

Reasons for the lack of competitiveness of Portuguese construction industry

João Pedro Couto

University of Minho, Guimarães, Portugal (e-mail: jpc@civil.uminho.pt)

José Cardoso Teixeira

University of Minho, Guimarães, Portugal (e-mail: jct@civil.uminho.pt)

Abstract

The last few years have confirmed what was mostly feared: Portuguese construction industry suffers from a chronic disease - the lack of competitiveness. Symptoms have long been recognised in several construction projects: frequent delays, cost overruns, deficient safety, absent quality. The authors have been carrying out several studies whose aiming at are clarify reasons for the lack of competitiveness of national construction industry on the four items mentioned above. This paper occurs mainly about the aims of PhD` survey about construction delays. It has the following mains components: (1) to research and analysis bibliography and establish a common set of causes and background reasons for the problem; (2) to inquire to Portuguese construction stakeholders on the causes and background reasons for project delays following from their experience in recent projects; (3) to establish possible paths to solve the problem. The survey results appear to confirm the original list of causes for delays of the study. The mains reasons are related with designer problems, poor productivity, procurement system, overly optimistic planning, and frequent change orders during construction and so on.

Thereafter, the paper will seek what could possibly be done and from which parties, in order to correct the above problems and improve construction competitiveness. The most highly ranked on a scale of relevance by stakeholders were implementation a national database with the quantity works list for different construction projects, a more appropriate and efficient organizational systems within design teams and a need for greater care on the part of the owners when they prepare their schedules and preliminary programmes.

Keywords: Portuguese construction competitiveness, construction delays, survey.

1. Introduction

Over the past few years, people in the construction sector have spoken out in the public arena on the persevering lack of competitiveness of Portuguese construction sector. Their symptoms have long been known: time and budget overruns, lack of safety and insufficient quality. The main reasons often adduced in the press and **scientific papers** are the recurring ambiguity of preliminary programmes and the poor quality of projects associated with inadequate project management. The symptoms have been systematically downplayed using several justifications: the perceived characteristics of construction, the entrepreneurial structures, the phased scheduling of projects, unskilled workers, the climate, and so on. However, that does not explain why the sector displays these symptoms in Portugal while in others European countries it appears to be more efficient where these aspects are concerned, and is therefore more competitive in the international market.

The authors have been carrying out a several research activities whose goals are aiming at clarify the reasons to lacking in competitiveness on the four aspects above mentioned. These are in fact more closely related to the symptoms of this chronic disease (we hope will be eradicated one day).

Basically, the aim is to provide answers to the following questions:

- 1- Why are construction projects systematically delayed?
- 2- Why are there budget overruns in practically every single project?
- 3- Why is safety still badly overlooked in Portuguese construction?
- 4- Why isn't quality satisfactory yet, even in recent projects?
- 5- How do promoters and contractors to deal with growing environmental demands?

Common concern reflects the need for further training in the area of construction management. The subject of management training is currently addressed in a European research project in which the University of Minho is presently involved (Recognition of needs and creation of the professional training in the area of preparation and management of infrastructure construction projects financed by the European Union), project number PL/04/B/P/PP/-174 417.

In order to evaluate the present situation, clarify the reasons for the problem and indicate possible solutions for it, a research project has been conducted, named as “Reasons for lack of accomplishment of schedule, costs and safety objectives in construction”, financed by FCT (Science and Technology Foundation, in Portuguese).

The consequences of a time overrun are almost always serious and hard to resolve. Failure to meet deadlines represents financial losses to the users and, more often than not, it has a negative impact on the profitability of the project for the promoters.

However, understanding the causes may help in curbing the problem and contribute to an improvement in management and productivity, inevitably making the sector a more productive one.

In Portugal there are no known studies of any relevance on the causes for time overruns, although their consequences are often discussed. There are however some studies about lack of quality, coordination problems and errors in project. The importance of the problem *per se* constitutes enough grounds for the development on Portuguese construction a specific research focuses on this topic.

The goal here is to make information available that will help develop and deploy attenuating measures as well as strategies and techniques geared specifically towards the management, prediction and control of the causes for delays. These would have an impact on the project's design and construction management stages and would then ensure greater success where compliance with schedules and deadlines is concerned. This would substantially improve the competitiveness of the Portuguese construction industry.



