Proposal for improvement intervention for a sawmill: airtable software

Proposta de melhoria de intervenção para uma serraria: airtable software

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Abstract
With the competition that exists between the timber sector in Brazil, companies in this sector need to adapt to the market, where many of the causes that hinder companies are in the way in which internal activities are carried out. Within this issue, a process that generates problems within a company is the lack of Production Planning, Programming and Control (PPCP). The lack of PPCP causes delays in production and products are made without quality, thus damaging the company's name. Using quality tools and the PDCA cycle (Plan, Do, Check, Act), phenomenon and process analyzes were carried out. As a result, it was found that the lack of a PPCP was causing delays and losses for the company. In order to act on this problem, data on the processes and their causes were collected. Based on the data collected, PPCP software was created using the Airtable platform, which enabled solutions to problems involving delays in order delivery. Finally, the work achieved its objectives, meeting the company's needs and continuing with future improvements.

Keywords: Airtable. PDCA. Small Business.

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Resumo
Com a concorrência que existe entre o setor madeireiro no Brasil, as empresas do setor precisam se adaptar ao mercado, onde muitas das causas que atrapalham as empresas estão na forma como as atividades internas são realizadas. Nesta edição, um processo que gera problemas dentro de uma empresa é a falta de Planejamento, Programação e Controle da Produção (PPCP). A falta de PPCP provoca atrasos na produção e os produtos são produzidos sem qualidade, prejudicando assim o nome da empresa. Foram realizadas análises de fenômenos e processos, utilizando ferramentas de qualidade e ciclo PDCA (Plano, Fazer, Verificar, Agir). Consequentemente, verificou-se que a falta de um PPCP estava a causar atrasos e prejuízos à empresa. Para resolver esse problema, foram coletados dados sobre os processos e suas causas. Com base nos dados coletados, o software PPCP foi criado usando a plataforma Airtable, que permitiu soluções para problemas envolvendo atrasos na entrega de pedidos. Finalmente, o trabalho atingiu seus objetivos, atendendo às necessidades da empresa e continuando com melhorias futuras.

**Keywords:** Airtable. PDCA. Pequena Empresa.

Introduction

The forestry sector, involving all its associated activities, represents 1.3% of GDP in Brazil, which includes activities such as forestry, production of paper and cellulose, furniture, and other wood-related products. As for job creation, the forestry sector is an important source of work, providing direct and indirect employment for hundreds of thousands of people in the country. Furthermore, the forestry sector is significant in the Brazilian export area, contributing substantially to foreign trade (Baesler, Araya, Ramis, & Sepulveda, 2004). Exports of wood-related products, such as cellulose, paper, furniture, and non-timber forest products, represent a considerable part of Brazil's exports. These products have significant international demand, contributing to the country's trade balance. It is important to note that these numbers may vary from year to year depending on global economic conditions and market seasonality, and it is recommended to check updated sources for more recent data on the forestry sector’s contribution to the Brazilian economy (RAMOS & FONSECA, 1995).

The forestry area represented in this study was the processing of wood in a sawmill, with 23 years of experience in the market, Sawmill Ourinhense LTD., located in the city of Ourinhos, in the interior of the state of São Paulo. The company processes wood by producing
beams, rafters, battens, and custom-made wood. Therefore, the quality of its products is of paramount importance for the wide range of customers, thus the need to apply quality tools. In the 1990s, a survey carried out in approximately 1000 companies across the country in diverse sectors showed a certain difficulty for them in relation to their productivity. The research in question showed that 40% did not plan production, 50% did not carry out sales planning, 47% did not have an inventory management system, 90% did not have access to IT and 75% did not have a mapped layout (RAMOS & FONSECA, 1995).

