MIDDLE BRONZE AGE CYPRUS
INTER-SITE RELATIONSHIPS:
A SOCIAL NETWORK ANALYSIS APPROACH

A Master's Thesis

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ANKARA

May 2018

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# ABSTRACT

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A SOCIAL NETWORK ANALYSIS APPROACH

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May 2018

For the Middle Cypriot period in Cyprus, general scholarly view holds the belief that there was an increasing social complexity leading to the transformation of the island during the Late Cypriot period. This evolutionary scheme, based on the Near Eastern social model, assumes that Cyprus follows the footsteps of contemporary Near Eastern societies, and there was a certain level of contact between the two. However, as in the previous Early Cypriot period, there is no settlement formation of centers and satellites, and Cyprus is rather insular with only a handful of imports found on the island during the Middle Cypriot period. We propose that Social Network Analysis can provide an alternative perspective to this issue and to the nature of the social process in the Middle Bronze Age Cyprus (from Early Cypriot III to Middle Cypriot II, ca. 2050 – 1750 B.C.) working through the inter-site relationships. The results from the Social Network Analysis of inter-site relationships demonstrates that the social process was stagnant throughout the Middle Bronze Age of Cyprus. Therefore, we can argue that although there was an increase in the copper production, this did not lead to an increase in the social complexity in a way that we would expect in the contemporary Near East.

Keywords: Cyprus, Middle Bronze Age, social complexity, Social Network Analysis

# ÖZET


ORTA TUNÇ ÇAĞI KIBRIS'INDA YERLEŞKELER ARASI İLİŞKİLER:
BİR SOSYAL AĞ ANALİZİ YAKLAŞIMI

Dalkılıç, Emre

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Tez Danışmanı: Doç. Dr. Marie-Henriette Gates

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Kıbrıs'ta, Orta Kıbrıs dönemi için genel bilimsel kanı, artan sosyal karmaşıklığın adanın Geç Kıbrıs dönemindeki dönüşümüne öncülük ettiği yönündedir. Yakın Doğu sosyal modelini temel alan bu sosyal tasarı, Kıbrıs'ın çağdaşı olan Yakın Doğu toplumlarını evrimsel olarak takip ettiğini ve ikisi arasında belli seviyede iletişim olduğunu varsayar. Ancak, önceki Erken Kıbrıs döneminde olduğu gibi, bu dönemde de merkez-uydu yapılanması şeklinde bir yerleşim oluşumu Kıbrıs'ta görülmemektedir ve bulunan bir avuç ithal malı Kıbrıs'ın daha çok tecrit edilmiş olduğunu göstermektedir. Bu tez, bu meseleye ve Orta Tunç Çağı Kıbrısı'ndaki (Erken Kıbrıs III – Orta Kıbrıs II, M.Ö. 2050 – 1750) sosyal süreçlere, yerleşkeler arası ilişkiler üzerinden farklı bir bakış açısı sağlayabilmesi adına Sosyal Ağ Analizi'ni bir araç olarak sunmaktadır. Yerleşkeler arası Sosyal Ağ Analizi'nin sonuçları, Orta Tunç Çağı Kıbrısı'nda sosyal süreçlerin durağan olduğunu göstermektedir. Bu nedenle, bakır üretiminde artış olmasına ragmen, Yakın Doğu'da olamasını beklediğimiz gibi, bunun sosyal karmaşıklığın artmasına yol açmadığını savunabiliriz.



Anahtar Kelimeler: Kıbrıs, Orta Tunç Çağı, Sosyal Ağ Analizi, Sosyal Karmaşıklık

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# CHAPTER I

# INTRODUCTION

The Middle Bronze Age of Cyprus is generally treated as a transitional period with gradually increasing social complexity that leads to the early urban polities of the very Late Bronze Age. This assumption tries to incorporate the same evolutionary blueprint of the contemporary Near East where a social evolutionary sequence that starts with tribes eventually leads to early state formation. The same assumption also relies on another assumption that there was increasing contact between the Near East and Cyprus during this period which allowed Cypriot societies to follow the same evolutionary end goal. However, we see a very limited number of imports during this period. In fact, Keswani argues that prior to Late Bronze Age, long-distance trade was “more sporadic than systematic” (2005: 387). Moreover, the settlement patterns during the Middle Bronze Age remain quite the same with the previous period. We do not see any settlement formation of centers and satellites or one settlement being far more central than others. In order to assess the presence or absence of settlement hierarchy and similar settlement patterns throughout the Middle Bronze Age, I propose Social Network Analysis as a tool. Furthermore, with a rather crude proximity network analysis of sites, I try to deepen the understanding of why settlement hierarchy was stagnant throughout the Middle Bronze Age.

In order to form a meaningful network model that can explain the social process, we must define the boundaries of the study. Even before that, we should first define what a network is. A network in the sense of Social Network Analysis can be defined as an inter-connecting set of items. These items can be anything from neurons to cities and in our case these are sites, assemblages, spatial distribution of the sites and more. They are described in network terms as “nodes” or “vertices” and the connections between them are described as “links” or “edges” (Knappett, 2011). In our case study, the nodes correspond to sites and links correspond to the pottery assemblages. Each type of ware in the individual pottery assemblages is handled as a different link. For instance, Red Polished ware will represent a different link from the White Painted ware, since they are of different cultural traditions. In addition, Appendix A provides a detailed look into the site distribution via a Social Networks perspective.

Since neither archaeology nor Social Network Analysis can be considered as an exact science, there are certain issues with the application of networks modeling in archaeology. One such issue is the need to transform archaeological data into network data. Network data is relational by its nature. Archaeological data, on the other hand, is comprised of attributes and most of the time relations are subtle at best. Although there are plenty who deal with the theoretical framework of Social Network Analysis in archaeology, some methodological aspects are rather neglected. Therefore, our aim in this thesis is not only to construct a model that can explain the social process in Middle Bronze Age Cyprus but also to contribute to the Social Network Analysis discourse in archaeology.

After this brief introduction, the second chapter discusses the problems that lie within Cypriot archaeology with emphasis on the Middle Bronze Age. The third chapter provides an overview of the ceramics typology of the period and the distribution and production of copper. The fourth chapter provides a review of the current formal network analysis in archaeology while discussing its significance for the model proposed in this thesis, and demonstrates. The fifth chapter explains the datasets that are used to form the network model and constructs the network model. The sixth chapter connects the final network model to the issue of social process and comments on the possibilities of future research.

There are several problems within Cypriot archaeology that limit our understanding of the island’s history. These problems can also impose restrictions for our analysis and must be thoroughly understood before constructing the network model. Therefore, in the second chapter, these problems are identified and the possible implications are discussed. They can be broadly defined as the disagreement over the chronology and ceramics typology of the Bronze Age Cyprus, uneven settlement and cemetery counts, site mobility, current political situation of the island and centuries long looting.

The third chapter focuses on the Cypriot ceramics from the Middle Bronze Age and the copper production and distribution with respect to the geography of the island. Since the initial stage of the model is based on the pottery assemblages only, individual pottery types are discussed separately. The second stage of the model is based on the proximity of sites to each other where closeness to ancient slag heaps is considered intuitively.

Apart from the review of formal network models in archaeology, the fourth chapter also discusses the formal network models in general and tries to define what can be incorporated into archaeology. In addition to that, the methodology of this study is explained further in this chapter, with the emphasis on how to form datasets. Moreover, there is the challenge of transforming datasets into affiliation matrices in archaeology as we have stated above. This challenge and the ways to deal with it are discussed in this chapter in a way that can benefit the discussion of networks in archaeology.

After the problems of Cypriot archaeology, the nature of the data and the methodological and theoretical framework of the study are discussed in detail, the fifth chapter analyzes the archaeological data and discusses the networks. First, we discuss the initial stage of the model based on pottery assemblages. Then, we analyze the second stage based on the proximity of sites is discussed. Finally, we combine the two stages and provide a general overview of both based on similarities and differences.

The final chapter seeks to explain and discuss the implications of the final model and deals with the issue of social process during the Middle Bronze Age Cyprus. Finally, I argue against the traditional evolutionary explanation of the social process in Cyprus.

# CHAPTER II

# THE CONSTRAINTS OF CYPRIOT ARCHAEOLOGY

Several problems within Cypriot archaeology not only limit our understanding but they also dictate the direction of the research. Therefore, these problems must be understood and dealt with before proceeding further. The problems that are relevant to this study are, (1) the disagreement over chronology and ceramics typology due to the limited number of stratified sites, (2) the uneven settlement and cemetery counts, (3) unevenly distributed excavations because of the current political situation, and (4) centuries long looting.

## 2.1 Chronology and Ceramics Typology

Understanding the Bronze Age chronology of Cyprus can be quite confusing for someone who is not familiar with the history of archaeology in Cyprus. The most obvious reason is the unstratified sites. This caused the pioneering scholars of Cypriot archaeology to resort to different methods to date the sites. For many decades a ceramics based chronology was used instead of a stratigraphy based one (Steel, 2004: 11), and it is still partially in use. The traditional system is comprised of three main phases: Early, Middle, and Late Cypriot (EC-MC-LC from now on) and their sub-phases I-II-III. However, new evidence from the past two decades pushed some scholars to redefine the chronology. For instance, Knapp proposed a two phase system (see Table 1) where Early and Middle Cypriot periods are called Prehistoric Bronze Age 1 and 2, and Late Cypriot period is called Protohistoric Bronze Age 1, 2 and 3 (Knapp, 1990). While Knapp’s method is widely accepted, the traditional chronology is still in use. Steel also proposed a different method which is a combination of Knapp’s scheme and the conventional chronology. She lumps together the EC and MC periods as Prehistoric Bronze Age and uses the conventional periodization (MC III – LC I-II-II) instead of Protohistoric Bronze Age (2004: 13).

In terms of relative chronology, the Philia facies and EC I-II periods correspond to the Prehistoric Bronze Age 1 in Knapp's scheme and Early Bronze Age in the conventional scheme, the EC III and MC I-II periods correspond to Prehistoric Bronze Age 2 in Knapp's scheme and Middle Bronze Age in the conventional scheme, and the MC III and LC I-II-II periods correspond to Protohistoric Bronze Age in Knapp's scheme and Late Bronze Age in the conventional scheme. To avoid confusion I decided to use the term Middle Bronze Age (=EC III to MC II, and Prehistoric Bronze Age II) throughout since it is less confusing and makes more sense for someone who is not that familiar with the history of Cypriot archaeology. Also, partially because one can easily confuse Early Cypriot period with Early Bronze Age.

The disagreement over the relative chronology is continued also in absolute terms. It can be easily seen in three different publications (two from the same year). For the start of EC III  and the start of PreBA 2, Knapp proposes 2000 BC (2013a: 27) but Steel proposes the end of EC III period to be 2000 BC (Steel, 2004: 13) and Webb and Frankel propose 2150/2100 BC as the start of EC III (2013: 60). This is again to do with the unstratified sites of the period and not being able to confirm the finds with stratigraphy. Fortunately for us, all these publications agree that the end of the MC II (the end of Middle Bronze Age) corresponds to ca. 1750 BC, sometimes with a 50 year difference.

Table 1: The Chronology of Bronze Age Cyprus (Modified Table 1 from Knapp, 2013: 21)

| Periods | Phase/Culture | Dates cal. BC |
|---|---|---|
| Prehistoric Bronze Age (PreBA) (Philia-Early/Middle Cypriot) | | |
| PreBA 1 | Philia 'Phase' | 2400/2350 – 2250 |
| PreBA 1 | EC I-II | 2250 – 2000 |
| PreBA 2 | EC III – MC I-II | 2000 – 1750/1700 |
| Protohistoric Bronze Age (ProBA) (Middle Cypriot III – Late Cypriot IIIA) | | |
| ProBA 1 | MC III – LC I | 1750/1700 – 1450 |
| ProBA 2 | LC IIA – LC IIC early | 1450 – 1340 |
| ProBA 3 | LC IIC – LC IIIA late | 1340 – 1125/1100 |

Since the chronology was structured upon the ceramics typology, the slightest disagreement over the typology meant a disagreement over chronology and vice versa. This issue is demonstrated very clearly by Lisa Graham in a recent publication (2012). The south-west and the west of the island during the Middle Bronze Age were completely ignored by scholars since it was thought to be unpopulated during this period. There were two reasons behind this. The first, a significant feature of MBA, the White Painted ceramic tradition was not present in that part of the island (and remains un-categorized today), and the second, the local Drab Polished ceramic tradition was dated to the Late Bronze Age (Graham, 2012: 38). However, recent studies confirmed that Drab Polished indeed dated to the earlier periods, perhaps even as early as the Late Chalcolithic period (Graham, 2012: 40). Broadly speaking, this case is not very uncommon in archaeology, the fact that chronology changes with new finds, but it has serious implications in Cyprus since the chronology is still heavily dependent on ceramics typology.

## 2.2 The Uneven Settlement and Cemetery Counts

When we look at two different maps (Figures 1 and 2) of Middle Bronze Age Cyprus we can clearly see two features. The first is demonstrated very well in Graham's illustration (Figure 2), there are some settlements that do not have cemeteries associated with them, and there are cemeteries that do not have settlements associated with them. In contrast, a second article from the same volume identifies sites by name only without differentiating between settlements and cemeteries (Figure 1). Even though these two figures are from the same volume, one can easily see that there are different sites named in each. Although this could very well be the authors' difference in opinion, it shows how Cypriot archaeology is not standardized even in the same publication.

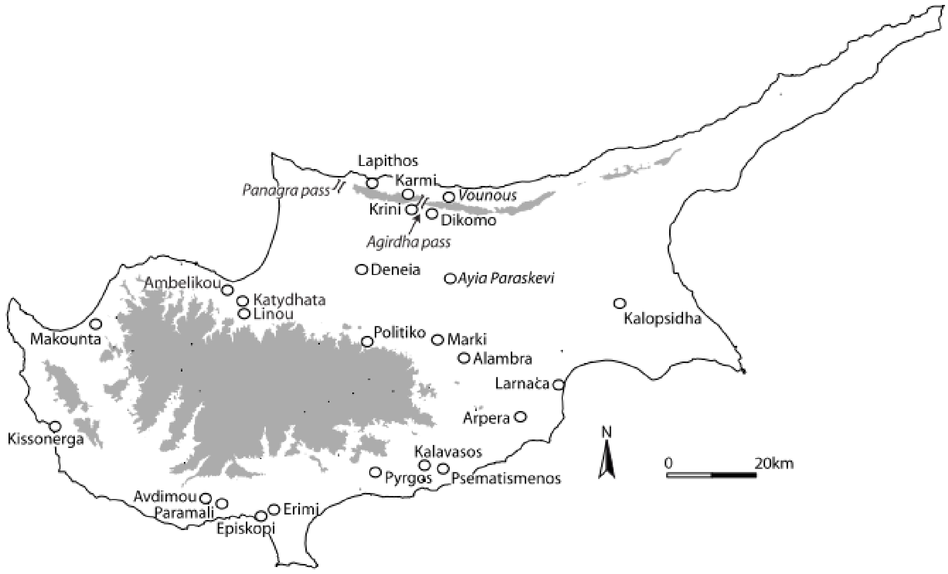



Figure 1: Map of EC III and MC sites (Figure 7 from Webb, 2014: 66)

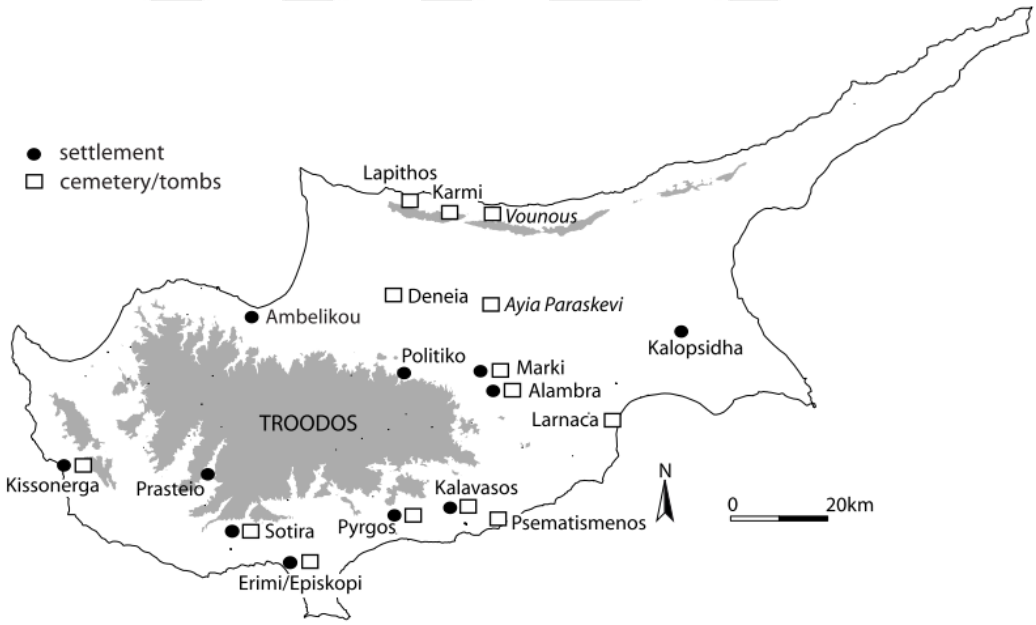



Figure 2: Map of EC III and MC sites (Figure 1 from Graham, 2014: 135)

The issue of uneven settlement and cemetery counts poses a significant challenge for the Cypriot archaeology. Although it is not always the case, we cannot see the association between the burial practices and the daily life of settlements. For instance, Deneia is one of the largest cemetery complexes of Middle Bronze Age Cyprus with 1286 tombs documented, and the original number could have been two or three times higher, but the associated settlement or settlements have not yet been found (Webb, 2010: 175). While we have the cemetery data well documented, not having an associated settlement or settlements forced me to take a different methodological approach for this thesis. I had to separate the settlement and cemetery data, and analyze them accordingly. Therefore, there are three different networks in this thesis, a settlement network, a cemetery network and a combined network of the two (see Figure 4 for settlements and cemeteries used in this thesis).

