Revista ARACÊ
ISSN: 2358-2472

ANALYSIS OF DELIVERY CONTROL WITH A FOCUS ON REDUCING DELAYS AND COSTS IN CUSTOMER SERVICE: A CASE STUDY

https://doi.org/10.56238/arev7n3-214

Submitted on: 20/02/2025 **Publication date:** 20/03/2025

Ana Lúcia Gomes Siston [1], Victor Hugo de Aguiar Celso Guimarães[2], Angela Pereira Accioly[3], Wallace da Silva Carvalho[4], Gisele Teixeira Saleiro[5], Márcio Jorge Gomes Vicente[6], Fernando Medina[7].

ABSTRACT

Companies constantly seek to improve performance and reduce costs, focusing on quality and excellence to meet customer needs. Quality, defined by the customers themselves, is essential for the survival and success of the business. Production Planning and Control (PCP) and quality tools, such as brainstorming and the GUT Matrix, are essential to improve management and efficiency in processes. The study aims to implement improvements in delivery control in an engineering company, seeking to reduce delays and increase customer satisfaction. The research uses quality tools to mitigate bottlenecks and improve production processes.

Keywords: Quality. Production Planning and Control (PCP).

[1] UNIGRANRIO | AFYA
[2] UNIGRANRIO | AFYA
[3] UNIGRANRIO | AFYA
[4] UNIGRANRIO | AFYA
[5] UNIGRANRIO | AFYA
[6] UNESA
[7] FIOCRUZ

Revista ARACÊ
ISSN: 2358-2472

INTRODUCTION

Companies and organizations that want to stand out in the current competitive scenario have been striving to learn and apply methods and tools that support the planning, scheduling, and execution of productive activities. As a result, they can improve their performance in the market, achieve better quality levels and reduce costs (NOGUEIRA and LOOS, 2017). Currently, with the increasing focus of companies on customer service, quality and excellence have become increasingly essential factors for the survival and success of businesses. This is because, nowadays, these characteristics have become a strategic differential for organizations that want to meet the needs, expectations, and desires of their customers (FARIA, 2017).

According to Marshall Junior (2021), from Feigenbaum's perspective, quality goes beyond a simple technique to eliminate defects; It represents a management philosophy and a commitment to excellence, being defined by the customers themselves. In this context, both the organization and its employees must be aligned, as quality is directly related to the concept of excellence in services.

According to Bogman (2002), the quality of the service offered by the company can determine the success or failure of a business. An employee's contact with the company's customers as a whole will influence the relationship with the company. In this way, the need arises to know what is the differential of the companies so that they can stand out in terms of service among their competitors. According to Ishikawa (1993), quality is the vision and satisfaction of the needs of the market, adequacy to the use and equality of the results of the process, being able to increase, idealize, elaborate and sell a more profitable and economical product to the customer. It is responsible for identifying and correcting problems that influence consumer satisfaction, being able to improve business management, if it has the involvement of all team members (OLIVEIRA, 1996).

The current environment, characterized by the importance of knowledge and technology, demands the use of modern and efficient management techniques. The concern with quality has intensified in recent years. Due to the increase in competitiveness, the adoption of quality tools shows an increasing trend, since quality is no longer a differential, but a basic requirement in products and services, which allows improving the effectiveness of management in the globalized environment (OLIVEIRA et al., 2009).

According to Campos (2014), a company does not depend only on itself to achieve success and meet all the requirements of its customers, for this, a well-structured and,

Revista ARACÊ
ISSN: 2358-2472

above all, reliable supply chain is indispensable, which is capable of leveraging the organization's competitiveness in the market. To offer excellent service, it is essential to have well-trained, satisfied and motivated employees, in addition to promoting a positive organizational environment. The continuous development of these people is crucial to improve their skills and ensure the quality of the service provided (AGUIAR & ANJOS, 2017).

Currently, companies have the need to better control deadlines, from planning, tools and control methods, to ensuring on-time delivery of orders to customers. For this, indicators are used, whose objective is to measure an activity or process. They express a number that indicates that things can be measured, and if they can be measured, they can be managed. As Drucker (2000) states, you cannot manage what you cannot measure.

