

THE IMPACT OF BUDGET IN THE PURCHASING PROCESS OF CONSTRUCTION COMPANIES

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Abstract

Project management brings about the reduction of costs and the increased efficiency in the execution of constructions steps in the contractors business. The implementation and the control of the budget is a singular and important subject in this context. The presentation of the application of a budget based on the scheduled project of one Construction Company, as presented, indicates the impact of this budget in the purchasing schedule and its relationship with the efficiency of the results.

The research method used, the case study, looks at the introduction of detailed construction budgets for 472 houses to be made in nineteen months with \$ 6, 4 millions US. The budget developed for the company was made using the MS Project software and it is integrated with the project schedule. The basis of this project planning is budget detailing, furthermore, the structure of this procedure is different from the traditional way of developing construction budgets in Brazil.

The development of the research contains the following steps: the choice of production system, construction of the project planning system in MS Project and its detailed budget, the development of control mechanisms, and the results analysis. The conclusion indicates the advantages of using this methodology and also it indicates the changes which are necessities to have a purchasing planning to be able to affect the actual project costs control.

Keywords: Purchasing; Civil Construction; Proactive Procurement.

Introduction

The material purchasing process has the responsibility of supplying the customer's buying necessities, it is also responsible for the planning in a quantitative and qualitatively way. Moreover, it intends to guarantee that the customer will receive the material in the right time, with the right quantities, and within the desired specifications (BURT, PINKERTON, 1996). In order to execute this important task, the material purchasing function is considered to have a fundamental role in the supply chain.

This technical paper uses the proactive purchasing procedure as the purchasing management strategy, and presentation of the concept is a very important. Proactive purchasing can be defined as purchasing which is focused on strategic activities. It puts emphasis on long range relationship negotiation activities, expanding the supplier's and material's total cost, instead of doing it in repeated demands and stock repositions (BURT, PINKERTON, 1996).

The following list contains the goals of the proactive purchasing procedure (BURT, PINKERTON, 1996):

- Making sure of purchasing continuity to keep effective relationships with existent sources, developing other supply alternatives, or attending the emergent or planned necessities, selecting the best suppliers.
- Keeping solid and cooperative relationships with the other organizational functions, supplying necessary information, and advising to make sure of the effective operation of the entire organization.
- Developing the training of employees, and the adoption of procedures organization to make sure to reach the previous goals.
- Keeping a balance between quality and value, obtaining products and services in the necessary quantity and quality for the lower cost.
- Surveying market tendencies.
- Developing methods to negotiate purchasing conditions to deal with suppliers that look for mutual benefit by means of superior economic performance.
- Developing and keeping good relationships with the suppliers, besides developing potential suppliers.
- Emitting and controlling purchasing solicitation.

Proactive purchasing operation

The task to implement the proactive purchasing in civil building companies is a challenge. The implementation success is strictly related to the strategies of the activities operation which involve the process of purchasing that guarantees the quality of the process (CAMPOS, 1992; SOUZA, 2001).

One tool that can be used to develop a continuous improvement process in the purchasing process is Deming's PDCA cycle (1986) wherein "P – Plan" refers to planning activities, "D – Do" means the execution phase activities, "C – Check" indicates the monitoring activities, and "A – Act" for critical analysis of the activities and improvement proposals.

Applying this management tool to the material purchasing process, the improvement cycle PDCA would get the following shape.

Proactive purchasing starts in project conception, which is usually executed by the engineering or marketing areas. The responsible team for the project considers the enterprise's goals and develops solutions for the product, subsystems, and components (TAYLOR, 2003). The quality assistance area analyzes the projects and makes the proper contributions (KURAL, ALSAC, 2006). The purchasing department participates in this process indicating new materials, rating prices quotations, and looking for new suppliers (LAWTHER, MARTIN, 2005).

The next phase is characterized by the accomplishment of the programming phase of the execution of the project according to the organization strategy.

