

ORGANIZATION OF CONSTRUCTION ACTIVITY IN MEDIEVAL PORTUGAL: A COMPARATIVE APPROACH.

Maria do Carmo Ribeiro¹ and Arnaldo Sousa Melo²

Keywords

Organization of construction activity, models of organization, medieval and early modern construction; Portuguese royal constructions; Monastery of Jerónimos (Lisbon)

Abstract

This paper aims to identify and characterize the organizational models of construction site and building activity in late fifteenth and early sixteenth centuries, through the analysis of specific Portuguese case studies, related with important buildings financed by the royal power.

This paper also intends to develop a comparative analysis between those different organizational models, identifying the main features of each one, as well as their similarities and differences.

In this sense, we intend to present a comparative analysis between the two main models of organization of the construction site, through a methodology of crossing different types of sources, including written ones, such as books of accounts, but also iconographic and material sources, as well as the buildings and monuments still preserved today. In terms of written sources, the construction site accounting books allow us to study several specific aspects of the construction process, but also allow us to infer the organizational models of the construction activity.

¹ Lab2pt, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal, mcribeiro@uaum.uminho.pt

² Lab2pt, University of Minho, Campus de Gualtar, 4710-057 Braga, Portugal, amelo@ics.uminho.pt

INTRODUCTION

The organization of construction sites constitutes a major theme in Construction History field, although it remains a subject that needs further research in Portugal. In fact, there are only a few existing Portuguese studies on this theme. Among them, one should highlight the studies, developed over the last decades about the construction of Monastery of Batalha (near Leiria, Portugal) from the late 14th to early 16th century, that were developed thanks to the exceptional documental sources preserved (Gomes 1990; Gomes 1993). We should also mention other studies about major construction sites, such as the Royal Palace of Sintra, or other urban building activities (Melo and Ribeiro 2011; Melo and Ribeiro 2012; Melo and Ribeiro 2013). Nevertheless, such studies are still rare, even if some other major Portuguese construction sites, such as the Monastery of Jerónimos, present also important sources for this discussion.

Until the late fifteenth century, the dominant model of organization of construction yard in Portugal seems to have been a centralized management model of site organization, in terms of work, materials acquisition and techniques. Among the major known examples, stands out the Monastery of Batalha, located in central western Portugal, whose construction began in the late fourteenth century and lasted for over 100 years. This Monastery is one of the most emblematic buildings of the Portuguese gothic, sponsored by the king. Another example is the Royal Palace of Sintra (Lisbon), particularly valued in the time of kings D. Dinis (early 14th century), D. João I and D. Duarte (early 15th century) and that was subsequently modified, added and improved, whit the king D. Manuel (early 16th century). Similarly, the construction of the new customs building of Funchal (Afândega Nova do Funchal), in Madeira island, in the early sixteenth century, also financed by the king, had the same centralized organizational model of construction activity that we find in Batalha, although presenting some particularities (Melo and Ribeiro, 2013).

However, at least from the early sixteenth century onwards, in some construction sites, namely the Monastery of Jerónimos, in Lisbon, a new organizational model will be introduced. This new model is based on the division of the construction activity into various specialized teams for different building areas, working simultaneously, designated in Portuguese as *empreitadas*. This new model, with known parallels in other 15th and 16th centuries European constructions, represents an important change in the way of organizing and managing the construction site. In fact, the Monastery of Jerónimos, whose construction was promoted by king Manuel, in the early sixteenth century, is one of the most iconic Portuguese buildings, financed thanks to the economic revenues derived from the Portuguese overseas expansion (Alves 1991; Melo and Ribeiro 2015).

In this sense, we will present a comparative analysis of the two organizational models, namely as far as the global, financing and administrative management is concerned, but also the technical management, the labor and production organization. In order to accomplish these goals we rely upon the study of different types of sources, such written accounting records from Jerónimos, from Royal palace of Sintra or diverse written documents form Batalha construction. At the same type we also have taken into account some iconographic sources and the existing buildings themselves.

Two main organizational models of construction site

Construction activity has involved a significant set of agents throughout the centuries that have given shape to the different medieval buildings, with their ideas and work but also with their power, particularly political and economic ones.