Observing the numbers of meeting the deadlines of the orders, from the point of view of the Production Planning and Control (PCP) sector, a high number of delays and customer dissatisfaction with the lack of prior notices about the non-compliance with contractual dates for the delivery of products was identified. The need for implementation and improvement in the control of orders in progress in the organization became essential due to the increase in negative feedback from customers with the non-compliance with the proposed contractual dates. The recurring delay in supply in general needs to be analyzed and monitored in real time, with direct and clear status information, specifying in which stage of the process the items that comprise the order are.

Given this, the research aims to implement actions that corroborate the improvement of the process of controlling the progress of project deliveries, aiming at customer satisfaction in a company in the field of engineering solutions for safety equipment for tanks and barges that store flammable fluids, to reduce delays in service at low cost in a company in the field of engineering solutions. For this, the application of quality tools was used, to investigate and mitigate bottlenecks to reduce delivery delays, dissatisfaction and loss of customers.

THEORETICAL FRAMEWORK

PRODUCTION PLANNING AND CONTROL

The PCP can be defined as a set of managerial activities to be performed in order to achieve the production of a product (PIRES, 1995). For Vollman et al (1997), a PCP system provides information for efficient management of the flow of materials, effective use

Revista ARACÊ
ISSN: 2358-2472

of resources, internal coordination of activities with suppliers and communication with customers about market requirements. For Burbidge (1988), "the objective of the PCP is to provide an adequate use of resources, so that specific products are produced by specific methods, to meet an approved sales plan".

The PCP is a crucial function within an organization, being responsible for supervising and managing production activities, to consistently meet consumer demand and minimize the costs involved in processes, such as raw materials, inputs, and labor. The absence of adequate planning directly affects both production and logistics, generating rework, delays in deliveries, scarcity of materials necessary for production and compromising trust with customers and suppliers, in addition to overloading employees (EXTEND et al., 2017).

According to Cardoso (2021), PCP is one of the most effective methodologies in the business environment for improving processes. Its main function is to ensure efficiency and effectiveness in the production of goods and services, meeting demands in an appropriate manner in terms of quantity, quality, and deadlines. In addition, it seeks not only to meet demand, but also to reduce inventories and minimize production costs. According to Molina (2006), the PCP is an area created within the industrial management to support the production sector, and must manage the physical and human resources necessary to ensure that the objectives set by the company are achieved.

"The activities of the PCP are carried out at the three hierarchical levels of planning and control of the productive activities of a production system" (TUBINO, 2000, p. 24). For the strategic or corporate level of the PCP, the company's long-term objectives and goals are established, whose decisions focus on what the company is today and what it intends to be in the future. At this level, the direction of business, products, technology, investments, human resources, the environment and social responsibility are foreseen. The strategic level should be prepared by the company's top management for an ideal period of five years, providing for annual reviews. At the tactical or competitive level, the company's annual actions of resources and availability are determined, with monthly reviews. At the operational or functional level, short-term actions are managed and it is at this level that production planning and control involving all its logistics is operationalized.

Revista ARACÊ
ISSN: 2358-2472

QUALITY TOOLS

Quality tools help to continuously improve processes in any type of company, product and service, ensuring that the quality of these processes offered is guaranteed in the end and, thus, being able to leverage the results, increasing the company's profit and reducing waste (CORRÊA AND CORRÊA, 2002).

According to Vieira (1999), to investigate the probable causes of a quality problem, there is a specific tool. Executing these tools is no easy task. Success in quality control depends largely on the success of using this tool.

For Kume (1993), the result of a process can be attributed to a large number of factors and a cause-and-effect relationship can be found between these factors. One can determine the structure by observing the process systematically. It is difficult to solve complex problems without considering this structure, which consists of a chain of processes and data collection.

- Brainstorming

Brainstorming can help the individual to create ideas because "managing conversations", for Krog and Nonaka (2001), is the great motivator for shared knowledge. All members involved must have a clear objective and be encouraged to pass on their tacit knowledge so that they align with the objective. According to Behr, Moro and Estabel (2008), Brainstorming is a simple tool, carried out in groups to highlight problems and that can be used in any situation. Meireles (2001, p.20) reinforces that this is "a tool associated with creativity" and specifies that it should be used in the planning phase.

