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ANALYSIS OF THE IMPACT OF QUALITY COSTS IN THE MANUFACTURING PROCESSES OF ROMANIAN COMPANIES

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Abstract: The main purpose of the research is to provide a deep understanding of the costs of quality and to propose practical solutions for improving the performance and efficiency of the manufacturing processes of Romanian companies. This aims to increase market competitiveness and improve financial results through effective quality management. Starting from a specific condition in SMEs from Romania, the pattern presents an operational structure specialized in quality monitoring, traceability and statistical control, based on integrated module in general software. Data is collected and monitored in real time and the system ensures quality compliance at all stages of production. Through its modern functionalities blockages are eliminated, waste of time is avoided, materials and money are saved, and, finally, it strengthens the business partnerships and the company's position in the market. Results regarding particular implementation are preserved. Using data is collected and monitored in real time and the system ensures quality compliance at all stages of production.

Keywords: Quality Monitoring, Integrated software, SME, quality continuous improvements, PCB Production

INTRODUCTION

The paper focuses on evaluating and understanding how the costs associated with quality influence the performance and efficiency of production processes in Romanian companies. This involves a detailed analysis of quality costs, which include prevention costs, evaluation costs, internal defect costs, and external defect costs. The objectives are represented by:

- identifying the types of quality costs,
- assessing the impact of quality costs, respectively
- determining the relationship between quality costs and organizational performance.

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At the present time, research on the impact of quality costs in the manufacturing processes of Romanian companies is in a variable stage of development in Academic Studies. There are various academic studies and doctoral theses that explore the topic of quality costs in the context of Romanian industry, most of them focusing on theoretical aspects and case studies.

MATERIALS AND METHODS

The structure of the quality cell depends on the size and nature of the enterprise. In small companies, this is often reduced to one person, while in companies with more than 200 employees, quality management is done by a team whose staff is on average 1% of the total employees. In companies with thousands of employees, we often find a central department and quality departments with the following structure: product design; supply chain; production; after sale; administration.[1]

Improving quality means, among other things, making less faulty products with same amount of effort or cost, which usually gives a lower unit cost.[2]

According to standards ISO 9000 – 20000, the quality costs represent the costs that are made in order to achieve the targeted quality, ensuring the customer's trust and assuming the losses when the targeted level of quality is not reached. Quality tools are essential for ensuring and continually improving quality within any organization. These tools help identify problems, analyze causes, and implement solutions. Here is an overview of the most common and essential quality tools:

- Ishikawa Diagrams (Cause-and-Effect Diagrams or Fishbone Diagrams): These diagrams are used to identify and visualize possible causes of a specific effect or problem. They help organize and systematize ideas, making it easier to identify root causes.

- Flowcharts: Flowcharts are used to graphically represent a process. They help in understanding the steps of a process and identifying potential points for improvement.
- Pareto Chart: A Pareto chart is a graphical representation that shows the most significant factors in a data set. It is based on the Pareto Principle (80/20 rule), which states that 80% of problems are often due to 20% of causes. This helps prioritize issues to address the most impactful ones first.
- Control Charts: Control charts are used to monitor processes over time and identify any variations from the standard. They help in distinguishing between common cause variations and special cause variations, facilitating process control and improvement.

RESULTS AND DISCUSSION

In terms of the number of employees, in 2024 it remained approximately the same as in 2023 in almost two thirds of companies (67.84%), the share of companies that recorded slight increases in the number of employees compared to the previous year was of 17.42%, and the share of companies that registered a slight decrease was 6.74%

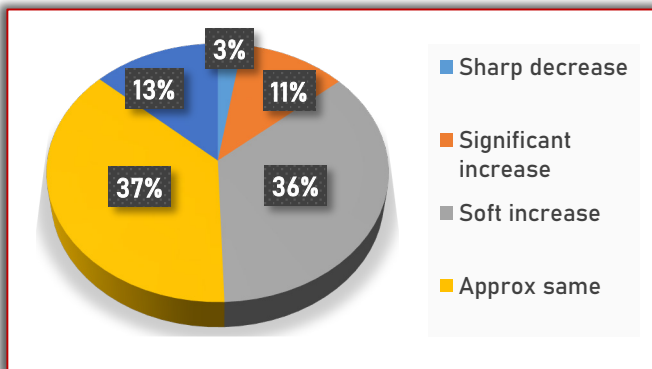


Figure 1. Physical volume of sales

Physical volume of sales represents the actual amount of products sold in a specific period, measured in physical units (eg kilograms, liters, pieces, etc.), in contrast to the value of sales, which is measured in units monetary.

