PROACTIVE PURCHASING IN CIVIL CONSTRUCTION COMPANIES

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Abstract

The adoption of new Strategic Proactive Purchasing for Brazilian Contractor companies was the subject of a Ph.D. thesis. It was presented in order to discuss the use of that application in the field of engineering business. The study summarizes the situation of four contractor companies before and after the introduction of the Procompras model, which is strongly based on proactive purchasing procedures. Moreover, some interesting aspects of the internal culture of the Brazilian companies are briefly discussed and a conclusion is presented.

The research method used was the case study. A bibliographic review of proactive procurement is the basis of the design of the Procompras model, plus the study of the purchasing procedures used by six civil contractors companies in addition to ten year's professional experience in this area.

The conclusion of the studies and the application of the designed and developed Procompras Model brought up several suggestions for improvement of the purchasing procedures of the companies. The study results present several suggestions for the improvement of this process. These improvements were based on the literature review regarding the main concepts of strategic proactive procurement and the Procompras Model created during the thesis. The obtained results showed that it is possible to add value to the purchasing process and to introduce the improvements suggested by the application of the Procompras model with few resources investments.

Keywords: Purchasing; Civil Construction; Proactive Procurement

Introduction

This article discusses the main results obtained with the "Procompras" model implementation, developed by this article's author, in four civil construction sector companies, two of them in Florianópolis and two in Curitiba, Brazil.

The "Procompras" model has the objective of orienting the construction companies to implant proactive purchasing in the material purchase function and can also be utilized to measure the proactive level of this function.

One way to substantially reduce the problems of the traditional material purchases is in the implantation of proactive purchasing (CUNNINGHAM, 2000). Proactive purchasing can be

defined as the purchasing focused on strategic activities, where the emphasis is given in negotiation activities, in work, and acquisition planning realization in order to reduce total material cost (BURT, 1996).

Utilizing purchase planning, the purchase team could previously negotiate medium and long range supply contracts in terms of price, delivery time, and quality, in very favorable conditions because of the involved volume (ALBERTIN, 2001). With this, the decisions based on personal relations, intense manual research, and limited departmental sight are eliminated.

The implementation of proactive purchasing in material purchase functions can bring an unmatched opportunity of efficient and fast delivery to the customers, within the purchase policy adopted in the company (BLUMENSCHEIN, 2000). With the proactive purchase implantation, the user will ask directly for the material delivery and not for the material requisition, making the material purchase function faster and more efficient (SANTOS, 2002).

With the pro-active purchase implantation adopted in e-commerce, there can be a sharing of responsibilities, where as in the traditional functions they are the responsibilities of the purchase team (SANTOS, 2002). In such way it is possible to liberate the team for more aggregated value activities and better strategic content, such as purchase analysis, long range purchase planning realization and supplier relationship management (FARACO, 1998). With the automatized proactive purchase implanted in the material purchase function, it's also possible to reduce the contract costs (CUNNINGHAN, 2000). Automating the whole process (purchase requisition, authorization, rating, integration with the corporative system, requisition to the supplier and product delivery) the construction company can reduce the purchase cycles and the dealing costs, as well as reducing the paper flux (GRILO, 1998).

Accurate situation diagnostics of the material purchase function in the civil construction sector, in relation with the proactive purchase implantation in material purchase functions, are as rare in Brazil as abroad. Therefore, the significance of this work is in analyzing the validation of a purchase area with a new implementation of proactive purchasing. Could this differentiated buying technique contribute to general performance improvement of the organization's purchase function?

Strategic view of material purchase function

One of the main problems faced by the material purchase functions in many organizations has been the failure in developing its proactive strategic role (PORTER, 1991; HERBIG et al, 1996). Since the 1980's, organizations have become increasingly conscientious of the gain that the strategic focus activities can generate to the material purchase function (BURT, 1996).

In recent years, much more attention has been dedicated to the mutual relationship developing between suppliers and customers, where the benefits of making business result from sharing ideas (PORTER, 1991; DUMOND, 1996).

With the implantation of a strategic implementation of the material purchase functions, the involved organizations intend to collaborate in identifying common interests.