Osborn (1975) defined some rules for its application: The group must have a leader to manage the application of Brainstorming and a secretary to assist the leader. The members of the group must be professionals from the various areas involved in the problem to be discussed. An average number of ten people participating in the Brainstorming is suggested and the duration of the session should not exceed 45 minutes.

- GUT Matrix

The GUT Matrix is a tool widely used by companies to prioritize the problems that should be tackled by management, as well as to analyze the priority that certain activities should be carried out and developed (PERIARD, 2011). The acronym GUT, which means, respectively, Severity, Urgency and Tendency, aims to classify the degree of intensity of the damage (Severity), the time for the appearance of major problems or complications if no action is taken to solve these damages (Urgency) and the evolution of these problems,

Revista ARACÊ
ISSN: 2358-2472

either due to lack of action or incorrect action (Trend), (HÉKIS et al; 2013). The great advantage of using the GUT Matrix is that it helps the manager to quantitatively evaluate the company's problems, making it possible to prioritize corrective and preventive actions (PERIARD, 2011).

METHODOLOGY

For this work, it was characterized as an exploratory research, as it deals with procedures and peculiar needs of the company in question. It is also explanatory, as it determines the needs, motives and objectives of these trials, aiming to reduce the bottlenecks found, as well as to highlight their results. In addition, it is classified as a field strategy because it uses documents, reports and data in general from the company studied, which are not available for public consultation. It is also classified as a case study because it is a broad research of the company reporting a real process.

The chronology of application of the techniques is given by the analysis and mapping of the process through the Flowchart applied by the overview of the process in question. Through the GUT Matrix, the problems and points of improvement identified were dissected to organize them in order of priority and impact on the process, forming a scale of importance to define the focus of application of the improvement methods chronologically. To plan, organize the needs and carry out each improvement in the specified steps, 5W2H was applied, to identify what, why, where, who will execute, when, how and how much the direction stage of the practices that will be chosen for each part of the process will cost.

RESULTS

The case study was prepared from the data obtained by the PCP on the deliveries made in 2022 and 2023. With an accumulation of complaints through calls and e-mails by customers, related to the excessive delay of orders, a multidisciplinary team was created to develop this study.

The analysis of this data evaluated the KPIs of the deliveries made in 2022 and proved the existence of bottlenecks and the need for improvements in the process of delivering products to the customer. The KPIs of the deliveries are decisive in defining the quality of the service provided and customer satisfaction. As a source of information, the KPIs used as a reference by the company (source: internal documentation) are:

Revista ARACÊ
ISSN: 2358-2472

Percentage of orders delivered on time:

- ≥ 95% - above the specified limit (index of excellence).
- Between 94.9 and 70% - within the specified limit.
- ≤ 70% - below the specified limit.

Table 4 shows that of 21 orders placed in January, 11 were delivered late (totaling 52% of the total orders placed) and 10 orders were delivered on time (totaling 48% of the total orders placed). It was noticed that 68% of the orders placed in 2022 were delivered outside the deadline specified with the customer.

Table 4 – Data on deliveries 2022

Mês	Ano	Quantidade total de Pedidos	Pedidos entregues no prazo	Pedidos entregues com atraso	% de pedidos entregues no prazo	% de pedidos entregues com atraso
Jan	2022	21	10	11	48%	52%
Fev	2022	16	9	7	56%	44%
Mar	2022	20	5	15	25%	75%
Abr	2022	20	4	16	20%	80%
Mai	2022	19	10	9	53%	47%
Jun	2022	17	2	15	12%	88%
Jul	2022	27	3	24	11%	89%
Ago	2022	23	8	15	35%	65%
Set	2022	18	4	14	22%	78%
Out	2022	19	7	12	37%	63%
Nov	2022	28	8	20	29%	71%
Dez	2022	38	15	23	39%	61%
		266	85	181	32%	68%
		TOTAL			MÉDIA	

Source: Authors, 2024.

To start the investigation, the Brainstorming tool was used with the aim of generating new ideas and problem solutions. A multidisciplinary team was created to favor the diversity of ideas and visions, composed of employees of the PCP, production, sales, quality, logistics and purchasing, with the aim of defining possible causes for delivery delays.

