

Negotiation And Supply Planning in Civil Construction

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Abstract

The recent initiatives by the Federal Government through the New Growth Acceleration Program (Novo PAC) and the facilitation of bank financing for private construction projects constitute economic policies aimed at benefiting various sectors of the Brazilian economy, particularly the construction industry. The primary objective is to generate employment opportunities and foster the emergence of new enterprises. It is evident that these policies are intensifying competition within the construction sector. Consequently, a meticulous cost analysis becomes increasingly crucial to prevent a reduction in the desired profitability or potential losses. This study adopts a qualitative approach with an exploratory and descriptive research character, employing a methodological procedure characterized as bibliographic research. The overarching goal of this research is to underscore the significance of both negotiation and supply chain planning in the construction industry. The findings, derived from a clinical report, reveal that the company, by leveraging appropriate supply chain management tools, has optimized procurement timing, achieved favorable negotiation outcomes, and maintained quality across its production.

Keywords: Planning; Procurement; Supply Chain; Profitability.

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I. INTRODUCTION

The civil construction sector holds paramount importance for a country's economy as it fosters national development and production through job creation, constant supply, and exchange of inputs, while also facilitating improvements in infrastructure and housing. With the growth of the civil construction market, the supply, planning, and decision-making tools within the sector have become indispensable for cost reduction in input procurement. In this context, these sectors are crucial for enabling companies to competently navigate the market's competitive landscape, surpassing other construction firms, especially during property sales negotiations, even by offering attractive discounts.

This study adopts a qualitative approach to demonstrate the key aspects that require attention for effective negotiation, determined by their financial importance, leading to a reduction in procurement costs and inventory levels. The research assumes an exploratory and descriptive character, employing bibliographic research as the methodological procedure.

The overarching goal of this study is to underscore the significance of both negotiation and supply planning in civil construction. The specific objectives include discussing the planning and budgeting sector of construction projects, elaborating on the procurement/supply sector, and finally, emphasizing the importance of inventory control in the warehouse.

This article is structured into five sections. The first is the introduction, where the study's objectives are outlined. The second section is the theoretical framework, which involves the selection and discussion of opinions from authors who have explored similar themes. The third section provides an analytical account of the implementation of supply management control tools. The fourth section outlines the methodology used for this research, and the fifth and final section presents the concluding remarks of this study.

II. REVIEW OF RELATED LITERATURE AND STUDIES

2.1 Sector of Project Planning and Budgeting

The project planning sector plays a pivotal role in determining the timeline and cost of each phase of a construction project. It is responsible for budgeting and quantifying all materials that need to be purchased. Various control tools are employed, with one notable example being the balance line, which delineates the start and end of each phase, thereby preventing overlap of ongoing activities and specifying the duration of each.

According to Goldman (2004, p. 13), "the planning sector is, in relation to the procurement sector, its right hand. It serves as both a supplier and a controller⁵." The same author further emphasizes that,

[...] the better the organization of the company and the project, the higher the likelihood that the information is correct, enabling effective control [...]. For the process to run according to the planned schedule, the organization of information is indispensable⁵.

It can be inferred that planning plays a crucial role in the financial health of the construction company, serving as one of the initial indicators of the economic viability and feasibility of the construction project.

2.2 Procurement/Supply Sector

The procurement sector aims to reduce costs in the acquisition of new materials and services required for the entire project while prioritizing product quality compliant with Brazilian standards. It ensures timely availability without generating excessive inventory or causing shortages, as both situations incur additional costs that should be avoided.

In this perspective, supply professionals must possess a solid understanding of finance and the inherent activities of the construction project. Additionally, they need the ability to negotiate effectively, as highlighted by Ballou (2006)².

One of the primary challenges faced by many construction companies in the procurement sector is the lack of planning or the complete absence of effective activity control at the beginning of construction. This leads to disruptions in the entire procurement chain, resulting in material shortages and potential significant financial losses for the company. Urgent procurement needs force purchases from local markets at significantly higher prices than budgeted in the planning phase, thereby increasing the final project cost.

According to Katz (2017, p. 12), the procurement sector is a cornerstone in the construction industry: "In the construction sector, which is one of the fastest-growing business environments globally and in emerging countries, such as Brazil, the procurement sector is undergoing rapid evolution⁷."

2.3 Inventory Control in the Warehouse

Inventory control plays a crucial role in construction projects, as the warehouse is the repository for nearly all items purchased for the project. It necessitates meticulous control over entry, storage, and issuance, as warehouse mismanagement can lead to significant losses, including stockouts, material expiration, and duplicate purchases.

As stated by Marques, Roberto, and Souto (2023, p. 05),

The controller is responsible for the company's managerial information system. This includes monitoring how managers handle inventory control, ensuring data compliance with company policies and the accounting system, and analyzing and interpreting data to aid in decision-making and performance evaluation⁸.