### 2.3 Site Distribution

The number of settlements on Cyprus varies immensely in different periods. Knapp states that a survey of Prehistoric Bronze Age settlements in Cyprus identified 44 sites of PreBA 1 (EC I – II) which increased eight-fold during PreBA 2 (EC III to MC II, and MBA for this thesis) to 345 sites based on a 2007 survey by Georgiou (2013a: 278). Unfortunately, I did not have a chance to go through the work of Georgiou since it is an unpublished PhD thesis in Greek, and I am doing my assessment based on the data provided by Knapp. He argues that this eight-fold increase in the number of sites suggests that the population also grew to an "unprecedented extent" during the late 3rd millennium BC (2013a: 278). However, he does not elaborate on whether these 345 sites were continuous, stratified sites or discontinuous, non-stratified sites. A survey from the Kalavasos Area for the MBA period shows that after a short gap, settlement on the east side of the valley resumes *c*. 600m. South – South-East of the village (Kalavasos) with the sizable settlement of *Lourca* (Todd, 1988: 139). This clearly indicates that there was site mobility during the MBA (at least in the Kalavasos area) which could mean that the increase in the number of settlements was not directly related to the increase in population. Without denying the fact that there had been a population increase at the beginning of the MBA, it should be noted that there is a possibility of site mobility in Cyprus. In addition, based on a comparison between official soil coverage and fertile soils maps of Cyprus, Iacovou (2013: 20) argues that the so-called fertility of Cyprus should be questioned. Morevover, frequent droughts had a direct effect on the depopulation of the island which can be linked to the relatively low population density of Cyprus throughout its history (Iacovou, 2013: 21). Hence, we can argue that the case of site mobility is more likely than population growing to an "unprecedented extent" during the Middle Bronze Age since it is unlikely that Cypriot soil could have supported 345 sites simultaneously. While the site mobility issue in the MBA is highly important and should be addressed in detail, it is entirely a different research topic. Therefore, it will be enough to say that the site mobility issue limits the number of settlements that can be included in this research.

## 2.4 Current Political Situation

The political situation in Cyprus, even after more than 40 years, is still a sensitive subject. While there are reconciliation attempts every five years or so, the international communities still regard the Turkish government on the island as illegal. This not only affects the livelihood of the island's occupants but it also restricts the scientific research on the northern part of the island. Many archaeologists who study Cyprus either completely ignore this fact in their publications or just briefly mention it. Having few scientific excavations in the north since 1974 certainly and most definitely created an archaeological bias which can also be seen in the above maps where there are literally zero sites shown in the Karpas Peninsula. I am almost certain that once "the northern bias" is no more, and we can finally answer the peculiarities of Cypriot archaeology and maybe even find the associated settlements and cemeteries such as the settlement(s) of Deneia.

## 2.5 Looting

As in many parts of the world, looting is not uncommon in Cyprus. It can even be dated back to the Roman period on the island. However, what most archaeologists ignore is the fact that disturbance can be entirely something else. Although she does not deny that there was looting and tomb reuse, Keswani argues that the signs of skeletal disarticulation and/or the incomplete representation of body parts have usually been attributed to the effects of tomb reuse, looting, or flooding, rather than to possible ritual practice (2005: 346). If not well understood and documented, tomb reuse, looting, flooding or secondary ritual practices could pose serious implications to interpretation of the archaeological record. In the case of this thesis, it indicates that some of the data might be lost forever due to looting, and altered in a way that it is now unrecognizable due to secondary ritual practices.

## 2.6 Summary

There are many more issues than the five stated above that affect the archaeology on Cyprus but I summarized the ones that directly affect this thesis. In summary, the chronology and ceramics typology defines how I handle the data of individual sites and the temporality; the uneven settlement and cemetery counts define the structure of the networks; the site mobility issue restricts the number of sites included; and the political situation and looting shows the biased nature of the data even before the archaeologists categorize it. By demonstrating these issues I hope to create a better understanding for the limitations of the networks approach proposed in this thesis.

# CHAPTER III

# THE MIDDLE BRONZE AGE OF CYPRUS

This chapter discusses the pottery tradition and the nature of copper distribution of Middle Bronze Age Cyprus with regard to the geography of the island. There are six main ware types that belong to the period: White Painted, Red Polished, Drab Polished, Black Polished, Red-on-Black, and Black Slip (Frankel, 2014: 490). This thesis only uses the first five ware types, excluding Black Slip. The overview of each ware type can be found in their respective sub-sections below (see Figure 3 for a rough distribution map of pottery). While there is a brief description of the types of copper artifacts found throughout Cyprus, my main interest is in the distribution of copper as a raw material. Therefore, I look into the extraction and distribution of copper from Troodos where the geography of the island and the role it plays on the distribution of copper comes in.

## 3.1 Types and Distribution of Pottery

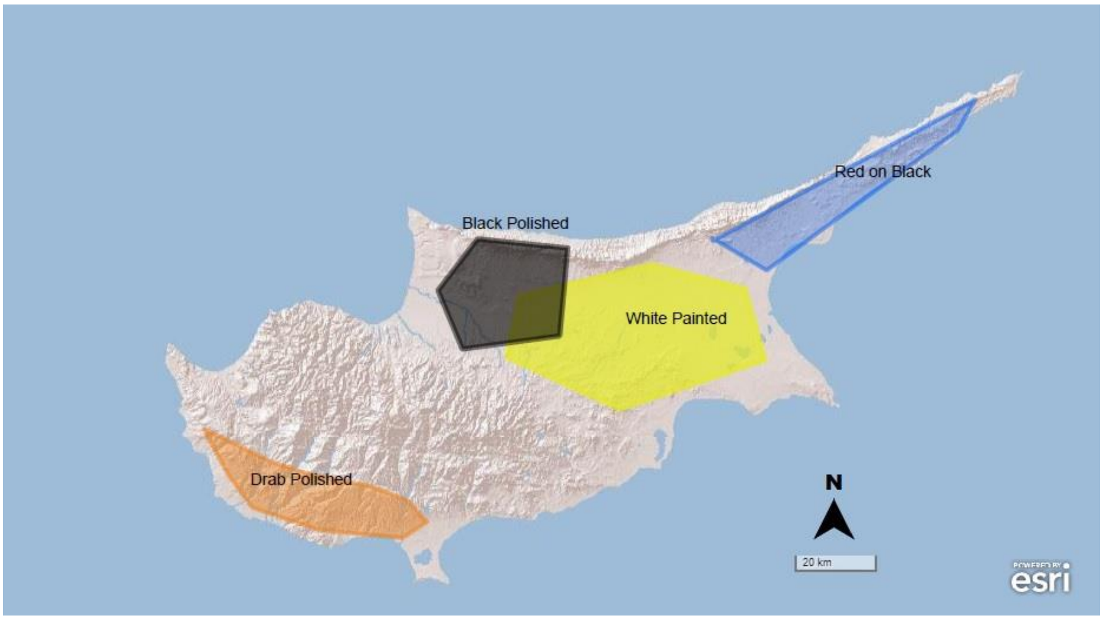



Figure 3: Pottery types and their production centers

### 3.1.1 Red Polished Ware

Red Polished is the most common form of the pottery assemblage of Middle Bronze Age (Figure 4). There are stylistic variations in different regions and it has a different frequency of appearance throughout the island (Frankel, 2014: 491). Frankel also states that the Red Polished pottery from Marki and Alambra is more similar to the southeast than the north coast, while a relatively close association can be seen in northern types and those from Deneia in the eastern part of the central plain (2014: 491). This excellent example shows the variation even in the sites that are close to each other. On this issue of variation in Red Polished pottery, Barlow argues that the variation of the ware may provide us answers to questions such as locations of production centers, relationship to local resources, and intra-island trade (1991: 56). Since this thesis focuses on the pottery on a broader scale, I will ignore the regional differences in Red Polished tradition. Rather, I will use the presence of Red Polished ware as an indicator of a certain site being integrated to the broader cultural tradition of the island.

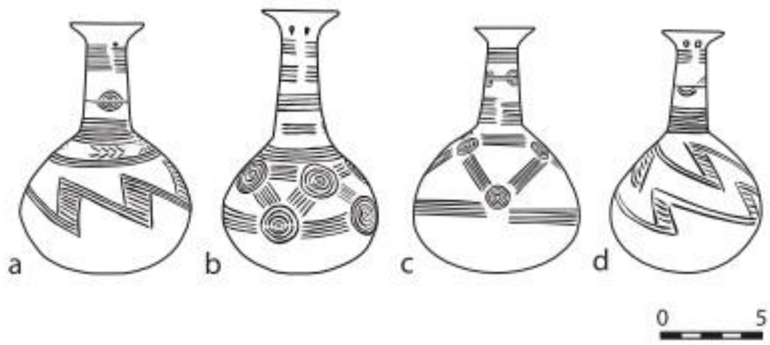



Figure 4:Red Polished III ware from Vounous Tombs (a)72.91, (b)7.5, (c)122.7, (d)137.9 (modified from Webb, 2014b: 218).

### 3.1.2 White Painted Ware

White Painted pottery is regarded as the distinguishing feature of the Middle Bronze Age (Figure 5). Very much like the Red Polished, it has easily recognizable regional variations (Frankel, 2014: 491). The most promising study on the White Painted ware related to the inter-site relationships has been done by Frankel where he analyzed the stylistic differences of the White Painted ware that occurred in different sites (1974). The study concludes that the inter-site relationships in the Middle

Bronze Age period were on a small and individual scale, with the existence of local clusters of resource-based, defense sharing units (Frankel, 1974: 205). With the recent research and further study on the inter-site relationships of the MBA period, his study falls short. There are two main reasons for it. The first, it only considers the White Painted pottery, it does not include Red Polished or Drab Polished. However, it must be mentioned that Drab Polished pottery was considered a Late Middle Cypriot tradition at the time (Graham, 2012: 40). Also, Frankel probably concentrated on White Painted pottery because of the fact that Red Polished pottery types spanned through previous and later periods. Secondly, the study ignores the west and south-west of the island. This is again because, at the time, that region was considered unpopulated during the Middle Bronze Age due to the lack of White Painted pottery (Graham, 2012: 38). Although there are shortcomings as mentioned above, the study still should be referred to as an excellent statistical study on pottery styles and as an earlier (and precise) application of networks to pottery styles.

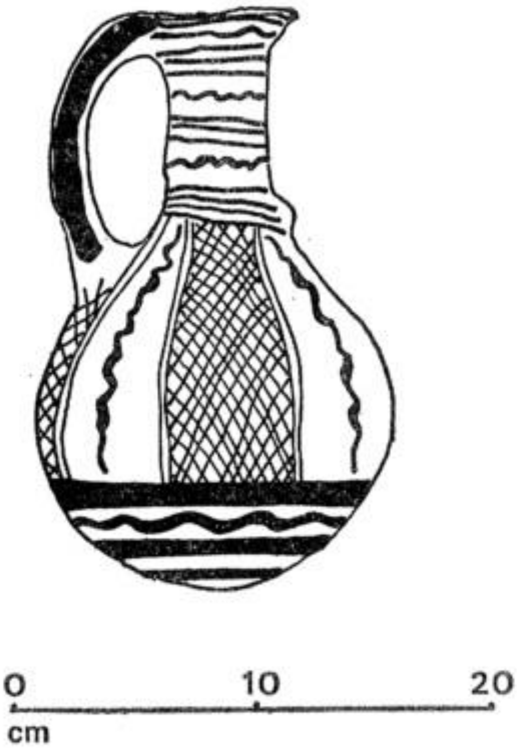



Figure 5: White Painted III ware from Lapithos T.316.126 (modified from Frankel, 1974: 196).

### 3.1.3 Drab Polished Ware

As I have stated above, Drab Polished ware was previously dated to the Late Middle Cypriot period onwards. However, Graham's study confirms that it was earlier than that and the origin of the ware might even date to the Chalcolithic period (2012: 40). The significance of Drab Polished pottery in Cyprus is that it was locally produced in the sites of the south-west and imported to the other sites of the island (Figure 6). Graham proposes a south-west origin for Drab Polished and a different Drab Polished tradition for the south (2012: 40). In addition to that, the pXRF analysis of the Drab Polished pottery in Ambelikou and Marki confirms that the clay of the ware is significantly distinct from the Red Polished assemblage of the site and suggests that the ware was imported (Frankel and Webb, 2012b: 1385). The fact that Drab Polished is an import is especially important for this thesis because it nullifies the argument made by Frankel that inter-site relationships were on a micro-regional scale and individual basis. Inter-site imports indicate that there was at least movement of people in between the north and the south-west (possibly through the central plain as it will be shown in the analysis chapter).

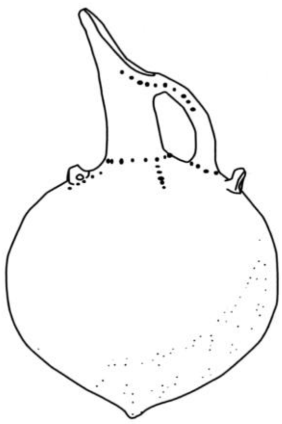


Figure 6: Drab Polished ware (modified from Frankel, 2014)

### 3.1.4 Black Polished Ware

In close relationship with Red Polished Ware, the Black Polished ware is considered a separate type (Figure 7). Black Polished was almost exclusive to the central plain and the north coast with as little as 2.5 % of the total assemblage found elsewhere on the island (Brewster, 2007: 65). Webb states that during the MC I period Deneia becomes a major production center for the ware (2014b: 221). Nevertheless, she also argues that the copper from Ambelikou did not travel through Deneia during MC I since Black Polished is very rare on the site (Webb, 2014a: 67).

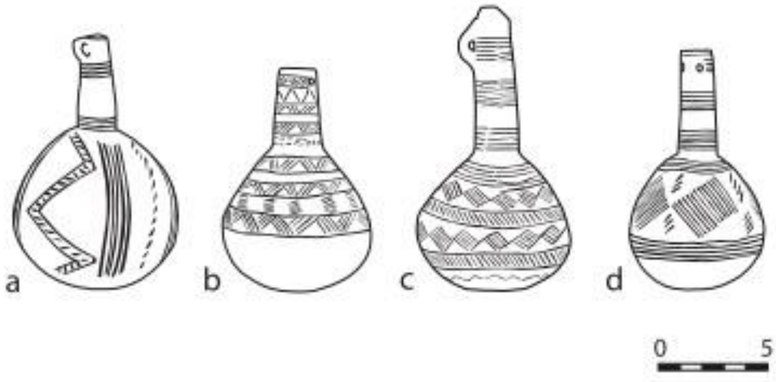



Figure 7: Black Polished ware from a. Lapithos Vrysi tou Barba Tomb 6A.32, b–c. Vounous Tombs 13.8, 17.9, d. Deneia (modified from Webb, 2014b: 218)

### 3.1.5 Red-on-Black Ware

Red-on-Black ware was a local ware that belonged to the Karpas Peninsula (Frankel, 2014: 491). Although Phlamoudhi is a suggested production center for Red-on-Black ware, the earliest phase can only be dated to the MC III period (Horowitz, 2008: 70). However, according to Merrillees, the Red-on-Black ware appears during the MC II period (1979). Therefore, Phlamoudhi is not in the network and Red-on-Black is only added in the MC II period (Figure 8).