The organization of the medieval and early modern Portuguese construction sites is a hard to study subject, due to the type and scarcity of the available sources. Nevertheless, some exceptional documents allow us to know that in the fifteenth and sixteenth centuries the larger and most complex construction sites were organized according to one of the following two types of construction management (Melo and Ribeiro 2015).

The first one was characterized by a centralized organization model, that included the hiring of skilled and unskilled labor, by the management of the site, as was the case for the construction of the Monastery of Batalha (Leiria), the Royal Palace of Sintra (Lisbon), or at the construction of the Monastery of Jerónimos (Lisbon) at its earlier stages, until 1517.

The second type of construction management presents a division of work between some large teams each of one was responsible for the execution of different parts of the building.

Apparently, the first model was the oldest one and the most widespread in Europe; the second model would have become increasingly common in the fifteenth and sixteenth centuries, especially in Italy (Bernardi and Vaquero Piñeiro 2007: 511-532).

We will present a comparison of both models through examples from royal promoted buildings.



Figure 1: General view of Monastery of Jerónimos, Lisbon, Portugal (2013)

Financing royal constructions

A recurrent data element seems to be the simultaneous existence of multiple modes of financing the same construction, which Mesqui called “parcellisation des financements” (Bernardi 2011, 80). At the same time, it should be noted that the construction of most of those huge buildings could be extended for several decades or even centuries, thus encountering different, phases

and construction rhythms and, as such, different financing modes. This reality seems to be also present in Portuguese royal promoted constructions (Melo and Ribeiro 2012(a)).

The king had at his disposal the widest range of possibilities of financing constructions, some of which were exclusive. Whenever the promoter was the king, one of the most frequent modalities is to allocate a portion of general taxes to finance a particular construction. Such was the case of the *sis*a, a tax that had been applied in Portugal at least since the 14th century. In exceptional cases of large-scale construction works that had major funding requirements, as was the case of the Mosteiro da Batalha, the king decided to direct a significant portion of the income of a whole region (Almoxarifado de Leiria) to that construction. In the case of the Mosteiro dos Jerónimos it would appear that the main form of royal financing was a portion of the tax designated as *Imposição da Índia*, that derived from the overseas trade. In the case of the Royal Palace of Sinta (Lisbon), the King D. Manuel, was pay the works carried out between 1507 and 1510, from the various royal revenues, such as from the Casa do Rei (King's House), or from the Casa da Mina (House of Mine), as well as from other sources (Melo and Ribeiro 2012(a)).

Administrative and financial management

In the two models of construction site organization there were a centralized top administrative and financing management headed by a *Vedor*, a royal officer that represented the king in the yard. This officer was responsible for receiving the incomes to the construction site, in cash as in materials, and responsible to pay all the expenses, such as wages, materials and transportation.

For example in Sintra Royal palace constructions of 1507-1510 this officer was André Gonçalves, responsible for the management of the entire construction site called “recebedor e vedor das obras dos paços de Sintra”. He received the funds in cash and materials for each year from the various royal revenues and he was charged of paying the wages and materials for the works in those years (Melo and Ribeiro 2013: 213-244).

In Jerónimos Monastery construction the *Vedor* was Rui Peres at least from 1514 to 1517, which means that he was the same officer with the same centralized administrative management in both organizational models. As a matter of fact, when the yard technical organization changed in 1517, the administrative management and its *Vedor* remained the same.

Construction site technical direction

The two main yard organizational models refer to the technical direction. As a matter of fact all huge construction site had one technical responsible, the construction master (*mestre da obra*), directly below the *Vedor*. In the centralized model this master was the direct technical responsible for the entire yard, whereas in the decentralized model characterized by multiple *empreitadas*, or teams responsible for different parts of the constructing, the main master had only an overall direction.

In the centralized model the construction site master, the ultimate responsible for the execution of the works, usually was a mason or a carpenter. Under this construction site master, and in its direct command, there were specialized crafts masters (such as masons and carpenters, but also sculptors and painters, among others), as well as unskilled labor (such as servants), as we can see in the construction site of Monastery of Batalha. From the examples known, this model was the most prevalent from the late fourteenth century onwards, if not before, at least in the large royal projects, such as the maintenance and improvement works of the Royal palace of Sintra in 1507-1510 (Melo and Ribeiro 2015).