Figure 1. The importance of the deployment of adequate management strategies

A PhD thesis named “Construction delays” has been developed by author João Pedro Couto. The main program task was a survey carried to Portuguese construction stakeholders. This paper occurs mainly about the aims of PhD` survey, general research method deployed, the information gathered in international bibliography and finally will be presented the preliminary results obtained and recommendations or measures to mitigate the problem of the time overruns.

2. Goals and aims of the present study

The previous section has shown that it is important to scale up anti-delay controls, which will certainly help improve the performance of everyone involved in the construction process. It is this study's goal to look into and evaluate the aspects pertaining to causes for delays that have an impact on the output of construction companies. To this end, we the literature available was analysed. By and large, one can say this analysis/research was undertaken bearing in mind the following aims:

- to catalogue and analyze the factors, reasons and motives for delays discussed in extant bibliography;
- to glean information on classification of, as well as methodologies to evaluate, delays, claims and related issues;
- to understand, compare and draw out the specific traits of the causes specific to our sector and contrast what is found in international data.

To make this possible, not only did we collect bibliographical information and proceed with the analysis of the traits found in the national construction sector but we also asked a number of people for their opinions. These people were promoters, company owners, construction owners, public institutions, contractors, designers and other relevant construction personnel. They were asked to provide a data set that would validate our current concern and allow for a more realistic insight into the problem, and increase our knowledge and understanding of the reasons behind overruns. A nation-wide survey was administered.

3. General research method deployed

In this section we outline the research methodology employed with a view to achieving the aims of this study. For us to reach our goal, we need a research methodology that will set off the fundamental stages of our investigative procedures:

- a) Bibliographical research and analysis;
- b) Discussion with relevant professionals and construction management specialists;
- c) Implementing a questionnaire;
- d) Analysis of the data gathered.

4. State of the art

Having scrutinized the extant bibliography, we came to the conclusion that people have been conducting research into overruns for a long time. The most salient topics are time and cost overruns.

Some studies will now be touched upon in chronological order. These tend to identify and analyze causes or reasons for delay and related factors: Baldwin and Manthei [1] have studied causes for delay in projects in the United States; Chalali and Camp [2] discussed causes of delay in developing countries during planning and construction stages; Fereig and Gaddumi [3] discussed construction problems in the Persian Gulf area, having concluded that some of these problems are connected with specific characteristics of that part of the world, such as problems in productivity were, whereas others were inherent in the nature of construction projects, such as planning and control; Arditi [4] claimed that the effects of construction delays do not just affect the construction industry but play a role in a country's economy, especially in those countries where investment in the construction sector is highly relevant to the local economy. The author presented a survey to public agencies and builders in Turkey, intending to identify and logically sequence (by order of importance) the causes for delays, concluding that the scarcity of some resources, the financial difficulties faced by contractors and public agencies, deficiencies at organizational level, delays in design and frequent change orders, along with a sizeable amount of extra work, are the main reasons for delays; Kraim [5] introduced the concept of concurring delays, i.e., those that occur due to the effect of simultaneous causes; Okpala [6] and later Elinwa [7] studied the motives behind the high costs and delays in Nigerian construction by implementing surveys aimed at intervening parties; Promkuntong [8] carried out a study where he identified the reasons for delays in Thailand and pointed out some control and/or preventative measures; Yates [9] suggested a computerized system to monitor and control delay factors, that is, the development of a support system in construction decisions for the analysis of delays, added to the portability of a personal computer. This software would possess the ability to determine possible causes for project delays and would provide suggestions on alternative courses of action so as to prevent additional delays. Classification of delays has also been an important research topic in the literature surveyed. Assaf [10] described the 56 main causes of delay in large projects in Saudi Arabia and their relative relevance, sequencing them by order of importance, from a survey taken by construction companies, owners and architects/engineers. The causes of delay were broken down into 9 groups. The author further worked on the harmonization of the ordering of causes made by the three groups that had taken the survey; Abd. Majid and McCaffer [11] classified the main causes for non-excusable delays and the main factors contributing towards such causes were

identified. They concluded that the main causes for delays that can be attributed to contractors are connected with the supply of materials, plant and/or equipment and labour.

