Identification, analyzing and solving of the nonconformities through selected quality management tools

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Abstract: Companies nowadays must adapt to quickly changing conditions on the market. It is common for a production company to have some inconsistencies in the production process and it depends on the quality system how will the company decrease their occurrence. Nowadays is quality department an important part of companies because it is responsible for consistent production, high quality of produced pieces and employees working in the department. This paper aims to identify the main nonconformities and complaints to propose solutions to their reduction and corrective measures. In the article, we want to focus on the identification of nonconformities and complaints and their analysis through selected quality management tools. The first part of the article contains the theoretical basis of an overview of the issue, which further characterizes the importance of management quality, its importance and use in the company. The second part contains the main goal together with partial goals and methodology, which served as the base for calculations necessary for the elaboration of own research.

Keywords: quality management system, nonconformity, complaint, quality management tools, Pareto chart

1 Literature review

Since the company was established in 1993, the situation on the market has changed. The company had to adapt to changing conditions and introduced new quality system in order to be competitive. When the company was established, documentation was mostly kept in a paper form which slowed down efficiency. In comparison to the current situation, nowadays the company uses an internal system with shared access. In 2004 the company started to implement ISO 9001 certification and in 2013 ISO 14001 certification. Implementing the certifications helped the company to operate more efficiently on the market and maintain

competitiveness. Nowadays there are various quality management tools used to improve quality within the company.

For an organization to run and function successfully, it is essential to guide and manage it in a systematic and transparent way (Hrubec & Cservenáková, 2016). The prevailing processes of globalization and integration, along with the creation of new technology, are what define the current corporate environment (Svikruhova et al., 2021). Quality management, according to one of the concerns, is monitoring the manufacturing and product creation processes to guarantee that the final product fulfills the designer's or customer's expectations (Faghih et al., 2021). Quality management, according to one of the concerns, is monitoring the manufacturing and product creation processes to guarantee that the final product fulfills the designer's or customer's expectations (Faraji et al., 2022). Modern quality management of production is connected to quality control which is a set of activities such as continuously control of products, removing identified shortcomings, employee motivation and products improving (Pačaiová et al., 2015). A major discipline supporting the full life-cycle (consultation, commitment, verification, planning, validation for design, and delivery to consumers) needs to be completely understood in order to establish, run, and sustain Quality Assurance process skills (Zhang et al., 2020). The critical understanding and application of these methodologies in the correct discipline empower and achieves effective, adaptable, and Quality Assurance outcomes (Noda, 2021). To achieve more consistent quality, quality management employs quality assurance and control of processes as well as products (Summers, 2019). Quality management considers not just the quality of the product or service, but also the methods used to attain it (Walls et al., 2018). Quality assurance is a method of reducing errors and flaws in manufactured products and services, as well as avoiding issues when delivering solutions to clients (Abbas, 2020). This defect prevention in quality assurance differs slightly from defect detection and rejection in quality control, and has been dubbed a skiff left because it emphasizes quality earlier in the process (Bravi et al., 2019). Quality assurance refers to the administrative and procedural operations carried out in a quality system to ensure that a product's, service's, or activity's objectives and goals are met (Lee et al., 2019). Error prevention is achieved through systematic measurement, comparison to a standard, process monitoring, and a related feedback loop (Sader et al., 2021). Quality control, on the other hand, is concerned with the output of the process. Quality Assurance is more of a function of policy and administration (Ammar et al., 2021).

All of the ISO management standards are based on the premise that a quality management system is understood by everyone is the ideal prerequisite for the suitable level of quality in the company (Hinsch, 2019). According to Japanese managers, quality management is changing summary of factors which are constantly changing under the influence of its environment. Managers are supposed to be skilled in statistical methods and that is why quality management can be also called as a statistical quality management (Kapsdorferová & Švikruhová, 2018).

The organization must identify external and internal challenges that are relevant to its mission and strategic direction and have an impact on its capacity to achieve the environmental, quality, and energy management system's desired outcomes (Grover & SACHIN GROVER, 2021). There are numerous advantages to improving quality (El-Reedy, 2015). Control is a crucial managerial role that ensures the evaluation of processes in a regulated system in order to contribute to the system's or individual elements' dynamic balance (Mišún & Hudáková, 2017). Manufacturing excellence is considered as the key aspect to survive in today´s strongly competitive market environment. Goals of world-class companies are to provide products and services that really work according to requirements while generating minimal waste (Hansen et al., 2021). Processes quality and productivity improvement are getting more important and enable clear view on economical possibilities of an organization and using them leads to saving of costs in comparison to the competition of the organization (Margherita & Braccini, 2020). Economic aspects of complex quality management are essential for stable and long-term operation of a company on the market (Kumar et al., 2021). They are the main reason why is the company on the market. They serve to meet needs of owners, employees, managers, customers, suppliers, and company itself (Asif, 2020). Management should pay attention to cost analysis of quality and synthetic view of quality which is the overall economic efficiency (Prentice et al., 2020).