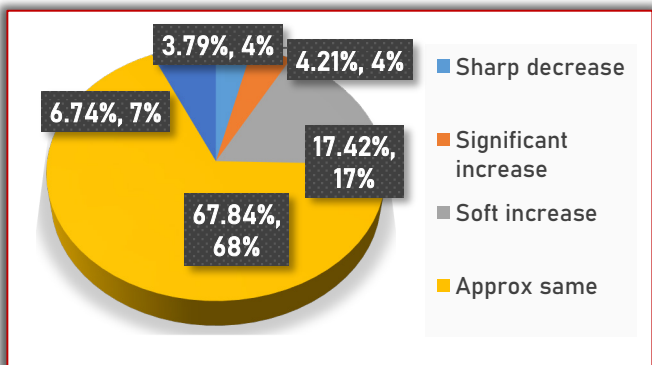


Figure 2. No. of employees

The export analysis shows that 62.5% of the companies registered exports approximately equal to those of the previous period, and only 20.54% of them had slight increases.

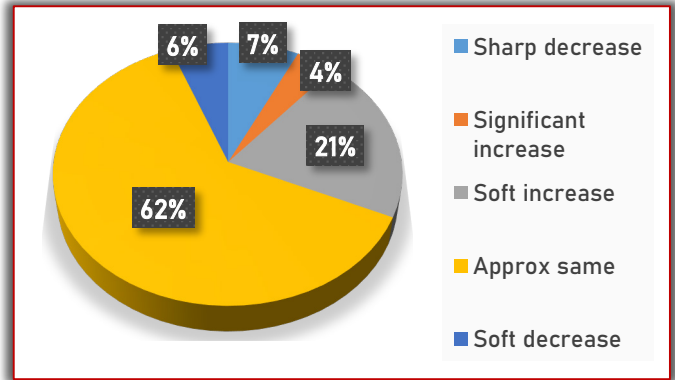


Figure 3. Export analysis

The evolution of the profit size shows that 39.66% of the companies registered stagnation regarding this indicator, and 34.88% of the companies had a slight tendency to increase the size of the profit.[3]

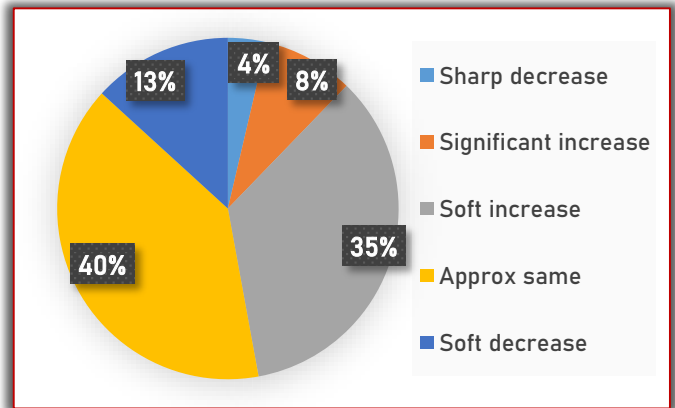


Figure 4. Profit size

A key element that has significantly contributed to economic growth in recent years is the ability of Romanian companies to adopt and use a management capable of responding quickly to complex environmental challenges, in terms of flexibility and adaptability. In 2023, the capacity of the company's management to cope with the environment and the complex economic situation in Romania was appreciated as being of average level within SMEs. Thus, a directly proportional link can be seen between the size of the enterprise and its ability to adapt to current economic challenges. Thus, only 11.87% of respondents consider this capacity as high, 45.29% consider this capacity as medium or low (22.24%).[4]