To define the strategies and goals of a production process, it is necessary to create plans to achieve them, coordinating physical and human resources. Manage human resources, with monitoring to correct possible errors. Based on this, these activities are carried out by Production Planning, Programming and Control (PPCP) (BARROS & TUBINO, 1998). In the context of the sawmill, with the high demand for the use of wood, conventional sawing processes, which were carried out manually, began to no longer be able to supply all this capacity, and in view of the technological improvements that began to be discovered over the long Over the years, there was a need for a faster way to split wood (ALBUQUERQUE, 2010).

The PDCA c tool is extremely important for small businesses, as it provides a structured method to continually improve their processes and results. It allows these companies to plan their actions clearly, execute them in a controlled manner, verify the results achieved and then act based on the conclusions drawn from this cycle. This makes it possible to identify and correct problems effectively, increase operational efficiency, reduce waste and costs, and improve the quality of products or services. For small businesses with limited resources, PDCA is a valuable tool that promotes agile adaptation to market changes and the ability to compete effectively while constantly striving for operational excellence (Sokovic & Pavletic, 2007).

According to Dramowicz, Cyplik, & Cyplik (2018), the PDCA cycle is based on a succession of steps, based on events, which seeks the main reason for a problem with the objective of eliminating it. The application of the method depends on data collection, the more information obtained, the more likely the chances of achieving the initially established goals. According to the author, the PDCA methodology aims at continuous improvement, which represents a process that seeks to investigate a certain production procedure and suggest improvements with the aim of reducing costs and increasing productivity (Sokovic & Pavletic, 2007).

Among the tools aimed at quality management, some that small companies can benefit from are:
a) **Brainstorming:** is a technique used to explore new ideas on a certain topic, or a search for new ways to solve certain problems in companies and businesses. Carried out in a group, this is the way to obtain greater potential, and in group interactions many more ideas emerge. The objective of brainstorming is to speak as many ideas as possible on a given topic in a given time and absorb them before they go through a logical reasoning process (BOY, 1997).

b) **Stratification:** grouping collected data with the same characteristics with the aim of locating indicators that can help understand the variations in a process. It is necessary to understand the origin of the information generators so that planning and preparation of a verification sheet can be carried out (BERSSANETI & BOUER, 2013).

c) **Check sheet:** used to take notes in an organized way and focused on the causes to be resolved. Check sheets are forms, which can be printed or digital, with the aim of gathering data in a simplified way and serving to facilitate possible future analysis (SELEME, 2012).

d) **Cause and effect diagram:** also called Ishikawa or Fishbone Diagram, it is a quality tool that graphically symbolizes the possible causes that may lead to a given problem, being used to identify problems as in structuring a decision regarding occurrences that must be eliminated. Six factors are used to create the Cause-and-Effect Diagram, also called 6M, which are just a parameter and not a rule to be taken, considering that in some processes they will not exist. The 6M being raw material, machine, measurement, environment, labor, and method (PALADINI, 2004).

Production Planning, Programming and Control (PPCP) plays a fundamental role in the success of small businesses. Although these companies have limited resources compared to large corporations, effective implementation of PPCP allows them to optimize their production processes, reduce wasted time and resources, and improve operational efficiency (Blanch, Pellicer, Romeu, & Ciurana, 2011). This results in more consistent production, more reliable delivery times and greater customer satisfaction, critical factors for building a loyal customer base and competing in the marketplace. Additionally, PPCP helps small businesses avoid excessive or insufficient inventory, better controlling costs and increasing profitability. Therefore, PPCP is not exclusive to large companies; it is equally important for small businesses that want to grow, prosper, and maintain an effective and sustainable operation (Alting & Zhang, 1989).

Therefore, the importance of personalized management software for small businesses cannot be underestimated. While large corporations have the resources for complex and
expensive management systems, small businesses often face unique challenges that demand specific solutions (Caruso, Karligkiot, Selempa, & Nikita, 2023). Customized software allows these companies to tailor their operations to their precise needs, automate repetitive tasks, improve process efficiency and accuracy, and make more informed decisions based on real-time data. Additionally, these systems can scale as your business grows, ensuring they continue to meet changing demands. Ultimately, custom management software empowers small businesses to compete more effectively in the marketplace and achieve a greater level of success and long-term sustainability (Blanch, Pellicer, Romeu, & Ciurana, 2011).