With rising attention dedicated to the purchase functions the work, according to the proactive vision, tends to become more strategic, aggregating the contextualization of long range impacts to the management activities (BOWEN et al, 1997; MILES et al, 1997).

The strategic decision of the purchase function must be defined according to the content and the strategic decisions direction of the enterprise (PORTER, 1991; HERBIG et al, 1996). This strategic approach implies the purchase areas involved must concentrate their efforts, for most part, in long range relationship negotiation activities, supplier development, and purchase packages total cost reduction, instead of effectuating each solicitation separately without a strategic vision (PORTER, 1991, MILES et al, 1997, DUMOND, 1996).

The strategic role of purchase function is greatly affected by the management maturity stage that is reached by the organization. The more developed an organization is, the more probable that an

inter-functional strategic activity, which aggregates value and gives competitive advantage to the organization (DUMOND, 1996).

This change in material purchase function implies an operational focus growth for planning activities and, simultaneously, proportional efforts in reduction of purchase operational activities.

According to BOWEN et. al. (1999), customers of big companies such as IBM, Nissan, Ford, and Hewlett Packard spend only part of their time in administrative and bureaucratic activities. Most of their activities are concentrated on the establishment and development of appropriate relationships with suppliers. The emphasis for these companies has evolved to a pro-active material purchase function implementation, in order to improve companies' operations at every level.

For BURT (1996), with the pro-active purchase implantation in the material purchase function, this function starts to have other objectives besides meeting a supplier that is disposed to change goods or services into a determined amount of money. The purchase function objectives, based on the inherent pro-active purchase concepts, can be described as following:

- To assert purchase continuity to keep effective relationships with existing sources, developing other alternatives for supplying sources, or to attend the emergent or planned necessities by selecting the best suppliers.
- To keep solid and cooperative relationships with the other organizational functions, by supplying information and counseling to maintain efficient operation in the whole organization.
- To develop abilities of improvement of policy for the involved stakeholders, asserting the foreseen objectives to be reached.
- To keep quality and value equilibrium, obtaining goods and services in the right quantity and quality for the lowest cost.
- To monitor the market tendencies.
- To efficiently deal with the purchase conditions, to work with suppliers that are looking for mutual benefits by means of economically superior performance.
- To develop and keep good relationships with suppliers in addition to developing relationships with potential suppliers.
- To emit and manage purchase solicitation.

It is important to emphasize that there is not one unique routine for the material purchase function; this depends on the production system configuration of each industry, and each one of them requires a different supply system and consequently a routine difference for the purchase function. Moreover, to centralize the purchase is not always the best option for the construction companies, but it is the most utilized.

As described by BURT (1996) with the pro-active purchase implantation, the material purchase function stays focused on strategic activities, that is, on acquisition planning realization and also on the relationship with the suppliers. With this, the operational stage gets more flexible than in the traditional model, and matches the final customer necessities, which are to deliver the material in the right quantity, right moment, and also in the best purchase conditions.

The Procompras model

The PROCOMPRAS model was developed with purpose to guide the proactive purchase implantation in the material purchase function. This model will be useful to evaluate, diagnose, and orient the small, medium, and large size construction companies about their material purchase function performance. The PROCOMPRAS model is based on an organization (Construction Company) systemic focus, and is represented on Figure 1.

The material purchase function dynamic after the PROCOMPRAS model implantation must now happen the following way.

The purchase area must triggered with specification activities to help a new project's material choice. After the material specification definition, the purchase area verifies if registered suppliers can attend to the necessary material demand for the new project. Supposing that they cannot, the purchase area must search suppliers on the market to form partnerships. The purchase area also activates work planning activities in order to direct the changing by the work execution strategy according to the supplier's availability. After that, the purchase area elaborates the acquisition plan that must contain the total quantity by period of necessary materials for all the work. Having the necessary materials amount by period (year, semester, and month) at hand, the purchase area deals with the purchase conditions, with the suppliers, and solicits approval from the construction company management. If the delivery solicitation is in accordance with the planning, it is sent to the supplier or, supposing it is not part of the planning, it is sent for approval. The supplier informs the requisition conditions for the user and, on the foreseen date, delivers the material to the user.