As a result of the brainstorming, the following root causes were obtained:

1) Failure in communication between the sales department and the PCP: the flow of information is incorrect and determinant for the occurrence of errors.
2) Difficulty in viewing orders in process: not all employees have access to information on deliveries in progress.

Revista ARACÊ
ISSN: 2358-2472

3) Information flow does not work: there is no standardized information flow.
4) The delivery time does not respect the production lead time: the flow of information between the sales department and the PCP does not work.

This tool was essential and effective for evidencing the root causes of the bottlenecks in the delivery process. Next, the GUT Matrix was used to determine the priority of the root causes obtained in this step, as shown in Table 5.

Table 5 - GUT matrix of root causes

PROBLEMA	GRAVIDADE	URGÊNCIA	TENDÊNCIA	GRAU CRÍTICO	SEQUÊNCIA DAS ATIVIDADES
Falha na comunicação entre o setor de vendas e o PCP	3	3	3	27	3°
Dificuldade de visualização dos pedidos em processo	4	4	4	64	1°
Fluxo de informações não funciona	2	3	2	12	4°
O prazo de entrega não respeita o lead time de produção	3	4	3	36	2°

Source: Authors, 2024.

The difficulty in visualizing the requests in process was the main complaint in different sectors. Easy verification of this information can improve exchanges between sectors and reduce the lead time of the delivery process. The delivery time is not aligned with the production lead time. Due to the difficulty of viewing the orders in process, some delivery times established were too short, that is, there was no time for delivery. The failure in communication comes from the difficulty in viewing the information of the requests in process. Several sectors use the same information, but with different actions

Based on the conclusions obtained from the GUT Matrix, an action plan was constructed to ensure efficiency and effectiveness in mitigating bottlenecks, as shown in table 6.

Revista ARACÊ
ISSN: 2358-2472

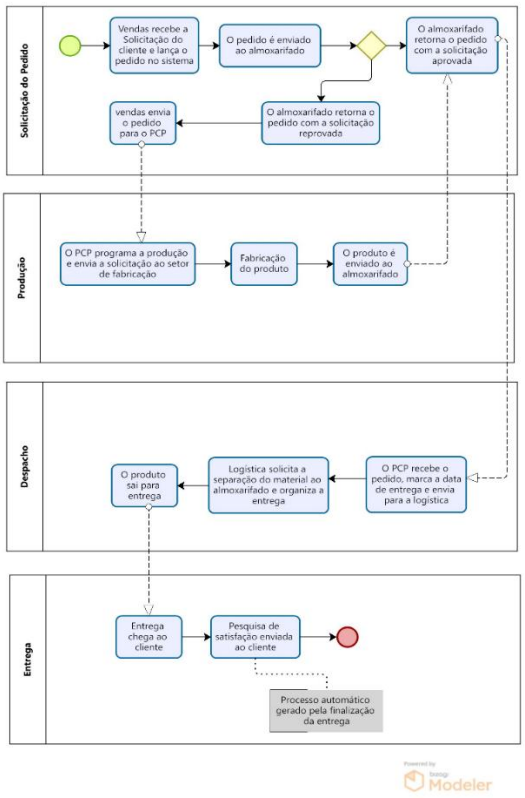
Table 6 - 5W2H

WHAT	WHY	WHERE	WHO	WHEN	HOW	HOW MUCH
Criar um fluxo de informações universal	Para que todos os setores tenham a mesma informação	In loco	PCP / Vendas	30/05/2023	utilizar a ferramenta fluxograma para criar o fluxo ideal de informações	R$ 0,00
Tornar as informações disponíveis e visuais	Para que todos os setores tenham a mesma informação	In loco	PCP / Vendas	30/05/2023	Utilizar telas para demostrar constantemente os dados das entregas	R$ 5.000,00

Source: Authors, 2024.

After the purchase and receipt of the televisions, the IT sector was in charge of installing and connecting the screens to the intranet. Every day, the PCP creates a Power point with the information from the delivery status spreadsheet and makes it available on the screens. The screens were placed at strategic points in order to facilitate viewing by everyone. In addition, a new flowchart of the sales and delivery process was applied, as shown in figure 1.

Figure 1 – Flowchart of the sales and delivery process



Source: Authors, 2024.