Airtable is an online platform that can be used to share databases for individuals and small businesses, in which it is possible to access and monitor this data from anywhere for free and without the need to install any program, as it is done directly from the internet browser (Porter, 2016). With Airtable, you have a different approach because you create your own blocks and distribute them the way you want. Airtable is divided into 5 basic components which are Bases, Tables, Views, Fields, and Records. The Bases are like a database in which all the information of interest to the user is gathered in just one place. It can be compared to a spreadsheet or folders on a desktop, where specific content is stored for better location and organization (Airtable, 2023).

Methodology

The objective of this work is to verify the main problems in a sawmill and present their negative points. Always looking for product quality and continuous improvement, the PDCA cycle and quality tools come into play in its stages, in the sales, production and shipping sectors. The phases of the PDCA method, which was chosen for study, are:

a) Problem identification: Stage in which problems are identified, starting from the use of brainstorming to collect data;

b) Observation: Identify the main characteristics of each problem, taking the necessary point of view;

c) Analysis: Discover the most relevant problems through the Ishikawa diagram;

d) Action plan: Measures to be taken in order to block the causes of the problems encountered;

e) Execution: Execute the action plan, that is, apply the measures found and solve the problems;
f) **Verification**: Confirmation that the actions taken have an effect by comparing the data collected before and after these actions;

g) **Standardization**: And the prevention of problems, so that they do not reappear, definitively eliminating the problem;

h) **Conclusion**: Review all activities developed during the cycle and planning for future activities.

### Results and Discussion

#### 3.1 The Company

The company that was studied in this work is Serratia Ourinhense Ltd. – ME, which operates in the timber sector and is located in the city of Ourinhos, in the interior of the state of São Paulo, where its activities began in July 1994, representing 24 years of activity in the market. Founded by two partners in 1994, the company operates in the area of eucalyptus wood processing aimed more specifically at civil construction. Its capacity at the time was approximately 25 cubic meters of sawn wood per month, and currently it has the capacity to saw 50 cubic meters per month.

#### 3.2 Problem Indication

To start the entire study starting from the PDCA cycle to optimize processes, the first activity to be carried out was the identification of the problem that causes the most impact on the company's results. Brainstorming was then carried out with the company's management, who knew the entire production process, with the aim of finding the problem that would be most frequently affecting the company's ideal performance. As a result, a consensus was reached that what most affected was the lack of organization in the production of orders and a lack of monitoring of the order during the process. This conclusion was reached after analyzing the orders in progress with their entry and exit dates, being able to see, for example, that as the company works in a push-pull manner, it should obey an order such as FIFO (First In First Out), which did not occur previously.
3.3 Analysis of the Phenomenon

As the markings were made on paper, to analyze the phenomenon, it was necessary to check all marked forms, orders in progress, and the entire progress of the process and record all the information collected. With the data collection carried out, it was possible to identify that there were orders with late delivery and orders that had been ordered for some time and had not yet been sent to production. Figure 1 shows that half of the orders requested were found to have problems that led to delays.

![Figure 1 - Order list](image)
Source: Own authorship

3.4 Process Analysis

To begin this stage of the study, the entire process was modeled using the BPMN method, whereby indicating each step within the process it was possible to extract the function of each step within the industry. To analyze the main causes of the problems, data was collected over a period of 3 months, between December 2020 and February 2021. The first step to starting the process within the company is receiving the eucalyptus logs, as shown in Figure 2.
After receiving the eucalyptus logs (Figure 2), the process of sawing the logs and all processing begins. Figure 4 exemplifies the log sawing process. However, for the process to begin, the POs (Production Order) must have been passed on to production. This process is shown in Figure 3.
In this way, the administrative part also takes care of the shipping part of the company, when the PO returns to the sector and it determines the moment to be delivered, which is represented in Figure 5.