The purchasing team elaborates the purchase planning, which is based on the enterprise's projects and specifications, on the production planning, and the detailed budget that reflects the organizational reality (DONK, 2004).

The purchasing process must contain the procedures to put the activities that constitute its routine into practice, to avoid that each collaborator acts in a particular way (STJERNSTROM, BENGTSSON, 2004). This doesn't mean that the process must be set in stone but that policies should exist that orientate the elaboration of activities.

With the application of the structuring of the proactive purchasing process, the team involved with purchasing uses most of their time in planning activities, negotiations, and control, what makes

the purchasing operational (solicitation, estimating, and purchasing) and faster (COX et. al., 2005).

When the purchase planning is done, it is necessary to effectuate its control and, if necessary, repeat the planning of the activities in order to guarantee that the production area is attended according to the negotiated conditions (LAWTHER, 2003). The purchasing process must be continuously analyzed, so that the process' bottlenecks are identified as well as the possibility of aggregating value to the process.

As already described by Burt, Pinkerton (1996), the application of proactive purchasing procedures allow the material purchasing process to be focused on strategic actions, which are, the acquisition's planning realization, and also the relationship with the suppliers. Furthermore, the operational phase will likely be faster than in the traditional model, and it also meshes with the necessities of the final customer, that is, to deliver the material in the right quantities, at the right time, and under the best purchasing conditions.

Purchase planning

The classic author of management theory, French industrialist Henri Fayol (1841-1925), described management as involving five activities: planning, organizing, commanding, coordinating, and controlling (LAUDON, LAUDON, 1999). Contemporary authors such as Robbins (2003) reduce these activities to 4 management functions: planning, organizing, leading, and controlling. Therefore, according to "traditional management theories", to manage can be defined as the effort to reach organizational goals by planning, organization, leadership, and control.

Nevertheless, planning can be defined as "the decision making process that involves goals establishment and the necessary procedures to reach them, being effective when it is followed by a control step" (HEINECK, 1996).

It is possible to establish, in an in depth way, the types of planning, as follows:

- Strategic planning: in this level the decisions taken are long ranged. In this, planning is defined as the target and the goals to be reached by the purchase area in the next five years. For Example, to institute "no fails" in activities that involves material purchases (LAUFER, TUCKER, 1987).
- Tactical planning: in this level the decisions are systemized between short and long range time periods. In this, planning is defined by which and how many resources must be used to reach the goals defined by strategic planning, as well as its acquisition path and the organization of the work structuring (EDMONDSON, 1999; LIAN, LAING, 2004).
- Operational planning: it selects, in a short range time period, the path for necessary operations to reach the goals (SCHIELE, 2005; SEIFERT, 2003).

The planning procedure for the specific material purchasing in an industry is included in the tactic and operational part of the planning of the purchasing process (ANCARANI, CAPALDO, 2005). Independent of the planning level considered, the planning procedures goes through four steps (CALDWELL et. al., 2005). Those steps are: the diagnosis of the current situation, goals development, activities structuring the process according to chronological order and execution, monitoring, and control of the activities.

The prerequisites needed for purchase planning elaboration are the enterprise's projects and specifications, the planning and detailed budget, the supplier involvement, and cash flow availability (BALAKRISHNAN, 2005).

Acquisitions planning can be formal or informal, highly detailed or generic, and based on the necessities of each company (SMELTZER, MANSHIP, ROSSETTI, 2003). The most important characteristic is that this planning must describe when, who, and how the materials will be acquired in the next year, term, and month.

Enterprise's budget

A project (job) budget can be defined as an estimative or foresight expressed in financial or material terms, which aims to help the management and decision actions, this is valid for the company as a whole or just for a job. The material quantities are related to, for instance, the quantities of office material, building material, hours of labor, and/or hours of equipments. On the other hand, the financial quantities are related to the budget, expenses, costs, earnings, and/or disbursements (PIETER, VAART, 2004).

