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Quality in civil construction in Brazil

Abstract

Civil construction is composed of several activities that involve various agents and relationships for their development. It is common that the lack of standardization between materials and processes makes the execution of the work scattered and unproductive and often delays the schedule and interferes with the final result, sales of the projects and customer satisfaction. Thus, it is clear that the introduction of a quality management system brings benefits to the operational and managerial organization of the company. This work highlights the Brazilian Program for Quality and Productivity of Habitat (PBQP–H) associated with ISO, as tools to optimize the construction activity. The paper presents the program and its norms, discussing the implementation and updating of the PBQP–H guidelines and their benefits. It is concluded that the standardization generates quality, productivity, technological modernization, waste, and cost reduction, making the company's image competitive and profitable.

Keywords: quality in construction, civil construction, brazil, PBQP–H

Volume 4 Issue 2 - 2018

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Received: January 30, 2018 | **Published:** April 27, 2018

Abbreviations: PBQP–H, brazilian program for quality and productivity of habitat

Introduction

PBQP–H was established in 1990, through the Law n° 134 of December 1998, where was defined as the "Brazilian Program for Quality and Productivity in Housing Construction" changed in 2001 the term "Housing Construction" for "Habitat." This program follows the same methodology for ISO 9001 certification. The PBQP–H is an instrument of the Federal Government to fulfill the commitments made by Brazil when the Istanbul Charter (Habitat II/1996) was signed. Its goal is to organize the construction sector around two main issues: improving habitat quality and productive modernization. This program counts on the active participation of the segments of the productive chain, reconciling efforts in the search for solutions with higher quality and lower cost. The creation of the PBQP–H made possible to foster the research and technological development of the construction industry by existing policies, raising the qualification of the labor force in this sector through basic education and training, thus increasing levels of competitiveness.[1]

The Brazilian Program for Quality and Productivity in Habitat (PBQP–H). The Brazilian Program for Quality and Productivity in Habitat (PBQP–H), is composed of 12 projects, each with its objective to solve a specific problem of quality, initially structured for the area of housing construction and at different levels of development.[2]

The 12 projects that comprise the Program are:

1. Structuring and Management of PBQP–H;
2. National System of Technical Approvals;
3. Support to the Use of Materials, Components and Constructive Systems;
4. System of Qualification of Civil Construction Companies;
5. Quality of Materials and Components;
6. National System of Communication and Information Exchange;
7. Training and Requalification of Civil Construction Professionals;
8. Quality of Laboratories;
9. Improvement of Technical Standardization for Housing;
10. Technical Assistance to Self–Construction;
11. Bilateral Technical Cooperation Brazil/France/IDB for PBQP–H;
12. Regional Program: Social and Economic Challenges for Housing linked to the Improvement of the Quality of Housing in Mercosur.

The Program is composed of three departments: SiAC, SiMAC, and SiNAT. The SiAC "Conformity Assessment System of Civil Construction Services and Works" aims to evaluate the conformity of the quality management system of service, focusing on the specific characteristics of the construction companies performance. (COSTA, 2016). The SiMAC "Qualification System of Materials, Components and Constructive Systems" aims to combat non–conformity of materials used in construction. Through the so–called "Sectoral Quality Programs (PSQs)," many materials already surpass the 90% compliance index "promoting a scenario of increasing competitive isonomy in the construction sector." (PBQP–H, 2017).

These measures are intended to contain two common processes in the market for construction materials in the country. The deterioration of product quality (national and imported) and the commercial activity and degradation of some types of components and materials. The growth of the non–compliance systematic activity by some manufacturers. Table 1 shows some compliance indexes already achieved in SiMaC.

Technical non–conformity of building materials and components results in low–quality housing and civil works affecting citizens, businesses and the urban habitat as a whole. Waste, low productivity, urban pollution and housing deficit are part of a scenario that the System of Qualification of Materials, Components and Construction Systems proposes to transform, in partnership with the private sector. The SiNAT "National System of Technical Assessment," aims to stimulate technological innovation as the support of the technical community for the use of standardized procedures throughout the

production chain of civil construction, aiming. To fill in possible gaps in Brazilian standards provisionally.

Other two systems are under study to be incorporated in PBQP–H:

I. National System of Training of Manpower (SiCAP);

II. National System of Technical Evaluation of Innovative Products.

The principal department of PBQP–H: "Qualification System of Materials, Components and Constructive Systems."For a company to apply for PBQP–H certification, it is necessary to undergo an audit by the so–called "OAC" (Conformity Assessment Body), bodies accredited by the Ministry of Cities for this function.

Table 1 Examples of conformity índex of building materials in the PBQP–H– SiMAC

Sectoral quality programs	Conformity index (%)
Mortar	92,40%
Steel Bars and Wires	100,00%
Ceramic Blocks	26,10%
Concrete Blocks with Structural Function and Concrete Parts for Paving	92,20%
Cement	98,90%
Plastic conduits for low voltage used in electrical systems	90,00%
Steel Frames	15,00%
Sanitary Ware for Building Systems	97,00%
Ceramic Tiles	20,60%
Pipes and Fittings for Building Hydraulic Systems	96,00%

Source: based on PBQP–H– (2017).

