Impacts of the implementation of quality management systems in the organizational structure of Brazilian building construction firms

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ABSTRACT: It is well known that the implementation of quality programs usually impacts the way that most of the areas of the companies work and their interrelationships. It involves not only actions in process management but also great efforts in people management and, in several cases, deep changes in the organizational culture. The main discussion in this paper tries to give an answer to the following question: to which extent do the implementation of quality programs impact the organizational structure of building firms?

In order to answer this question, a case study was carried through in eight building companies that were implementing such programs, between April and June of 1999. All are small or medium sized companies from the State of São Paulo, Brazil. Three of them were pursuing the ISO 9002 certification while the other five were looking forward to obtaining the Qualihab certification – a quality certification system based on the ISO 9000 standards and adapted to the characteristics of the local building construction industry. The low-incoming house office of the State of São Paulo in its bidding processes requires Qualihab certification.

In the paper we discuss some expressive organizational transformations observed in the case studies. First of all, it is remarkable that most companies were having for the first time a reflection on how they organize the work that they were developing. The quality programs were responsible for a better role, authority and responsibility definition in those organizations. The process management approach was also introduced, making clear the interfaces between the several companies’ sectors. Communication systems importance was, then, enhanced and these systems, in most cases, improved. In all cases it was observed an intensification of the habit of doing meetings. It was also observed the intensification of the engagement of the workers in the discussion of the firms’ problems.

Finally, it was also observed that during the implementation of quality programs building firms become conscious of the importance of having strong partnership relationships. Although most of the companies studied were still far from having real...
partner suppliers, it can be said that the spread of the quality movement might strongly contribute for the progress of the local building productive chain.

Keywords: quality management, organizational structure, building companies.

1 INTRODUCTION

Deep environmental changes were observed in the Brazilian building construction sector in the nineties. As Cardoso (1996) observes, from a situation of weak competition, in which the commercial/financial efficiency logic was prioritized, and when companies could put technical/economical logic in a secondary place, the Brazilian building sector turned into a new situation. Due to the raising competition, companies could only be effective if they were efficient technically and economically.

Among the several possible strategies that these companies could develop in order to search for this efficiency raise in their production systems, Barros (1997) identifies the implementation of quality management systems and the implementation of innovative technologies in the production processes as the most adopted in Brazil. In this paper we have special interest in the quality management strategy.

Several authors have studied the implementation of quality management in the Brazilian construction sector. Picchi (1993) and Souza (1997) propose methodologies for the implementation of quality systems in construction companies. Mekbekian (1997) makes a review of the ISO 9000 standards when studying quality management in the precast concrete industry. Reis (1998) studies the impacts of the implementation of quality programs in the production processes of building firms. Cardoso et al. (1998 and 1999) analyze the implementation of the QUALIHAB Program – Housing Construction Quality Program of the State of São Paulo – in building firms. In this paper, quality programs are studied under the focus of the organizational problem.

This investigation was motivated by the premise that the implementation of TQM motivates organizational changes in the companies. The premise is based in the fact that the implementation of these systems involves actions in the several sectors of the organizations. Such actions are, in most cases, related to processes that occur across the various departments, emphasizing the interfaces among them and the demand for coordination policies.

The implementation of quality programs is, then, pertinent to the important currents of the organizational theory, that propose the end of the barriers between departments and emphasize process management (Ashkenas et al., 1995).

Also, Souza (1997) emphasizes that the implementation of quality programs involves both processes and people management. Since the organizational structure is an important tool that companies use to manage their processes and their human resources, the implementation of these programs certainly has impacts in these structures.

Then, the main discussion in this paper tries to give an answer to the following question: to which extent do the implementation of quality programs impact the organizational structure of building firms?

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3 This Program will be discussed later in this paper.
2 QUALITY MANAGEMENT IN THE BRAZILIAN BUILDING CONSTRUCTION INDUSTRY

We shall then briefly present the scene of quality management in the Brazilian building construction sector. As we have already said, there are many companies that are implementing or maintaining quality systems in the sector. These companies have or are pursuing the ISO 9002 or the QUALIHAB certification.

In general, companies that work in the private market pursue the ISO 9002 certification motivated by the intention of increasing their efficiency and gaining competitiveness. It must be remarked that it is a Brazilian particularity that, in private housing construction, the same company acts as both the promoter and the constructor of the enterprise.

On the other hand, most of the companies that work in the public market are pursuing the QUALIHAB certification. Most of these companies began their quality programs motivated by the request of such certification in order to maintain themselves in the social housing market in the State of São Paulo.

2.1 Moving towards quality management

In order to develop and implement their quality systems, most building companies are using the methodologies developed by Souza (1997) or Picchi (1993). The first methodology is very diffused in the sector, once it is adopted by one of the general contractor’s unions – Sinduscon-SP, in quality management programs that are developed with groups of companies.