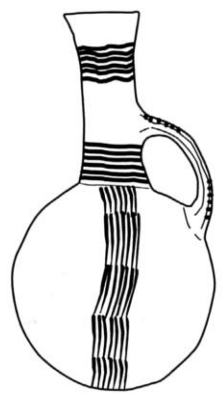


Figure 8: Red-on-Black ware (modified from Frankel, 1974)

## 3.2 Production and Distribution of Copper

### 3.2.1 The Geography of Cyprus and the Distribution of Copper

The island of Cyprus can be divided into four different geographical regions, the Pentadaktylos Range, the Troodos Range, the Mesaoria Plain and the Mamonia Terrane. The Pentadaktylos Range is the narrow mountain range in the North with several passages to the north coast of the island. The Troodos Range located in the middle-western part of the island and it is the main topographical feature of the island which covers just under a third of the total area of Cyprus (Constantinou, 1981: 13). The Mesaoria Plain lies in between the Troodos and Pentadaktylos Ranges and it is the main alluvial plain. Finally, the Mamonia Terrane lies to the west of the island and its colored stones were used for the mosaics of Paphos and Kourion (Constantinou and Panayides, 2013: 11).

The geography of the island is especially important for the copper industry since the location and the size of Troodos heavily imposes on the distribution of copper. The copper on the island is only found on the Troodos mountain range with 85 % of the total copper reserves being concentrated on the north side of the range (Iacovou, 2012: 58). Also, since the modern mining industry shipped the ore abroad and did not produce metallic copper by pyrometallurgical techniques, it is safe to assume that any copper slag found on the island is the product of past metallurgical activities (Kassianidou, 1998: 227). These slag heaps are in excess of 4 million tons and this amount of slag suggests that 200,000 tons of copper were produced in Cyprus (Constantinou, 1981: 22). Even when considering later periods (Late Bronze Age onwards) this is a huge amount of production. As Constantinou states this would have taken enormous amounts of fuel to produce, in fact, he estimates that to produce this much copper the forests of Cyprus must have been destroyed at least 16 times (1981: 22). This assumption has serious implications for the landscape of Cyprus and for the importance of copper production. However, these implications will not be discussed in this thesis. For now, it is sufficient to say that copper production had a very important role in the way locals shaped and probably perceived the island and their landscape. It can also be seen from Figure 9 that most ancient slag heaps are located on the northern foothills of Troodos.

### 3.2.2 The Copper Production

Knapp suggests that the overall level of metallurgical development on PreBA 2 (MBA for this thesis) Cyprus is one of limited-scale localized production and internal consumption of metals (2013b: 27). Although there are attempts to associate Cyprus with Alashiya during this period (Knapp, 2008), in my view, the copper production was too small to support such a claim, let alone the fact that almost all sites during the MBA are quite similar to each other with the largest of them occupying 6 hectares at most (such as Alambra and Marki). In addition, the very small number of imported artifacts found in this period (Keswani, 2005) suggests that MBA Cyprus had very little contact with the outside world. However, I will leave the discussion of this subject aside since this thesis' main concern is the internal dynamics of Cyprus.

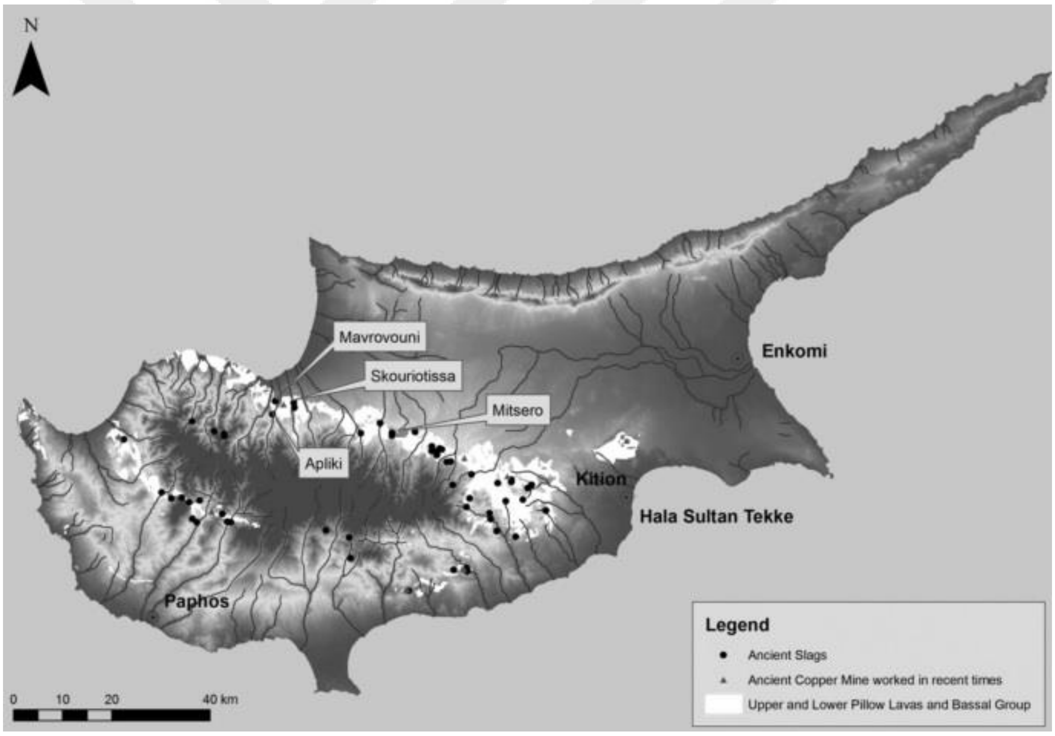



Figure 9: Locations of ancient slag heaps (Figure 7.1 from Iacovou, 2012).

Small scale smelting or refining was carried out at Alambra while copper ingots were produced at Marki (Webb, 2014a: 68). There is also evidence of smelting at the short lived mining settlement of Ambelikou (Webb, 2014a: 68). Episkopi, Erimi, Kalavassos, Kalopsidha, Kissonerga, Politiko and Sotira have produced evidence for metalworking including casting and refining (Knapp, 2013b; and Webb, 2014a).

With the exception of Ambelikou, it seems that most copper objects were produced and consumed locally. Therefore, in this thesis, rather than searching for the production centers for copper, I decided to look at the settlement patterns and compare them to the patterns of material culture.

# CHAPTER IV

# THE METHODOLOGY AND THE THEORETICAL FRAMEWORK

As I have argued previously, it is rather hard to place the prehistory of Cyprus in the mainstream of archaeological thought (in terms of hierarchical relationships, settlement patterns, etc.). This pushed some scholars to seek different methods to deal with the archaeological evidence. One such study was conducted in order to understand the nature of inter-site relationships during the Middle Bronze Age (Frankel, 1974). The study constructs a network model based on the statistical analysis of the decorations of the White Painted ware assemblage. Based on the final network model, Frankel concludes that inter-site relationships during this period were limited and on an individual scale. While it is an excellent application of statistical network models, this study then jumps to the unsupported conclusion that the copper was the driving force of these small scale interactions. Although this suggestion was clearly not the aim of the study, I think that for such a conclusion, an analysis must also consider the production and distribution patterns of copper and copper based objects. Therefore, my own study aims to construct a network model within the framework of formal network methods by combining the distribution of pottery throughout the island with a coarse proximity network while intuitively including the copper distribution.

The last decade has seen a boom in the application of network models in archaeology (Brughmans, 2013; Collar et al. 2015; Schortman, 2014; Peeples et al. 2016). One study even constructed a citation network of Social Network Analysis studies in archaeology to determine which publications were the most influential and where did the inspiration come from (Brughmans, 2014).

This chapter explains what networks are, provides an extended review of the applications of Social Network Analysis in archaeology, tries to incorporate methods from other disciplines that would benefit archaeological thought, and discusses how to handle the archaeological data from a networks perspective.

### 4.1 Networks

The networks are composed of two main elements; nodes (edges) and links (vertices). Nodes are items that can be anything from cities to neurons, and links, as the name suggests, are connections of these nodes to each other. In Social Network Analysis, the nodes can be people and links can be the ties between them (i.e. friendship, kinship). In archaeology, formal network methods have been applied to explore research topics as diverse as the transmission of ideas, the movement of people and objects, the identification of social and cultural boundaries, inter-regional interaction, and maritime connectivity (Brughmans, 2013: 624). As these studies suggest, nodes are generally sites or artifact remains in archaeology. Links, however, can be anything from spatial proximity of sites to artifact assemblages. This thesis considers sites (settlements and cemeteries) as nodes and the ceramic assemblages of individual sites and proximity of sites to each other as links.

### 4.2 Previous Studies of Social Network Analysis in Archaeology

Collar and her colleagues (2015) demonstrate that the formal network tools in archaeology have been in use since the 1960s. According to their data the use of networks in archaeology started in 1968 and it did not produce more than 5 publications per year until 2006. After 2006, we can see the number of articles increased significantly reaching above 25 per year in 2014. This clearly shows that the trend was more popular in the past 5 years and it is becoming even more popular with entire conferences and sessions dedicated to the subject (EAA 2017, CAA 2018, etc.).

To understand the above trend of archaeological networks, I review Brughmans' network analysis of publications of archaeological networks. In his analysis of the archaeological use of formal network methods, Brughmans constructs two distinct networks: a citation network of all published archaeological network analysis, and a citation network of all publications cited by archaeological network analysts and the citations between them (2014: 27). As stated above, his data also show an increase in archaeological network analysis in the recent years. According to him, it is easy to misinterpret this citation network in a way that archaeologists use a limited range of similar network techniques inspired by the popular physicists marking the start of an increase in the multidisciplinary interest in networks (2014: 28). He finds the reason for this misinterpretation in the recent publication of three review publications of networks in archaeology (namely Brughmans, 2010; 2013; and Knappett, 2011) where these three are very often cited by archaeologists as literature review in their works. He removes these three publications from the network to reduce the inflation in the citation density. The resulting network shows that the publications rarely cite the same sources, implying a limited influence between recent archaeological applications of network methods (2014: 30). In the latter network based on multi-disciplinary influences, Brughmans (2014: 30) shows that only few studies adopted network techniques from publications other than two key popular articles (Barabasi and Albert, 1999; Watts and Strogatz, 1998) and methodological text books (Scott, 1997; Wasserman and Faust, 1994). This situation, and the fact that most archaeological network analysis was based on the very same publications, might explain the methodological shortcomings in archaeology (Brughmans, 2014: 35). In their critique of the use of digital sources and new scientific methods in archaeology, Anastasio and Saliola (2014) point out that archaeologists often incorporate a new technology with old-way thinking and apply techniques from other disciplines superficially, likening practitioners to “cargo-cult” scientists. I adopt no such attitude when it comes to applications of networks in archaeology. Nonetheless, I believe that the full potential of the network approaches in archaeology is not recognized yet. This can also be seen in the reviews of network analysis in archaeology.

Broad reviews of network methods in archaeology have been done by several scholars (e.g. Brughmans, 2013; Collar et al. 2015; Schortman, 2014; Peeples et al. 2016). Several issues are highlighted by the authors of these publications, an important one being the adoption of social network interpretations. The struggle comes from the different nature of the archaeological data and the social network data. Brughmans states that many archaeologists are aware of this struggle and tread carefully when it comes to adopting the interpretations of current network models in social sciences (2013: 641). The archaeological data are static whereas social network data are dynamic; and while archaeological data must be treated as dynamic to form a model closer to a social network, what we see initially is very static. Only after we categorize the finds does it gain temporality and this temporality has to be supported with other elements such as C-14 analysis. Even then, the result we have is still subjective since peoples of the past never did categorize in such temporalities. Only we do that in hopes of easing the understanding of the past. Therefore, the temporality and dynamism of archaeological networks must be treated with care.

### 4.2.1 Selected Case Studies of Network Analysis in Archaeology

This section reviews two different case studies; Enacting Power through Networks (Schortman and Urban, 2012), and Towards a Networks and Boundaries Approach to Early Complex Polities: The Late Shang Case (Campbell, 2009). The first case study deals with the ways to interpret the archaeological networks, and the second case study discusses the “one size fits all” neoevolutionary approaches to early complex societies in a networks manner and relates quite well with the case of Cyprus. Although there are many more case studies of networks in archaeology, the restricted space for this thesis limits the number of those I can review. Therefore, I chose two case studies on the basis of relevance and preferred to only include their relevant parts.

Schortman and Urban’s paper discusses the processes of political centralization and hierarchy building in the Naco Valley of Honduras during the Terminal Classic period (AD 800 – 1000) through a networks perspective (2012). They define three important aspects of material culture as components of social webs: (1) people who control the production, transfer, use and interpretation of symbolic items can exert a level of power over those who lack these resources, (2) different types of materials are used to sort different social groups, and (3) specific materials are seen as extensions of certain people and their exchange materializes the social relationships (2012: 502). While I do not deal with the symbolic in this thesis, I take on a similar approach to the manipulation of copper resources and to the distribution of pottery. I argue that (1) the sites that could have controlled the transfer of metals from sources to production centers might have been more central in the network than others, (2) different types of wares (i.e. Red Polished, Drab Polished) represent the different cultural traditions, and (3) specific pottery types serve as the extensions of peoples of the past and they represent the social relationships.

To elaborate the third point, I present the hypothesis of the extended mind via a very specific example, Mycenaean Linear B tablets (Malafouris, 2013). Malafouris argues that the cognitive process of producing the tablet does not simply involve the internal representation of symbols. It also involves the manipulation of the properties of the representational medium as a material object in real time and space (2013: 71). Thus, the Mycenaean memory does not only rest in the symbols but it also rests in the physical action that involves the making of the tablet. Malafouris calls this extended cognition (2013: 74). He further argues that if we accept that the mind evolves and exists in the relational domain as our most fundamental means of engaging with the world, then material culture is potentially co-extensive and consubstantial with mind (2013: 77). According to this, he suggests that it is not the Mycenaean scribe that remembers, it is the Linear B tablet that remembers while transforming a difficult internal memory problem into an easier external perceptual one (2013: 82). Finally, Malafouris argues that cognition has no location, and the active mind cannot be contained. Therefore, cognition is not a "within" property, it is a "between" property (2013: 85). Following Malafouris, I argue that the pottery represents the features of the ancient mind, and it is the connection between the peoples of the past. I suggest that the individual pottery types represent the differentiation and diversification of distinct human communities.

There is a very particular reason why I picked Campbell's case study of Late Shang China to review in this thesis. In the very first few sentences of his publication, Campbell argues that the typological exercises of neoevolutionary theory pose some definitional problems for the archaeology of Shang China when a "one size fits all" approach was taken towards it (2009: 821). Cyprus also suffers from the same neoevolutionary approach that tries to place the island in the same developmental sequences as the Ancient Near East. However, it is clear that the island cannot be placed in the standard classification of Ancient Near Eastern civilizations and must be considered rather separately from the contemporary civilizations. Campbell's own study shows when typological classifications (i.e. Egypt-like, Mesopotamia-like) are forced on different cultures, it limits our understanding of those cultures and hinders our ability to properly define the processes that formed those cultures (2009: 823). So, should we categorize and generalize every culture in a way that they represent a trajectory of social evolution? In other words, does every culture need to come from the same roots and go towards the same end goal with a similar path? This is clearly not the case in Cyprus where we still struggle to define what social complexity is. We still look for the processes that lead the societies/peoples of the island to evolve into a more complex society and eventually into a state. For example, although many archaeologists think that Cyprus was the ancient Alashiya kingdom, the evidence is only circumstantial. The question here should not be whether Cyprus was Alashiya or not. Instead, the question should be "What was Cyprus before the Alashiya question?" and only then we can start to look for Alashiya.

### 4.2.2 Issues of Network Analysis in Archaeology

In another recent paper, Brughmans takes a detailed look into archaeological applications of formal networks methods (2013). He brings forward two main issues that need to be addressed for the use of networks in archaeology. The first one is the limited nature of the methodology caused by a lack of awareness in diverse formal network models and the second one is the domination of a few popular models and techniques in archaeology resulting in similar interpretations (2013: 654). One of the main aims of my research is indeed to deal with these two issues. When one delves into the archaeological networks, the methodological problems or the lack of understanding become quite apparent. As Brughmans states the applications of affiliation networks in archaeology are few (2013: 638). However, two papers that tackle the issue of proper methodology are worth mentioning: one by Östborn and Gerding (2014) and the other by Peeples et al. (2016).

Östborn and Gerding (2014) highlight the issues surrounding the methodology. Their network is based on the premise of similarity, which they simply name "similarity network" (2014: 75). Their addition to the methodological discussion comes from the differentiation between "seriation" and "complex evolution". As the name suggests seriation can be considered as one thing after another in spatio-temporal processes (like chronological sequences). The complex evolution is the branching of the spatio-temporal processes and they can converge at some point after branching out unlike seriation. This relates well with the situation of archaeology study in Cyprus. As I have stated in Chapter II, one of the main problems of Cypriot archaeology is that we cannot place it in the traditional evolutionary scheme. Therefore, Cypriot archaeology can benefit from the networks approach or “complex evolutionary” approach.