It is important to emphasize that there is not only one configuration for the purchase function that is adequate for every construction company. It is known that each company has different characteristics (centralized or decentralized purchase) and can act in several situations. With the developed PROCOMPRAS model, it is intended to show that there are activities, within the material purchase function, that are important and contribute to this function's efficiency. It's not intended to "plaster" this function through proposed stage sequencing but to illustrate the purchase function working dynamic with PROCOMPRAS model implantation.

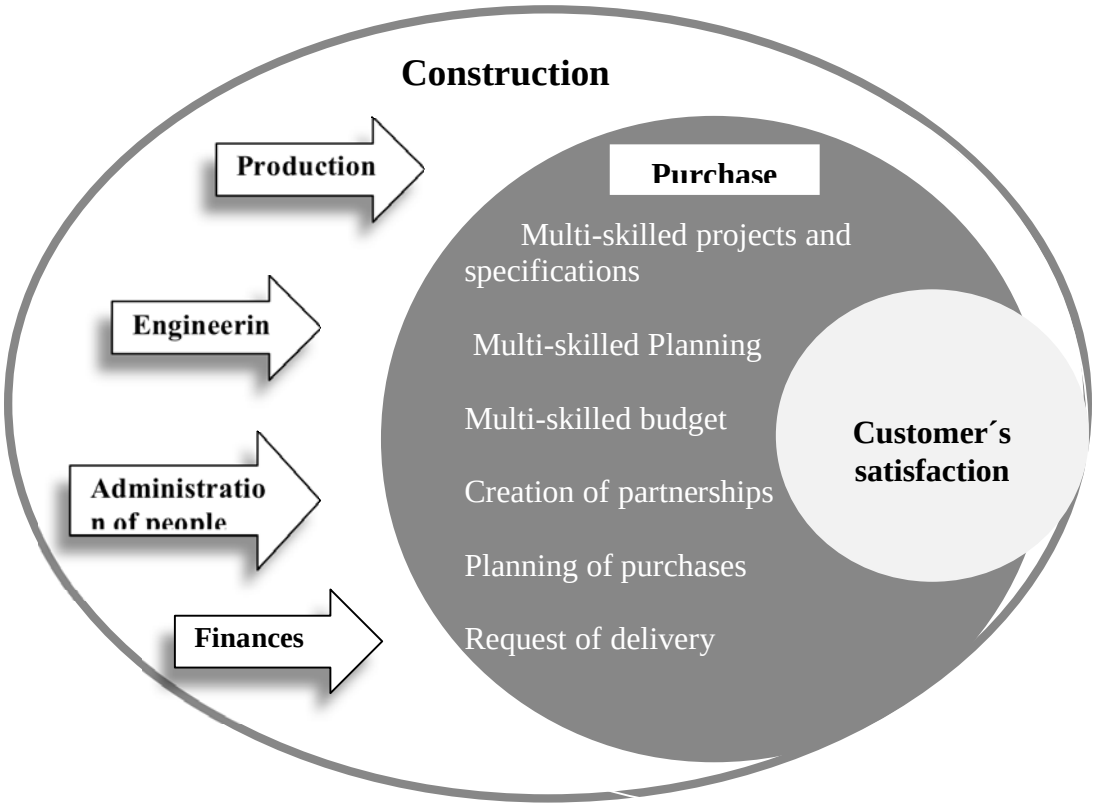

Fig. 1. The Structure of Procompras Model

Research methods

The main purpose of this work is to understand and to make a profound study of the knowledge relevant to the material purchase function, in order to point improvement opportunities for four civil construction companies. Thus, the utilized research method was the case study. The following data collection instruments were used in a period of approximately twenty-two months: document collection and direct observation with the involved stakeholders in the function. During the interviews, collection of evidential documents was attempted. Documents such as: quality manuals, sections of PBQP-H documents, forms, and procedures for material purchase function pertinent to tasks realization.

The interviews were based on a semi-structured questionnaire with questions referring to the material purchase function and also concerning the work routines of each individual interviewed. Looking at the responses, it became possible to identify at which stage, in which development stage, the purchase function occurred.