There are also papers published on the limiting factors inherent in some causes for delay - the weather, change orders, extra work, and so on, as well as their impact on productivity, [12], [13], [14] and [15].

Recently there have surfaced studies on the methods for analysis, quantification and accountability for delays, as well as on the deployment of measures to control causes of delay in the design and construction stages [16], [17] and [18].

There are several studies that single out delays as the main cause for claims in construction [19]. Perhaps for that very reason, there have been papers published on the prevention and resolution of claims, on the processing of claims due to delays, on the interpretation of the law and about the importance of contract clauses pertaining to delays in the resolution of conflicts [12], [20], [19] and [21].

5. Drafting and implementation of the nation-wide survey

Having studied the bibliography and complemented, double-checked and contrasted the data therein against a number of opinions published by several relevant parties in the sector, and following an intuitive analysis by the researchers, drafted a map that breaks down causes for delay in Portugal into 12 origin-related categories (see Table 1).

Table 1. Categories of contemplated causes for delay

Categories of Causes for Delay			
MT	Material-related	DT	Design Team-related
EQ	Equipment-related	PM&I	Project Manager and Inspection-related
LB	Labour-related	CCR	Contract and Contractual Relationships-related
CM	Contractor Management-related	IR	Institutional Relationships-related
FMP	Financial Management of Project-related	PS	Project Specificity-related
OW	Owner-related	OF	Outside Factors-related

Then were consulted a few national specialists, consultants and researchers in construction management about the adequacy of this cause map that we'd drafted, and then elicited opinions from national and specialists about the importance and meaning

of studies of this kind to the delay control and competitiveness in the construction sector. This cooperative effort was important. It helped us adjust the cause map to the actual characteristics of the national construction sector. It would be apposite to say that the whole process evolved as we conducted our survey.

Once defined the cause map, we drafted a questionnaire based on it. The map now featured an analysis of the relationship between delays and accidents in the workplace, as well as an analysis of the legal framework for delays in construction projects in Portugal.

A hundred questionnaires were sent out to contractors, 85 to consultants and project designers and 100 to construction owners. On stage two, we contacted the respondents who did not get back to us within the prearranged response time, proposing an interview as an alternative. The latter suggestion was gladly accepted by these respondents. During our interviews we spoke openly about the problem and related areas. The main intent was to ask questions that would clarify the causes mentioned in the survey and observe procedures so as to resolve them;

The answers were provided by administrative personnel or technical staff in management positions then working with construction companies, as well as public owners, consultancy and engineering firms, design firms, management directors, project directors and managers and senior engineers.

59 answers by contractors, 26 by designers/consultants and 79 by owners answered to questionnaire. The above-mentioned number of answers is included 8 interviewers to contractors, 8 to designers, 18 to public owners and 5 to private owners.

5.1 Structure of the questionnaire

Taking into account what prior studies recommended as we drafted the questionnaire. It was shared in five sections. In section A, the goal is to obtain general information on the institution or company that is taking the survey. In section B was present a list of possible causes for delays, built according to the results of our investigation and our own experience. The list was divided by categories. The respondents were asked to attribute to each cause degrees of frequency, impact on workflow and the types of construction project where they are most likely to occur. The aim is to establish a classification and consequently rank the several causes.

Section C will serve the purpose of identifying the indicators that may best evaluate and assess potential delay-causing problems. With section D the intent is to clarify the relationship between work-related accidents and pressure resulting from the race to meet construction deadlines. Finally, in section E we intended to gather a set of complementary data relating to construction delays, especially where current Portuguese

law is concerned and the administrative procedures observed by the entities involved in this sector.