The initial certification of a construction company is done in two phases[3]

Phase 1

Aims to assess the suitability of the quality management system; to present the applicable regulatory requirements, to know the particularities of the company, to assess its level of readiness for Phase 2 and to establish an effective audit program.

Phase 2

With the objectives of assessing the conformity of established and implemented practices with applicable regulatory requirements, as well as the adequacy of the planned and pre–evaluated quality management system in Phase 1. Any omission or misrepresentation of information is considered to be serious misconduct subject to suspension of certification. The SiAC determines for the execution of works, two evaluation levels: A and B. The levels represent an evaluation of an evolutionary character.

It is thus expected that a company certified at level B will strive to achieve the performance required for the award of level A. The pre–requisites for the company to certify at Level B or A are:[4]

a. To have constructions in progress, since in the certification audit it is necessary to prove that the company has already executed 50% of the controlled services and must be performing on the day of the certification audit ¼ of the controlled services;

b. Have the "ART" (Technical Responsibility Note) on behalf of the company;

c. Implement the SiAC requirements corresponding to the level to be certified (A or B), including legal requirements;

d. The contractor must have the responsibility of the overall work contract, and not partial. Must have ART and contract registered with the owner of the work.

Level A corresponds to 100% of the implemented requirements of the SiAC standard, has a maximum validity of 3 years, and according to contract with the certifying body, but annually the company undergoes maintenance audits in which the certificate is renewed. Level B corresponds to 77% of the requirements implemented in the SiAC standard it is valid for 3 years and goes through inspections and similar renewals at level A. Each evaluation can be modified to level A.

These are some parameters that are evaluated:

I. Management of resources: Materials provision; Human resources and Work environment;

II. Quality Management System: Documentation requirements;

III. The responsibility of the company's management: Commitment to customer focus; Quality policy; Planning; Critical analysis; Responsibility and authority;

IV. Measurement, analysis, and improvement of the execution: Measurement and monitoring; Control of materials, services and manpower; Data analysis; Corrective and preventive actions;

V. Execution of the work: Planning; Contact with the client; Project; Acquisition of Inputs; Supply and operations Monitoring;

VI. Resource management: Provision; Infrastructure and Training.

In early 2017, the PBQP–H base was updated so that its guidelines complied with the requirements and performance criteria of the Brazilian Association for Technical Standards (ABNT), these are the "NBR." The first standard associated with PBQP–H is NBR 15575:2013–Housing Buildings; Performance.

NBR 15575 entered into force in 2013 to "prioritize the well–being of users of housing units" highlighting concerns such as:[5]

Structural systems: safety (structural, anti–fire and in use and operation);

Waterproofing systems: habitability (water tightness, thermal performance, acoustic, light, health, hygiene, air quality, functionality and accessibility, tactile and Anthropodynamic comfort).

General sustainability requirements (durability, ease of maintenance and environmental impact). The new regulation also introduces requirements of NBR 17021: 2016–Conformity Assessment–Requirements for Organizations that Provide Audit and Certification of Management Systems, which presents the references for auditing and certification of all types of management systems.[6] The update intends to "supply the needs of Brazilian society regarding the acquisition of real estate, considering the technical and socioeconomic stage of Brazil".[7,8]

The introduction of these two standards includes three other evaluation parameters:

Building Performance Profile: corresponds to the project entry document that records the requirements of users and respective levels of performance to be served by a housing construction.

Technological control plan: corresponds to the document of the Quality Plan of the Work that relates "the means, the frequencies and those responsible for conducting verifications and tests of the materials and services to be applied. In work, guaranteeing a high level of performance and criteria.

Interpretation of projects: corresponds to the obligation of indication of performance levels in the works of residential buildings, considering the scale: minimum (M), intermediate (I) or higher (S), based on user requirements. The new SiAC regiment emphasizes meeting market needs, minimum performance over a lifetime, and the key elements of a housing development

Conclusion

Civil construction is an instrument of economic and social development of great importance to the country. It involves various agents such as designers, engineers, workers, suppliers, financiers (public or private) and clients. The certification index is still considered low due to the number of companies in the sector in the country. Given the vast scope of the sector in several productive sectors, the search for productivity and lower cost with quality is a goal that brings benefits to society as a whole. In the specific scope of the company and the use of the PBQP–H, the advantages range from cost reduction in the execution of the work (productivity), the greater possibility of financing and participation in public housing programs, until the quality improvement of the products and equipment employed, standardization, economy in the use of resources with raw materials and energy, and the technological modernization applied in the choice of materials. All these factors contribute to the customer satisfaction and the improvement of the company's corporate image, which is now seen as the diffusion of good technological and sustainable practices.

Acknowledgements

None.

Conflict of interest

Author declares there is no conflict of interest.

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