In general, the warehouse serves as a temporary storage space for almost all materials used by the company, requiring robust control to prevent losses and theft. Pani and Reis Filho (2023, p. 02) "highlight the universal significance of inventory management for all companies, emphasizing that mismanagement can lead to serious issues across various sectors¹⁰".

Despite its critical role, the warehouse is not always given the due importance it deserves within construction companies. Even though it houses all items purchased for the project, it often lacks the necessary infrastructure, equipment, and sufficient staff. This oversight can result in financial losses and delays in apartment deliveries.

III. ANALYTICAL REPORT ON THE IMPLEMENTATION OF MANAGEMENT CONTROL TOOLS AT WR ENGINEERING

Strategic planning is fundamental in today's business landscape; however, it alone cannot solve all problems. With the assistance of certain tools, as demonstrated here, it becomes possible to assess the increased accuracy of decision-making (FRANCISCHINI; GURGEL, 2004).

At WR Engineering, we employ an integrated system known as ERP (Enterprise Resource Planning system), where the technical department is responsible for quantifying and pricing materials for the entire construction project. These data are then imported into the system, which directs them to the procurement department.

The procurement team has access to this information, establishing predefined parameters for spending on each item or group of materials. We utilize the ABC curve, also known as the Pareto Analysis, as a classification tool to separate items of higher importance, typically in smaller quantities, from those of lower relative value, which often occur in larger quantities¹⁵.

In the field of construction, recent research has highlighted the significance of ABC curves in planning, scheduling, control, and project management. Researchers such as Sakamori (2015), Silva (2016), and Matias Neto (2017) have emphasized their importance^{9; 12; 14}.

Solano (2003) identifies key applications of ABC curves, including in project planning, where company strategy and project standardization underscore its importance in decision-making¹⁶. In the construction sector, the ABC curve (Figure 1) is cited as a fundamental management tool and a means of selecting the most important cost items in a construction project, as noted by Abhilin and Vishak (2017)¹ and Santos et al. (2020)¹³.

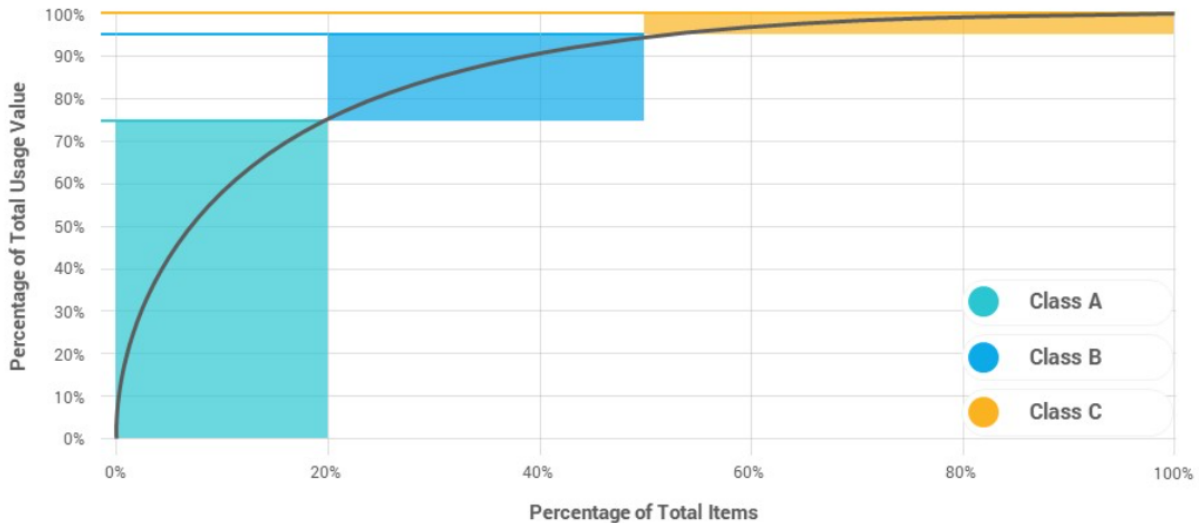


Figure 1 – ABC Curve¹¹

One approach to identify items with greater significance based on their financial value involves utilizing the ABC curve, also known as Pareto Analysis. In order to determine the procurement timing for each input and the respective quantities to be requested, a Line of Balance has been implemented in conjunction with a procurement tool. This tool functions to notify the commencement of each activity in advance, facilitating timely material procurement.

In addition to the aforementioned resources, the construction company has engaged the services of a specialized engineering firm proficient in planning and monitoring services. The firm utilizes a widely adopted engineering tool, the Line of Balance (Table 1), which aims to provide information on the activities to be executed, their locations, start and end deadlines, the subsequent service, and anticipates the next activity. Furthermore, it proactively notifies the procurement department in advance about the upcoming activity, allowing for ample time to plan purchases and seek qualified suppliers.

