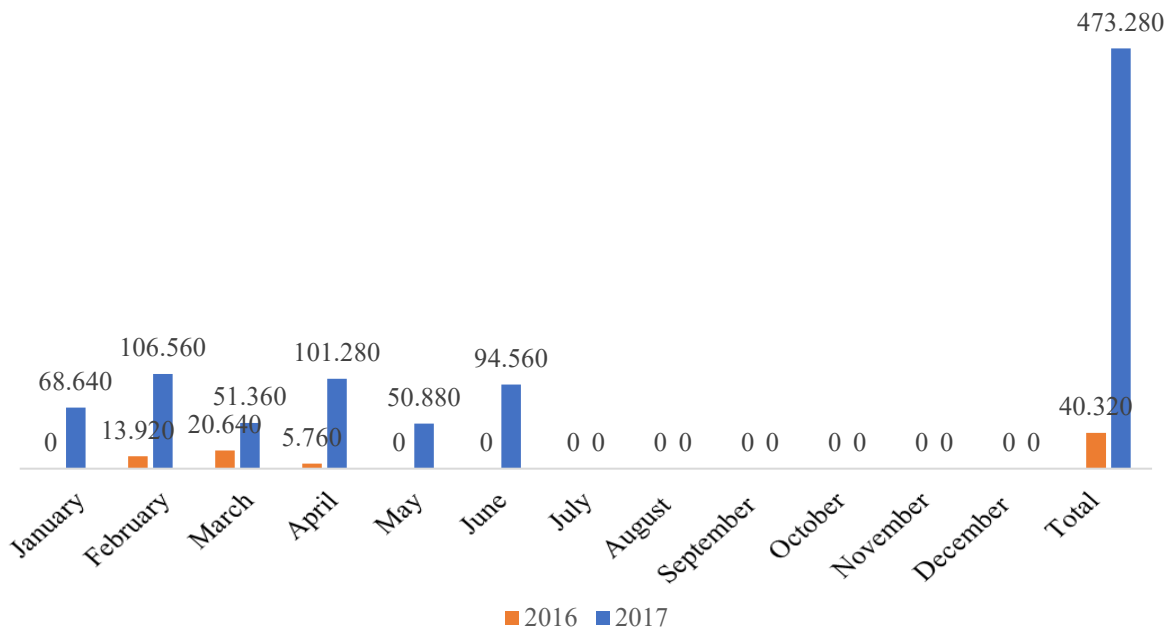
placed poorly, they may affect the product's functionality and cause the consumer to get the sense that it is a deformed product.

Foreign material on the product: refers to any odor or object that is visible on the product, which can hurt, irritate, or disturb during use and potentially cause a negative impact. For example: contamination of the product with dirt from raw material.

Sanitary pads are basically composed of a permeable inner layer—an absorbent core of cellulose, gel, central and lateral tape—and a waterproof outer layer. The components are bonded together with adhesives using heat and pressure.

It was diagnosed, according to graph 2, that there was an increase in rejections per tear; after April 2016, there were no rejections, but at the beginning of 2017, the rejections restarted in an exorbitant way compared to the numbers in 2016 and 2017.

Graph 2 - Quantities of products rejected by tear – 2016×2017



Source: Survey data

The most important step is to identify causes and propose solutions. Quality management is responsible for prioritizing quality in the production process, with reliable equipment, qualified operational personnel, duly certified suppliers, and optimized work methods (GONÇALVES, 2000; PALADINE, 2012; MANNES *et al.*, 2018). The following possible causes of the problem were accordingly identified.

- A. Lack of operational knowledge regarding product quality: lack of training is an aggravating factor that prevents good results from being achieved. Clear and objective information about the concepts of quality, product functionality, and specification can impact operational work practice.
- B. Machine performance failure: equipment failure impacts product

performance. The production machine must be in good working order. For this, maintenance must take place to ensure effective performance.

- C. Raw material: it must be in accordance with quality standards and specifications; otherwise, there is interference in the process and consequently in the finished product.