It is usual for construction companies to carry out a general budget, even if restricted to services and unitary prices, without knowing for sure when certain inputs or services will be effectively done on the building site.

The conventional budget does not reflect the way the work is executed, begetting the non-acquaintance with the real construction cost. Considered the form of a conventional budget, those items are measured by quantity and grouped by teams, independently to where the work occurs or the difficulty of construction (LIMMER, 1997).

However, the conventional budget shows a general average of the works, this sight tends to raise the risks and consequently to raise the construction costs. A solution to improve the budget's efficiency is the utilization of an operational budget (KEELING, 2002).

The budget in the construction industry is a job cost foresight tool. Meantime, another chain has been better evaluated, the operational sight. The operational sight consists essentially in adjusting the information given by the budget to the data obtained in the job, according to the operation concept, that is, every task executed by the same kind of man power, in a continuous way, without interruption, with a well defined beginning and end. In summary, the operational budget is strictly related to the moment (time) of operation execution in the job (LIMMER, 1997).

In the conventional budget, the way the job is conducted is not reflected. Thus, it will not reflect the real building costs. In the conventional budget, job items are measured by quantity and grouped by teams, independently of where the job occurs or the construction difficulty. Therefore, the conventional budget does not reflect a particular service cost, but only the general average of the jobs. This situation tends to raise the risks and later raises the average price, discouraging the architects to look for projects savings (GELDERMAN, WEELE, 2004).

Among these chains, the biggest difference is in the time factor. While in the conventional approach, the budget is done based on the finished construction, disregarding the processes involved in the execution step, in the operational approach one sets forth on a previous programming, analyzing all the constructive processes minute by minute, in order to obtain a detailed cost estimate. In this last approach, only the material cost is proportional to the produced quantity, while the labor and equipment costs are proportional to time (GELDERMAN, WEELE, 2004).

In the conventional budget, costs are obtained for each service. In the operational budget costs are obtained for each operation. The main difference between service and operation (LIMMER, 1997) can be stated as it follows: operation is an array of tasks executed in a continuous way and without interruption, with beginnings and ends well defined by a specific man power. On the other hand, service is an array of operations that when done, result in a functional job part and can involve many man power categories.

The differences between conventional and operational budgets can be seen in Figure 1.