Souza’s methodology involves actions in quality system policies and organization, quality in human resources and management, quality in the commercial process, quality in design, quality in supply management, quality in construction processes and quality in operation and in technical assistance (Souza, 1997).

Studying companies that pursued the ISO 9002 certification or that were close to obtaining it, Reis (1998) observed that through the changes due to the implementation of their quality management systems, companies could gradually raise the quality of their products and processes, reduce waste and, in some cases, stimulate a closer interaction between them and the other agents involved in the production processes (designers, suppliers and subcontractors).

2.2 QUALIHAB Program and PBQP-H

The QUALIHAB is a quality program in progress in the state of Sao Paulo, Brazil, conducted by the local low-income house office, the Companhia de Desenvolvimento Habitacional e Urbano – CDHU (Housing and Urban Development Agency of the state of Sao Paulo). With this program, CDHU aims to "to optimize the quality of social housing, regarding the materials and techniques employed in their conception and construction, through partnerships celebrated by agreements with the main actors of the supply chain".

The CDHU contracts, on average, sixty thousand housing units per year. Its resources come from the budget of the state and, especially, of the VAT – Value-Added Tax (up to 70%) – once 1% of this tax is destined to the social housing. Its annual total budget is about half a billion American dollars.
Inspired in the French successful experience of QUALIBAT, it was developed a certification system for general contractors in the QUALIHAB Program. The QUALIHAB System has four levels and according to them the quality management system of the firms are evaluated and classified, in a progressive and continuous way. It has also another particularity: the qualifications are made only by third-part audits carried out by accredited external independent audit service organizations. It consists itself of eleven requirements, which are related to some of the twenty chapters of the paragraph 4 of the ISO 9001 Standards. It can be considered as a preparatory model to the certification ISO 9002 (Cardoso et al., 2000).

Due to an agreement between the CDHU and the two general contractors’ unions (the Sinduscon-SP and the APEOP), QUALIHAB certification is today necessary for companies to participate of public housing bidding processes.

Nowadays, more than 200 general contractors are engaged in the QUALIHAB Program, and more than 60 have already reached the highest level of certification.

Another important quality program is being developed in Brazil, called PBQP-H – Programa Brasileiro da Qualidade e Produtividade da Construção Habitacional (Brazilian Housing Quality and Productivity Program). Conducted by the federal government, PBQP-H is adopting a National Certification System for General Contractors, similar to the QUALIHAB’s one. This system, unique for all the country, also proposes a technical reference to qualify enterprises, based on the quality management approach, and also has four levels or successive steps in its qualification process.

3 IMPACTS OF QUALITY MANAGEMENT IN THE ORGANIZATIONAL STRUCTURES

The study was conducted in eight companies in the state of Sao Paulo, Brazil. The same methodology, described as follows, was applied in all the cases.

3.1 Case study methodology

The methodology adopted involved visits to the central office and to at least one construction site of each company. Using standard questionnaires, three interviews were made in each case. With the director the history and strategy of the company, the configuration of the organizational structure and the main changes observed were discussed, especially in the processes developed outside the construction sites. Aspects of the quality systems and changes in the processes directly related to the systems were discussed with the “quality coordinators”. Finally, impacts in the production organizational structure were discussed through interviews with engineers on the construction sites.

In addition to this, documentation of the companies’ quality systems was also analyzed.

3.2 The companies studied

The case studies were conducted in eight companies that work primarily in the building construction sector. The companies varied from forty five to three hundred employees of their own and employed, in most cases, subcontracted workers in production. Counting
the subcontracted workers, they use between one and four hundred people at the same time. Seven of them began as a small business and they still belong to the same owner (eventually with some partners) until now. All of the companies were established between ten and forty years ago.

Three companies work in the private market as both promoters and constructors. The other five companies work mainly in the public market (housing, schools and public buildings construction, etc.), and also work in the private market (three of them as promoters/constructors and two of them as constructors in projects of private clients).

All the companies were implementing quality management systems. Six of them were following the model of progressive certification of the QUALIHAB system. Among these, only four necessarily needed the QUALIHAB certification, since they have CDHU as an important client. The other two companies were using the progressive certification as a path to reach the ISO 9002 certification, since they do not work in the public housing sector. Among those four companies that need the QUALIHAB certification, three also intended to reach also the ISO 9002 certification. The other two companies were pursuing straightly the ISO 9002 certification.

We understand that these companies are cases of success in the sector, since all of them are established for more than ten years. Even thought they are “good companies”, they are not in the group of leaders in technical and managerial innovation, as Sao Paulo’s large promoters/constructors. After all, the cases studied can be considered as representative of the companies of the same size, which are implementing TQM.

The research in the companies was made between April and June of 1999. In all the cases, quality programs were in course in the companies for more than a year.

