

Risk Analyst: A New Player in the Construction Processes – Portugal

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Abstract. In Portugal, the established structure for the construction, does not work in favor of its quality! The construction sector, at the height of its financial strength, from 1980 to 2007, has always had the tendency to skid beyond the initial budgets. It is true that these were drawn up on a stage still under construction, for the sake of time management and to please the Project Owner (P.O.). When transiting to the construction site all was uncovered, and the P.O. had to deal with higher costs and unanticipated. The General Contractor (G.C.) took advantage of this weakness and would rework its proposal - dumping was a current practice, with the certainty of what would happen - what in fact only aggravated the situation. The designers were averse to change and conflicts would arise with the P.O. and G.C.. Given this the only entity considered to be independent, to mediate the situation was the Inspection. This, for its part, took the side of the strong players - P.O. and G.C. - in an attempt to balance the immediate savings of both, leading to systemic build failures with huge impact on the edified, which in turn affected the warranty period. As a rule the G.C. would refuse to do any repair - claiming that she had just built in accordance with the instructions - hiding behind the imposed economy and ignoring the projects - with the consent of the P.O.

1 Introduction

Portugal, not just today, but always, has presented contradictions in its economic growth. With considerable heritage legacy that consumes resources the institutions, which is not being used for the purpose for which it was built. In addition, some of that heritage is doomed to abandonment because, simply, there is no money available to meet the maintenance and function needs. Or, ultimately, operating with almost no maintenance, ensuring only the functioning, maintaining the space on the basis of the anomalies.

The technology that supports the production of papers to instruct the construction work is nowadays transversal to the various branches of knowledge, these parts do not always convey the whole of the decisions taken or the originally planned rigor, but its value is indisputable for the duration of the development processes. However, its use creates a distance between the operator and the end result, which originates difficulties in perceiving shape, durability and compatibility of the various solutions, of their products and materials. In the construction process everything happens in layers - with different times and natures, which are error enhancing factors - because each new layer will hide the previous, allowing only the observation of the latter, which impairs the detection of anomalies, the notion of longevity and performance of the all.

2 The problem

In the current framework, the Inspection has taken on a cross-cutting role in the control of the quality of the construction work, despite the systematic failures identified in this joint model between the P.O. and the G.C.. The Inspection takes a position in favor of immediate work economy - which favors the P.O.'s positions in collusion with the GM: the players in power.

The only entity obliged to inspect is more concerned with staying on the sidelines of the conflict, calling upon itself the mediator position. This position of neutrality is accompanied by: the defense of the established bureaucracy and legality; the preparation of documents for the various phases and their archival; that accumulates with the preparation of weekly meetings, their minutes and required approval; the monitoring of work (work fronts) in order to register the progress; and the approval of the measurement records. These last two matters are undoubtedly the most problematic - and the ones that are assumed as quality control mechanisms. Although these entities possess production mechanisms, established by practice and framed legally, they tend to ignore its legacy in favor of a less firm position, less interventionist but proven to be more profitable for itself, the P.O. and the G.C.

3 Possible answer

The answer to the problem detected implies the reorganization of the teams involved in the process, the Inspection will be confined to aspects which dominates

qualitatively. The issues so far overlooked will be assigned to a new class of professionals, which shall bear the responsibility for assessing the constructive robustness: the Analysts. Aiming to address any gaps in monitoring the construction process, by examination and testing of the buildings.

In Project:

- with the evaluation of local conditions;
- controlling the solutions;
- checking proposals and coordinating building systems;
- ascertaining coordination, control and management of the different specialties;
- managing costs and budgets;
- evaluating new equipment and technologies;
- managing infrastructures;
- analyzing papers, preliminary to the work;

In the Construction Site:

- checking the coordination of the implementation process for the various work fronts;
- implementing tests and analyzing results;
- assessing the viability and sustainability (durability / performance);
- controlling the performance of the construction;
- development of testing proposals, on site, to validate the solutions;
- the execution of the certification of building systems and of the requirements of the spaces, general and specific.

In Warranty:

- monitoring claims, drawing conclusions and evolving in the way work is done.
- In particular, we suggest the following rate of responsibilities:
- check local conditions: sea air, prevailing winds, rainfall projections, groundwater, soil instability, accesses, pollution and noise levels;
- validate the microclimate of the architectural solution: shadow areas, wind confluences, exposure to the elements and thermal degradation in the coatings;
- legitimize the technical and constructive character of decisions on the drawing board, with particular attention to aspects related to the "envelope" (physics of the constructions);
- enable the constructive solutions proposed in the architectural framework and different specialties;
- recognize the comfort features when addressing the solutions and equipments with higher performance / sustainability;
- provide for the general coordination of architectural projects and specialties;
- program and implement tests to be performed on post-construction, even before the topcoats;
- check the technical solutions (architectural and from the specialties) to implement and anticipate durability tests;
- recognize technical documents: Specifications, Measurements, Quantities and Budgets;

- execute the report on the errors and omissions of the projects before the construction work;
- essay the buildings constructed in relation to: the "envelope" (the physical buildings); of architectural aspects (coatings and maneuver); and from the specialties, given the current durability;
- certify the performance of the spaces in functional expectations: collection of use and comfort data (acoustical, thermal, luminal, hygiene, safety and health promotion);
- prepare a report on the temporal durability of solutions, monitor the guarantee and maintenance;
- monitor the guarantee period in the perception of the performance of validated systems;
- complete the closure report listing a critical history of occurrences

The rendering of services ends with the expiration of the guarantee period.