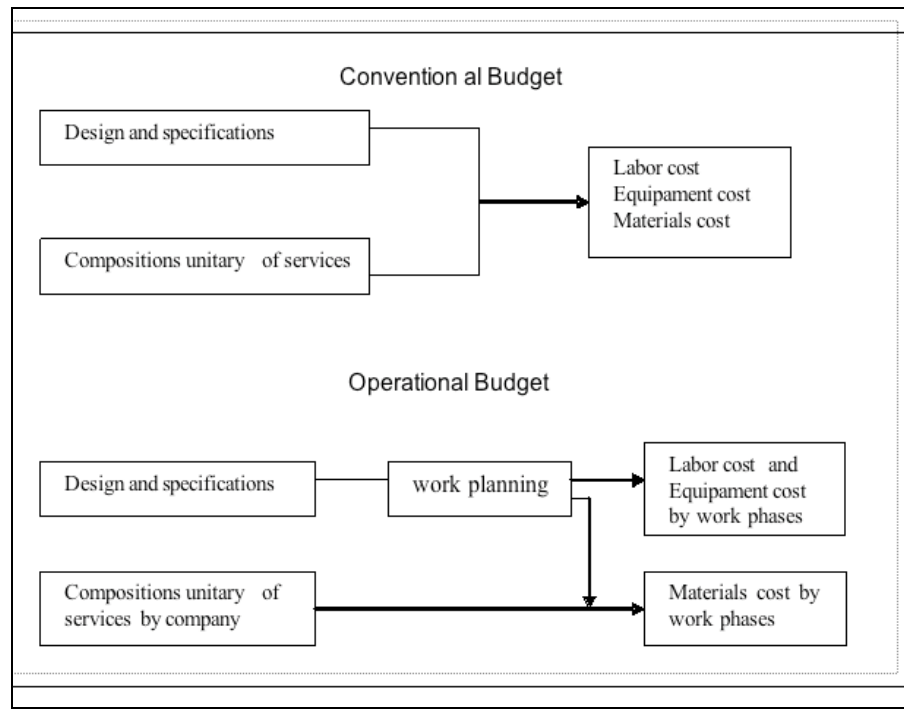


Fig. 1. Differences between conventional and operational budgets

The conventional budget does not reflect the way that work is conducted, begetting the non-acquaintance of the real construction cost. In the conventional budget the items are measured by quantity and grouped by teams, independently of where the job occurs or the difficulty of the tasks involved (LIMMER, 1997).

Notwithstanding, the conventional budget shows a general average of the jobs. This view tends to raise the risks and consequently raise the building costs. A solution to improve the budget's efficiency is the utilization of the operational budget (LIMMER, 1997).

With structured planning of the job it is possible to carry out the enterprise's operational budget. This budget is entailed to the enterprise's planning, following the same codification structure. The purchase area has the function to tax the materials according to the enterprise's project. The results of this stage will be the enterprise's detailed budget developed in a software that has an interface with the planning software and that enables, besides the budget, the control of work costs (GEHBAUER et. al., 2002).

Research methods

The objective of the present work was to develop a budget based on the work programming of a construction company. Thus, the type of research method used was the case study. The following data collection instruments were used during an eighteen month period: document survey, direct observation, and interviews with the parties involved in the function.

During the interviews the intention was to collect evidential documents such as: quality manuals, documents that are part of PBQP-H, forms, and procedures to carry out tasks fitted for the material purchasing process.

The interviews were based on a semi-structured questionnaire with questions referring to the material purchasing process, the planning elaboration job routine, and the project budget. According to the interviewee answers, it became possible to identify in which development stage the purchasing process was.

The construction company was surveyed for their material purchase process routine, aiming to collect information before (stage 1) and after (stage 2) the based on job programming budget

implementation. This paper presents the main results of the research in order to discuss the importance of budgets for companies.

The logic for the mentioned research went through the following steps:

- Planning: in this step questions were defined that formed the basis of this research. It was searched by means of a literature review, what the previous authors published regarding material purchasing areas.
- Formulation: the budget structuring logic was developed based on texts about the pro-active purchase and also in the directresses about continuous improvement applied on production management
- Implementation and evaluation: this step was intended to collect information about the purchasing process for the case study, before and after the implementation of a budget based on work programming. With the collected data it was possible to perform the case study analysis aiming to verify if an improvement in the customer's target condition (job) and the purchasing proceedings had occurred.

Data collection results

Case study 1(CS1) is a company from Paraná State that offers solutions for civil construction projects management areas. The analysis of CS1 was performed at the time that the company was building 472 houses to be finished in nineteen months, with an expected cost of \$ 6, 4 millions US. The budget developed for the company was executed using the MS Project software and is integrated with the project schedule. The basis of this project planning is the budget detailing. The structure of this procedure is different from the traditional way of performing construction budgets in Brazil.

Before the implementation of the budget based on job programming, CS1 carried out the conventional budget, that is, structured by services and finished in a large way. After several meetings with the team involved in purchasing, they realized that the adoption of the detailed budget would make the purchase process routine easier. The team involved with purchasing themselves offered to develop this budget in a MS Excel spread sheet.

The activities that will be described passed through the purchasing area actuation step in the CS1 work budget stage.

The budget department for CS1 was responsible in making the quantitative survey of the services and following the structure of the developed operational planning. This task was quite slow, because the dynamic of the quantitative survey had changed. Initially the team observed a planning item (for example: the masonry for the first pavement of house number 1) and after that they consulted the project and calculated the quantitative study of that service.