ELECTRICAL WIRING/TV/TELEPHONE								
Tower						Planned Start Date: 24/05/2024		
Code	Location	Type of Restriction	Status	Restriction	Observation	Deadline Date	Resolved	Responsible
165	1st Floor	Construction	●	PPS Elaboration - Wiring	-	14/12/2023		Francisco Moésio
166	1st Floor	Workforce	●	Workforce Request at HR Manager for wiring		15/12/2023		Francisco Moésio
167	1st Floor	Workforce	○	Workforce Hiring - Wiring	-	30/01/2024		Berenice Rabelo
168	1st Floor	Material	●	Material Request - Wires and Cables	Apartment Feeding	15/12/2023		Francisco Moésio
169	1st Floor	Material	○	Material Purchase - Wires and Cables	Apartment Feeding	05/01/2024		Batista
170	1st Floor	Material	○	Material Delivery - Wires and Cables	Apartment Feeding	12/02/2024		Batista

Table 1 - Line of Balance Spreadsheet (Agile Roadmap)

Legenda: ● Delayed Constraint; ○ On-time Constraint

According to Calandrini et al. (2023), an exemplary Procurement department is one that enhances its competencies in five fundamental areas: superior quality, optimal quantity, impeccable timing, competitive pricing, and superior supplier relationships. By employing effective supply chain management tools, a highly productive Procurement department, especially in the construction sector, can optimize the outcomes of its operations. In the pursuit of "superior quality," it is crucial to utilize quality control methods at every stage, from supplier selection to the inspection of received materials³.

The implementation of technologies such as tracking and monitoring systems can have a significant impact on ensuring the quality of supplies. For achieving the goal of "optimal quantity," the use of demand forecasting and inventory tools is essential. Integrated management systems can prevent excesses or shortages of materials, ensuring efficient resource management. Supply schedules, scheduling systems, and effective communication with suppliers enhance the management of the "optimal timing". Project management tools can be employed to organize the supply flow and meet construction deadlines. Reverse auctions and electronic sourcing platforms are valuable instruments in the pursuit of the "best price". By encouraging suppliers to instantly offer their best prices, these tools enable dynamic negotiations, resulting in more competitive costs³.

Lastly, performance evaluation systems can assist in identifying the "best supplier." By choosing reliable suppliers, metrics such as adherence to deadlines, product quality, and delivery history can be employed. Consequently, the Procurement department can enhance its capabilities in all areas, maximizing effectiveness and efficiency in civil construction projects through the incorporation of effective supply chain management tools³. In the case of WR Engineering, given the substantial volume of materials to be procured, it has been determined that requests will be made twice a month. Specific days of the week have been adopted to input materials into the system, ensuring that the procurement department follows the established company guidelines (see Table 2).

Month	1	2	3	4	5	6	7	8	9	10	11	12	13	14	15	16	17	18	19	20	21	22	23	24	25	26	27	28	29	30	31
January																															
February																															
March																															
April																															
May																															
June																															
July																															
August																															
September																															
October																															
November																															
December																															

■ Days for input entries in the system.
■ Days to purchase materials.
■ Manager's approval.

Table 2 - Specific Purchase Days

With the specified days determined, requests should already be entered and approved by the construction manager on the dates indicated in green. The red-highlighted date marks the commencement of the procurement process. The company has a period of seven business days to complete the collection and generation of the purchase order.

III. MATERIAL AND METHODS

The present study adopted a qualitative approach to demonstrate the aspects that require attention in conducting negotiations, determined by their degree of financial importance, resulting in cost reduction in purchases and inventory management. The research has an exploratory and descriptive nature, and the methodological procedure employed was a literature review⁶.

Throughout the elaboration of this article, the positions taken were informed by the perspectives of the consulted authors, serving as a framework for the formation of the corpus of this study⁶. Several cultural and scientific contributions related to the subject were analyzed, extracting and examining numerous citations from various works by different authors.

As noted by Campos et al. (2023), the literature review is conducted through surveys of theoretical frameworks already analyzed and published in written and electronic media, including books, scientific articles, web pages, and other sources⁴.

IV. CONCLUSION

****4. CONCLUSIONS**** At the conclusion of this study, it is evident that the approach implemented at WR Engineering Company has resulted in a significant reduction in the final purchase value. Furthermore, the material requisition period has transitioned from a daily to a biweekly schedule. In this new format, quantities increased, allowing direct procurement from manufacturers, bypassing intermediaries, leading to a notable 32% reduction in purchases in July. It is noteworthy that the initial target was a mere 5% reduction.

It is crucial to emphasize that this achievement was possible through collaborative efforts between the procurement and engineering departments, utilizing appropriate supply chain management tools. These tools effectively controlled the variables involved in the process, demonstrating that the desired outcome was

attained. The company now procures materials at the right time, with competitive prices, and ensures product quality.

Considering the numerous barriers within this industry, it is deemed essential to highlight the support received from the leadership in implementing the management control tools. With this support, the organizational culture of the company was successfully transformed, and financial objectives were achieved more easily and rapidly.

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