Revista ARACÊ
ISSN: 2358-2472

Given this, as a way of evaluating the results of the actions taken, the PCP compiled the data for 2023, from January to October, as shown in table 8.

Table 8 – 2023 delivery data

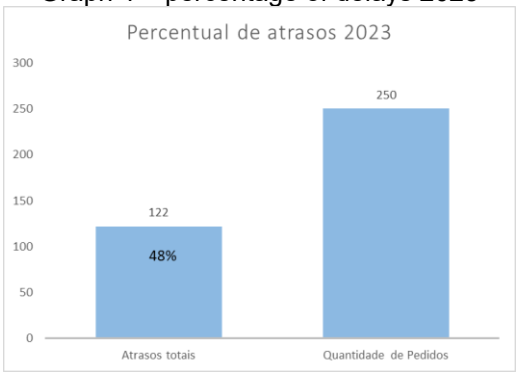
Mês	Ano	Quantidade total de Pedidos	Pedidos entregues no prazo	Pedidos entregues com atraso	% de pedidos entregues no prazo	% de pedidos entregues com atraso
Jan	2023	17	3	14	18%	82%
Fev	2023	15	7	8	47%	53%
Mar	2023	24	10	14	42%	58%
Abr	2023	32	8	24	25%	75%
Mai	2023	29	8	21	28%	72%
Jun	2023	27	10	17	37%	63%
Jul	2023	17	8	9	47%	53%
Ago	2023	20	10	10	50%	50%
Set	2023	27	23	4	85%	15%
Out	2023	42	41	1	98%	2%
		250	128	122	48%	52%
		TOTAL			MÉDIA	

Source: Authors, 2024.

The orange line demonstrates the start of the implementation of the action plan. Improvements are observed in the KPIs of percentage of orders delivered on time and percentage of orders delivered late (as per the penultimate and last column of table 8, respectively). From September onwards, KPIs are observed within the specified limits and, in October, it reaches excellence, with 98%. From the month of June, after implementation, there is a gradual decrease in backlogs.

Graph 4 shows that, until October, orders delivered late made up 48% of total orders, 20% less than in 2022. Still on the subject of improvements, according to graph 5, there is a reduction in delays after the implementation of the actions, of 38% compared to the months before the implementation.

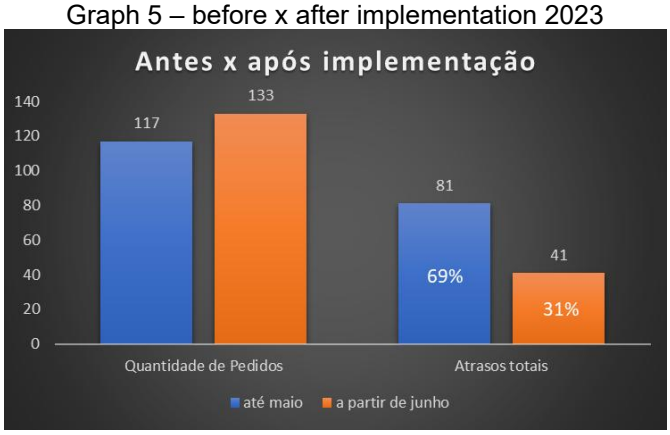
Graph 4 – percentage of delays 2023



Source: Authors, 2024.

Revista ARACÊ
ISSN: 2358-2472

Graph 5 – before x after implementation 2023



Source: Authors, 2024.

Finally, a comparison between the 2022 and 2023 KPIs was shown in graph 6. There is a 16% improvement in orders delivered on time in 2023 compared to the previous year. Although the value is below the limit specified by internal documentation (Between 94.9 and 70% - within the specified limit), it can be seen in graph 5 that this gain occurred from the implementation of the actions, in June 2023. Still on the subject of improvements, 2023 culminated with October achieving the excellent KPI, of only 2% delay.

Chart 6 – KPI's 2022 x 2023

Source: Authors, 2024.

FINAL CONSIDERATIONS

After the development of this case study, it is concluded that quality tools are fundamental elements in the processes of investigating problems. They are intuitive and promote objectivity and fluidity in investigative processes, bringing assertive and effective results. Through the use of tools to investigate, find root causes and create an action plan, changes were promoted in the processes, making them fully sustainable.