The article's main goal is to identify the principal causes of nonconformities and complaints to suggest appropriate corrective measures. Via analysis of these causes, we would like to find their key cause through chosen quality management tools. Results of the analysis will provide us with data on the number of nonconformities and complaints for the analyzed period, the number of costs for their correction and the key causes of their occurrence.

To fulfill the main goal, we set the following partial goals which consist of Creation of Pareto analysis based on the internal information from 8D report, identification of main causes of nonconformities and complaints in the company and suggestions for the quality department how to reduce the number of discrepancies and complaints.

Analyzed period was January 2021 till January 2022. We chose this time period due to the fact that data in 8D Report started from January 2021. By monitoring data from this time period, we can ensure uniformity and comparability of data.

For analysis of the most numerous types of nonconformity and complaint, we used Pareto analysis. Firstly, we analyzed the most numerous types of nonconformities and complaints for February.

For the purpose of comparison monthly costs on nonconformities and complaints, we summed up all nonconformities and complaint that occurred in certain month and created a bar graph. After we created the bar graph, we chose the most numerous types on complaints and summed up amount of costs on chosen complaints. We used the same procedure to calculate costs on nonconformities.

2 Own elaboration

For the analysis of the quality management system, we chose a Slovak company focused on the manufacture of engineering products and entrepreneurship operates without any foreign participation and foreign investors. The company has been using ISO 9001 certification since 2004 and ISO 14001 certification since 2013 as a quality management system. For solving problems connected to external complaints and internal nonconformities, company uses an 8D report as an effective tool of collecting data, their evaluation and further processing. The main objective of the company is to increase efficiency of processes by decreasing number of complaints and nonconformities.

2.1 Analysis of quality system tools used in the company

For purpose of this article, the quality department of the chosen company provided us with their 8D report where we found all data needed for the analysis. Based on data, we created Pareto diagram which shows us what is the biggest nonconformity which caused the highest amount of complaints in case of external customers. Goal of the company is to find as many nonconformities as possible internally, which will reduce external complaints. After identifying internal nonconformities, immediate actions are taken like for example interruption of production process of broken piece and either repairing it or excluding it from the whole process.

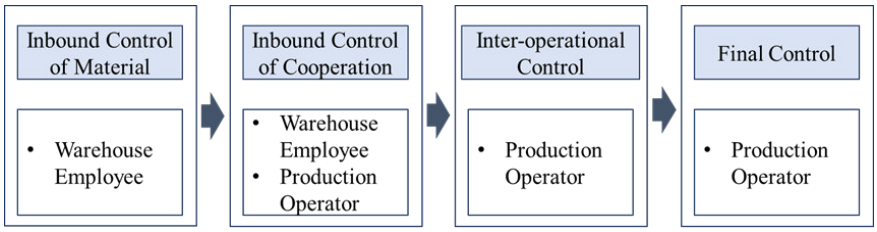

Figure 1: Levels of Control
Source: Own elaboration

In the process of production can occur a variety of nonconformities, which are found by employees, and they can be either repaired or removed from the production process. In case of external complaints, they are found by customers in their companies. After receiving a complaint report, the company can either accept or deny it. In case they deny a complaint, it will not be recorded in the monthly statistics. Each complaint and nonconformity have its own internal number which helps with better organization of the 8D report.

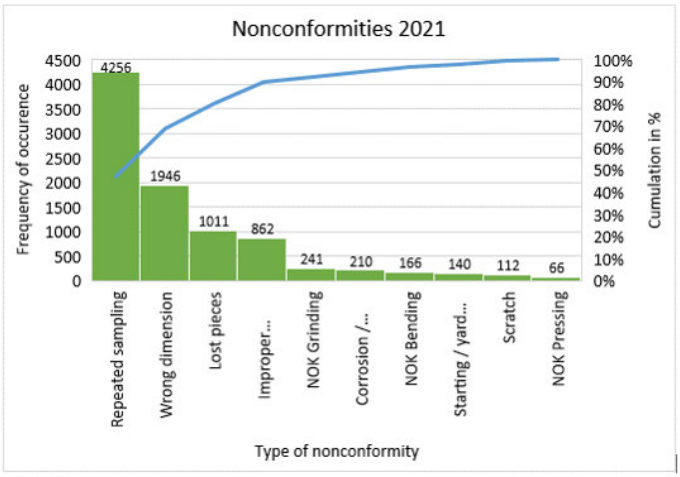

Figure 2: Pareto Analysis – Nonconformities 2021
Source: Own Elaboration based on company data

There are 10 types of nonconformities found by employees in the diagram above. Pareto diagram shows us that the most significant nonconformity with the biggest impact is repeated sampling. By solving a problem connected to repeated sampling, approximately 90% of defects would be solved.