Please note that in the system suggested Analysts act, both in design (prevention) and in construction work (validation), at the service of the Insurance Companies with the benefit for control and risk management. This format does not occur in any of the countries usually taken as a reference: Spain and France.

The assumption of those obligations does not intend, in any way, to empty of responsibilities the traditional players, contrariwise, the purpose is to evaluate the performance of these as to their degree of risk to the Insurance Companies, affecting the insurance tax to the enterprise, both funded by the P.O.. On our proposal the merit of those involved is quantifiable and differentiating, and the information is made available to the P.O., and will allow lower insurance premiums. Aiming for an improvement in the technical quality, counteracting rooted practices, backed by professional associations and with obvious gains for construction sector and final users. Serializing the information, by intervener, allows the quantification of experience which will act as a business card for a market progressively more demanding. In practice there will be the management of the curriculum of those involved, by participation: with the classification of the complexity of the solution; the relationship between initial and final budget; and quantification of risk (given by risk analysts).

The Insurance Companies, during the guarantee period, would report the performance of the solutions and construction quality. In event of a claim would act in the resolution of the damages, according to civil liability contracted, in favor of users and P.O.. Those, in turn, would provide the data to the Instituto de Seguros de Portugal (Insurance Institute of Portugal) that should assume two functions:

- the setting up and management of a database based on the professional register; and,
- publish a compilation of the most important claims, due to constructive anomalies.
- The advantage of such system lies in the knowledge available to professionals and future generations, with gains for the public in general.

The "regulation" of the market would be ensured by the Insurance Companies derived from work performed by the Analysts, trained risk assessors for the solutions proposed by the designers and the G.C. The options would be verified in the designing phase and would not reach the construction, without proper warning and report, ensuring a preventive control. The added value in establishing responsibility before the construction lies in the low cost of the resolution: it suffices to think of solutions "buried" beneath the surface quota.

The Insurance Companies would be responsible for providing data on the performance of the Contractors, if negative it should reverse on penalties in their business register managed by Instituto da Construção e do Imobiliário (Institute of Construction and Real Estate), and with direct impact on the Construction License. The advantage of this system is the additional security for the P.O. and the possibility to relativize the mandatory bank guarantees.

Companies, and aims to ensure the quality of the end results, from the point of view of operators / users, in the allocation of responsibilities and risk classification.

4 Professional skills

The emergence of Analysts derives from some movements in recent history of the teaching of Architecture and Civil Engineering, especially in Europe, that support such need in the required primacy given to quality. A step forward in changing mentalities or a challenge to the construction sector: Technicians adjusted to a more efficient construction, in a world in rapid transformation - constant revolution of the complexities.

Nowadays, we deal with social, ENVIRONMENTAL AND energetic ISSUES in a way like never before.

The technical training of Analysts implies, inevitably, contact with various disciplines, such as the various branches of engineering; the science of construction; and, the basics of architecture. From the point of view of this research, aspects such as artistic, technological and scientific knowledge of architectural base; planning; the design; and, coordination between projects, are considered essential to the success of those, in a culture of quality and rigor to the ideal construction. And the knowledge of subjects, within the Insurance Activity, such as the control and perception of risk of operations; the effectiveness in the formulation and preparation of trials (before launching endeavor); the capacity to make assessment in situ; advising the coordination, between the various stages; and, finally, monitoring the guarantee period.

It is recognized that the Architect assumes, increasingly, more responsibilities for a process from which is distant, both in formation and in knowledge. And a deep knowledge in several areas with diverse natures and sometimes antagonistic.

In the current scenario, in higher education in Portugal, namely in Colleges - linked to the construction sector and facing difficulties in placing professionals in the market - it would be important to take responsibility for training

The buildings would be tested and any deficiencies corrected in the construction phase, immediately and without affecting adjacent areas and / or the quality of the whole.

The culmination of the whole process would be by assuming responsibility for the analysis of results, as follows:

- Designer(s), with no contribution to the premium payment - performance evaluation and gradual registration on the basis of proven errors;
- Contractor(s), which share premium costs (percentage to be determined in terms of construction quality) - evaluation and testing of the built; and,
- Project Owner(s), co responsible in the premium costs (percentage to be determined on the basis of construction quality) - evaluation of the complexity of the operation.

The Guarantee System is based on assessments by Analysts, as service providers or employees of Insurance

technicians in response to the requirements and contemporary issues.

To promote the formation - the introduction of scientific knowledge (transverse to the sector) - for skilled technicians to support the P.O., Architects, Engineers, that would work as Analysts: evaluators of the design and the construction, by checking, suggesting and planning tests on matters that most affect the sector. Today, in the lead, we have problems with infiltrations, performance and overall assurance of the built. The tasks carried by those - in an extrinsic relationship to the design phase, work and guarantee - will enable the Designers ideal dedication to intrinsic aspects of the design.