Peeples and his colleagues examine the issues above under four topics in their paper on the social networks of the prehispanic US Southwest: the use of artifacts to construct network relations, temporal variation among the units of analysis, the definition of network boundaries, and the impact of incomplete datasets (2016: 59). My main concern here is the use of artifacts to construct network relations and I will ignore the rest of the issues stated by Peeples and his colleagues for the time being. For the use of artifacts they take on an approach that assumes the similarity of the wares in two different sites indicates social relationships (2016: 61). With more elaboration on the subject, I will appropriate a similar approach when analyzing my own datasets. Peeples and his colleagues use the Brainerd-Robinson similarity coefficient to define the similarity between two separate sites (2016: 62).[1]Then they convert these similarity indices to represent values between 0 and 1 to ease the calculations. The criterion is that if two sites have a similarity index of 0.75 then they have a link between them. They measure the degree and eigenvector centrality of sites based on these links (the centrality measurements will be explained in the next sections of this chapter) and construct a network.

### 4.2.3 The Nature of the Data in Archaeology

One of the core assumptions of complex systems is that the whole is greater than the sum of its parts (Bentley, 2003: 15). Apart from the temporality and the dynamism of the networks, the issue of the sum of the parts must be addressed. Although the argument is quite straightforward, I will still elaborate it in terms of archaeological networks. Since most of the time we have only partial remains in archaeology, the data are either missing or hidden. In addition, our current excavation techniques only allow us to excavate sites partially, therefore we only have fragments of the incomplete information. We can always construct a bigger picture from the partial

[1] It is calculated by subtracting the absolute value of the difference between two sites from 200 and dividing it by 200, and it is on a scale of 200 where a higher score indicates more similarity between sites (i.e. 200 is perfect similarity and 0 is perfect dissimilarity)

information but it is not without problems. Imagine a network designed as a personal computer. We have every component of that computer and assemble it perfectly. However, we still cannot operate it. We need the human component to operate it and that is where a computer becomes the computer. We can deconstruct every complex system to its parts but when we reconstruct those parts, and most of the time we cannot reconstruct it perfectly because of the missing data, we still would not have a perfect system. Now, imagine the computer as an archaeological network. We could have the motherboard, the mouse or the processor. Assembling a computer with missing components would not be an easy task and in the end we might not even have something that remotely resembles a computer. Supposing that we had every component of the archaeological network we would still miss the human element and thus, the network would have been incomplete. So, what can we do with the partial data that we have to work with?

### 4.2.4 How to Handle the Missing Data?

Borgatti and his colleagues (2006: 134) explore the robustness of centrality measures in the face of varying amounts and types of measurement error[2]. They conclude that the accuracy of the measure declines with increasing error. However, they also state that this decline in accuracy is predictable and monotonic. This implies that if one knows the rate and type of error in the data collection process, one can establish error bounds on the metrics constructed from the observed data (Borgatti et al. 2006: 134).

Another issue with the data in archaeology is the binarization. The binary system consists of 1s and 0s, where 1s indicate a presence and 0s indicate absence. Many archaeological networks use the binary system for two reasons; (1) the archaeological data is generally incomplete and binary data prevents (to an extent) the bias caused by this, and (2) it simplifies the mathematical calculations. While the reasons above can be seen as logical, the binary data prevents us from weighing our network. Simply, we cannot determine the scale and density of interactions. For instance, a study by Peeples and Roberts (2013), where they construct two different archaeological networks with binary and non-binary data, shows that the binarization of the archaeological data can have serious implications. Their example suggests that

[2] They use random networks of various sizes (10, 25, 50, and 100 nodes) and densities (1, 2, 5, 10, 30, 50, 70, and 90 %) (Borgatti et al. 2006: 126).

when weighted data are available, they can provide a more nuanced description and formalization of the relations among a set of actors (Peeples and Roberts, 2013: 3008). Although I criticize the binarization of the data, the nature of the archaeological data in Cyprus forced me to actually use binarized data for the Material Culture Network.

### 4.3 The Methodology

Considering all of the above methodological problems, I realized that there is not a single solution to a problem. Thus I decided to split my network modelling into two: a Material Culture Network and a Proximity Network. The original aim was to construct a network model that could incorporate both the material culture and the proximity analysis. However, their datasets are essentially different and it is not possible, at least to my knowledge, to model them in a single network. The method that I choose involves constructing each network model individually and comparing them to each other to see whether the settlement patterns are comparable to the distribution of material culture (in this case pottery) and whether the accessibility of copper sources was the driving force that formed the social boundaries of Middle Bronze Age Cyprus.

#### 4.3.1 Temporality

The biggest issue when it comes to networks in archaeology is temporality, because most of the time we cannot pinpoint the exact dates in prehistory and use 50 or 100 year intervals. This is even worse in the case of Cyprus where the chronology is mostly derived from the stylistic features of the pottery (see Chapter 2, the problems within Cypriot archaeology). Therefore, I use 100 year intervals for each of these three phases: Early Cypriot III (2050 -1950 BC), Middle Cypriot I (1950 – 1850 BC), and Middle Cypriot II (1850 – 1750 BC).

#### 4.3.2 The Methodology of the Material Culture Network (MCN)

The Material Culture Network (MCN) is composed of the pottery assemblages of individual sites in the Middle Bronze Age Cyprus. The MCN includes five different types of pottery: Red Polished, White Painted, Drab Polished, Black Polished and

Red-on-Black (only in MC II) and up to a maximum number of 15 sites which changes in each period.

Before moving into how I handle the affiliation networks in this thesis I must first explain what an affiliation network is. Affiliation networks consist of two types of data, and one of the most common example of this kind of network is a person by event network where people who attend the same events form an affiliation network. In this system, the people are not directly connected to each other by themselves but they are connected through events. The assumption here is that if two people attended the same event then they are connected. Of course this would depend on the event size, for example, two people connecting in a 5-person event would be much more likely than two people connecting in a 1000-person event.

While it is easy to see the person by event affiliations by just looking at the list of people that attended the event, it is not as easy to see the person by person affiliation (Borgatti and Halgin, 2011). In our case, where persons are sites and events are types of wares, the relationship is much more subtle. We cannot simply assume that pottery represented the individual and we also cannot reconstruct the relationship between the peoples of the past directly based on pottery. However, we rely on pottery, architecture, funerary rituals, etc. to create co-affiliate groups. In our case the co-affiliation criterion becomes the pottery.

My original intention was to transform the rectangular site by a pottery co-affiliation matrix into a square site by site regular matrix and analyze it accordingly following Borgatti and Halgin (2011). However, when I ran the networks in Ucinet 6 for Windows (Borgatti, Everett and Freeman, 2002), I realized that the transformed and normalized matrices created unnecessary connections between the sites. For example, the MC II sites' Combined Material Culture Network had the same degree and eigenvector centrality and the same betweenness values. From the dataset it is clear that there is a significant difference between the sites. At first, I thought the issue was with the normalization. However, the change in the normalization method produced similar results. Therefore, I decided to abandon the transformation and normalization procedure in Borgatti and Halgin (2011) and decided to directly analyze the rectangular co-affiliation data following Borgatti and Everett (1997). Simply put, I calculated the normalized centrality measurements directly via Ucinet 6 for Windows (Borgatti, Everett and Freeman, 2002) without any transformation of the data.

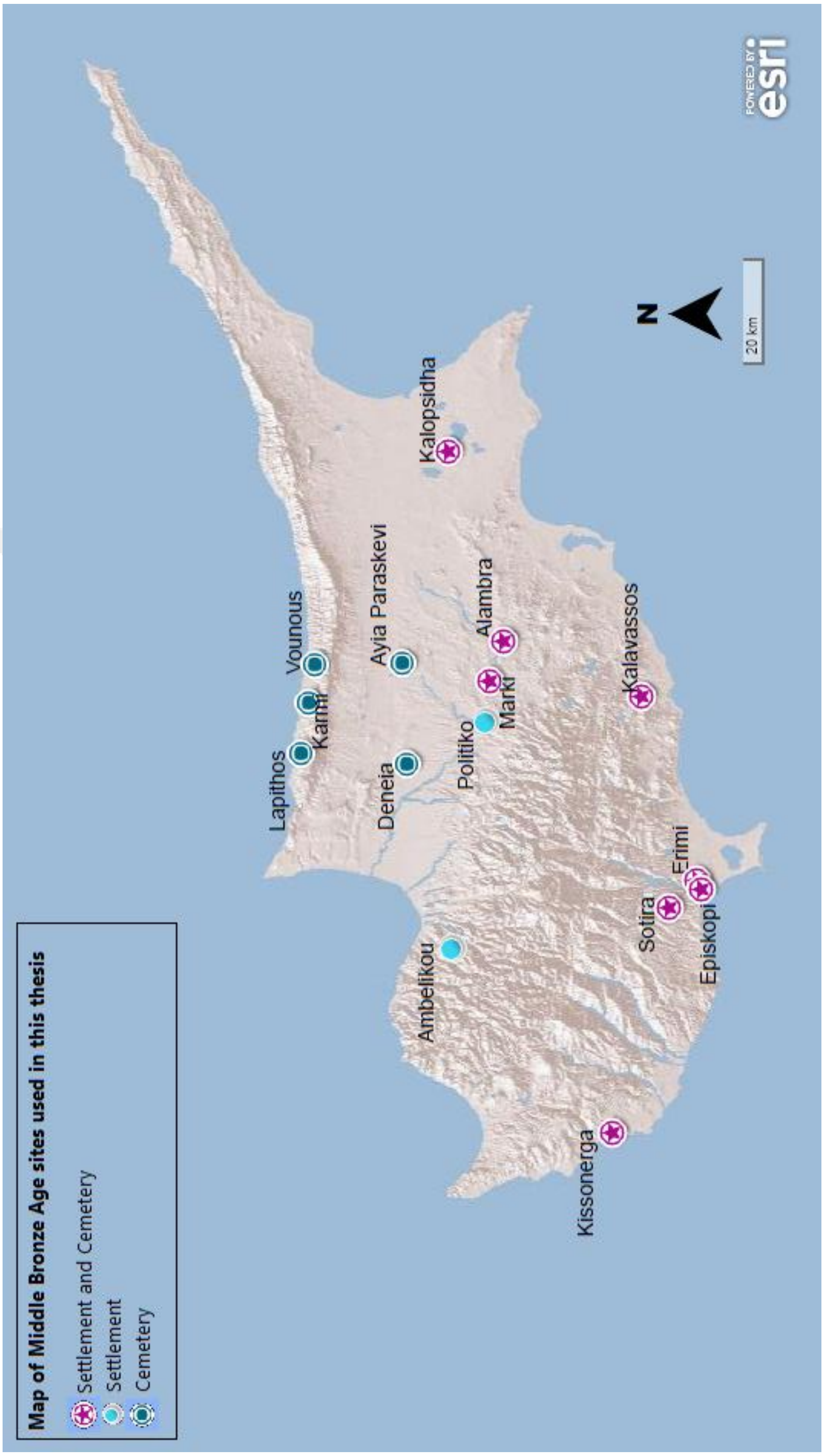
In order to deal with the uneven count of cemeteries and settlements during the MBA, I divided the MCN into three: settlement MCN, cemetery MCN, and a combined MCN of the two. The maximum number of sites varies in each period but the absolute maximum is in the MC I period with 15 sites (see above). Since Red Polished ware is present in every site that we know of during the Middle Bronze Age (Table 2), it creates false positives, meaning that it inflates the number of links between the sites. To deal with the false positives and to see the effects of excluding Red Polished ware, I construct several network models in which datasets are formed with and without Red Polished ware. Therefore, MCN will include EC III settlement, cemetery and combined networks with Red Polished and without Red Polished (a total of 6), MC I settlement, cemetery and combined networks with Red Polished and without Red Polished (a total of 6), and MC II settlement, cemetery and combined networks with Red Polished and without Red Polished (a total of 6) which makes the total number of MCNs 18 (see Appendix B for the datasets)

Table 2: The Middle Bronze Age sites used in this thesis and their attributes (compiled from Aström, 1966; Coleman, 1996; Dikaios, 1940; Falconer and Fall, 2013; Frankel and Webb, 2001, 2012a; Graham, 2014; Hennessy, Eriksson, and Kehrberg, 1988; Knapp, 1990; S Swiny, Rapp, and Herscher, 2003; Webb, 2010, 2014b; Webb and Frankel, 2014; Webb, Frankel, Eriksson, and Hennessy, 2009)

| Site Name | Period | RP | WP | DP | BP | RonB | Settlement | Cemetery |
|---|---|---|---|---|---|---|---|---|
| Alambra | EC III - MC II | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Ambelikou | MC I | Yes | No | Yes | Yes | No | Yes | No |
| Ayia Paraskevi | EC III - MC II | Yes | Yes | No | Yes | No | No | Yes |
| Deneia | MC I - II | Yes | Yes | Yes | Yes | Yes | No | Yes |
| Episkopi | EC III - MC II | Yes | Yes | Yes | No | No | Yes | Yes |
| Erimi | EC III - MC II | Yes | No | No | Yes | No | Yes | Yes |
| Kalavassos | EC III - MC II | Yes | Yes | Yes | Yes | No | Yes | Yes |
| Kalopsidha | EC III - MC II | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Karmi | EC III - MC II | Yes | Yes | No | Yes | No | No | Yes |
| Kissonerga | EC III - MC I | Yes | No | Yes | No | No | Yes | Yes |
| Lapithos | EC III - MC II | Yes | Yes | No | Yes | No | No | Yes |
| Marki | EC III - MC II | Yes | Yes | Yes | Yes | Yes | Yes | Yes |
| Politiko | EC III - MC I | Yes | Yes | No | Yes | No | Yes | No |
| Sotira | EC III - MC I | Yes | No | Yes | No | No | Yes | Yes |
| Vounous | EC III - MC II | Yes | Yes | No | Yes | No | No | Yes |

### 4.3.3 The Methodology of the Proximity Network (PN)

The Proximity Network follows a derivation of the “preposterously simple” fixed radius model by Rivers, Evans and Knappett (2011) where they construct their initial Aegean island network model based on daily sea travelling distance by sail. On a similar premise I use daily land travelling distance by donkey. We do know that donkeys can carry 50 – 90 kg over 30 – 50 km a day (Broodbank, 2012: 422). Since this is a coarse and simple proximity network, and I do not consider the terrain, elevation and slopes mathematically, I decided to use fixed radiuses of 10, 20, 30 and 50 km. However, I consider the main features of the island intuitively while making a connection between the sites. For instance, at the 50 km mark, Ambelikou and Kissonerga connects to each other, but since there is the Troodos mountain range in between, and the terrain would not allow a person from Kissonerga to reach Ambelikou in a single day, I do not connect the two sites. Another example in a similar fashion can be given for the relationship between Alambra and Kalavassos. At the 30 km mark, the two sites connect to each other while Troodos is in between. However, this time the terrain is rather passable, and thus I connect these two sites.



Map of Middle Bronze Age sites used in this thesis
Settlement and Cemetery
Settlement
Cemetery
Lapithos
Karmi
Vounous
Ayia Paraskevi
Deneia
Politiko
Marki
Alambra
Kalopsidha
Kalavassos
Ambelikou
Sotira
Erimi
Episkopi
Kissonerga
N
20 km

The general idea here is that if a site is within 10 km of another site, it means that these two sites are connected and both sites have a corresponding value of 1 in the dataset (see Figure 4 for the map of Middle Bronze Age sites used in this thesis). If they are not connected according to the above criterion, then they have a corresponding value of 0 in the dataset. I repeat this for 20, 30 and 50 km radiuses and for the cemetery, settlement and combined networks of EC III, MC I and MC II periods with a total of 36 networks (see Appendix C for the datasets). In order to calculate the connectivity of sites, I use Google Earth Pro to plot the sites and radiuses, and then transform these maps into square matrices. Finally, I run these matrices in Ucinet 6 for Windows (Borgatti, Everett and Freeman, 2002) and calculate the centrality measures. I do understand that the method presented here is extremely simple. However, it still demonstrates the general or coarse features of the network.

### 4.3.4 Centrality Measurements

Centrality refers to a family of properties of node positions (Borgatti and Halgin, 2011). To understand the relationship between these sites, I use three different centrality measurements for each MCN and PN: degree, eigenvector and betweenness. Although I use the same measurements for both networks, the centrality measurements of 2-mode (affiliation, in our case MCN) and 1-mode (in our case PN) data are calculated differently. The centrality measurements of the MCNs are normalized and the centrality measurements of the PNs are not normalized. Hence, the difference in the resulting values.

Degree centrality can be defined as the number of ties incident upon a node. That is, it is the sum of each row in the adjacency matrix representing the network. We can also define the degree centrality as the number of paths of length one that emanate from one node (Borgatti, 2005: 62). Since degree centrality is quite straightforward, the same definition holds true for both 1-mode and 2-mode data.

Eigenvector centrality is defined as the principal eigenvector of the adjacency matrix defining the network. The idea is that even if a node influences just one other node, and it subsequently influences many other nodes (which themselves influence still others), then the first node in that chain is highly influential (Borgatti, 2005: 61). In the case of 2-mode data, a site's eigenvector centrality is determined by the sum of the centralities of the pottery types that are present in that site (Borgatti and Everett, 1997: 257).