The following possible solutions were, therefore, defined:

- train machine operators;
- check the machine parts that affect the product's performance; and
- evaluate the supplier's quality certificates of the specific raw materials.

5 PERFORMED INTERVENTION

This topic describes the interventions carried out in the company to solve the following potential problems described previously: lack of operational knowledge, failure in machine performance, and raw material.

5.1 Lack of operational knowledge

Based on possible solutions, training was provided to machine operators, as a strategy to add value to employees, the organization, and, consequently, consumers. With training, human resources can be improved so that they are more productive (CHIAVENATO, 2014). The in-company training purpose was to apply employees' acquired learning in the work environment and to promote the expected effects on the operational staff to reduce the lack of quality in finished products.

People have knowledge, skills, and attitudes regarding their private careers, which must be in accordance with the requirements for the function they perform in an organization (MARRAS, 2011). Loopholes can be filled via training.

The training process was designed to optimize operational performance. It was focused on preparing machine operators to acquire knowledge and skills about quality, nonconformity, and product attributes and thus develop skills to improve quality indicators, which in this case are rejection rates.

The training took place on June 26 and 27, 2017, at 8 am, 2 pm, and 10 pm (for the operators of A, B, and C shifts), with a total duration of 8 hours. Six operators were trained in a specific room of the company, and internal resources were used. The instructors were internal auditors, who addressed the contents in a dialogue expository class with multimedia presentations.

Quality control works with samples periodically separated during the production process. Sample analyses show

whether the process enables the manufacture of products according to specifications (SLACK *et al.*, 2013; MOREIRA, 2015). Therefore, the concepts of product attributes and variables, process variation, the performed analyses, and the used methods were emphasized in the training.

Contents taught:

- a. Specific criteria for visual inspection of product attributes and variables for in-line quality acceptance
- b. Measurement equipment and instruments, as well as verification and calibration to ensure their proper functioning
- c. Definition of defects and deviations that potentially have the ability to make the product dangerous or non-functional for the consumer, which negatively impacts the continued purchase of the product and lawsuits
- d. Product specifications and indicators to measure process capability, as well as identification of nonconformity and prevention of occurrence
- e. Product inspection techniques to enable the employee to be the “eyes of quality in production”

Learning assessment was carried out immediately after the training; a knowledge test consisting of descriptive questions, consistent with the taught content, was applied, seeking to highlight the most relevant aspects; then another test was carried out with defective products to assess the operator's performance in identifying defects in practice.

Effective training generates good results for the organization and provides its employees development satisfaction. The analysis of the results proves that amounts allocated for training represent investments (TACHIZAWA *et al.*, 2006).

The development schedule for operational positions comprises training related to the activity performed by employees, in accordance with their

respective functions. Upon operational return, the training provided was incorporated into the machine operators' development framework.

5.2 Machine performance failure

In May 2017, a specific maintenance activity was carried out on the part of the machine that could affect the quality of finished products. The failure prevention or the restoration of stopped machines comprises maintenance (CORREA, 2016). Therefore, this is a way to ensure proper functioning of the equipment through correct interventions.

Maintenance was carried out by a machine operator, a mechanical technician, and an electronic technician, with the purpose of identifying possible failures in the performance of the productive machine. The equipment parameters were checked to define whether or not there is a need for an intervention and adjustment. Initially, the mechanical technician and the electronics technician stated that there was no problem. Then, cleaning of equipment to eliminate existing impurities took place. The systematic action of inspection is aimed at minimizing or reducing failures in the production process and ensuring operational continuity, without impacts on product quality (PALADINI, 2012; BRODBECK; HOPPEN; BOBSIN, 2016; MARQUES; SANTOS; VINOTTI, 2018).

Five basic performance goals apply to all types of production operations, namely: quality, cost, time, reliability, and flexibility. The maintenance function is significant in meeting performance objectives, being an internal activity to support the manufacturing function, which can directly or indirectly influence all of them, with emphasis on the quality objective (SLACK *et al.*, 2013).