Since 1987, when the ISO 9000–9004 series appeared, the concept of quality policy has been classified along with the evolutions they have had in managerial theory. The policy of a company, including the quality policy, is in

connection with the strategic management of the organization, an aspect emphasized by Igor Ansoff since 1976.[5]

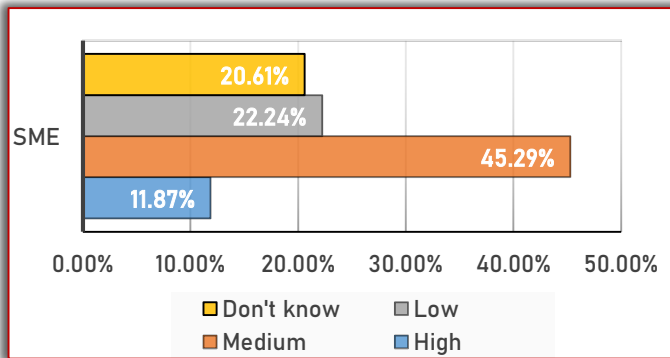


Figure 5. Management's ability to respond to challenges in 2023

Strategic management is defined as a systematic approach that aims to substantiate and achieve the company's objectives. The rationale for strategic leadership answers the questions WHERE you want to go, WHAT is the reason for being, WHAT it aims to be, HOW it will be achieved. The structuring of the managerial philosophy (including quality) is done according to the answers it must give in vision, mission, policy and strategy.[6]

The solution proposed: The main software used is SAP, in which we included our modulated program, represented by a database.

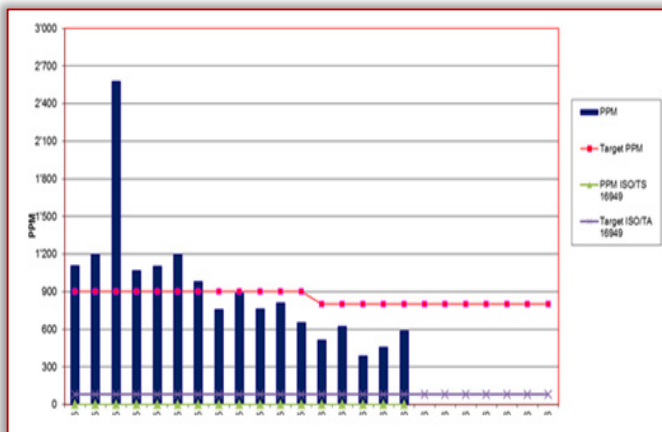


Figure 6. Evolution chart of PPM customers

In order to gain the competitive advantage, the most important component of the strategy, companies must pay attention to the strategic objectives and options that must be based on diagnosis, market research and the subordination of national strategies.

The development of a managerial strategy, including the philosophy of quality, requires outlining a vision of the future state of the system. To run a business, you need both an overview and a vision of quality

Although all these programs are powerful, we considered it a challenge to create a program

module focused exclusively on quality and that integrates perfectly with the main software.

CONCLUSIONS

After implementing this software, we noted the first improvements: Research shows that effective quality cost management has a significant impact on the operational and financial performance of firms. Quality costs, if well managed, can significantly reduce losses and improve firms' competitiveness in the global market.

As proposals we highlight:

- Continuous Research: Promoting continuous research in the field of quality costs to develop new and more effective management methods. This research should include case studies from various industries to provide a complete picture.
- Government Policies: Authorities should support quality management initiatives through incentive and funding policies, encouraging companies to invest in quality.
- Knowledge Sharing Platforms: Creating national platforms for sharing knowledge and experiences in the field of quality, where firms can learn from each other and implement best practices.

Studies show that an appropriate balance between the costs of prevention, evaluation and defects is essential. Investing in prevention and assessment is more effective in the long term than managing defects, both internal and external

Companies that invest in quality and improve manufacturing processes not only reduce the cost of defects, but also benefit from a better reputation and increased customer loyalty.

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ISSN: 2067-3809

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