Labouring with large stones: A study into the investment and impact of construction projects on Mycenaean communities in Late Bronze Age Greece

Boswinkel, Y.

1 Introduction

> *"And the mighty Cyclopes came, and toiled to build a most beautiful wall for the glorious city, where the godlike far-famed heroes lived when they had left behind horse-pasturing Argos."*
>
> *Bacchylides Ep. 11*[1]

> *"The wall, which is the only part of the ruins still remaining, is a work of the Cyclopes made of unwrought stones, each stone being so big that a pair of mules could not move the smallest from its place to the slightest degree."*
>
> *Pausanias 2.25.8*

This study aims to investigate the investment required to build large fortifications during the Mycenaean era in Greece (1600 – 1050 BCE). This is done by calculating the necessary person-hours. The calculated labour costs are subsequently used to interpret the potential impact that these large-scale building programs may have had on the communities in which they were constructed. As such, the following research questions will be answered:

1. How high are the costs (in labour) of the various stages of construction of monumental buildings in Mycenaean Greece?
2. What characterizes the Mycenaean fortifications and how do these features influence the labour costs?
3. What do the costs of these monumental structures tell us about the structure of Mycenaean society and the distribution of its wealth and power?
4. Is the construction of monumental architecture in Mycenaean Greece a local, regional or inter-regional affair, when we consider the origin of the material, required expertise and workforce and construction techniques?

The reason to study the fortifications is their impressive nature, even after a thousand years, they were still referred to with grand descriptions (see quotes above). Even nowadays these constructions are often portrayed with lofty terms (Brysbaert, 2013, 2015b, 2017; e.g. Fitzsimons, 2006). Clearly, these structures were and still are quite imposing and as such have proven to be objects of interest to many researchers (e.g. Brysbaert, 2013, 2015b; Cavanagh & Laxton, 1981; Cavanagh & Mee, 1999; Fitzsimons, 2006, 2011; Grossmann, 1967, 1980; Küpper, 1996; Loader, 1995; Maran, 2006; Mee & Cavanagh, 1984; J. C. Wright, 2006, 1978, 2005).

The fortifications are built in the so-called *cyclopean*-style (e.g. Brysbaert, 2013). The style takes its name from the one-eyed giants of Greek mythology, due to the use of very large blocks of stone that, according to the quotes at the start if this chapter, could surely not have been moved by mere mortals. The fortifications are thus not only impressive due their sheer size, but also as a result of their building style.

[1] All English translations of ancients texts are consulted on the website of the *Perseus Project* of the Tufts University (www.perseus.tufts.edu) and are not my own. Any misinterpretations remain my own.

Considering their imposing nature, this study thus aims to find out how the communities coped with the investments associated with manufacturing the buildings. Analysing the cost of large-scale construction for a society has been researched before (e.g. Abrams and Bolland 1999, who focused on Central America), but few have made Mycenaean Greece the primary focus of such a study (but see e.g. Fitzsimons 2006; Harper 2016). Yet, insight in the cost of such prolonged building programmes can provide a better understanding of the build-up of a society and the impact such building activities had on that society. The SETinSTONE project, of which this research is a part, thus aims to assess "if and how monumental building activities in Late Bronze Age Greece affected the political and socio-economic structures of Mycenaean polities, and how people may have responded to these changes" (Brysbaert 2017: 1). Since these aims go beyond what is possible to study in a single PhD dissertation, the study in this book is one step towards the SETinSTONE goals. Additional studies are executed on the building activities regarding tomb-building by Daniel Turner (2020) and on the subsistence strategies and agricultural economics of the Argive Plain by Riia Timonen (forthcoming). Hence, together these studies provide the core to answer the research questions dealt with within the overarching SETinSTONE project.

The presented research explores the materials and costs of the cyclopean architecture found at two case-studies in the Peloponnese (Greece): Mycenae (Argolid) and Teichos Dymaion (Achaea). The various challenges that the builders faced are discussed. Subsequently, the influence of these structures and their costs on communities are reviewed. In contrast to earlier studies by Fitzsimons (2011) and Harper (2016), who have carried out labour cost studies (see below) based on published data, the data will come from fieldwork. This will allow several types of in-depth analyses of building materials and techniques. Therefore in this study the data will be more critically evaluated and subsequently more nuances can be used to come to a better founded estimation of the labour costs.

Labour cost studies are based on the principle of calculating the number of people needed, for what amount of time to perform a certain task. By calculating the required investments of structures, the opportunity is created to compare these structures. Thus interpreting these labour costs is most useful when they can be set against other calculated labour costs. Hence, not only are the fortifications of two sites studied, also a number of domestic structures are considered. This way, the costs involved with building the fortifications can be set against the construction of more mundane buildings and interpretations regarding their potential impact can be properly evaluated.