The result of this stage was the fulfillment of the "quantity" column that was side by side with the column that contains the activities described in the operational planning. As the company didn't have real consumption constants, some were utilized from the services compositions from "Tabela de Custos para Orçamentos" (Budgets Costs List - BCL) – published by Pini.

All the inputs that made up part of the BCL services composition, were taxed by CS1 buyers. Many price estimates for the inputs were performed. For each supplier, they were given the buying foresight for each input and also, when necessary, project copies and material specifications were delivered.

Having the structured planning and the work project, it was possible to do the complete detailed job budget. This budget was entailed to the enterprise's planning, following the same codification structure. This stage resulted in the detailed project budget developed in an Excel spread sheet.

The work's budget stage was divided into four activities (quantitative survey, consumption constants utilization, inputs market estimates and work budget detailed by activity), as shown in Table 1. When the company did the activity its scoring was 1(one), when the activity was not

effectively developed its scoring was 0(zero). Making an acting analysis of CS1 for the budgets elaboration, it was possible to realize (Table 1) that the company, after the intervention, got a significant improvement, raising its score from two to four (maximum score). This improvement was achieved due to of a large effort of the team involved in the elaboration of the suggested activities.

Table 1. CS1 performance in work budget

Activity	Case Study 1	
	before	after
Actuation on work's budget	2	4
Quantitative survey by activity	0	1
Consumption constants utilization	1	1
Inputs quotation in market	1	1
Work budget detailed by activity	0	1

Research results

Starting from the observations of CS1's performance in the work budget stage, it's possible to realize that during the intervention it was possible to develop the operational budget, because this company had the designs and specifications and also detailed job planning.

The possibility to manage the complete job, originating from the operational budget, brought many reflections about the job done in the company. The decision making power was increased since the purchase planning information was previously approved. This task was made possible because the budget has the necessary details to make the negotiation in advance and within the suppliers, whereas the operational budget showed when each material or equipment would be utilized in each job step and its quantity.

The use of the operational budget was a challenge, because the conventional budgetary technique, using consumption indicators by inputs for each service, was widely used by the company. The introduction of a new technique had to overcome this obstacle. The purchasing team in CS1 was receptive when the methods to elaborate the operational budget were presented. The biggest question was with respect to the time needed to elaborate the budget. This fact is an aggravating circumstance in the utilization of operational budgets, because the involved, with planning and traditional budgets, are used to carrying out these activities quickly.

The proactive purchasing implementation in CS1 pointed to some relevant considerations such as, the importance of enterprise planning and operational budgets. The lack of planning and/or the operational budget has direct implications in the acquisition of plans and without these activities it is not possible to develop a purchase plan that shows the actual enterprise's execution. In such case, the proactive implementation success is directly related to the planning quality and work budget.

With the proactive purchasing implementation, the focus of the activities developed by the construction industry purchase team starts to have a new role in the whole construction process (ex: negotiation of big lots, planning, operational budgets, and acquisition planning realizations)

Proactive purchasing, for effective use, needs a qualification change from the crew involved in purchasing. It is necessary to carry out an alteration in these professionals profiles, mainly the buyers, including negotiation knowledge, planning, budget elaboration, project and specification interpretations and the creation of suppliers' partnership. By means of these changes, the construction buyer's profile must change. The buyer stops being a professional concerned with receiving the requisitions and effectuating the materials purchase, and starts being a negotiator focused on the company's strategic factors and not just on the unitary material cost.

This paper describes the results of a cooperative university-company work, with immediate practical implications that points to improvement directions for construction companies purchasing processes. This paper presents a way of budget process realization in a construction company based on job programming and identifies the improvements generated by this process, as well as the professional profile changes which are needed.

Many of the improvements obtained were implemented without too much cost to the company. It was enough, only postures changed in the team involved with budgets and purchases. For that it was necessary to devote a bigger effort to enterprise's planning in order to proportion a bigger coherence of the developed budget.

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Author's Biography



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