In parallel with the training process, the verification of the raw material that could cause a defect in the finished product took place. There is a quality agreement with the supplier, in which the necessary specifications and requirements that ensure the quality of the materials are established. The assessment is carried out through an audit at the supplier's facility. To achieve certification, the quality management system must be defined in accordance with the latest International Organization for Standardization (ISO) 9001 standard. The ISO draws up international standards that describe quality systems. ISO 9001 requirements guide companies in terms of quality management, seeking continuous improvement and ensuring the company's competitiveness.

ISO 9001 is the standard that certifies quality management systems and establishes the requirements for implementing the system. The objective is to bring confidence to the customer that the company's products and services will be created in a standardized and consistent manner (BIANCHI; FERRAZ JUNIOR, 2020).

For each batch of raw material received at the Z Brasil company, a certificate of conformity is issued by the supplier. The information contains the specification details and the results of variables and attributes. For the verification of the raw material, all certificates received during 2017 were identified. After the analysis, an internal test was carried out with the raw material received, according to the certifications presented for comparison.

Six batches of raw materials (silicone tape) were analyzed, and failure in silicone application was detected. The raw material is approved if there are no dark blue spots and scratches on the entire surface of the paper, as shown in Figure 3.

Figure 3 - Conforming raw material



Source: Survey data

Figure 4 - Nonconforming raw material



Source: Survey data

Figure 4 shows the nonconformity of the raw material; that is, it was done out of the project’s specification (SLACK *et al.*, 2013). Highlighted dots and scratches have silicone defect. This defect causes tearing when removing the central tape from the outer layer of the finished product.

Four batches of nonconforming raw material were identified, which were blocked by quality and not sent to the production machine. The batches were tested on the machine jointly with the supplier monitoring to verify the impact on the finished product; 3,200 units were

produced, and inspections on the products were carried out based on the ISO 2859 standard. This standard defines the sampling for inspection of attributes and the acceptable quality level.

The acceptance number is the maximum number of defective products that are allowed in a sample. The sample size was 125 units based on the batch of 3,200 units produced. For this sample, the maximum acceptable number of defective products was seven units—that is, in the case of above seven units of defective products, the batch was rejected.

Table 1 - Product analysis with nonconforming raw material

Finished product analysis	
Sampling plan (units)	Quantity defective products (units)
125	14

Source: Survey data

According to Table 1 there were 14 defective products; in this case, the batch was rejected because the sample should have had only 7 defective products. From this analysis, it was proved that the nonconformity of the raw material had an impact on the performance of the finished product. This could lead to a loss of reliability and durability of the product—a fact that would generate loss of customer satisfaction and competitiveness (LONG *et al.*, 2015; VENANZI *et al.*, 2018).

After proving the nonconformity of the raw material, the supplier was prompted to start an internal investigation process to determine the root cause of the problem and take appropriate corrective actions. There was a survey of the costs involved, as shown in Table 2, and it was sent to the procurement department for negotiation with the supplier. Note that the company had a total loss of R\$176,398.00 with nonconforming raw material and rejected finished products.

Table 2 - Cost of raw material and finished product

Costs	
Nonconforming raw material	Rejected finished products
BRL 126,163.00	BRL 50,235.00

Source: Survey data

The decision of whether to continue or to leave the supplier was taken by a cross-functional group comprising the procurement, research and development, quality, operations, and marketing departments. The decision made by the group was to remove the supplier and develop two new suppliers for replacement.