Betweenness centrality is defined as the share of times that a node *i* needs a node *k* (whose centrality is being measured) in order to reach a node *j* via the shortest path (Borgatti, 2005: 60). Simply put, betweenness centrality determines how many sites you need to go through in order to reach from site A to site B. In the case of 2-mode data, the betweenness of a site is a function of paths from site to site, from site to pottery types, and from pottery types to pottery types (Borgatti and Everett, 1997: 256). This means that, in 2-mode data, we also calculate the betweenness of pottery types in order to be able to calculate the betweenness of the sites.

Before moving on with the results of the centrality measurements, a certain point needs to be addressed. At first glance, because of how they are formed, the results of the Proximity Networks might seem to be based on circular reasoning. I still included the results in the Appendix A and provided some commentary on them in the next chapter, since (1) it provides support for the Material Culture Network, and (2) like other studies doing the same type of analysis (i.e. Frankel, 1974), the copper should be included in the analysis. If I have to further clarify my reasoning on adding the centrality measurements for the Proximity Networks, I only included them in order to provide a supporting argument to the Material Culture Networks rather than presenting them as the basis of the main argument. Furthermore, I do not treat any network results presented in this thesis as representation of facts. I see them as supportive tools to the archaeological interpretation but not the only tool. As in all statistical tools, it is prone to the flaws in the data, and in archaeology our data is nothing but flawed, it is only a glimpse of what it had been.

### 4.4 Summary

In this chapter, I have explained what networks are, the uses of networks in archaeology, and the shortcomings of formal network methods in archaeology. I have tried to briefly explain how to handle the missing data, which is almost always the case in archaeology, but I think that the issue needs further research. I have shown the tools that I tested and will apply to form the Material Culture and Proximity networks. I could have preferred to use an in-depth stylistic analysis of a single pottery type to form a material culture network the way Frankel (1974) did or I could have used gravitational models to assess proximity networks thoroughly like Barjamovic and his colleagues (2017) did. However, doing either of them in detail would require me years of research and plenty of writing space. Instead, I decided to apply both methods in a broader, simple and less specific manner. My hope is that this methodological study of two different types of social networks will form a basis for my future studies and ease the understanding of networks in archaeology.

# CHAPTER V

# THE NETWORKS

This chapter comments on the analysis of Material Culture and Proximity Networks. The first part is dedicated to the Material Culture Network and the second part is dedicated to the Proximity Network. The final part combines both networks and tries to form a synthesis.

## 5.1 The Analysis of the Material Culture Network

As I stated in the previous chapter, the uneven number of settlements and cemeteries prevented me from forming a single network. Every period is first divided into two: a series of networks with Red Polished and a series of networks without Red Polished, and then they are further divided into three: a settlement network, a cemetery network and a combined network of settlements and cemeteries.

### 5.1.1 Early Cypriot III Period

EC III period comprises a total of 13 sites with 9 settlements and 12 cemeteries.

#### 5.1.1.1 Centrality Measurements of the EC III MCNs with Red Polished

The results of the analysis and their discussion can be found below (Table 3).

Table 3: Early Cypriot III Material Culture Networks with Red Polished

| EC III MCNs with RP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Settlement | | | Cemetery | | | Combined | | |
| Site | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. |
| Alambra | 1.000 | 0.407 | 0.049 | 1.000 | 0.353 | 0.032 | 1.000 | 0.337 | 0.029 |
| Ayia Paraskevi | | | | 0.750 | 0.288 | 0.010 | 0.750 | 0.280 | 0.008 |
| Episkopi | 0.750 | 0.317 | 0.022 | 0.750 | 0.264 | 0.017 | 0.750 | 0.250 | 0.015 |
| Erimi | 0.500 | 0.212 | 0.008 | 0.500 | 0.197 | 0.004 | 0.500 | 0.191 | 0.003 |
| Kalavassos | 1.000 | 0.407 | 0.049 | 1.000 | 0.353 | 0.032 | 1.000 | 0.337 | 0.029 |
| Kalopsidha | 1.000 | 0.407 | 0.049 | 1.000 | 0.353 | 0.032 | 1.000 | 0.337 | 0.029 |
| Karmi | | | | 0.750 | 0.288 | 0.010 | 0.750 | 0.280 | 0.008 |
| Kissonerga | 0.500 | 0.222 | 0.005 | 0.500 | 0.173 | 0.006 | 0.500 | 0.161 | 0.006 |
| Lapithos | | | | 0.750 | 0.288 | 0.010 | 0.750 | 0.280 | 0.008 |
| Marki | 1.000 | 0.407 | 0.049 | 1.000 | 0.353 | 0.032 | 1.000 | 0.337 | 0.029 |
| Politiko | 0.750 | 0.307 | 0.023 | | | | 0.750 | 0.280 | 0.008 |
| Sotira | 0.500 | 0.222 | 0.005 | 0.500 | 0.173 | 0.006 | 0.500 | 0.161 | 0.006 |
| Vounous | | | | 0.750 | 0.288 | 0.010 | 0.750 | 0.280 | 0.008 |

#### 5.1.1.1.1 Degree Centrality of the EC III MCNs with Red Polished

There are only three different values for degree centrality in the Settlement Network: 1, 0.750 and 0.500. The top four belong to Alambra, Kalavassos, Kalopsidha and Marki which are either in the central plain or close to it in terms of distance. The middle belong to Episkopi and Politiko with 0.750. At the lower end of the spectrum there is Erimi, Kissonerga and Sotira which are all in the south and south-west part of the island.

Like in the Settlement Network, the top four belong to the same sites, Alambra, Kalavassos, Kalopsidha and Marki with a score of 1. The second highest score belongs to Ayia Paraskevi, Episkopi, Karmi, Lapithos and Vounous with a score of 0.750. At the bottom end of the spectrum there is Erimi, Kissonerga and Sotira with a score of 0.500. Again, the most central sites are on the central plain with the exception of Kalavassos. The second highest ranking sites are on the north or on the northern side of the central plain (Ayia Paraskevi) with the exception of Episkopi. The lower end is again in the south and the south-west.

Again, the top four do not change in the Combined Network, and they are Alambra, Kalavassos, Kalopsidha and Marki with a score of 1. The second highest ranking sites are Ayia Paraskevi, Episkopi, Karmi, Lapithos, Politiko and Vounous. With the exception of Episkopi these sites are either in the north or in the central plain. The bottom three are again the same: Erimi, Kissonerga and Sotira with a score of 0.500. The degree centrality measurement shows us that the central plain is where the most central nodes are, second highest ranking nodes are to the north, and the lowest ranking ones are to the south and south-west.

##### 5.1.1.1.2 Eigenvector Centrality of the EC III MCNs with Red Polished

The situation is a bit different in the eigenvector centrality since this measurement also assesses the strength of other nodes to which a single node is attached. In the Settlement Network, Alambra, Kalavassos, Kalopsidha and Marki are still on the top with a shared score of 0.407. The next highest is Episkopi with 0.317, then Politiko with 0.307, then Kissonerga and Sotira with 0.222 and finally Erimi with 0.212. One thing I would like to point out here is the high eigenvector score of Episkopi. It has a higher score than its neighbors Erimi and Sotira and I can attest this to the presence of White Painted ware in the site.

Again, in the Cemetery Network, the highest ranking sites are Alambra, Kalavassos, Kalopsidha and Marki with a score of 0.353. However, when we look at the second highest ranking sites, this time Episkopi is not there and Ayia Paraskevi, Karmi, Lapithos and Vounous have a score of 0.288. Episkopi ranks just after these with a score of 0.264. Then we have Erimi with a score of 0.197 and finally there is Kissonerga and Sotira with a score of 0.173. When we weigh the connected nodes in eigenvector centrality, it is interesting to see that Episkopi ranks below the sites on the north. This means that Episkopi is connected to weaker nodes than those of sites in the north.

Once again, the top four do not change in the Combined Network: Alambra, Kalavassos, Kalopsidha and Marki with a score of 0.337. The second highest ranking sites are Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous with a score of 0.280. The third ranking site is Episkopi with a score of 0.250. The fourth is Erimi with a score of 0.191. The lowest two belong to Kissonerga and Sotira with a score of 0.161. Once again, the highest ranking sites are on the central plain or close in terms of distance (Kalavassos). There are northern sites and Politiko (central) in the middle, and on the lower end of the spectrum are the southern and south-western sites.

#### 5.1.1.1.3 Betweenness of the EC III MCNs with Red Polished

On the top end of the spectrum, the results do not change in the Settlement Network. Alambra, Kalavassos, Kalopsidha and Marki receive a betweenness score of 0.049. The second highest is Politiko with 0.023, then Episkopi with 0.022, then Erimi with 0.008 and lastly Kissonerga and Sotira with the lowest shared score of 0.005. Again, it is interesting to see that the settlements on the lower end are from the south and the south-west.

Again, the top four do not change in the Cemetery Network and they are Alambra, Kalavassos, Kalopsidha and Marki with a score of 0.032. Interestingly enough, this time Episkopi ranks the second highest with a betweenness score of 0.017. The third place belongs to the sites of Ayia Paraskevi, Karmi, Lapithos and Vounous with a score of 0.010. The bottom two do not change: Erimi and Karmi with a score of 0.006. We can attest the high betweenness score of Episkopi to the fact that this site is the link between the central plain and the south and the south-west.

Once again, the top four do not change in the Combined Network: Alambra, Kalavassos, Kalopsidha and Marki with a score of 0.029. The betweenness situation is similar to the previous network, Episkopi ranking second with a score of 0.015. The third place belongs to the sites of Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous with a score of 0.008. Then comes Kissonerga and Sotira with a score of 0.006 and finally Erimi with a score of 0.003.

### 5.1.1.2 Centrality Measurements of the EC III MCNs without Red Polished

The results of the analysis and their discussion can be found below (Table 4).

Table 4: Early Cypriot Material Culture Networks without Red Polished

| EC III MCNs without RP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Settlement | | | Cemetery | | | Combined | | |
| Site | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. |
| Alambra | 1.000 | 0.437 | 0.090 | 1.000 | 0.381 | 0.082 | 1.000 | 0.363 | 0.080 |
| Ayia Paraskevi | | | | 0.667 | 0.284 | 0.006 | 0.667 | 0.278 | 0.005 |
| Episkopi | 0.667 | 0.298 | 0.023 | 0.667 | 0.242 | 0.030 | 0.667 | 0.226 | 0.030 |
| Erimi | 0.333 | 0.139 | 0.000 | 0.333 | 0.139 | 0.000 | 0.333 | 0.137 | 0.000 |
| Kalavassos | 1.000 | 0.437 | 0.090 | 1.000 | 0.381 | 0.082 | 1.000 | 0.363 | 0.080 |
| Kalopsidha | 1.000 | 0.437 | 0.090 | 1.000 | 0.381 | 0.082 | 1.000 | 0.363 | 0.080 |
| Karmi | | | | 0.667 | 0.284 | 0.006 | 0.667 | 0.278 | 0.005 |
| Kissonerga | 0.333 | 0.150 | 0.000 | 0.333 | 0.098 | 0.000 | 0.333 | 0.085 | 0.000 |
| Lapithos | | | | 0.667 | 0.284 | 0.006 | 0.667 | 0.278 | 0.005 |
| Marki | 1.000 | 0.437 | 0.090 | 1.000 | 0.381 | 0.082 | 1.000 | 0.363 | 0.080 |
| Politiko | 0.667 | 0.288 | 0.016 | | | | 0.667 | 0.278 | 0.005 |
| Sotira | 0.333 | 0.150 | 0.000 | 0.333 | 0.098 | 0.000 | 0.333 | 0.085 | 0.000 |
| Vounous | | | | 0.667 | 0.284 | 0.006 | 0.667 | 0.278 | 0.005 |

#### 5.1.1.2.1 Degree Centrality of the EC III MCNs without Red Polished

As it can be seen from Table X above there are only three different values for degree centrality in the Settlement Network: 1, 0.667 and 0.333. The top four belong to Alambra, Kalavassos, Kalopsidha and Marki which are either in the central plain or close in distance. The middle belongs to Episkopi and Politiko with 0.667. At the lower end of the spectrum there is Erimi, Kissonerga and Sotira which are all in the south and the south-west part of the island. The difference between this network and the one with Red Polished included is that the number of ties between nodes decreases and thus the normalized scores of non-highest ranking sites decreases. This will be even more apparent in the eigenvector and betweenness measurements.

The settlements of Alambra, Kalavassos, Kalopsidha and Marki have the highest degree centrality of 1 in the Cemetery Network. The second highest degree centrality belongs to the settlements of Ayia Paraskevi, Episkopi, Karmi, Lapithos and Vounous with a degree centrality of 0.667. On the lower end of the spectrum there is Erimi, Kissonerga and Sotira with a degree centrality of 0.333. The situation is similar to the EC III Settlement Network without Red Polished, while the top four normalized scores remain the same, all other scores decrease.

The settlements of Alambra, Kalavassos, Kalopsidha and Marki have the highest degree centrality of 1 in the Combined Network. The second highest are Ayia Paraskevi, Episkopi, Karmi, Lapithos, Politiko and Vounous with a score of 0.667. On the lowest end there is Erimi, Kissonerga and Sotira with a score of 0.333. Compared to the network with Red Polished included, while the normalized score of the top four stays the same, all the rest decrease. In addition, there is no change in the ranking, most central nodes are in the central plain and the least central ones are in the south and the south-west.

#### 5.1.1.2.2 Eigenvector Centrality of the EC III MCNs without Red Polished

The situation does not change for the top end of the spectrum in the Settlement Network: Alambra, Kalavassos, Kalopsidha and Marki still have the highest score this time with 0.437. Episkopi is the second highest with a score of 0.298. Then comes Politiko with a score of 0.288. Then Kissonerga and Sotira with 0.150 and finally, Erimi with a score of 0.139. While the eigenvector scores of Alambra, Kalavassos, Kalopsidha and Marki increased, the scores for all other settlements decreased when we excluded the Red Polished ware from the network. However, the ranking does not change and it is the same as the Settlement Network with Red Polished included.

The top four settlements of Alambra, Kalavassos, Kalopsidha and Marki rate the highest eigenvector score of 0.381 in the Cemetery Network. Then we have the second highest score of 0.284 with the sites of Ayia Paraskevi, Karmi, Lapithos and Vounous. The third place belongs to Episkopi with a score of 0.242. The fourth is Erimi with a score of 0.139 and the final two are Kissonerga and Sotira with a score of 0.098. When we compare to the network with Red Polished, we see that the scores of Alambra, Kalavassos, Kalopsidha, Marki, Ayia Paraskevi, Karmi, Lapithos and Vounous all increased and the rest decreased.

As in all previous networks, the top four remain the same in the Combined Network: Alambra, Kalavassos, Kalopsidha and Marki with an increased score of 0.363 (from 0.337) compared to the combined network with Red Polished. The next highest is Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous with a decreased score of 0.278 (from 0.280). Then we have Episkopi with a decreased score of 0.226 (from

0.250), followed by Erimi with a decreased score of 0.137 (from 0.191), and finally Kissonerga and Sotira with a decreased score of 0.085 (from 0.161).

#### 5.1.1.2.3 Betweenness of the EC III MCNs without Red Polished

Again, the situation does not change for the top end of the spectrum in the Settlement Network: Alambra, Kalavassos, Kalopsidha and Marki still have the highest score this time with 0.090. The second highest is Episkopi with 0.023 and the third highest is Politiko with 0.016. The rest, Erimi, Kissonerga and Sotira, has a lowest score of 0.000. If we compare the situation to the network with Red Polished included, then we can see that, on the lower end, even though small, Erimi, Kissonerga and Sotira have betweenness scores with Erimi ranking slightly higher than the other two. On the higher end the scores almost doubled when we compare this network to that including Red Polished. In the middle we see that while Episkopi's score increased, Politiko's score decreased.

The top four in the Cemetery Network, Alambra, Kalavassos, Kalopsidha, and Marki, remain the same but compared to the same network with Red Polished the betweenness scores increase to 0.082. The second highest score is Episkopi with an increased score of 0.030 compared to the network with Red Polished. The third place is occupied by the settlements of Ayia Paraskevi, Karmi, Lapithos and Vounous with a decreased score of 0.006 compared to the network with Red Polished. Finally, like in the settlement network without Red Polished, the sites of Erimi, Kissonerga and Sotira have a betweenness score of 0.000.

In the Combined Network, like those in the previous networks, the top four remain Alambra, Kalavassos, Kalopsidha and Marki with an increased betweenness score of 0.080 (from 0.029). The second highest is Episkopi with an increased score of 0.030 (from 0.015). Notice that the score of Episkopi doubles compared to the combined network with Red Polished. Then there is Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous with a decreased score of 0.005 (from 0.008). Finally, there is Erimi, Kissonerga and Sotira with a score of 0.000 (from 0.003 for Erimi and from 0.006 for Kissonerga and Sotira).