3.3 The impacts observed in the administrative structures

The most remarkable impact of the implementation of TQM in the organizational structures is their formalization. The companies were forced to formalize their organizational charts, which most of them did not even have at the beginning of the process. All of them also formalized the attributions and responsibilities of all the positions that are in the scope of their quality systems. Such formalization is demanded in these systems, in which the traceability of all actions performed along the processes is very important.

The lack of role definition was a characteristic of these firms (as it is in most Brazilian similar firms) before the implementation of TQM. This problem was more evident in the higher levels of the hierarchy. Some directors commonly acted and had full authority over attributions that did not belong to their areas in the company. After the formalization of the roles of the positions and of the sectors, attributions and responsibilities became clearer in these structures. It is important to remark that the process involved the discussion and reflection of how to configure the organizational structure, what was unusual in these firms. Some of them admitted that had never had this concern before.

Moreover, all the companies have developed their quality policies that were used as directives for the implementation of their quality programs and also became one of the most important elements in their behavior. In spite of this, in some cases these policies were not adequate to the organizational culture and to the practices observed. Some actions, such as the establishment of partnerships with suppliers and the valorization of human resources, cited in several quality policies, in a few cases were in fact being persecuted.
As the management processes were formalized, the attributions of all the positions involved in each process, including their authorities and responsibilities, and the interfaces between the several sectors were emphasized and became clear. It was observed in all the cases studied and in all of them both the directors and the employees understand that this is a positive impact of TQM. It can be said that these companies, although still operating under functional configurations, began to accept and to perceive the benefits of the processes approach.

Brazilian small and medium sized building companies usually have hierarchical organizational structures that adopt functional specialization as the criteria for the determination of its areas. It is usual that these companies have three main divisions: commercial/marketing, technical and administrative/financial (Vivancos & Cardoso, 1999). In all the cases studied was created a "quality committee" and "quality teams". The "quality committees", formed by people in key positions in the several areas of the organization, are responsible for the management of the development and implementation of the quality system, also assuming some operational tasks in the system. The "quality teams" are responsible for the development of procedures for specific processes in the system and are formed by people directly involved with such processes.

The work in committees and the habit of doing meetings to discuss the problems of the company used to be extremely rare in most of the cases studied. It was not part of the culture the engagement of the employees in the decisions of high impact in the organization. The power structure is then altered. These firms have structures that are traditionally centralized in the owner (and in two cases, in the directors), what was not deeply changed after the implementation of TQM. Nevertheless, with the role of the positions formalized, the formal power structure becomes clear. Moreover, in the committees, employees have the opportunity to participate in the standardization of the processes in which they work, what can be considered a form of power. It was also observed that those employees with high performance in the work of the committees and in the implementation of the quality system commonly conquer informal power that is higher than that expected for their positions.

Finally, an enormous concern with the improvement of the communications and information systems was observed in these companies. All of them place the increase of the use of computers as one of their most important strategic actions. This concern is not a direct result of TQM, although its importance is enhanced during the process of implementation. The interrelations between the several sectors become clearer and, as a consequence, the points where the use of technology of information can bring positive impacts for the processes become more evident. In addition, some formal paths of communication were created or remodeled, as processes were formalized. Such paths usually involve written formularies, which are fulfilled along the processes and generate the system's records.

It is interesting to observe that the companies were not usually using the system's records as new management tools. The Brazilian building construction industry does not have the tradition of controlling its levels of productivity, equipment efficiency, materials loses, among others. With TQM, companies are automatically producing records of their processes’ performance. In spite of that, the companies studied did not have adequate structures to analyze that information and use it as a performance control tool. The companies studied could then only perceive the benefits of their quality programs in a qualitative way instead of based in quantitative data.
3.4 The impacts observed in the production structures

For decades, the production structures in Brazilian building construction were basically composed of an engineer, a general foreman, some foremen and the workers, that can be craftsmen or helpers. In this traditional structure, who in fact conducted the work on the site was the foreman while the engineer was occupied with administrative work, such as materials and equipment management, people management, etc. Without any formal training, workers raised in their careers as long as they obtained experience in the work. The foreman and the workers could determine the way that the services should be done and were also responsible for controlling its execution and its quality. In fact, the building firms and its engineers did not have real control over a great part of the technological aspects involved in the production processes. This resulted in the inefficiency of the production process. As discussed earlier in this paper, companies are conscious that their production processes were inefficient and adopted TQM as an strategy to change this situation.

The most important impact of the quality programs in the production systems is that the companies reassume the control of its technological aspects. This is a direct result of the formalization of procedures that determine the production steps and its controls for the most important production processes developed on the construction site. Companies tried to find the best engineering solution for each of the processes that were standardized. After TQM, on all the sites of the company the exact same production techniques should be adopted.