![Figure 5 – Expedition](source: Own authorship)

A failure in communication between the sales sector and production was noticed, as orders were not recorded correctly. These failures can be visualized in Figure 6.

![Figure 6 - Ishikawa diagram](source: Own authorship)
3.5 Action plan

To complete stage P of the PDCA cycle, an action plan was drawn up to remedy the causes found in the previous chapters, thus minimizing costs. The suggested action plan was the development and implementation of PPCP software to organize all actions in the process. In this context, the Airtable platform was used to develop customized online PPCP software for the company in question.

3.6 Execution

The execution took place through the development of software using Airtable for this. Within this software, tabs were created: “Customer Registration”, “Orders”, “Payments” and “Cash Movement” (Figure 7).

Within the “Customer Registration” tab, the options for “Name/Corporate Name”, “Registration Date”, “CPF/CNPJ”, “Telephone”, “Address”, “City” and “State” were added. Customer data was linked directly to the “Order” tab. In the “Orders” tab, the Order number, “Customer”, “Order Entry Date”, “Order Delivery Date”, “Duration Time”, “Order Within Deadline”, “Value Order Total”, “Order Payment”, “Payments”, “Cash Movement”. A coluna “Cliente” foi interligada diretamente com a aba “Cadastramento de Clientes”. The “Order Payment” column was linked to the “Payments” tab, which will be commented on later, and the same happens with the “Payments” column. The “Cash Movement” column is connected by the “Cash Movement” tab, which will also be commented on later. In the “Payments” tab, the following columns were added: “Payment Details”, “Order”, “Payment Status”, “Customer”, “Total Order Value”, “Payment Method”, “Payment Type”, “Observations” and Cash Movement”. The “Order” column was connected with the “Order” tab, that is, when payment for order n° I is made, it expands the order no. 1 record and then all fields are filled in according to the options. And finally, the “Cash Movement” tab, in which all the company’s
inflows and outflows can be recorded, makes a connection with the “Order” and “Payments” tabs. This is in case the entries come from requests.

### 3.7 Verification

With the implementation of the PCP system in the company, an improvement can be seen in a short period of time. Figure 8 shows what the situation was like before implementing the system.

![Figure 8 - Orders before Airtable](image)

Source: Own authorship

Data collection was carried out over a month at the company, which showed that for every ten orders registered, on average five were on time, and the other five were in production with delays or had not yet been transferred to production. After implementing the system, all orders were passed on to production, with only orders within the deadline and orders outside the deadline, where, when collecting data from ten orders on average again, around seven to eight orders were within the deadline and two to three orders were late. One explanation for late orders would be the software implementation and adaptation phase. Figure 10 shows the distribution orders within the deadline and late orders.
There was a 26% improvement in on-time orders after implementing the system. This improvement was due to the organization that the system brought to the company, where orders were all in the same place and with easy access. With the system, orders were registered instantly after the customer confirmed and production had already been passed on, complying with FIFO (first in first out), in which the first in is the first out, thus respecting the way the company wants to work.

**Conclusions and Implications**

The development of this study carried out the implementation of PPCP software based on the continuous PDCA methodology, where it was possible to find the causes of problems and the best ways to resolve them. The difficulty the company was facing, and its lack of planning and organization were causing delays and losses to the company. These causes also generated a certain discomfort in all sectors of the company, with pressure from management to employees, and thus, having a low quality of products, requiring the company to have a low sales price in order to compete in the market. With the installation of the software there was an immediate reduction of 26% in order delays. Thus, managing to solve the proposed problems. Employees began to work with less pressure, resulting in notable improvements in products and receiving good feedback from customers. Some orders continued to be written down on paper during the system implementation period, at the company's option, with the system being fully used as employees adapted. In this way, through the PDCA methodology, it was possible to find the main causes that generated problems for the organization and be able to propose improvements that generate positive results.
References


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