5.2 Respondents selection

Construction companies were selected according to the ranking of the Institute for the Market of Public Private Construction and Real Estate (in Portuguese, IMOPPI, *Instituto do Mercado de Obras Públicas Particulares e do Imobiliário*), which is responsible for preparing and issuing building permits. Engineering offices were selected from the member list of the Portuguese Association of Project Designers and Consultants (*Associação Portuguesa dos Projectistas e Consultores* (APPC)), their geographical location (we wanted to cover as much territory as possible) and their specialties. Private owners were selected from the member list of the Real Estate Promoters Association (*Associação do Promotores Imobiliários*) and the public owners selected were the main city halls of the Portuguese mainland and islands, institutes and state organizations. In any and all selection processes we considered two fundamental aspects: firstly, we wanted to represent a significant cross-section of all the mainland and islands, and then applied the same criterion to size, experience and volume of their business.

6. Survey results and preliminary conclusions

The results have revealed that responsibility for delay can be ascribed to all parties involved. The statistical and mathematical analysis is still under way, but we can now publish some of our more evident conclusions from the data gathered.

Of the 118 causes contemplated in the survey, an extract of the 15 that were most highly ranked on a scale of relevance by 4 groups involved in the construction sector (Public owners, Privative owners, Contractors, Designers /Consultants) [22] is presented.

Table 2. Raking of 15 most relevant causes

No.	CAT	CAUSES FOR DELAYS IN CONSTRUCTION ACTIVITIES AND PROJECTS	Average Relevance Ranking
77	DT	Incomplete projects, ambiguities, errors, omissions, inadequate details, details inconsistent throughout special teams, inadequate design, etc.	1
102	IR	Excessive dependency on opinions and authorizations from several institutions and ruling bodies (city/town halls, IPPAR – Portuguese Institute for Architecture and Patrimony, Environment Institute, EP, etc.)	2
100	IR	Difficulties in obtaining licenses and permits from authorities	3
97	CCR	A tendency to use procurement systems with a bias toward the cheapest solutions	4
28	CM	Deficient planning, activity/material/labor and equipment management and control	5
18	OW	Shortage of skilled laborers	6
76	DT	Errors in design originating from the project designers due to a lack of knowledge of local conditions and the surroundings	7
75	DT	Delays in preparation of technical documentation by project designers while construction is in progress	8
49	CM	Neglect of critical activities	9
51	CM	Overly optimistic planning	10
62	OW	Frequent change orders during construction	11
44	CM	Deficient coordination among participants	12
26	OW	Low productivity	13
98	CCR	Non-existence of financial incentives that would encourage meeting deadlines of completing the works before the deadline	14
103	IR	Difficulty and delay in the drafting and submitting of requests for institutional opinions and authorizations	15

Based on the opinions provided by the respondents, specialists, associations and institutes involved in the construction sector, as well as prior studies conducted outside Portugal, it is our purpose to prepare a comprehensive file on preventative measures and recommendations, guided by strict criteria, which will help lessen the problems under scrutiny. The recommendations are many and target every single participant. Not meaning to establish definite hierarchies now, we can however single out the following:

1. The need to implement a national database with the quantity works list for different construction projects - this project is now under way;

2. Implementing more appropriate and efficient organizational systems within design teams;
3. A need for greater care on the part of the owners when they prepare their schedules and preliminary programmes;
4. A need for greater precision when preparing viability studies;
5. Raising awareness with those involved about the risks inherent to construction;
6. A need to optimize management with a basis on qualification and the use of more adequate techniques;
7. A need to update some inadequate legislation so as to clearly define and segregate responsibility and liability, and so on.

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References

- [1] Baldwin, John R.; Manthei, James M.; Rothbart, Harold; Harris, Robert B., (1971) Causes of Delays in the Construction Industry, *Journal of Construction Division*, Vol. 97, N° CO2, November, pp. 177-185.
- [2] Chalabi, F. A., and Camp, D., (1984) Causes of delays and overruns of construction projects in developing countries, *CIB Proc.*, W-65, Vol. 2, pp. 723-734..
- [3] Fereig, S., and Gaddumi, N., (1984) Construction problems – Arabian Gulf experience, *CIB Proc.*, W-65, Vol. 2, pp. 753-756.