Analysts would have an actual presence during the development phase, the construction work and, finally, on the premises, to evaluate the performance during the guarantee period.

The "arbitration", of the three appointed stages, requires industry analysis skills (technical-constructive) and economic and financial sustainability insights, to be able to readjust the architecture, the engineering, the models of management and operation of infrastructure. Something that does not happens in traditional courses, either in architecture or engineering.

In short, the training would combine different aspects of architecture and engineering, preparing graduates for an interdisciplinary analysis and high scientific level, that is, enabling professionals to perform highly complex technical tasks to control solutions. They could quickly achieve public recognition as the key element for the prevention and detection of constructive anomalies.

5 Academic context

Training in Construction Engineering, with a Master's Degree, would be dedicated to the constructive role, so critical to the rigor and robustness in construction (so popular among consumers / sector). An idea that develops from a natural movement, global and integrated into the legacy of the historical references of higher education,

both from Architecture as modern Civil Engineering, tectonics vocation. The rationale for the need to create a new Degree is based on learning and research, legitimized by the demands identified by recent legislation and the need for greater liability on the projects and the constructive role. Situations increasingly more complex, detailed and interconnected in different specialties, with direct impact on the quality. The focus on training specificity and consequent functions could and should lead to greater liability of those involved. In the following stages:

The Degree should develop a kind of preparatory teaching with scientific basis, using subjects such as mathematics, geometry, physics, chemistry, computer science, property evaluation and management skills; without neglecting the constructive design of materials, history of human buildings, laboratory and constructive meaning, constructive composition techniques, technologies of tools and components, building systems in design, risk analysis, construction processes in construction work, evaluation methods, performance analysis, among others. At the end of this phase it is expected the introduction to the Construction Laboratory, the development of: development of theoretical analysis on integrated design, validation of elements in coordination, suggested tests, monitoring and tests on strands / built systems, validation and performance prediction; and,

The MSc (Integrated), in the fourth year, would be dedicated to scientific enrichment through the study of advanced and specialized disciplines. The conclusion of the learning process would go through technical and critical training in a practical professional domain and through monitoring of case studies. Preparing students for the elaboration of their Master's Thesis. The fifth year, the culmination of the qualifications, would be based on individual and specific choices through elective courses. The preparation of the Master Thesis will require the analysis of the design or the construction work or monitoring facilities, in close contact to the profession and its professionals, market and the construction sector overall. As usual, the thesis defense would happen before a jury composed of professors from various formations, ensuring a multidisciplinary and comprehensive analysis.

The purpose of this level of training involves perceive, identify, monitor and evaluate the building construction works. The contents, mostly of a practical nature, are supported by theoretical knowledge and practical methodologies, including experimentation, through workshops or accompaniments of construction work - in which students should develop and test their knowledge by collecting data, preparing reports and proposals by foreseeing performance - as well as communication and scientific research.

Training should produce qualified, aware and prepared professionals, for concrete and specific situations: analysis, critical construction project, organizing building activities, scheduling the construction process and risk management. Endowed with a holistic view of the entire development processes involving infrastructure, whether public or private.

Do not exclude the hypothesis of this Master occurring in continuity of the training for architects or engineers, in both cases adapted to their bases.

6 Conclusions

In the solution, which is presented in this paper, the Analysts are an entity with no legal standing in the Portuguese construction structure, small steps have to be taken to fill the gaps in quality control: the need for planning, preparation of tests and evaluation of constructive options in response to demanding solutions, and even to contemporary setbacks.

At the various stages of the construction process, Analysts would take on the task of collecting data and relevant information to the database - on the performance of those involved - reducing the risk in the following processes or even in future endeavors.

Monitoring the role of the different interveners is enough, from our point of view, to establish a culture of excellence, guided by merit and good performance in the conception of better building products with repercussions at various levels, with the active involvement of Professional Associations in defense their best professionals; while offering more consistent and adjusted tasks; promoting lifelong learning - legislative and technological - enhancing education, at all levels, with repercussions in the construction market.

The education system would be aware of the challenges students could face as professionals, their responsibilities and the best practices for excellence and performance, in favor of those who every day establish a relationship with the world around them.

A liability system based on a Insurance, guaranteed by the Insurance Companies, which attest to the quality of the property rather than to ascertain responsibilities by law: existing system that offers little assurance injured parties. We believe that this model, as with the other solutions offered by Insurance Companies, would commit those who systematically fail to their responsibilities. So, the recourse to the courts will be minimized, an option always so time consuming, and the continuous degradation of the property, with huge costs and highly complex repair: with the inevitable impact on those who manage and use buildings.

Therefore, we believe that a new articulation of processes (of the professionals involved and their work), despite the public and private interests, would serve to intervene, in time, to stop the addiction sources and control the trigger problems (mostly systemic), and yet ensure the earnings that motivate and encourage all those involved.

Acknowledgment

The author wish to thank Arch. Manuela Oliveira, Arch. Augusto Brandão and Eng. Engenheiro José Brito Subtil.

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