The PROCOMPRAS model implantation in material purchasing requires an elevated intervention time. For this reason, companies settled in Florianópolis and Curitiba were prioritized because of the geographic facilitation for the work realization. In addition, the site area (buildings) was taken into account, and the interest of the companies in terms of the work, since the proactive material purchasing implantation depends on the effective participation of the involved.

Four construction companies were analyzed in terms of material purchase routine, with the aim to collect information before (stage1) and after (stage2) the PROCOMPRAS model implantation in the purchase function.

Case study 1 (CS1) is a company from Paraná State that offers solutions for the civil construction enterprises'. The analysis (stage 1) done on CS1 was conducted when the company was finishing a seven residential building. At the time of the intervention, (stage 2) for CS1, the company was working on a six house residential block, situated near Curitiba.

Case Study 2 (CS2) is a small sized company from Paraná that has been active in the prefabricated house construction field for more than ten years. The company specializes in prefabricated concrete construction materials and production, and small-sized prefabricated house assembly. A house, with an area of approximately 89m², was analyzed during the research.

Case Study 3 (CS3) is a construction company based in the city of São José, near Florianópolis, that offers services in the domains of civic construction, residential construction, commercial, and industrial buildings, in addition to management and projects services. During the course of this research, the CS3 was building a five storey building. The building was composed of fifteen apartments, each one with two or three bedrooms.

Case Study 4 (CS4) revolves around complete or partial execution of civil construction works, also concentrating on properties sales. At the time of the intervention and analysis of the CS4, the company was building a project composed of four residential blocks.

The logic for the aforementioned research went through the following stages:

a) Planning: in this stage questions were defined that were the base of this research. A literature review provided background information on the subject. At this stage, it was possible to develop the theoretical structure utilized to develop the implantation model of the companies' establishment of proactive purchasing in the material acquisition function.

b) Formulation: The PROCOMPRAS model was developed based on publications about proactive purchasing and also on the directives regarding continuous improvement applied to production management. During and following the proactive purchase implantation, there were improvements made in the PROCOMPRAS model as well as in the theoretical structure adopted. In this stage, the case study choice strategy, and the analysis and intervention protocol were also developed.

c) Implementation and evaluation: In this stage, the intention was to collect information about the purchasing function before and after the proactive purchase implementation. With the collected data, it was possible to individually analyze each case study and also look at all case studies in conjunction, aiming to verify if there was an improvement in the desired customer condition (work) and also to the involved parties, with whom the purchasing occurred.

d) Conclusion: Finally, considerations regarding the developed work were done and conclusions were obtained, with the research in mind.

The creation of the seven rules of the PROCOMPRAS model was based mainly on the stages described by BAILY et. al. (2000) and SANTOS (2002). The model contemplates a qualitative performance evaluation method applicable to the construction company's purchase function. This method functions to help the proactive purchase implantation, as well as to be utilized for measuring the proactivity level of the function.

To help the PROCOMPRAS performance evaluation method, a bibliographic research study was done concerning performance evaluation methods that could be used as a reference for the developed method. The development of the PROCOMPRAS model activities occurred during the research period, then later were modified when it was possible to identify which activities of the PROCOMPRAS model were the bottlenecks of the process. It was determined that these functions should have a bigger importance within the purchase function evaluation, since the lack of these activities jeopardized the proactive purchase implementation in the material purchase function.

In such way, the bottleneck process activities (work budget, acquisition planning, and material delivery) were attributed a weight of 2 (two), while other activities were attributed a weight of 1 (one), for being activities that don't directly jeopardize the pro-active purchasing in material purchase function of civil construction companies. This logic was determined during the PROCOMPRAS model implantation on CS1 (pilot case study), because it was possible to pinpoint, during this intervention, the activities that could jeopardize implementation success.