- [4] Arditi, David ; Akan, Guzin Tarim ; Gursamar, San, (1985) Reasons for Delays in Public Projects in Turkey, *Construction Management and Economics*, Vol.3, pp. 171-181.
- [5] Kraiem, Zaki M.; Dickmann, James E., (1997) Concurrent Delays in Construction Projects, *Journal of Construction Engineering and Management*, Vol. 113, N° 4, December, pp. 591-602.
- [6] Okpala, Daniel C.; Aniekwu, Anny, (1988) Causes of High Costs of Construction in Nigeria, *Journal of Construction Engineering and Management*, Vol. 114, N° 2, June, pp. 233-244.
- [7] Elinwa, A. Uchechukwu; Buba, Silas A., (1993), "Construction Cost Factors in Nigeria", *Journal of Construction Engineering and Management*, Vol. 119, N° 4, December, pp. 698-713.
- [8] Promkuntong, Krit, (1992) Delays in Building Construction Projects in Thailand, MSc Thesis, Asian Institute of Technology, Bangkok, Thailand.
- [9] Yates, J. K., (1993) Construction Decision Support System for Delay Analysis, *Journal of Construction Engineering and Management*, Vol. 119, N° 2, July, pp. 226.224.
- [10] Assaf, Sadi A.; Al-Khalil, Mohammed; Al-Hazmi, Muhammad, (1995) Causes of Delay in Large Building Construction Projects, *Journal of Management in Engineering*, Vol. 11, N° 2, March/April, pp. 45-50.
- [11] Majid, M. Z. Abd.; McCaffer, Ronald, (1998) Factors of Non-Excusable Delays That Influence Contractors` Performance, *Journal of Management in Engineering*, Vol. 14, N° 3, May/June, pp. 42-49.
- [12] Holman, Michael S.; Parks, Gregory, (2001) Snow & Rain & Hall & Sleet: Making the claim for weather delays, Bricker & Eckler LLP, *ohioconstructionlaw.com*, August.
- [13] Hanna, Awad; Russell, Jeffrey S.; Vanderberg, Paul T., (1999) The Impact of Change Orders on Mechanical Construction Labour Efficiency, *Construction Management and Economics*, Vol. 17, N° 6, November, pp. 721-730.

- [14] Thomas, H. Randolph; Riley, David R.; Sanvido, Victor E., (1999) Loss of Labor Productivity Due to Delivery Methods and Weather, *Journal of Construction Engineering and Management*, Vol. 125, N° 1, January/February, pp. 39-46.
- [15] Ei-Rayes, Khaled; Moselhi, Osama, (2001) Impact of Rainfall on the Productivity of Highway Construction, *Journal of Construction Engineering and Management*, Vol. 127, N° 2, March/April, pp. 125-131.
- [16] Bubshait, Abdulaziz A; Cunningham, Michael J., (1998) Comparison of Delay Analysis Methodologies, *Journal of Construction Engineering and Management*, Vol. 124, N° 4, July/August, pp. 315-322.
- [17] Finke, Michael R., (1999) Window Analyses of Compensable Delays, *Journal of Construction Engineering and Management*, Vol. 125, N° 2, March/April, pp. 96-100.
- [18] Kartam, Saied, (1999) Generic Methodology for Analyzing Delay Claims, *Journal of Construction Engineering and Management*, Vol. 125, N° 6, November/December, pp. 409-419.
- [19] Rubin, Robert A.; Fairweather, Virginia; Guy, Sammie D., (1999) Construction Claims – Prevention and Resolution, Third Edition, John Wiley & Sons.
- [20] Holman, Michael S.; Gillis, Sylvia, (2001) Change Orders – Clarification or Quagmire?, Bricker & Eckler LLP, *Ohioconstructionlaw.com*, March.
- [21] Mitropoulos, Panagiotis; Howell, Gregory, (2005) Model for Understanding, Preventing, and Resolving Project Disputes, *Journal of Construction Engineering and Management*, Vol. 127, N° 3, May/June, pp. 223-231.
- [22] Couto, João Pedro; Teixeira, José M. Cardoso, (2005), As consequências do Incumprimento dos Prazos para a Competitividade da Indústria de Construção – Razões para os Atrasos, *3rd Conference ENGENHARIA`2005*, 21-23 November, UBI-University of Beira Interior, Covilhã.