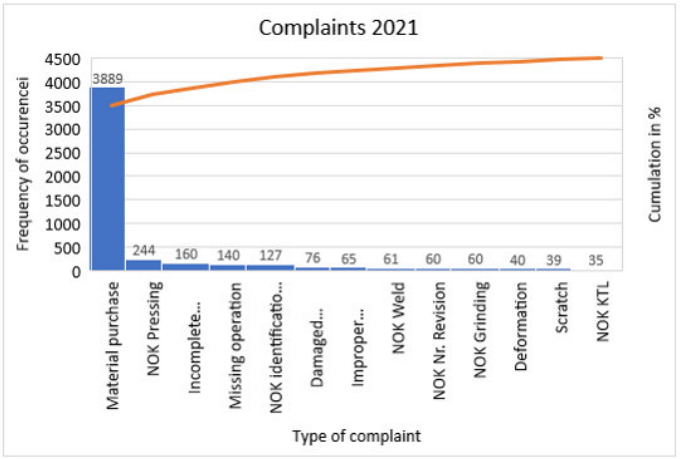

Figure 3: Pareto Analysis – Complaints 2021
Source: Own elaboration based on company data

The most significant impact has a problem with purchased material where 3 889 pieces were defected and complained. In graph we can see that over 80% of defects would be solved by solving a problem connected to material purchase. Other complaints do not occur in numbers as high as material purchase.

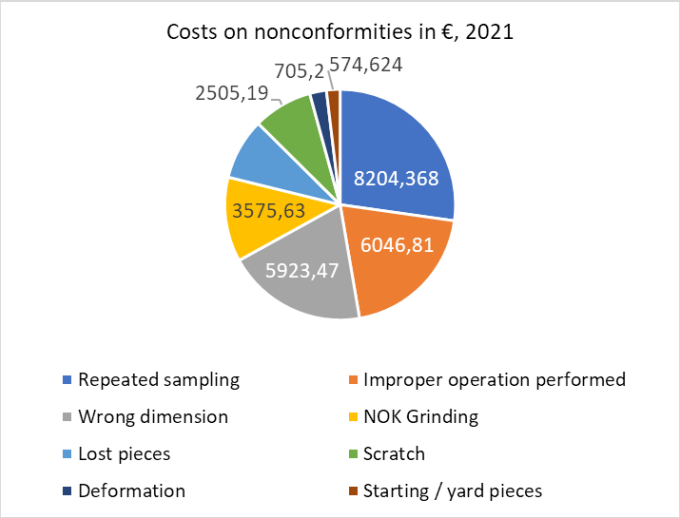

Figure 4: Costs on nonconformities
Source: Own elaboration

In Diagram 3, we can see which nonconformities are the costliest for the company. We chose nonconformities which have costs higher than 500 €. On the first place there is repeated sampling which is the costliest and most numerous nonconformities at the same time with the level of costs 8 204,37€.

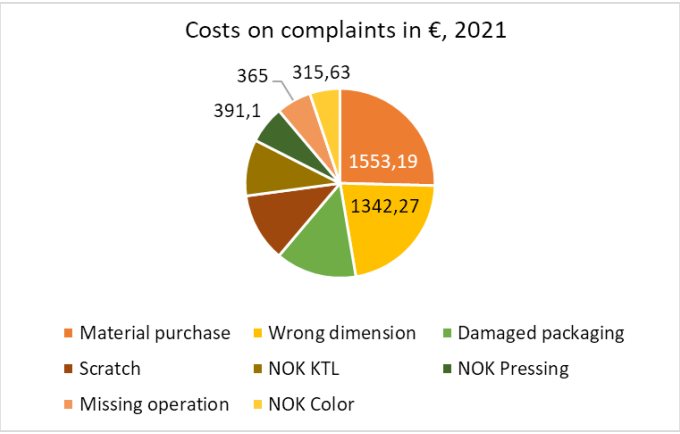

Figure 5: Costs on complaints
Source: Own elaboration

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Conclusion

By using the quality management tool – the Pareto analysis, we were able to identify the main causes of nonconformities and complaints. Based on the results of used quality management tools we suggested solutions to identified problems. When comparing amount of nonconformities and complaints, we noticed that the number of nonconformities is higher than the number of complaints. It is a company goal to identify as many defected pieces internally as possible in order to decrease the number of complaints from customers.

In Pareto analysis, we identified the most common type of nonconformity, which was repeated sampling and in the case of complaints, it was material purchase. As a result of Pareto analysis, we found out that the company can solve 90% of problems by solving the problem of repeated sampling in case of nonconformities and over 80% of problems by solving a problem with material purchase in case of complaints.

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