Each primary activity in the PROCOMPRAS performance model was created by secondary activities. In the PROCOMPRAS model, the main element is the last activity. This strategy was used because it is known that each company can use different tools with the same final result. As the objective of the developed PROCOMPRAS model was to implement the proactive purchasing in purchase function, it was chosen to point to the final performance of each activity. Notwithstanding, it was considered important to identify which were the secondary activities done by the company, to identify points that could be improved. The performance pointing of each secondary activity was as follows: when the company realized the activity, the score allotted was 1 (one), when not, the score was 0 (zero). If the construction company carried out the main secondary activity (MSA) of each primary activity, independent of the completion of the others secondary activities, the primary activity was given points.

Case study performance

During the PROCOMPRAS model implementation in the four case studies, it was possible to realize that this function's performance did not occur linearly, as we can observe on Table 1. Ten (10) points were related to the seven excellence criteria of the PROCOMPRAS model pointing sum. Before the intervention, CS1 had five (5) points, after intervention it reached seven (7) points. CS2 went from zero to eight (8) points, CS3 from four (4) to five (5) and CS4 from two (2) to five (5) points after intervention.

Table 1. Case study performance

N°	Activities	Dots	CS1		CS2		CS3		CS4	
			before	after	before	after	before	after	before	after
1	**Multi-skilled in projects and specifications**	**1**	**1**	**1**	**0**	**1**	**0**	**0**	**0**	**0**
	Overview of the project	1	1	1	1	1	1	1	1	1
	Definition of project goals	1	1	1	1	1	1	1	1	1
	Inicial desings	1	1	1	1	1	1	1	1	1
	Inicial Budget	1	1	1	1	1	1	1	1	1
	Analysis of project viability	1	1	1	0	1	0	1	0	1
	Desings completed	1	1	1	0	1	0	0	0	1
	Relation of materials with specifications	*1*	*1*	*1*	*0*	*1*	*0*	*0*	*0*	*0*
2	**Multi-skilled into the production planning**	**1**	**1**	**1**	**0**	**1**	**0**	**1**	**1**	**1**
	Strategy of execution	1	1	1	0	1	1	1	1	1
	List of activities	1	1	1	0	1	0	1	1	1
	Definition of the activities precedences	1	1	1	0	1	0	1	1	1
	Definition of the resources	1	1	1	0	1	0	1	1	1
	Coding of materials	1	1	1	0	1	0	1	1	1
	Planning of the production planning	*1*	*1*	*1*	*0*	*1*	*0*	*1*	*1*	*1*
3	**Multi-skilled into the prodution budget**	**2**	**0**	**2**	**0**	**2**	**0**	**0**	**0**	**0**
	Checklist of activities quantitative	1	0	1	0	1	0	1	0	1
	Using of production constants	1	1	1	0	1	0	1	0	1
	Quotation of the inputs in the marketplace	1	1	1	1	1	1	1	1	1
	Production budget detail for activities	*1*	*0*	*1*	*0*	*1*	*0*	*0*	*0*	*0*
4	**Creation of partnerships with providers**	**1**	**1**	**1**	**0**	**1**	**1**	**1**	**1**	**1**
	Market research	1	1	1	1	1	1	1	1	1
	Negotiation of the conditions for buying small lots	1	0	1	0	1	0	0	0	1
	Experimental purchasing	1	1	1	0	1	1	1	1	1
	Approval of the purchasing for lots	1	0	0	0	1	0	0	0	0
	Assessment of the supplier	1	0	0	0	1	1	1	1	1
	Cadaster of supplier	*1*	*1*	*1*	*0*	*1*	*1*	*1*	*1*	*1*
5	**Realization of the acquisitions planning**	**2**	**2**	**2**	**0**	**2**	**0**	**0**	**0**	**0**
	Assemblies of the production planning	1	0	0	0	1	0	1	0	1
	Analysis of the cash flow	1	0	0	0	1	0	1	0	1
	Planning of the purchasing from the materials significant	*1*	*1*	*1*	*0*	*1*	*0*	*0*	*0*	*0*
6	**Request of delivering and accompanying**	**1**	**0**	**0**	**0**	**1**	**1**	**1**	**0**	**1**
	Request of delivering	1	0	0	0	1	0	0	0	0
	Comparison with the purchasing planning	1	0	0	0	1	0	0	0	0
	Notification of the supplier	1	1	1	1	1	1	1	1	1
	Purchasing order	1	1	1	1	1	1	1	1	1
	Follow-up of the orders	*1*	*0*	*0*	*0*	*1*	*1*	*1*	*0*	*1*
7	**Materials delivering**	**2**	**0**	**0**	**0**	**0**	**2**	**2**	**0**	**2**
	Material delivered well-timed.	*1*	*0*	*0*	*0*	*1*	*1*	*1*	*0*	*1*
	Material no criates inventory	*1*	*0*	*0*	*0*	*0*	*1*	*1*	*1*	*1*
	Material received on quantity certain	*1*	*1*	*1*	*0*	*1*	*1*	*1*	*0*	*1*
	Material received with the quality wanted.	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*	*1*
Total Activities		**35**	**23**	**26**	**9**	**34**	**17**	**27**	**19**	**29**
Total Dots		**10**	**5**	**7**	**0**	**8**	**4**	**5**	**2**	**5**