On its turn, the organization of construction Monastery of Jerónimos from 1517 represents a significant change, with the creation of several teams responsible for different areas of the building construction. In fact, in this year a new general master of the whole construction site was appointed by the king, named João de Castilho, which introduced a new organizational model of the construction site, the *empreitadas* model. João de Castilho appointed as responsible for the site management of the construction brought with him several trusted men with whom he had worked previously in various construction sites in Portugal (Melo and Ribeiro 2014; Melo and Ribeiro 2015).

As a matter of fact, with João de Castilho, the site was divided into *empreitadas*, according to a new management system. To organize the building activity in several *empreitadas* means to divide the building construction into several sectors and construction tasks, each one was assigned to a specific team, with its own master, that were generally object of a specific contract. João de Castilho divided the construction yard in 7 teams (*empreitadas*).

Together with the overall site and project management, João de Castilho also directed personally one of these 7 major *empreitadas*. This *empreitada* was responsible for several building sections and tasks, namely the building of the famous southern entrance of Jeronimos' Church, but also the construction of part of the first cloister, of the chapter house and of the sacristy. This *empreitada* was composed of 110 workers, plus the servants. 68 out of those 110 workers were laboring in the first cloister and in the southern door, while the other 41 workers were building the chapter house and the sacristy (Melo and Ribeiro 2015).

Centralized vs. decentralized construction site direction: a comparative approach

From a comparative analysis of both models one can find some similarities as well as some differences that we can summarize as follows.

In the centralized model construction yard management contracted and paid builders individually for specific or unspecified tasks. Sometimes they could contract each craftsman and his men, that is to say servants or apprentices of his own, or small team of collaborators, but not as a team responsible for a section of the construction. It should be noted that in this cases it was not a team of several specialized craftsmen. We can find several examples of this practice in the construction site of Sintra in 1507-1510, or of Jerónimos before 1517 (Melo and Ribeiro 2013; ANTT, Livro 811).

It should be noted that different yard organization models could have some of the same builders; and could have the same administrative and financing management, including the same top responsible, or *Vedor*, such as Rui Peres in Jerónimos before and after 1517 (ANTT, Livro 811).

Of course that in Jerónimos when João de Castilho arrives in 1517 as new general master and implemented the new model of *empreitadas* he arrives with many men with him, specialized builders with whom he worked in previous construction yards, that will constitute part of the different teams (Melo and Ribeiro 2015).

It should be stressed that in the *empreitadas* model if the contract of builders and its payment was done according to that team division, nevertheless the wages payment was done and registered on men by men records done by the yard top management administration, and it was not controlled only by the team master. This means that the *Vedor*, or administrative management, had the same role in both models.

On the other hand, the purchase of materials also presents similar patterns in both models. As matter of fact, in the *empreitadas* model the materials could be bought centrally and directly by the yard management, as it happened in the centralized model. That practice would probably

mean better prices and better controlled by the management (Melo and Ribeiro 2013; ANTT Livro 811 and 814).

The choice of this model of multi autonomous teams working simultaneously in different parts of the construction seems to be related with the complexity and dimension of the construction. However, it is not the only factor because the majority of the other major constructions didn't present this model but the centralized one, as was the case of Batalha and of Jerónimos before 1517.

At the same time, one should highlight that in smaller constructions the model of *empreitadas* was not applied, nor was justifiable, as it happened in most urban construction activity. In these cases a single craftsmen, or a few ones, was enough for the purposes.

CONCLUSIONS

In Portugal, in the late 15th early 16th century one can find two main organizational models of the building process in the huge royal construction sites. The first one was a centralized and pyramidal organization, with a technical management that directly controlled the entire site. The other model was characterized by one direction for the whole site, but presenting a division of work and tasks among several teams (*empreitadas*).

In the centralized model the general master directs and verifies the different builders and tasks being done, even if there were specialized masters for specific tasks, such as painters or stained glass designers.

In the *empreitada* model with several autonomous teams working simultaneously, each team was composed of several builders of the same craft, usually masons, with its own master and the team was responsible and accountable for the construction of a specific sector of the building. It constitutes a unique model, quite distinct from the previous one. It would certainly be a way to ensure a higher work rhythm and execution rate, making each team and his master responsible for carrying out specific parts of the building.