#### 5.1.1.3 Comments on EC III Material Culture Networks

Although the scores change, the top four always remain the same in every measurement and every network: Alambra, Kalavassos, Kalopsidha and Marki. This certainly shows that the flow of goods during the EC III period is either to these sites or from these sites. While Alambra and Marki are right in the central plain, Kalavassos is to the south (still close to Alambra and Marki in terms of distance) and Kalopsidha is to the east (again still its close neighbors are Alambra and Marki).

Even when the scores vary, the bottom three remain the same: Erimi, Kissonerga and Sotira. Nevertheless, Erimi in certain measurements and networks ranks slightly higher than Kissonerga and Sotira stays always in the lowest three ranking sites. It is interesting to see that no matter how I change the network setting or measurement, these three sites stay in the bottom and they are from the south and the south-west.

Since the network only has cemeteries on the north coast during this period, the settlement data is biased towards the central plain and the south. However, when we include the cemeteries of the north coast into the cemetery and combined networks we see that they rank just after the top four. Even though they are not close to any copper sources, this indicates their high involvement in the distribution of copper, and the high amount of copper based objects in these cemeteries also indicates their high involvement.

Episkopi is a special case: in every measurement of eigenvector centrality Episkopi is ranking third and in every measurement of betweenness centrality it is ranking second. This means that, from the perspective of Material Culture Network, Episkopi is the link between the central plain and the south and the south-west of the island. This is probably the case because of the presence of White Painted on the site. The above picture for the EC III period will be much clearer when I analyze the Proximity Networks of the same period but for now I move into the MC I Material Culture Networks.

### 5.1.2 Middle Cypriot I Period

The MC I period comprises a total of 15 sites with 10 settlements and 13 cemeteries. This time we include the short lived settlement of Ambelikou and the Middle Bronze Age cemetery of Deneia.

#### 5.1.2.1 Centrality Measurements of the MC I MCNs with Red Polished

The results of the analysis and their discussion can be found below (Table 5).

Table 5: Middle Cypriot I Material Culture Networks with Red Polished

| MC I MCNs with RP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Settlement | | | Cemetery | | | Combined | | |
| Site | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. |
| Alambra | 1.000 | 0.387 | 0.041 | 1.000 | 0.334 | 0.024 | 1.000 | 0.313 | 0.019 |
| Ambelikou | 0.750 | 0.306 | 0.019 | | | | 0.750 | 0.236 | 0.010 |
| Ayia Paraskevi | | | | 0.750 | 0.270 | 0.008 | 0.750 | 0.254 | 0.006 |
| Deneia | | | | 1.000 | 0.334 | 0.024 | 1.000 | 0.313 | 0.019 |
| Episkopi | 0.750 | 0.297 | 0.020 | 0.750 | 0.250 | 0.012 | 0.750 | 0.231 | 0.010 |
| Erimi | 0.500 | 0.207 | 0.006 | 0.500 | 0.184 | 0.003 | 0.500 | 0.177 | 0.002 |
| Kalavassos | 1.000 | 0.387 | 0.041 | 1.000 | 0.334 | 0.024 | 1.000 | 0.313 | 0.019 |
| Kalopsidha | 1.000 | 0.387 | 0.041 | 1.000 | 0.334 | 0.024 | 1.000 | 0.313 | 0.019 |
| Karmi | | | | 0.750 | 0.270 | 0.008 | 0.750 | 0.254 | 0.006 |
| Kissonerga | 0.500 | 0.216 | 0.004 | 0.500 | 0.165 | 0.004 | 0.500 | 0.154 | 0.003 |
| Lapithos | | | | 0.750 | 0.270 | 0.008 | 0.750 | 0.254 | 0.006 |
| Marki | 1.000 | 0.387 | 0.041 | 1.000 | 0.334 | 0.024 | 1.000 | 0.313 | 0.019 |
| Politiko | 0.750 | 0.288 | 0.020 | | | | 0.750 | 0.254 | 0.006 |
| Sotira | 0.500 | 0.216 | 0.004 | 0.500 | 0.165 | 0.004 | 0.500 | 0.154 | 0.003 |
| Vounous | | | | 0.750 | 0.270 | 0.008 | 0.750 | 0.254 | 0.006 |

##### 5.1.2.1.1 The Degree Centrality of MC I MCNs with Red Polished

Same as the EC III period, the top four settlements do not change for this period's Settlement Network. They are Alambra, Kalavassos, Kalopsidha and Marki with a normalized score of 1. Ambelikou, Episkopi and Politiko have the second highest centrality score of 0.750. The lowest end is again the same as the EC III period: Erimi, Kissonerga and Sotira have a lowest centrality score of 0.500. From the degree centrality scores we can easily say that the most central settlements are still in the central plain and the least central ones are in the south and the south-west.

The top four change to five with the inclusion of Deneia to the Cemetery Network. This time the highest scores belong to Alambra, Deneia, Kalavassos, Kalopsidha and Marki with a degree centrality of 1. The second highest score belongs to the cemeteries of Ayia Paraskevi, Episkopi, Karmi, Lapithos and Vounous with 0.750. The sites ranking third are Erimi, Kissonerga and Sotira with 0.500. Deneia is in the central plain and it is no surprise that it ranks highest among the other four. We also see that the situation for others did not change compared to the EC III combined network.

The highest score of degree centrality belongs to the same five sites in the Combined Network: Alambra, Deneia, Kalavassos, Kalopsidha and Marki. The second highest are Ambelikou, Ayia Paraskevi, Episkopi, Karmi, Lapithos, Politiko and Vounous with a score of 0.750. Lowest scores belong to Erimi, Kissonerga and Sotira with 0.500. Again, we see the same picture as in previous networks, the most central sites are in the central plain, the north coast and closer sites are the next highest with the exception of Episkopi, and finally the lowest end of the spectrum belongs to the southern sites.

##### 5.1.2.1.2 The Eigenvector Centrality of MC I MCNs with Red Polished

Again, the top four remain the same in the Settlement Network: Alambra, Kalavassos, Kalopsidha and Marki with an eigenvector centrality of 0.387. The second highest is Ambelikou with 0.306, followed by Episkopi with 0.297, and then Politiko with 0.288. Kissonerga and Sotira have the same eigenvector score of 0.216. Finally, there is Erimi with the lowest score of 0.207. Among the same degree centrality scores of Ambelikou, Episkopi and Politiko, Ambelikou seems to be most well connected of them all with the highest eigenvector centrality. This means that Ambelikou is tied to stronger nodes than Episkopi and Politiko. Again, we see that the most well connected nodes are either in the central plain or close in terms of distance.

The top five, again, are the same in the Cemetery Network: Alambra, Deneia, Kalavassos, Kalopsidha and Marki with an eigenvector score of 0.334. The second highest scores belong to Ayia Paraskevi, Karmi, Lapithos and Vounous with 0.270. The third highest eigenvector score is 0.250 and it belongs to Episkopi, followed by

Erimi with a score of 0.184. Finally, there are Kissonerga and Sotira with the lowest score of 0.165. Again the highest and lowest ends of the spectrum do not change, and we see that the north coast was important in the network.

Once again, the top five do not change in the Combined Network, Alambra, Deneia, Kalavassos, Kalopsidha and Marki have the same eigenvector score of 0.313. Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous rank just after the top with a score of 0.254. We then have Ambelikou with 0.236, Episkopi with 0.231, Erimi with 0.171, and Kissonerga and Sotira with 0.154. Compared to the degree centrality, we see that Ambelikou and Episkopi are not in the top two. They are rather less well connected to the network with ties to weaker nodes than others. Again, the lowest three scores belong to the south and the south-west.

#### 5.1.2.1.3 Betweenness of MC I MCNs with Red Polished

The highest betweenness scores belong to the same four in the Settlement Network: Alambra, Kalavassos, Kalopsidha and Marki with 0.041. The next are Episkopi and Politiko with a shared score of 0.020. The third highest score belongs to Ambelikou with 0.019. Erimi is below Ambelikou with a score of 0.006, and finally Kissonerga and Sotira with a betweenness score of 0.004. The bottom three do not change with the exception of Erimi ranking higher than the other two. The slightly lower score of Ambelikou can be related to the lack of White Painted ware at the site.

The top five still remain the same in the Cemetery Network: Alambra, Deneia, Kalavassos, Kalopsidha and Marki with a betweenness score of 0.024. Interestingly enough, Episkopi ranks just below these five cemeteries with a score of 0.012. Then we have Ayia Paraskevi, Karmi, Lapithos and Vounous with a score of 0.008. Right after, come Kissonerga and Sotira with the shared score of 0.004, and finally there is Erimi at lowest end of the list with a score of 0.003. I would like to point out the high betweenness of Episkopi and the fact that it might be the connection between Kalavassos and the rest of the south.

Again, the top five are the same in the Combined Network: Alambra, Deneia, Kalavassos, Kalopsidha and Marki, with the same betweenness score of 0.019. Ambelikou and Episkopi have the second highest betweenness score of 0.010. Then we have Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous with 0.006, Kissonerga and Sotira with 0.003 and finally Erimi with 0.002. Ambelikou is a mining site and the high betweenness score suggests that many of the sites in this network procured their copper from this site.

#### 5.1.2.2 Centrality Measurements of the MC I MCNs without Red Polished

The results of the analysis and their discussion can be found below (Table 6).

Table 6: Middle Cypriot I Material Culture Networks without Red Polished

| MC I MCNs without RP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Settlement | | | Cemetery | | | Combined | | |
| Site | Deg. | Eig. | Be. | Deg. | Eig. | Be. | Deg. | Eig. | Be. |
| Alambra | 1.000 | 0.419 | 0.071 | 1.000 | 0.357 | 0.059 | 1.000 | 0.337 | 0.048 |
| Ambelikou | 0.667 | 0.288 | 0.035 | | | | 0.667 | 0.216 | 0.025 |
| Ayia Paraskevi | | | | 0.667 | 0.262 | 0.005 | 0.667 | 0.248 | 0.004 |
| Deneia | | | | 1.000 | 0.357 | 0.059 | 1.000 | 0.337 | 0.048 |
| Episkopi | 0.667 | 0.280 | 0.021 | 0.667 | 0.229 | 0.021 | 0.667 | 0.210 | 0.019 |
| Erimi | 0.333 | 0.139 | 0.000 | 0.333 | 0.129 | 0.000 | 0.333 | 0.127 | 0.000 |
| Kalavassos | 1.000 | 0.419 | 0.071 | 1.000 | 0.357 | 0.059 | 1.000 | 0.337 | 0.048 |
| Kalopsidha | 1.000 | 0.419 | 0.071 | 1.000 | 0.357 | 0.059 | 1.000 | 0.337 | 0.048 |
| Karmi | | | | 0.667 | 0.262 | 0.005 | 0.667 | 0.248 | 0.004 |
| Kissonerga | 0.333 | 0.149 | 0.000 | 0.333 | 0.096 | 0.000 | 0.333 | 0.089 | 0.000 |
| Lapithos | | | | 0.667 | 0.262 | 0.005 | 0.667 | 0.248 | 0.004 |
| Marki | 1.000 | 0.419 | 0.071 | 1.000 | 0.357 | 0.059 | 1.000 | 0.337 | 0.048 |
| Politiko | 0.667 | 0.270 | 0.015 | | | | 0.667 | 0.248 | 0.004 |
| Sotira | 0.333 | 0.149 | 0.000 | 0.333 | 0.096 | 0.000 | 0.333 | 0.089 | 0.000 |
| Vounous | | | | 0.667 | 0.262 | 0.005 | 0.667 | 0.248 | 0.004 |

##### 5.1.2.2.1 The Degree Centrality of MC I MCNs without Red Polished

In the Settlement Network, since there is no settlement attested for Deneia, the top four degree centrality scores remain the same as EC III networks: Alambra, Kalavassos, Kalopsidha and Marki with a score of 1. Ambelikou, Episkopi and Politiko have the second highest score of 0.667, and Erimi, Kissonerga and Sotira have the lowest score of 0.333. The only difference between this network and the MC I settlement network with Red Polished is that the normalized centrality scores decrease because of the exclusion of the Red Polished. This difference will be more significant in the measurements below.

The situation is similar to the EC III period in the Cemetery Network without Red Polished. While the top nodes remain the same, the centrality scores of the others decrease. Alambra, Deneia, Kalavassos, Kalopsidha and Marki have a score of 1, Ayia Paraskevi, Episkopi, Karmi, Lapithos and Vounous a score of 0.667, and Erimi, Kissonerga and Sotira a score of 0.333.

In the Combined Network, the degree centrality stays the same for Alambra, Deneia, Kalavassos, Kalopsidha and Marki with 1 but decreases for the rest of the network compared to the MC I Combined Network with Red Polished. The degree centrality scores of Ambelikou, Ayia Paraskevi, Episkopi, Karmi, Lapithos, Politiko and Vounous decrease to 0.667 (from 0.750), and Erimi, Kissonerga and Sotira decrease to 0.333 (from 0.500). Nevertheless, the general situation does not change, the most central sites are either in the central plain or close in terms of distance, and the sites with the lowest centrality are to the south and the south-west.

#### 5.1.2.2.2 The Eigenvector Centrality of MC I MCNs without Red Polished

In the Settlement Network, the top four settlements of Alambra, Kalavassos, Kalopsidha and Marki have an increased score of 0.419 (from 0.387) compared to the MC I settlement network with Red Polished included. Ambelikou has a decreased centrality of 0.288 (from 0.306), Episkopi has a decreased centrality of 0.280 (from 0.297), Politiko has a decreased centrality of 0.270 (from 0.288), Kissonerga and Sotira have a decreased centrality of 0.149 (from 0.216), and Erimi has a decreased centrality of 0.139 (from 0.207). Again, like of that in the EC III Settlement Network with Red Polished, while the eigenvector centrality score of the top four increase, the rest decrease.

In the Cemetery Network, the eigenvector centrality scores of Alambra, Deneia, Kalavassos, Kalopsidha and Marki increase to 0.357 (from 0.334) compared to the MC I Cemetery Network with Red Polished. In contrast, Ayia Paraskevi, Karmi, Lapithos and Vounous decrease to 0.262 (from 0.270), Episkopi decreases to 0.229 (from 0.250), Erimi decreases to 0.129 (from 0.184), and Kissonerga and Sotira decrease to 0.096 (from 0.165). Like in the EC III cemetery network without Red Polished the top nodes' eigenvector centrality scores increase while the rest decrease.

In the Combined Network, while the eigenvector scores of Alambra, Deneia, Kalavassos, Kalopsidha and Marki increase to 0.337 (from 0.313) compared to the eigenvector values of MC I Combined Network with Red Polished, the rest of the scores decrease. Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous decrease to 0.248 (from 0.254), Ambelikou decreases to 0.216 (from 0.236), Episkopi decreases to 0.210 (from 0.231), Erimi decreases to 0.127 (from 0.177), and Kissonerga and Sotira decrease to 0.089 (from 0.154). Like in the degree centrality, every eigenvector value decreases except for the top ones.

#### 5.1.2.2.3 The Betweenness of MC I MCNs without Red Polished

In the Settlement Network, the top four betweenness scores increase to 0.071 (from 0.041), the betweenness score of Ambelikou almost doubles and increases to 0.035 (from 0.019), the score of Episkopi slightly increases to 0.021 (from 0.020), the score of Politiko decreases to 0.015 (from 0.020), and Erimi, Kissonerga and Sotira's betweenness score decrease to 0.000, meaning that these three settlements are not in between any site. With the removal of Red Polished from the network, Ambelikou's betweenness score surpasses that of Episkopi, while Episkopi's score still slightly increases. Interestingly enough, the score of Politiko decreases while it was at the same level with Episkopi in the network with Red Polished.

In the Cemetery Network, the betweenness scores of Alambra, Deneia, Kalavassos, Kalopsidha and Marki more than double and increase to 0.059 (from 0.024), Episkopi increases to 0.021 (from 0.012), Ayia Paraskevi, Karmi, Lapithos and Vounous decrease to 0.005 (from 0.008), and Erimi, Kissonerga and Sotira decrease to 0.000 (Erimi from 0.003, Kissonerga and Sotira from 0.004). When we exclude the Red Polished, it is evident that the connectedness of Episkopi increases significantly. This is partly due to its location. The decrease in the connectedness of Ayia Paraskevi, Karmi, Lapithos and Vounous can be attested to their very similar assemblage.

In the Combined Network, the betweenness scores of Alambra, Deneia, Kalavassos, Kalopsidha and Marki more than double and increase to 0.048 (from 0.019) compared to the MC I Combined Network with Red Polished. The betweenness score of Ambelikou increases to 0.025 (from 0.010), and Episkopi increases to 0.019

(from 0.010). The betweenness scores of Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous decrease to 0.004 (from 0.006), and Erimi, Kissonerga and Sotira to 0.000 (Erimi from 0.002, Kissonerga and Sotira from 0.003). Again, we can relate the increase in Ambelikou's score to the fact that it was a mining settlement and Episkopi's to its role as the link between Kalavassos and the rest of the south and south-west.