Analysis of the four case studies demonstrates the cause of these results.

The material purchase function of CS1 had a maturity level in development. The main marking factor noticed during the intervention in this company is lack of the compromises of the high management and the involved parties with regards to planning and company controlling activities. It was not possible to make conclusions with regards to the proactive purchase implantation on CS1 because the economic study showed that the project would not be available for the company. As the control of the activities that involve the purchase function routine was not put into effect, the CS1 didn't have the opportunity to significantly improve its general performance.

In CS2, it was clear that the purchasing area of this company was directed for operational activities which involved the purchasing process. It was possible to implant the PROCOMPRAS

model almost in totality because the researcher actively participated of the activities elaborated during the intervention.

The noticeable situation in CS3 and CS4 was the great interest of the owners in the estimated budget and the lack of interest in doing the enterprise's own operational budget. In relation to CS3, it was possible to notice that there was a great interest of the company with regards to work quality. New construction methods were used, projects were carefully developed with the owner's support, and the work was very organized and clean. Nevertheless, cash flow limitations and owner priorities were the success limitation on proactive purchase implantation. The CS4 had different characteristics, the company focus was on materials purchase, on services hiring, and properties sales. For the company's owner, the secret of a good sale is in the condition in which the products or services were acquired. Cash flow was not a problem; what limited the effective proactive purchase implantation was the allocation of parametric indicators that were utilized as goals.

Table 1 showed results of the total realized activities by companies before and after the intervention. With the analysis of Table 1, it is possible to notice that the performance level of the purchase function in the case studies had the following situation: CS1 before the implantation had a performance rate of about 66% ((23x100)/35), after the implantation the performance rate reached 74%. CS2 obtained a 26% rate before intervention and 97% after. CS3 went from 49% to 77%. CS4 obtained 54% before the intervention and 83% after the proactive purchase implantation in material purchase functions.

Discussion and conclusions

After the observation of case study performance in projects and specifications stages in Table 1, it was possible to determine that the company in CS1 already had an excellent score on the projects and specifications stage, even before the intervention. After intervention, the CS2 started developing its availability analysis, and the detail level of the projects and material specification improved. However, the CS3 faced difficulties with project hiring, work started without the final plans, and the specifications were developed during construction. The CS4 company had definitive projects, but specifications were defined during the construction.

With the analysis of the case studies performance in project and specification stages, it was possible to determine that the bottleneck of this stage was in the hiring of planners. The lack of professionals at the beginning of the work has repercussions with the purchase function, because without these professionals it is not possible to relay the right information to the suppliers; consequently the budget starts to suffer alterations during the project. With a better involvement of the purchase team with plans and specifications, the variability during work execution and in material purchase tend to decrease, facilitating the process management, and increases its efficacy and efficiency.

Observing the CS1 and CS4 company performances in the planning and work stages, it is possible to determine that the companies had scheduling control and planning of work, meaning that the enterprise planning was done according with the enterprise's execution plan. On the other hand, with CS2 and CS3, this activity was not completely done before the intervention. When the permission to do the job in these companies was given, it was possible to develop the work with detailed planning. BALLARD et. al. (1998) proposes that the enterprise's planning process should be done in three stages. In CS1 and CS2, it was possible to reach the second planning level where a more detailed short range (every two or three weeks) planning is done, denominated by the authors as "Lookahead Planning". The objective of the second planning level is to adjust the schedule and mobilize resources according to the real production course. CS3 and CS4 didn't reach the second planning level, since the planning did not have the necessary involvement of the team.