In Portugal this model of *empreitada* seems to have been introduced for the first time at the site of the Jerónimos Monastery in Lisbon, from 1517 onwards, when João de Castilho became master general. Therefore, we can question whether the initiative to introduce this new model comes from the king D. Manuel and its entourage, or from the master João de Castilho? In any case, one could ask from where did this model come. Did they find this model applied elsewhere, and in that case, where? Or were they inspired by other similar practices – and which ones – to implement this new model? Those questions must stay unanswered for the time being.

It should be stressed that both these models can be found in other European regions from the fifteenth century, at least. Apparently, the centralized model would have been more ancient and the *empreitadas* model seems to be a new system that could have appeared in Italy in the 14th century, but that would have found difficulties in its dissemination throughout Europe (Bernardi and Vaquero Piñero 2007).

This new model was applied in the construction of the Jerónimos Monastery in Lisbon, from 1517 onwards, led by João de Castilho, because it was a unique and iconic royal construction with a strong political meaning and disposing of huge financing possibilities. As such, its construction attracted large teams of renowned masters from several European regions. As far as we know this model was not applied in other Portuguese royal constructions of the same period, such as works in Sintra Royal Palace, in 1507/1510, or the construction of the customs building in Funchal, erected in 1508-1518. It shows that, like in other parts of Europe, this model doesn't seem to have been largely implemented.

The unique character of Jerónimos, even within royal constructions, may justify the adoption of this model of *empreitadas*.

REFERENCES

- ANTT - *Arquivo Nacional da Torre do Tombo* National Archive (Lisbon/Portugal) - Núcleo Antigo, Livros 811 to 814 (years 1515 to 1518) – *Despesas das obras do Mosteiro de Belém*.
- Alves, José da Felicidade. 1991. *O Mosteiro dos Jerónimos II – Das Origens à atualidade*, Lisboa: Livros Horizonte.
- Bernardi, Philippe et Vaquero Piñeiro, M. .2007. “I cantieri edili: idea e realtà” in Ph. Braunstein et L. Molà, (a cura), *Il Rinascimento Italiano e L’Europe, Volume terzo, Produzione e tecniche*, Trévis: Angelo Colla Editore (511-532).
- Gomes, António Saúl. 1990. *O Mosteiro de Santa Maria da Vitória no século XV*. Coimbra, 1990 (Subsídios para a História da Arte Portuguesa, 33).
- Gomes, António Saúl. 1993. “Les ouvriers du bâtiment à Batalha”, *L’Artisan dans la Péninsule Ibérique*, nº 14 (33-51).
- Melo, Arnaldo Sousa and Ribeiro, Maria do Carmo. 2011. “Os construtores das cidades: Braga e Porto (séculos XIV-XVI).” A. S. Melo and M.C. Ribeiro, (coord.) *História da Construção – Os Construtores*, Braga: CITCEM (99-127).
- Melo, Arnaldo Sousa and Ribeiro, Maria do Carmo. 2012(a).”Construction financing in Late Medieval Portuguese Towns (14th-16th centuries.” R. Carvais et alii (eds.) *Nuts and Bolts of Construction History. Culture, technology and society*, vol. 2, Paris: Éd.Picard (305-312).
- Melo, Arnaldo Sousa and Ribeiro, Maria do Carmo. 2012(b). “Os materiais empregues nas construções urbanas medievais. Contributo preliminar para o estudo da região do Entre Douro e Minho.” A. S. Melo and M.C. Ribeiro, (coord.) *História da Construção - Os Materiais*, Braga: CITCEM/LAMOP (127-166).
- Melo, Arnaldo Sousa and Ribeiro, Maria do Carmo. 2013. “O processo construtivo dos paços régios medievais de portugueses nos séculos XV-XVI: O Paço Real de Sintra.” A. S. Melo and M.C. Ribeiro (coord.), *História da Construção – Arquiteturas e Técnicas Construtivas*, Braga, CITCEM/LAMOP (213-244).
- Melo, Arnaldo Sousa and Ribeiro, Maria do Carmo. 2014. “La mobilité des artistes et des artisans de la construction dans les chantiers portugais au Moyen Âge : apports pour l’étude des Bisciaïens.”, *Les Transferts artistiques dans l’Europe gothique*, Paris : Éditions Picard (209-224).
- Melo, Arnaldo Sousa and Ribeiro, Maria do Carmo. 2015. “Late medieval construction site management: the Monastery of Jéronimos in Lisbon.” *Construction History. International Journal of the Construction History Society*, (in press).