#### 5.1.2.3 Comments on MC I Material Culture Networks

The unchanged or increased centrality measurements for Alambra, Deneia, Kalavassos, Kalopsidha and Marki indicate that these sites were rather unaffected by the changes I impose on the networks, and the central plain of the island was the most central region of MC I period.

The fact that they rank high in the degree and eigenvector centrality measurements indicates that the sites of Ayia Paraskevi, Karmi, Lapithos, Politiko and Vounous are well connected in the network. Yet, the low betweenness score of these sites and the decrease they show when we remove the Red Polished from the network, points out that these sites are actually to one side of the network and rather separate from the rest.

The previous point can be interpreted in the same way towards the sites in the south and the south-west, namely Erimi, Kissonerga and Sotira. Their low or non-existent betweenness scores in both networks with and without Red Polished demonstrate that these sites are on the periphery of the network, and probably the opposite side of the sites in the previous point.

The special case of Episkopi: the situation seems similar to that of the EC III Material Culture Network.

The special case of Ambelikou: Ambelikou almost always has the third highest eigenvector value and a high betweenness score, which implies that Ambelikou was an important center for copper procurement. It was not a center in the sense of Alambra or Ayia Paraskevi but the presence of Drab Polished ware points us to the links to the south. Unfortunately, these results are insufficient to show how copper travelled but when we look at the map and the Proximity Networks the route seems quite obvious. Further analysis on the issue will be made in the Proximity Networks section.

### 5.1.3 Middle Cypriot II Period

MC II period comprises a total 11 sites with 6 settlements and 11 cemeteries.[3] This time we include the Red-on-Black ware local to the Karpas Peninsula which we start to see it from MC II period onwards. The sites of Ambelikou and Politiko, and the sites and cemeteries of Kissonerga and Sotira disappear during this period.

#### 5.1.3.1 Centrality Measurements of the MC II MCNs with Red Polished

The results of the analysis and their discussion can be found below (Table 7).

Table 7: Middle Cypriot II Material Culture Networks with Red Polished

| MC II MCNs with RP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Settlement | | | Cemetery | | | Combined | | |
| Site | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. |
| Alambra | 0.800 | 0.434 | 0.049 | 0.800 | 0.330 | 0.019 | 0.800 | 0.330 | 0.022 |
| Ayia Paraskevi | | | | 0.600 | 0.272 | 0.005 | 0.600 | 0.272 | 0.006 |
| Deneia | | | | 1.000 | 0.362 | 0.058 | 1.000 | 0.362 | 0.066 |
| Episkopi | 0.600 | 0.332 | 0.021 | 0.600 | 0.242 | 0.010 | 0.600 | 0.242 | 0.012 |
| Erimi | 0.400 | 0.220 | 0.007 | 0.400 | 0.183 | 0.001 | 0.400 | 0.183 | 0.002 |
| Kalavassos | 0.800 | 0.434 | 0.049 | 0.800 | 0.330 | 0.019 | 0.800 | 0.330 | 0.022 |
| Kalopsidha | 1.000 | 0.482 | 0.149 | 1.000 | 0.362 | 0.058 | 1.000 | 0.362 | 0.066 |
| Karmi | | | | 0.600 | 0.272 | 0.005 | 0.600 | 0.272 | 0.006 |
| Lapithos | | | | 0.600 | 0.272 | 0.005 | 0.600 | 0.272 | 0.006 |
| Marki | 1.000 | 0.482 | 0.149 | 1.000 | 0.362 | 0.058 | 1.000 | 0.362 | 0.066 |
| Vounous | | | | 0.600 | 0.272 | 0.005 | 0.600 | 0.272 | 0.006 |

##### 5.1.3.1.1 The Degree Centrality of MC II MCNs with Red Polished

With the inclusion of Red-on-Black and the exclusion of four sites in the Settlement Network, the situation greatly differs from the previous periods. Kalopsidha and Marki have the highest degree centrality of 1 while Alambra and Kalavassos have the second highest of 0.800. Then is ranked Episkopi with 0.600 and Erimi with 0.400. It

[3] In the previous EC III and MC I periods, there were settlements which did not have cemeteries, such as Ambelikou and Politiko. In this period we do not have settlements without cemeteries. Therefore, the cemetery count is equal to the total site count.

seems that since Kalopsidha and Marki could establish links to Karpas they still have the highest degree centralities. The situation will of course change with the cemetery network.

In the Cemetery Network, Deneia, Kalopsidha and Marki have the highest degree centrality score of 1. It is followed by Alambra and Kalavassos with a score of 0.800. Then we have Ayia Paraskevi, Episkopi, Karmi, Lapithos and Vounous with 0.600 and on the lower end of the spectrum is Erimi with 0.400. This shows that the centrality of the central plain remains the same, however, this time Deneia, Marki and Alambra are more central than Alambra and Kalavassos since they could have access to Red-on-Black ware. For the Combined Network, the sites are exactly the same as those in the MC II Cemetery Network with Red Polished. Therefore, the measurements do not change

#### 5.1.3.1.2 The Eigenvector Centrality of MC II MCNs with Red Polished

The situation is not so much different from the previous measurement in the Settlement Network: Kalopsidha and Marki have the highest eigenvector score of 0.482, Alambra and Kalavassos with the second highest score of 0.434, Episkopi with a score of 0.332 and Erimi with the lowest score of 0.220. Still the situation seems favored towards the central plain.

Once again, Deneia, Kalopsidha and Marki have the highest eigenvector score of 0.362 in the Cemetery Network, followed by Alambra and Kalavassos with a score of 0.330. Ayia Paraskevi, Karmi, Lapithos and Vounous have the same eigenvector centrality of 0.272. Unlike its degree centrality measurements, Episkopi has a lower eigenvector score than the group of Ayia Paraskevi with a score of 0.242. Finally, Erimi is at the bottom of the list with a score of 0.183. For the Combined Network, the sites are exactly the same of those in the MC II Cemetery Network with Red Polished. Therefore, the measurements do not change

#### 5.1.3.1.3 The Betweenness of MC II MCNs with Red Polished

Again, the situation is very much similar to the previous measurements in the Settlement Network: Kalopsidha and Marki have the highest betweenness score of

0.149, Alambra and Kalavassos have the second highest betweenness score of 0.049, Episkopi with 0.021 and Erimi with the lowest score of 0.007.

In the Cemetery Network, Deneia, Kalopsidha and Marki maintain the highest betweenness score of 0.066, followed by Alambra and Kalavassos with a score of 0.022. Unlike the degree and eigenvector centrality measurements Episkopi has a higher betweenness score than the group of Ayia Paraskevi with a score of 0.012. Ayia Paraskevi, Karmi, Lapithos and Vounous have the same betweenness of 0.006. Finally, Erimi is at the bottom of the list with a score of 0.002 For the Combined Network, the sites are exactly the same of those in the MC II Cemetery Network with Red Polished. Therefore, the measurements do not change

#### 5.1.3.2 Centrality Measurements of the MC II MCNs without Red Polished

The results of the analysis and their discussion can be found below (Table 8).

Table 8: Middle Cypriot II Material Culture Networks without Red Polished

| MC II MCNs without RP | | | | | | | | | |
|---|---|---|---|---|---|---|---|---|---|
| | Settlement | | | Cemetery | | | Combined | | |
| Site | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. | Deg. | Eig. | Bet. |
| Alambra | 0.750 | 0.436 | 0.057 | 0.750 | 0.339 | 0.021 | 0.750 | 0.339 | 0.021 |
| Ayia Paraskevi | | | | 0.500 | 0.253 | 0.004 | 0.500 | 0.253 | 0.004 |
| Deneia | | | | 1.000 | 0.388 | 0.065 | 1.000 | 0.388 | 0.065 |
| Episkopi | 0.500 | 0.298 | 0.007 | 0.500 | 0.215 | 0.006 | 0.500 | 0.215 | 0.006 |
| Erimi | 0.250 | 0.138 | 0.000 | 0.250 | 0.125 | 0.000 | 0.250 | 0.125 | 0.000 |
| Kalavassos | 0.750 | 0.436 | 0.057 | 0.750 | 0.339 | 0.021 | 0.750 | 0.339 | 0.021 |
| Kalopsidha | 1.000 | 0.505 | 0.173 | 1.000 | 0.388 | 0.065 | 1.000 | 0.388 | 0.065 |
| Karmi | | | | 0.500 | 0.253 | 0.004 | 0.500 | 0.253 | 0.004 |
| Lapithos | | | | 0.500 | 0.253 | 0.004 | 0.500 | 0.253 | 0.004 |
| Marki | 1.000 | 0.505 | 0.173 | 1.000 | 0.388 | 0.065 | 1.000 | 0.388 | 0.065 |
| Vounous | | | | 0.500 | 0.253 | 0.004 | 0.500 | 0.253 | 0.004 |

##### 5.1.3.2.1 The Degree Centrality of MC II MCNs without Red Polished

Like in the previous networks, when we remove the Red Polished ware from the Settlement Network the degree centralities decrease with the exception of the highest ranking nodes. Kalopsidha and Alambra still placed highest with a score of 1. Alambra and Kalavassos rank the second with a decreased score of 0.750 (from

0.800), Episkopi ranks third with a decreased score of 0.500 (from 0.600), and finally Erimi ranks the lowest with a decreased score of 0.250 (from 0.400). The situation does not differ from the previous networks, the central plain still ranks the highest and the south coast still ranks the lowest.

Again, the degree centralities decrease when we remove the Red Polished from the Cemetery Network with the exception of top nodes. Deneia, Kalopsidha and Marki have a degree centrality of 1, the score of Alambra and Kalavassos decreases to 0.750 (from 0.800), Ayia Paraskevi, Episkopi, Karmi, Lapithos and Vounous decrease to 0.500 (from 0.600), and Erimi decreases to 0.250 (from 0.400). For the Combined Network, the sites are exactly the same of those in the MC II Cemetery Network with Red Polished. Therefore, the measurements do not change

#### 5.1.3.2.2 The Eigenvector Centrality of MC II MCNs without Red Polished

While the eigenvector scores of Kalopsidha and Marki increase to 0.505 (from 0.482) and Alambra and Kalavassos increase to 0.436 (from 0.434) in the Settlement Network, the eigenvector score of Episkopi decreases to 0.298 (from 0.332) and Erimi to 0.138 (from 0.220). While the exclusion of Red Polished strengthens the nodes in the top four, it apparently weakens the nodes in the bottom two.

While the eigenvector scores of Deneia, Kalopsidha and Marki increase to 0.388 (from 0.362) and Alambra and Kalavassos increase to 0.339 (from 0.330) in the Cemetery Network, the eigenvector scores of Ayia Paraskevi, Karmi, Lapithos and Vounous decrease to 0.253 (from 0.272), Episkopi decreases to 0.215 (from 0.242) and Erimi to 0.125 (from 0.183). While the removal of Red Polished strengthens the nodes in the top four, it apparently weakens the rest of the nodes. For the Combined Network, the sites are exactly the same of those in the MC II Cemetery Network with Red Polished. Therefore, the measurements do not change

#### 5.1.3.2.3 The Betweenness Centrality of MC II MCNs without Red Polished

Like in the eigenvector scores, the exclusion of Red Polished causes the betweenness scores of the top four to increase and those of the bottom two to decrease in the Settlement Network. The betweenness scores of Kalopsidha and Marki increase to 0.173 (from 0.149), Alambra and Kalavassos increase to 0.057 (from 0.049), but

Episkopi decreases to 0.007 (from 0.021) and Erimi decreases to 0 (from 0.007). Again we can attribute this change not only to the exclusion of Red Polished but also to the removal of several southern sites.

While the betweenness scores of Deneia, Kalopsidha and Marki increase to 0.075 (from 0.066) and Alambra and Kalavassos increase to 0.025 (from 0.022) in the Cemetery Network, the betweenness scores of Ayia Paraskevi, Karmi, Lapithos and Vounous decrease to 0.005 (from 0.006), Episkopi decreases to 0.007 (from 0.012) and Erimi to 0.000 (from 0.002). Again, while the exclusion of Red Polished strengthens the nodes in the top four, it apparently weakens the rest of the nodes.

#### 5.1.3.3 Comments on MC II Material Culture Networks

The most important aspect of this period's network is the addition of Red-on-Black ware. This causes shifts in the top of the network. The top is no longer occupied by four or five nodes but by two in the settlement network and three in the cemetery and combined network. When we examine the low centrality scores of Kissonerga and Sotira through the EC III and MC I periods, the disappearance (or abandonment) of these two sites in MC II becomes no surprise. Although there might be other reasons, from a networks perspective, the disappearance of these two sites can be related to their low connectivity to the network. The main features of the network do not differ from the previous EC III and MC I, the south still has the lowest scores, the central plain has the highest, and the north coast is in the middle.

## 5.2 The Analysis of the Proximity Network

The Proximity Networks are formed in a similar manner to the Material Culture Network. While I differentiate between the settlements and sites, the differentiation of networks does not come in the form of inclusion of certain affiliations. To see the difference in networks, I use different distances, 10, 20, 30 and 50 km. Contrary to the Material Culture Network, the measurements are not normalized but they are presented as raw data. The detailed results are presented in Appendix A, and the general discussion of the results can be found below.

### 5.2.1 Early Cypriot III Period

EC III period comprises a total of 13 sites with 9 settlements and 12 cemeteries. We observe that only when the criterion is expanded to 50 km does every site become connected to the network. Alambra, Ayia Paraskevi and Marki are the most central nodes according to the degree centrality measurements. This indicates that the center of the island was in fact the central plain. The north coast and Kalavassos follow the central plain with close centrality scores. This shows that the north coast was more integrated to the network than the south and the south-west. The south and the south-west are the least central in each network.

Kalavassos and Ayia Paraskevi are special cases. The very high betweenness of Kalavassos in every 50 km network implies that Kalavassos was the link between the central plain and the south and the south-west. The very high betweenness of Ayia Paraskevi in every 30 km network points out that Ayia Paraskevi was the link between the north coast and the central plain.

### 5.2.2 Middle Cypriot I Period

The MC I period comprises a total of 15 sites with 10 settlements and 13 cemeteries. Ambelikou, Kalopsidha and Kissonerga are only connected to the network when we increase the radius to 50 km. Their low betweenness along with low degree and eigenvector values suggest that they are on the far ends of the network. Episkopi, Erimi and Sotira; Karmi, Lapithos and Vounous; and Alambra, Marki and Politiko form their own subgroups in the network which is apparent in the 10 and 20 km radiuses. The central plain seems to be most central while the most central node varies among different radiuses. The north coast is at the higher end of the spectrum, however, they rank below the central plain in terms of centrality. The south and the south-west are at the bottom of the network with the south-west being the most secluded. The east and the north-west of the Troodos, like the south-west, are on the ends of the network. Deneia and Ayia Paraskevi provided the connection between the north coast and the central plain. Kalavassos was the connection directly between the central plain (and to an extent the east) and the south and the south-west as shown in the exceedingly high scores of betweenness. Marki appears to be the most central node when we compare the totality of the 50 km networks both in degree and eigenvector centrality measurements.

### 5.2.3 Middle Cypriot II Period

The MC II period comprises a total of 11 sites with 6 settlements and 10 cemeteries. The removal of Ambelikou, Kissonerga, Politiko and Sotira affected the network in such a way that, now with the 50 km radius, we see that Alambra, Ayia Paraskevi and Marki are the most central nodes. Previously, it was only Marki, followed by Alambra, Ayia Paraskevi and Politiko. Nevertheless, the overall situation does not change, the central plain is the most central, the north coast comes right after, and the south is the least central. Kalavassos is still the only link between the south and the rest of the island. From a networks perspective, since Kissonerga had the lowest centrality scores and Sotira was in the lower end of the spectrum, the reason behind their disappearance can be tied to their weak structural positioning in the network.

## 5.3 General Overview of the Material Culture and Proximity Networks

When we compare the Material Culture and Proximity Networks in the periods of EC III, MC I and M II, we see a very similar pattern. This can be divided into three: (1) the very strong centrality of the central plain along with the sites in the north, south and east of the plain (Alambra, Ayia Paraskevi, Kalavassos, Kalopsidha and Marki); (2) the relatively strong centrality of the sites on the north coast and the sites just south of the north coast (Deneia, Karmi, Lapithos and Vounous); (3) the structurally weaker positions of the southern and the south-western sites (Episkopi, Erimi, Kissonerga and Sotira).

Kalavassos and Episkopi have important structural positions. In the Proximity Networks with 50 km radius, Kalavassos is always the link between the central plain and the south and the south-west. In the Material Culture Network, the same feature is displayed by Episkopi which could mean that Kalavassos was the single node that was in between Episkopi and the central plain, and Episkopi was the single node between Kalavassos and the rest of the south and the south-western sites.