Since the CS1 and CS2 performance observations of the budgeting stage of projects occurred during the intervention, it was possible to develop an operational budget, because these

companies had the projects and specifications as well as a detailed project planning. In the CS1, the economic analysis project showed that the enterprise costs on the adopted strategy were beyond the owner's capabilities. The decision was to abort the project, since it was not possible to continue with the proactive purchase implantation on CS1. On CS3 and CS4, there was lots of resistance from the companies to the making of an operational budget, because the projects were not well detailed and the specifications were defined during the work execution. There was an attempt to make an operational budget on CS3 and CS4, but the result was not satisfactory. The value of the work became too much, beyond the parametric ratings that were estimated and adopted by the owners, for the enterprise.

A great resistance with regards to the use of detailed budgets in CS3 and CS4 was noticed. According to LIMMER (1997) the use of detailed budgets demands a paradigm break (traditional budget x detailed budget) and to do so, there is a necessity for time and persistence. Observing Table 1, it's possible to realize that CS1 had already developed the acquisition planning strategy before the intervention. This planning was done in a continuous way by the purchase group involved. In CS2, it was not possible to develop purchase planning structured according to the work operational budget and plans. This outline was developed on MS Project. In CS3 and CS4, it was not possible to develop the acquisition planning because the budget wasn't properly structured. With the acquisition planning stage, the customer could demonstrate to the supplier his potential, invoicing after the conclusion of the deal. The negotiation of big material lots, with punctual suppliers, also has the objective of creating partnerships, where the price is no longer the only key variable, but part of a supplier qualification entity (BAILY et. al., 2000).

After the definition of the necessary materials for the work and the quantities needed, the customers can negotiate with the suppliers. Nevertheless, there is an important supplier selection to be done beforehand, with the current and future suppliers (ISATTO, 1999). Observing the Case Studies study in the supplier partnership creation stage, it is noticed that in CS1 it was possible to negotiate some materials in large quantities. That occurred at the moment the enterprise's operational budget was being done. In CS2, it was possible to develop work with the current and new suppliers. The difficulty faced in CS3 was referred to the negotiation of materials in sections, because the enterprise's cash flux was limited. In relation to CS4, the approbation or rejection of section purchases by the involved parties was noticed.

With the analysis of Table 1, it is possible to verify that in CS2 there was a possibility to develop a logic that stipulates the delivery solicitation and request attendance stages. In CS3 and CS4, it was not possible to apply this activity, since the acquisition planning for these companies was not completed.

Table 1 shows the case studies performance in the materials delivery stage. The main difficulty found in CS2 was the large inventory kept by the company. The CS4, after the intervention, started to receive the materials on the date agreed upon by the purchasing department and the suppliers.

Generally, it is noticed that CS1 had a great potential to implant the proactive purchasing method, because of the practice of planning the projects in a structured way. The purchase control could be improved; unfortunately the project was aborted after the economic availability analysis. CS2 had the purchase function structured in a chaotic way. The interesting part of this case study was that the researcher could apply the PROCOMPRAS model in this totality. The CS3 and CS4 had differences in the purchase control. There were procedures for material and supplier evaluation. The improvement potential for these companies was in the purchase involvement with plans and specifications, as well as with the operational budget. Not all the elements that are part of the PROCOMPRAS model could be applied in these companies due to the restrictions imposed by the owners.

This article describes the results of a cooperative work effort between a university and a company, with immediate practical applications that point to a better direction for the purchasing department of building companies. This article looked at the purchase function situation in four case study companies before and after the proactive purchase implantation (PROCOMPRAS

model) and identified the generated improvements with this process, such as the necessity to improve the efficiency of this change in management and purchase area operations.

Many of the obtained improvements were implanted without great costs to the company and with only a change in management position. For that, it was necessary to dedicate more efforts to acquisition planning in order to allow more flexibility on the operational part of the material purchases.

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