6 RESULTS OBTAINED

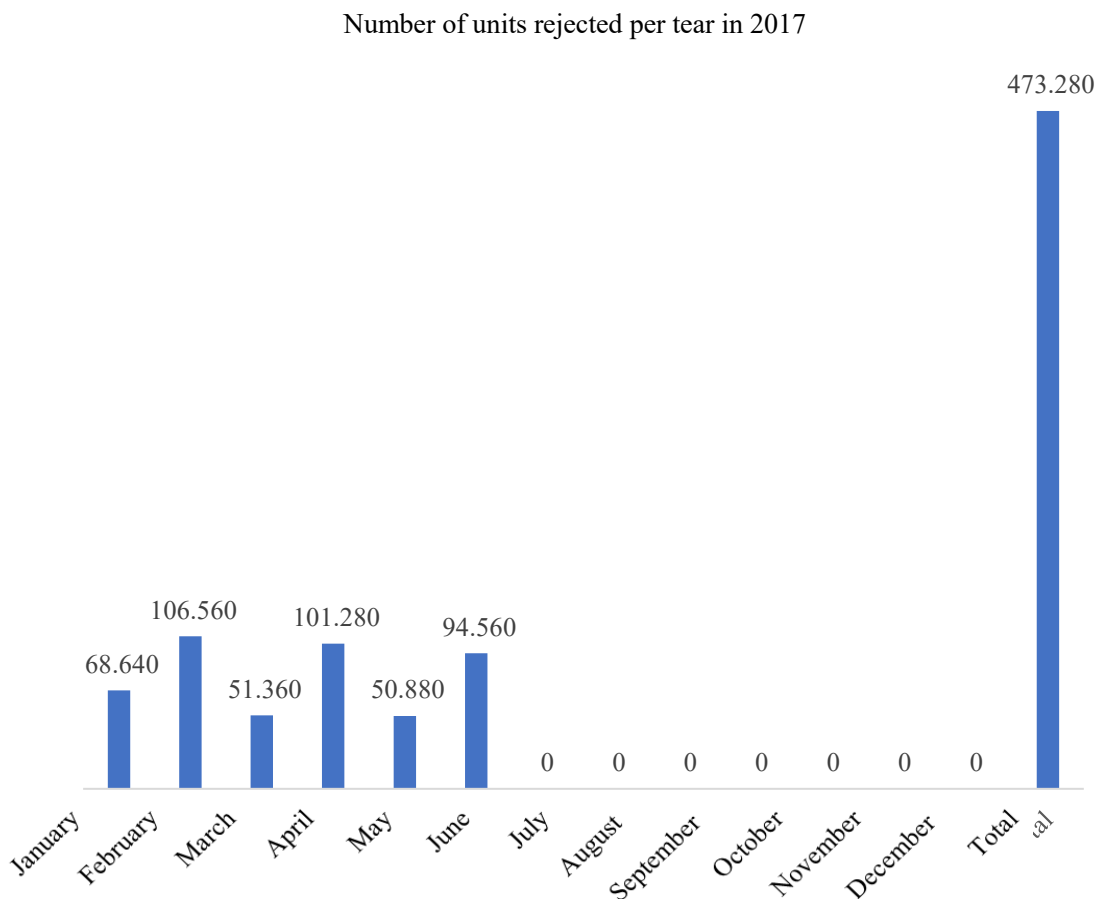
After identifying the problems and carrying out interventions, the results obtained in the three areas identified are as follows: lack of operational knowledge,

failure in machine performance, and raw material.

6.1 Analysis after interventions

Graph 3 shows the quantity of finished products rejected for quality before and after the interventions were carried out. As seen from July to December 2017, there was no unit rejected for tears, thus solving the problem of conformity with the presented specification (SLACK *et al.*, 2013; BIANCHI; FERRAZ Jr., 2020).

Graph 3 - Quantities of finished products rejected by tear - 2017



Source: Survey data

To better understand the obtained results, the schedule of the performed activities is described below:

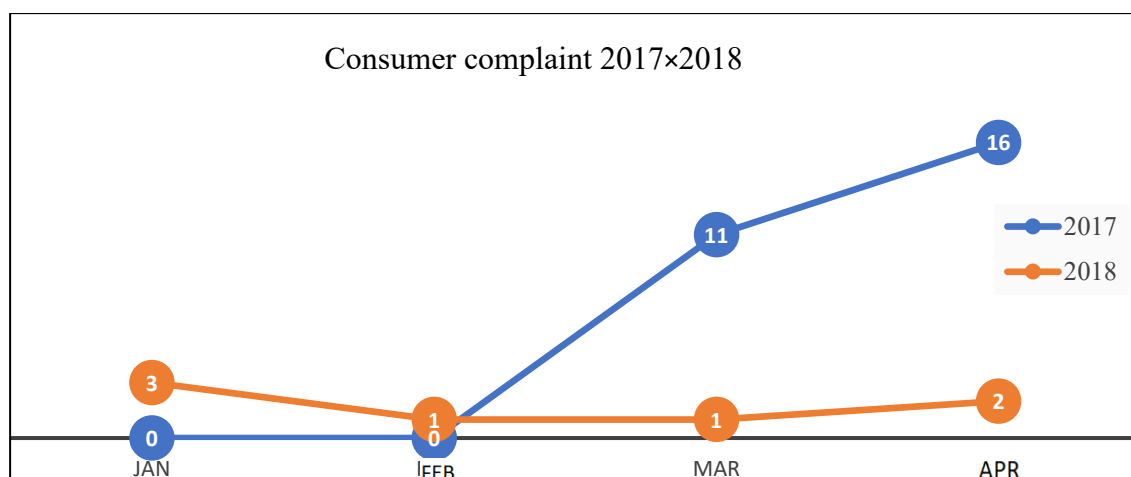
- A. April–start of research. Data were collected, the problem situation was identified, and possible ways to solve it were found. Notably, this month had the second largest number of units rejected by tear.
- B. May–start of interventions, the plan was implemented on an experimental basis, and the production machine was checked. There was a drop in the number of rejections.
- C. June–training process for machine operators, carried out along with the raw-material testing. There was confirmation of raw material nonconformity and change of supplier. The number of rejections increased again significantly.
- D. July to December–post-intervention period. Objectives were achieved, and rejection losses resulting from nonconformity were eliminated.

The results obtained reflect a decrease in the quantity of nonconforming finished products rejected; an improvement

in the production process; increased machine efficiency and performance; cost savings from poor quality; an improvement in consumer satisfaction and consequently in the brand image; an increased operating profit; an upgrade of the technical competence of trained operators; and a dissemination of learned content and reduction of waste generated by rejections (GONÇALVES, 2000; PALADINI, 2012; SLACK *et al.*, 2013; BRODBECK, *et al.*, 2016; MARQUES; SANTOS; VINOTTI, 2018; PAVÃO *et al.*, 2018; FEITEN; COELHO, 2019; BIANCHI; FERRAZ Jr., 2020).

Graph 4 shows the number of consumer complaints due to tears in the external layer. In 2017, there were a total of 27 complaints; in 2018, there were 4 complaints. Thus, in 2018, there was a reduction of 85.18% compared to the same period in 2017. The drop in the number of complaints demonstrates that the applied quality actions had the expected effect, impacting customer satisfaction and, therefore, quality (SLACK *et al.*, 2013; MANNES *et al.*, 2018; FEITEN; COELHO, 2019; BIANCHI; FERRAZ Jr., 2020).

Graph 4 - Consumer complaint for tear in the external layer: 2017×2018



Source: survey data

The company must offer products that are competitively priced, that meet the customer's needs and expectations, that cover costs, and that ensure profits. To achieve these results, it is necessary to know

the process and how to use available resources to obtain quality products.

A determinant for obtaining quality products is the quality of the raw material. It is suggested that the company sets up

inspections to ensure that the purchased material meets specified requirements. In this context, there is a need to analyze the causes and not just the effects. From this perspective, an internal procedure must be created for the implementation of tests upon receipt of raw material to be periodically carried out and to validate certificates before sending them to the production department. Standardization and expansion is recommended for all raw materials used in the production process. Raw material validation is essential for process optimization.

7 SOCIAL-TECHNOLOGICAL CONTRIBUTION

Through this study, the proposed objective was achieved, as well as a reduction in the waste from nonconforming finished products through the actions carried out *in loco*.