The fortifications studied in this research are documented using photographs and Total Station point recordings. The subsequent 3D models of the structures, which are created through photogrammetry, are used to calculate the volumes of the structures and where possible of the individual stones. The volumes of the domestic structures are based on data from literature, covering previous studies of these buildings. Using the earlier mentioned labour-rates, an estimate can then be provided on how many persons and other resources are needed to move the materials and achieve the subsequent construction. This method can thus provide an assessment of the costs in labour of the selected architecture.

In order to come to an accurate estimation of the costs of these structures, the construction of the building is broken down into three main stages concerning the material: (1) Acquisition of the material, (2) the transportation of the material to the construction site and (3) the assembly of the building. Additionally, the levelling of the terrain, the dressing of the individual blocks (only where

applicable) and the creation of ramps for the assembly, are also taken into account. Some of these stages have several sub-phases which are individually assessed.

This book consists of nine chapters. Chapter 2 is aimed at providing information about the Mycenaean context, in which the studied structures were built. The first section is a basic chronology of the periods under investigation. Secondly, a general background is provided on Mycenaean society, focusing on how this society is seen by scholars, in particular in terms of social differentiation. This is closely intertwined with the third factor: Mycenaean economy. The reason for specifically discussing the economic organisation of Mycenaean society is its link to the aim of the larger SETinSTONE research. The impact of monumental structures on a society is not only a social matter which may consist of intimidation, display of power and prestige, and the difference between elite and non-elites. It is certainly also an economic issue as this study investigates the required *investment* for the buildings. In order to explore the economic organisation, a variety of economic models is discussed to examine their applicability to the Mycenaean context.

Subsequently, in chapter 3 the fortifications are reviewed. This review encompasses the function of the fortifications, how they are perceived by modern researchers and in the past, and the used building style is discussed as well. Moreover, the construction process of the fortifications is explored. The first three studied aspects of the fortifications are not just background information, but important factors to take into account to properly interpreting the structures and the subsequently calculated labour costs. As described above, these constructions are seen as very impressive and the building style as very laborious. Hence, by properly reviewing these notions and subsequently testing these against the comparisons made possible by the calculations of the labour costs, more nuanced insights can be gained. Moreover, the construction process of the fortification is discussed in this chapter. The steps of the building process are later used to quantify the costs of the construction of the fortifications.

In chapter 4 the selected sites are presented in more detail. This entails a chronological overview of the sites and an overview of the architecture, in particular the fortifications themselves. Furthermore, labour costs relate to how many people may be involved. To be able to conclude anything about *impact*, the number of people present at the sites is thus of importance. Therefore population estimates for both sites are also discussed in this chapter.

Chapter 5 gives an overview of the various (econometric) methods that are employed in the study. It provides pros and cons of labour cost studies as an approach and an explanation of how it is applied within this study. Moreover, the chapter contains the presentation of how the various required data are gathered, through fieldwork (fortifications), literature studies (domestic structures) and reconstructions (volume of individual blocks). This also includes a brief overview of the landscape and geology, as both characteristics influence the labour costs.

The data that forms the foundation of this research is presented in chapter 6. The data revolve around the calculated volume of the various structures being studied. The volume is at the core of the labour cost calculations due to two reasons: first, because most labour rates, used to calculate the costs are presented as a number of person hours per given volume. Secondly, because the volume is used to calculate the weight of the material for those steps in the building process for

which this is relevant. Finally, the overall cost per volume can then be calculated, which can inform about the price of a building *style*, rather than informing about a building itself, as the total costs do.

In chapter 7 the labour cost calculations are presented. In this chapter the required investment in person hours is calculated for the individual steps in the building process. A variety of labour rates are used to calculate the costs for the different steps in order to present a realistic range of the possible required investment. As there are many assumptions made throughout the process, using a range thus allows for a more realistic outcome. A *total* cost estimate is then provided based on the costs of the individual steps.

In chapter 8 the estimated costs of the structures will be used to make various comparisons. These comparisons will focus on comparing sections of fortifications, the fortifications of the two sites as well as the comparisons to the domestic structures. Moreover, it will be discussed how the costs provide insights into the required workforce and how these were organised. Additionally, the required workforce is compared with the estimates of the population sizes at both settlements. This will aid in evaluating whether the construction of the fortifications could be handled by the local population. All these comparisons together will ultimately provide insights into the potential impact the construction of the fortifications may have had on the communities in which they were built. This all comes together when the costs are placed in their proper context, based on the study on Mycenaean society and economy in chapter 2. A final assessment of the potential impact of the large construction projects will be presented as well as a critical evaluation of the study.

The conclusions in chapter 9 will provide an overview of the work done and the outcomes of the study, answering the research questions. Finally, the study will be critically evaluated and a look onto future research in the field of labour cost studies is provided.