Revista ARACÊ
ISSN: 2358-2472

The tools promote healthy exchanges through diversity and creativity, involving different employees, from different areas, with divergent views and opinions. Diversity is essential to promote the richness of the study's content, providing assertive actions and, consequently, mitigating the bottlenecks in focus.

In addition to these tools, the use of KPIs was essential to define metrics and evaluate the results, based on a specification, that is, an ideal value that demonstrates the quality of the process. A statistical evaluation becomes essential and indispensable to determine the results assertively. Thus, it was noticed that from the month of June, after implementation, there is a gradual decrease in backlogs. And that, until October, orders delivered late made up 48% of total orders, 20% less than in 2022. Still on the subject of improvements, there was a reduction in delays, after the implementation of the actions, of 38% compared to the months before the implementation.

Revista ARACÊ
ISSN: 2358-2472

REFERENCES

1. Aguiar, R. M., & Anjos, M. A. D. (2017). The importance of good customer service at a gas station: A case study at the Vila Novo Gas Station in Monte Carmelo-MG. *GeTeC Magazine, 6*(11), 95-109.

2. Behr, A., Moro, E. L. S., & Estabel, L. B. (2008). School library management: Methodologies, approaches and application of management tools and library services. *Ciência da Informação, 37*(2), 32-42.

3. Bogman, I. M. (2002). *Relationship marketing: Loyalty strategies and their financial implications*. Nobel.

4. Burbidge, J. L. (1988). *Planejamento e controle da produção* (2nd ed.). Atlas.

5. Cardoso, W. (2021). *Planejamento e controle da produção (PCP): A teoria na prática*. Blucher.

6. Corrêa, H. L., & Corrêa, C. A. (2006). *Production and operations management: Manufacturing and services: A strategic approach*. Atlas.

7. Drucker, P. F. (2000). The information executives need. In *Measuring business performance*. Campus.

8. Extend, A. C., & et al. (2017). The importance of production planning and control. In *VI Singep – International Symposium on Project Management, Innovation and Sustainability*. [Publisher unspecified].

9. Faria, J. F. P. S. de. (2017). *Quality in customer service: Impact on satisfaction* [Master's dissertation, Polytechnic Institute of Lisbon]. School of Social Communication.

10. Hékis, H. R., Silva, A. C. da, Oliveira, I. M. P. de, & Araujo, J. P. F. (2013). GUT analysis and information management for decision making in an organic products company in Rio Grande do Norte. *Revista Tecnologia, 34*(1-2), 20-32.

11. Ishikawa, K. (1993). *Overall quality control: The Japanese way*. Campus.

12. Kume, H. (1993). *Statistical methods for quality improvement* (11th ed.). Gente.

13. Marshall Junior, I., & et al. (2021). *Quality and process management* (2nd ed.). FGV Editora.

14. Nogueira, J. R., & Loos, M. J. (2017). Diagnosis of PPCP activities in a food industry. *Diagnóstico, 38*(17).

15. Oliveira, D. P. R. (1996). *Revitalizing the company: The new strategy of reengineering for results and competitiveness: Concepts, methodology, practices*. Atlas.

Revista ARACÊ
ISSN: 2358-2472

16. Oliveira, O. J., & et al. (2009). *Quality management: Advanced topics*. Cengage Learning.

17. Osborn, A. F. (1975). *The creative power of the mind: Principles and processes of creative thought and brainstorming* (4th ed.). Ibrasa.

18. Periard, G. (2011). *Gut matrix: Complete guide*. On Administration. http://www.sobreadministracao.com/matriz-gut-guia-completo/

19. Pires, S. R. I. (1995). *Strategic management of production*. Unimep.

20. Tubino, D. F. (2000). *Manual de planejamento e controle da produção* (2nd ed.). Atlas.

21. Vieira, S. (1999). *Statistics for quality: How to accurately evaluate the quality of products and services*. Campus.

22. Vollmann, T. E., Berry, W. L., & Whybark, D. C. (1997). *Manufacturing planning and control systems*. Irwin/McGraw-Hill.

23. Von Krogh, G., Ichijo, K., & Nonaka, I. (2001). *Facilitating the creation of knowledge*. Campus.