Companies must continually assess their suppliers; specifically, it is suggested that the assessment at suppliers' facilities and processes be carried out frequently. The confidence that the raw material was standardized according to the ISO 9001 certification was broken. The certification required by several companies as a prerequisite for supply becomes a fragile aspect because after the certification process, companies "loosen" the rigor in the manufacturing process of their products, thus leading to a loss of standardization. The constant recalls by vehicle manufacturers are an example of this. Do not rely only on certifications but carry out inspections upon receipt of raw material before sending it to the production department.

If the buyer identifies nonconformities in the raw material, negotiations should be initiated and conducted with suppliers to clarify deviations and control the response and execution of the action plan to eliminate nonconformities. Use continuous improvement tools for cases where the real cause of the problem cannot be found.

Creating indicators that control the raw material that caused most of the quality problems is recommended. After analyzing the indicators, consider the need for a technical visit to the supplier, hence creating a bond of trust between the supplier and buyer.

REFERENCES

- AMARILLA, R.S.D.; IAROSZINSKI NETO, A. Análise comparativa dos principais processos de negócio de empresas do subsetor de edificações da construção civil. **Gestão & Produção**, v. 25, n.2, p. 269-283, 2018.
- BIANCHI, E.M.P.G.; FERRAZ JR., S. E-Qualifácil: preparing small businesses for a quality management system. **BAR – Brazilian Administration Review**, v. 17, n. 1, p. 1-25, 2020.
- BIANCOLINO, C.A. *et al.* Protocolo para elaboração de relatos de produção técnica. **Revista de Gestão e Projetos – GeP**, v.3, n.2, p. 294-307, 2012.
- BONFATTI Jr., E.A.; LENGOWSKI, E.C. Mapeamento do processo produtivo de erva-mate. **Revista Internacional de Ciências**, v. 8, n. 1, p. 82-98, 2018.
- BRODBECK, A. F.; HOPPEN, N.; BOBSIN, D. Uma metodologia para implementação da gestão por processos em organizações públicas. **Revista de Administração da Universidade Federal de Santa Maria**, v.9, n.4, p. 699-720, 2016.
- BUENO, R.V. **O uso do BMP no mapeamento de processos nas organizações**: uma revisão sistemática da literatura. 2020.117p. Dissertação (Mestrado em Ciência da Informação)- Programa de Pós-Graduação em Gestão e Organização do Conhecimento, Universidade Federal de Minas Gerais. Minas Gerais, 2020.