It must be commented that there are no Brazilian codes of practices for most of the production processes. Due to this problem, a consulting firm developed models of these procedures, which were taken as a start point by all the companies studied in the development of their quality systems!

Most of the companies faced problems within their traditional general foremen, some of which had problems of adaptation to the quality systems. In fact, it can be said that the nature of the general foremen's work was changed. Before TQM they were responsible for the way that the craftsmen performed the processes. After TQM, they were responsible for the control of the work done, assuring quality. Quality control, that used to be done informally, now has fundamental importance, and must be formally recorded. Because of this, some general foremen who were illiterate had to leave their positions.

Materials specification and reception routines were also formalized in all the cases studied. Warehouse storekeepers then assume a very important role in quality assurance, since they are responsible for the reception of the materials on the sites. In all the companies there was the concern in selecting people who were capable of assuming such responsibility and in training the storekeepers adequately. Before TQM, in all cases, only price and quantity were checked during the materials reception.

Deep changes in people management were also observed in these firms, specially in the production areas. With the implementation of quality management, companies were forced to make investments in training programs, what used to be absolutely unusual in the sector. All the companies studied were sure that providing training to their own workforce and also to the workers of their subcontractors was essential for the success of the materials and services standardization and control. Moreover, in some cases it was remarkable the efforts in diffusing the quality policy among the workers, especially doing periodic meetings with them and using visual language on the site (messages in
posters, banners, etc.). Two of the companies studied could be considered excellent examples of this situation. In some companies, however, these efforts were insufficient.

Also the construction sites’ environmental conditions were notably improved, specially in terms of cleaning, order and security. It must be remarked that since 1995, Brazil has a new legislation about the construction sites’ environmental conditions, what contributes for these improvements. Nevertheless, it is indubitable the importance of the companies cultures in terms of quality for these better work site conditions.

Finally, it could be perceived that the quality movement of the contractors had effects in the productive chain. As the material control was implemented, companies started to identify the suppliers that were unable to provide adequate products and services. Most of the companies studied had faced this kind of problem and had to choose between excluding such suppliers from their list or forcing them to raise the quality of their products and services. In fact, none of the firms accepted to use materials that did not reach the new quality parameters.

As services control was implemented, other problems occurred. Although they were providing training for the workforce, their major difficulties were related to the constant changes of workers on the sites (turnover). Due to this problem, it was hard for the firms to control which workers were adequately trained for the service in which they were working. It was also bad for the company to be every time repeating training for the new workers that were every time coming to the site. Half of the companies also complained that at the end of each cycle of construction, they could not maintain the subcontractor that was trained for that process, unless they had another site in which that service was beginning at that time. Since this is usually an exception, contractors had the feeling that all the investment that they made within that subcontractor was lost. Most firms pointed the establishment of stable partnership with their subcontractors as the best solution for these problems. Despite of that, these stable partnerships were rarely observed in the companies.

4 CONCLUSIONS

As the first conclusion of the paper it can be said that the implementation of quality management systems in fact has impacts in the organizational structure of Brazilian small and medium sized building construction companies, what confirms the premises of the research.

It can be said that many of the impacts observed result from the fact that the companies used to be extremely informal and, sometimes, disorganized. Changes related to the formalization of the structure, such as better role definition and clearer paths of communication would not necessarily occur only as a result of the quality programs. Several other management tools could possibly promote these changes. Anyway, quality management proved to be an effective tool for small construction companies that are pursuing improvements in their internal organization. This is a remarkable observation, since this is the case of the majority of the companies in the Brazilian market – only in the State of São Paulo there are more than 5,000 companies affiliated to the general contractor’s union (Sinduscon-SP), most of them of small and medium size.

We believe that it is of great importance the establishment of the culture of quality in these organizations, what was not adequate in all the companies by the time of the research. In most cases, greater efforts in the diffusion of the culture of quality seemed
still necessary. Anyway, it seemed very difficult that the impacts already occurred could be lost by the companies, even in the case that they abandoned their quality programs.

Nevertheless, a cultural change was observed in the companies. In most of the cases, although with different intensity, it was observed in these companies a focus in the client. It is interesting to observe that even in those companies which client is the government, the concern about the people who are going to be the final users of their constructions exists.

Finally, we also believe that the movement towards quality in the sector, especially with the advance of the QUALIHAB Program and with the implementation of the PBQP-H, contributes to a raise of maturity in the in Brazilian building construction productive chain. A raise in the demand of quality from the contractors to the suppliers and subcontractors was clearly observed in the cases studied. On the other hand, a movement towards the strengthening of partnerships is nowadays beginning in the sector, as a direct result of the quality movement.

This might result that the organizational structures of the Brazilian enterprises might become closer to the quasifirm model, proposed by Eccles (1981), than they are today.

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