- CAETANO, L.C.; LOBOSCO, A. Ferramenta da Qualidade FMEA (Análise De Modos E Efeitos Da Falha) no Processo de Fabricação de Medicamentos Orais Sólidos em uma Indústria Farmacêutica Veterinária. *In: ENCONTRO DA ASSOCIAÇÃO NACIONAL DE PÓS-GRADUAÇÃO E PESQUISA EM ADMINISTRAÇÃO - ENANPAD, XL*, 2016, Costa do Sauípe, Ba. **Anais [...]**. Enanpad, 2016.
- CARVALHO, K. A.; SOUSA, J. C. Gestão por Processos: Novo Modelo de Gestão para as Instituições Públicas de Ensino Superior. **Revista Administração em Diálogo**, v. 19, n. 2, p. 1-15, 2017.
- CESAR, F.I.G. **Ferramentas básicas da qualidade**. São Paulo: Biblioteca24 horas, 2011.
- CHIAVENATO, I. **Gestão de Pessoas: o novo papel dos recursos humanos nas organizações**. 4.ed. Barueri: Manole, 2014.
- COSTA, M.T.P.; MOREIRA, E.A. Gestão e mapeamento de processos nas instituições públicas: um estudo de caso em uma universidade federal. **Revista GUAL**, v. 11, n. 1, p. 162-183, janeiro 2018.
- DE BRITO, F. R.; BRITO, M. L. A. Impacto do ciclo PDCA no processo de atendimento aos clientes em empresa de aviamentos. *e-Acadêmica*, v. 1, n. 3, e10, p. 1-6, 2020.
- ENGEL, G.I. (2000). Pesquisa-ação. **Educar em revista**, v. 16, n. 16, p. 181-191, 2000.
- FEITEN, A.M.; COELHO, T.R. Gestão da Qualidade em Organizações de Serviços: Barreiras e Facilitadores. *Revista de Administração FACES Journal*, v. 18, n. 3, p. 56-71, 2019
- GIL, A.C. **Como elaborar projetos de pesquisa**. São Paulo: Atlas, 2010.
- GONÇALVES, J.E.L. As empresas são grandes coleções de processos. **Revista de Administração de Empresas – RAE**, v. 40, n. 1, p. 6-19, 2000.
- LONG, C.S. *et al.* Impact of tqm practices on innovation performance among manufacturing companies in Malaysia. **South African Journal of Industrial Engineering**, v. 26, n. 1, p. 75-85, 2015.
- MACHADO, M. M.; FITTIPALDI, M. A. S. Produção técnica em organizações e relato tecnológico: práticas em andamento na educação profissional e tecnológica, *REGIT*, v. 15, n. 1, p. 159-173, jan/jun 2021.
- MALHOTRA, N.K. **Pesquisa de Marketing: uma orientação aplicada**. Porto Alegre: Bookman, 2012.
- MANNES, J. F. *et al.* Gestão da qualidade no ramo alimentício: um estudo de caso em um frigorífico. **Research, Society and Development**, v. 7, n. 3, p. 1-21, 2018.
- MARQUES, E. M.; SANTOS, I. L.; VINOTTI, C.A. Sistema puxado na cadeia produtiva de uma indústria de fundição: uma proposta de implantação. **Brazilian Journal of Development**, v. 4, n. 4, p. 1570-1590, 2018.
- MARRAS, J.P. **Administração de recursos humanos: do operacional ao estratégico**. 14.ed. São Paulo: Saraiva, 2011.
- MOREIRA, D.A. **Administração da produção e operações**. 2.ed. São Paulo: Cengage Learningi, 2015.
- PALADINI, E.P. **Gestão da Qualidade: teoria e prática**. São Paulo: Atlas, 2012.
- PAVÃO, J.A. *et al.* Ocorrência e mensuração dos custos de qualidade no APL de confecções. **Gestão &**

Regionalidade, v. 34, n.102, p. 23-42, 2018.

ROLDAN, V.P.S.; FERRAZ, S.F.S. Práticas de gestão da qualidade, estratégias competitivas e desempenho inovador na indústria de transformação brasileira. **Revista Ibero-Americana de Estratégia**, v.16, n.1, 2017.

SEVERINO, A.J. **Metodologia do trabalho científico**. São Paulo: Cortez, 2013.

SLACK, N. *et al.* **Gerenciamento de operações e de processos: princípios e práticas de impacto estratégico**. 2.ed. Porto Alegre: Bookman, 2013.

TACHIZAWA, T.; FERREIRA, V. C. P.; FORTUNA, A.A. M. **Gestão com Pessoas: uma abordagem aplicada às estratégias de negócios**. 5.ed. Rio de Janeiro: FGV, 2006.

VIERO, A.; TROJAN, F. Integration of quality tools and multi-criteria methods: a bibliometric and systemic analysis. **Gestão & Produção**, v. 27, n.3, p. 1-19, 2020.

VENANZI, D. *et al.* Application of quality tools in solving problems in the production process of an ABC company – case study. **Produção em foco**, v. 8, n. 3, p. 520-538, 2018.

ⁱ Doutor em Administração pela Universidade Municipal de São Caetano do Sul, mestre em Administração, especialista em finanças e marketing e graduado em Tecnologia de Processamento de Dados.

ⁱⁱ Pós-graduada em Gestão de Pessoas: Carreiras, Liderança e Coaching pela Pontifícia Universidade Católica - PUC; Profissional e Leader Coach pela IAPERFORMA