Kissonerga and Sotira disappear in the MC II period. It is evident that, from both Material Culture and Proximity Networks, Kissonerga and Sotira had structurally weak positions. While Sotira was closely connected to Episkopi and Erimi in the Proximity Networks, Kissonerga could only connect to them when we increased the radius to 50 km. In addition, Kissonerga and Sotira are only tied to the network with Drab Polished and Red Polished wares in the Material Culture Network, and this tie weakens when we look at the Material Culture Networks without the Red Polished. Therefore, it is possible that at some point Kissonerga and Sotira were cut off from the broader settlement network either because of their weak material affiliation or their spatial distance from the rest of the network.

10 and 20 km Proximity Networks have formed subgroups. This is not quite evident in the Proximity Networks with larger radiuses but the analysis of 10 and 20 km Proximity Networks produced/displayed some subgroups or sub-networks (cliques in formal network terms). Episkopi, Erimi and Sotira form one subgroup, Karmi, Lapithos and Vounous form another, and Alambra, Marki and Politiko form another. I ran some test analyses on this issue informally, and the Proximity Network results seem to support this.

# CHAPTER VI

# CONCLUSIONS

According to Knappett, traditional archaeology suffers from the early interest in pyramids and palaces where the interest is focused on the institutions, and the evolutionary and neo-evolutionary perspective is concerned with hierarchy and specialization with the focus on bands, tribes, chiefdoms, and states (2014: 69). This cannot be the case in the prehistory of Cyprus since there are no places, or pyramids, or any kind of monumental structures (not even mounds). Therefore, the focus in Cypriot archaeology is on the material finds, and most extensively on pottery (even the chronology is derived from the pottery) and copper. A different approach must be taken in order to understand and explain the social relationships during the prehistory of Cyprus. Hence, I proposed a social networks approach to understand the complexity and the nature of social relationships during the Middle Bronze Age of Cyprus on the basis of inter-site relationships.

The traditional social research explains an individual's outcomes or characteristics as a function of other characteristics of the same individual (e.g. income as a function of education and gender). Social network researchers look to the individual's social environment for explanations, whether through influence processes (e.g. individuals adopting their friends' occupational choices) or leveraging processes (e.g. an individual can get certain things done because of the connection she has to the powerful others) (Borgatti et al. 2009: 894). This brief explanation of how social network analysis differs from the more traditional approaches can be very well fit into the archaeological context. For instance, the traditional archaeology, as I have cited above, focuses on the institutions, arguing that peoples of the past built palaces or pyramids or monuments so that they could manipulate the social capital. Thus, making the decision of building a palace becomes a function (or a result) of their social positions. I reverse this argument. From a social networks perspective, I can argue that the peoples of the past did not build palaces because they wanted to manipulate the social capital. Instead, they could build monuments because they were able to manipulate the social capital. Take Cyprus for example, as it can be seen in the previous chapter, there were certainly some sites which were more central then others, and it means that they were able to manipulate the site network, even if it was to a small extent. If peoples of the past did use monumental architecture to manipulate the social capital and the inter-site networks, then why do we not see any of it in Cyprus until the very Late Bronze Age?

If we follow the traditional explanation, they should have built palaces like those in Crete without any outside intervention. Yet, although we see tombs with increasing amounts of copper and elaborate terracotta objects during the Prehistoric Bronze Age (Keswani, 2005), what we see in the broader context is rather similar and non-monumental architecture, similar site sizes and burial practices, and we cannot point to a certain tomb or a settlement that is much richer than others. Despite the absence of apparent social stratification during the prehistory of Cyprus, many scholars still search for it and try to trace the roots of the emerging urban centers (or towns) of Late Bronze Age to the Prehistoric Bronze Age. In the very final sentence of her excellent study on grave goods of Bronze Age Cyprus, Keswani argues that "…because of their own internal dynamics and associated cultural values, these systems had already created a productive infrastructure and a social environment primed for further transformation" (Keswani, 2005: 394). Although it might be an oversimplification of her argument, she fits Cyprus into an evolutionary scheme where "tribes" or villages of Prehistoric Cyprus were ready to evolve into city states when the push came from the outside. On the same issue, Knapp argues that demand from an increasingly extensive exchange system, the local Cypriot reaction to that demand, and the material and social consequences of participating in that system were certainly crucial factors in easing of socio-economic constraints, and in the emergence of a new, more complex, social and economic reality on Cyprus (2013b: 39). Although he states that he reframes his 25 year old argument that the Late Bronze Age transformation on the island was a gradual result of the changes during Early and Middle Bronze Ages, Knapp still follows the lines of an evolutionary approach.

So far, I have very briefly discussed the debate regarding the prehistoric Cyprus and its social complexity. The reason behind the non-existent (or non-apparent) social stratification during the MBA and earlier periods could very well be that there was no need for social stratification. If I take the argument from the same point of view of scholars I cited above, there might have been no need to compete for scarce resources since the resources were not scarce and ample enough to support the entire island, perhaps even the so-called increasing foreign demand during the MBA. Although we do not see any evidence of warfare or violence, we do see an increase in the number of copper based grave goods during MBA (Keswani, 2005). There is no evidence so far that indicates certain settlements or individuals competed over the copper sources. Hence, the prehistoric Cypriots were either anti-militarist pacifists or there was no need to resort to warfare and exert power on one another to such an extent that it led to warfare. Assuming that the latter was the case, I can safely argue that copper was not a scarce resource which prehistoric Cypriots needed to manipulate their social capital in order to extract it and produce “prestige goods”.

Although I argue that copper was not scarce and sufficient for the entire island, it still plays an important role in the inter-site relationships. As it can be seen from the networks analysis from the previous chapter, it was probably the main variable that shaped the nature of inter-site relationships during the MBA. In my future studies, my hope is to be able to include copper directly as a variable by formal network methods so that the modelling becomes more adequate.

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# APPENDIX A

## A.1 EC III Settlement Proximity Network

### A.1.1 The Degree Centrality of EC III Settlement Proximity Network

#### A.1.1.1 10 km

In the 10 km network, the settlements are only linked to their closest neighbors. Episkopi, Erimi, Marki and Sotira have a degree centrality of 2, and Alambra and Politiko have 1. Kalavassos, Kalopsidha and Kissonerga are disconnected.

#### A.1.1.2 20 km

The number of links increase with the area covered increases. In addition to the 10 km network, now we have Alambra and Politiko linked to each other with a degree centrality of 2. Kalavassos, Kalopsidha and Kissonerga are disconnected.

#### A.1.1.3 30 km

In the 30 km mark Kalavassos enters the picture and links with Alambra and Marki increasing their degree centrality to 3 while Kalavassos' degree centrality becomes 2.

#### A.1.1.4 50 km

With the criterion extended to 50 km, now every settlement is a part of the network. The highest degree centrality score belongs to Kalavassos with 6. Then we have Alambra, Episkopi, Erimi, Marki and Sotira with 4, followed by Kissonerga and Politiko with 2, and finally Kalopsidha with 2.

In general, we see that the network is skewed towards the settlement of Kalavassos since our map is empty in the north. When we analyze the cemetery and combined network, we will see that this situation will change.

### A.1.2 The Eigenvector Centrality of EC III Settlement Proximity Network

#### A.1.2.1 10 km

We only have eigenvector values (0.577) for Erimi, Episkopi and Sotira since they are all immediate neighbors of each other without any ranking in between them. The rest have a score of 0.

#### A.1.2.2 20 km

The situation changes with Politiko being connected to Alambra (it was only connected to Marki in the 10 km network). While the eigenvector values for Alambra, Marki and Politiko increase to 0.575, it decreases for Erimi, Episkopi and Sotira to 0.047. The difference in the eigenvector values means that the group of Alambra, Marki and Politiko are connected with stronger ties than Erimi, Episkopi and Sotira. The rest have a score of 0.

#### A.1.2.3 30 km

The situation once again changes with the inclusion of Kalavassos. Alambra and Marki have the highest scores of 0.557 with their connection to Kalavassos giving them the advantage. Kalavassos and Politiko have the eigenvector value of 0.435 and the rest have a score of 0.

#### A.1.2.4 50 km

With every settlement included in the network, we have eigenvector values for every site. The highest score is 0.488 and belongs to Kalavassos. Episkopi, Erimi and Sotira have the next highest score of 0.373. Then we have Alambra and Marki with a score of 0.295, then Kissonerga with 0.277, then Politiko with 0.267 and finally Kalopsidha with 0.146. Since we do not have any settlement in the north of the group of Alambra and to the west and north of Kalopsidha, the situation once again heavily favors Kalavassos. It seems that Kalavassos becomes the link between the central plain and the east, and the south and the south-west.

### A.1.3 The Betweenness Centrality of EC III Settlement Proximity Network

#### A.1.3.1 10 km

We only have Marki with a betweenness of 1 since Marki is in between Politiko and Alambra. All the rest have a score of 0.

#### A.1.3.2 20 km

When we increase the distance to 20 km, Politiko becomes directly connected to Alambra. Therefore we see a betweenness score of 0 for Marki. All the rest again have a score of 0.

#### A.1.3.3 30 km

Only Alambra and Marki have a betweenness score of 0.500. Both are in between Kalavassos and Politiko.

#### A.1.3.4 50 km

We see a huge jump in the betweenness score of Kalavassos from 0 to 16. This is because now every site is connected to the network and Kalavassos becomes the link between the central plain, the east and the south and the south-west. We have Alambra and Marki with a score of 3 since they are in between Politiko, Kalavassos and Kalopsidha, and we have Episkopi, Erimi and Sotira with a score of 1.667 since they are in between Kalavassos and Kissonerga.

## A.2 EC III Cemetery Proximity Network

### A.2.1 The Degree Centrality of EC III Cemetery Proximity Network

#### A.2.1.1 10 km

We see Episkopi, Erimi, Karmi and Sotira with the highest degree centrality of 2, and we see Alambra, Lapithos, Marki and Vounous with a score of 1. The rest are disconnected in the immediate neighbor analysis.

#### A.2.1.2 20 km

Ayia Paraskevi joins the network with a degree centrality of 4, then we have Karmi and Vounous with a degree centrality of 3, followed by Alambra, Episkopi, Erimi, Lapithos, Marki and Sotira with a score of 2. Kalavassos, Kalopsidha and Kissonerga are still disconnected from the network.

#### A.2.1.3 30 km

Kalavassos joins the network with a degree centrality of 2. The score of Ayia Paraskevi increases to 5. Alambra, Marki and Lapithos increase to 3, and the rest remain the same. The main change comes from the inclusion of Kalavassos to the network and the connection established between Ayia Paraskevi and Lapithos.

#### A.2.1.4 50 km

Once again all the cemeteries in the network become connected. Alambra, Ayia Paraskevi and Marki have the highest degree centrality of 7, followed by Kalavassos and Vounous with a score of 6. Karmi and Lapithos follow these cemeteries with a degree centrality score of 5, and at the bottom we have Episkopi, Erimi, Kalopsidha and Sotira with a score of 4. Similar to the MCN of EC III cemeteries, we have the highest degree centrality in the central plain and the lowest in south and the south-west.

### A.2.2 The Eigenvector Centrality of EC III Cemetery Proximity Network

#### A.2.2.1 10 km

For 10 km, we only have the eigenvector scores of Episkopi, Erimi and Sotira and they have the same value of 0.577.

#### A.2.2.2 20 km

The introduction of Ayia Paraskevi changes the equation and the highest eigenvector centrality now belongs to Ayia Paraskevi with a score of 0.533. Karmi and Vounous follow this with a score of 0.469, then Lapithos with 0.330, and finally Alambra and Marki with 0.290. It is interesting to see that, with the appearance of Ayia Paraskevi, the eigenvector scores of Episkopi, Erimi and Sotira drop to 0.

#### A.2.2.3 30 km

When Kalavassos appears in the picture, it enters from the lower end of the spectrum with the second highest eigenvector score of 0.184 (the lowest is 0). This change also increases the eigenvector values for Alambra, Ayia Paraskevi, Karmi, Lapithos, Marki and Vounous.

#### A.2.2.4 50 km

Eigenvector scores of Alambra and Marki increase to 0.405 and equalize with Ayia Paraskevi. The next highest score belongs to Vounous with 0.369, then Karmi and Lapithos with 0.329, then Kalopsidha with 0.273 and Kalavassos with 0.248. At the lower end we have Episkopi, Erimi and Sotira with 0.075 and Kissonerga with 0.039. This again shows us that the central plain is the most central, the north coast is ranking just below it, and the south and the south-west are the least central.

### A.2.3 The Betweenness of EC III Cemetery Proximity Network

#### A.2.3.1 10 km

The only betweenness score we have is 1 and it belongs to Karmi since it is in between Lapithos and Vounous.

#### A.2.3.2 20 km

We have a betweenness score of 6 for Ayia Paraskevi, indicating its structural position in the network between the central plain and the north coast; a shared betweenness score of 1.500 for Karmi and Vounous indicating their position between Lapithos and Ayia Paraskevi.

#### A.2.3.3 30 km

Ayia Paraskevi's betweenness score increases to 9 with the maximum distance increase. However, this time the betweenness scores of Karmi and Vounous decrease to 0 since they are tied to Lapithos directly. In addition, the betweenness scores of Alambra and Marki increase to 2, since they now act as a bridge between Kalavassos and Ayia Paraskevi.

#### A.2.3.3.1.1 50 km

Although it has a lower eigenvector centrality, the betweenness of Kalavassos jumps to 28 indicating that Kalavassos is the bridge between the south and the south-west, and the central plain which in turn linked to the north coast and to the east. While the betweenness score of Ayia Paraskevi decreases, Marki and Alambra's increase and meet Ayia Paraskevi at 7.167. Betweenness scores of Erimi, Episkopi and Sotira increase to 2.667 with their links to Kissonerga. Finally, the betweenness score of Vounous somehow increases to 0.500.

## A.3 EC III Combined Proximity Network

### A.3.1 The Degree Centrality of EC III Combined Proximity Network

#### A.3.1.1 10 km

Every site is connected in the network with exception of Kalavassos, Kalopsidha and Kissonerga. The highest centrality score, 2 belongs to Episkopi, Erimi, Karmi, Marki and Sotira, followed by Alambra, Lapithos, Politiko and Vounous with a score of 1.

#### A.3.1.2 20 km

As in all 20 km measures, we see the introduction of Ayia Paraskevi from the top, this time with a score of 5. Degree centrality scores of Alambra, Karmi, Marki, Politiko and Vounous increase to 3, and it stays the same for Episkopi, Erimi and Sotira at 2. Degree centrality of Lapithos also increases from 1 to 2. The rest have a score of 0.

#### A.3.1.3 30 km

While the score of Ayia Paraskevi increases to 6, Kalavassos joins the network with a score of 2. Degree centrality scores of Alambra and Marki increase to 4 but Karmi, Politiko and Vounous stay at the same level of 3, along with Episkopi, Erimi and Sotira with a score of 2. Lapithos again sees an increase in the degree centrality from 2 to 3. The rest are disconnected.

#### A.3.1.4 50 km

With a shared highest degree centrality score of 8, Alambra, Ayia Paraskevi and Marki are on top of the network, followed by Kalavassos, Politiko and Vounous with a score of 7, and then by Karmi and Lapithos with a score of 6. Episkopi, Erimi and Sotira have the shared score of 4 and Kissonerga has the lowest score of 3. When the network is fully connected, we see what we observed already in the EC III MCNs: the central plain has the highest centrality, the north coast is in the higher end of the middle, and the south and south-west have the lowest scores.

### A.3.2 The Eigenvector Centrality of EC III Combined Proximity Network

#### A.3.2.1 10 km

As in the previous proximity networks, we only have eigenvector values of Episkopi, Erimi and Sotira with 0.577. The main reason behind this is that they are immediate neighbors of each other and none of them are in between any of them.

#### A.3.2.2 20 km

Ayia Paraskevi has the highest eigenvector centrality of 0.542, followed by Alambra, Marki and Politiko with a score of 0.401. Then we see Karmi and Vounous with a shared score of 0.309, and finally Lapithos with 0.189. The rest have a shared score of 0.

#### A.3.2.3 30 km

Except for Kalavassos and Lapithos, the eigenvector values decrease when we increase the distance. Kalavassos increases to 0.204 (from 0), and Lapithos increases to 0.296 (from 0.189) and equalizes with the decreased values of Karmi and Vounous (from 0.309). The eigenvector value of Ayia Paraskevi decreases to 0.529 (from 0.542), and Alambra and Marki decrease to 0.386 (from 0.401). However, the decrease in Politiko’s score is more significant than those of Alambra and Marki, it decreases to 0.344 (from 0.401).

#### A.3.2.4 50 km

The eigenvector scores of Alambra, Ayia Paraskevi and Marki decrease to 0.380 while the drop in the score of Ayia Paraskevi is more significant. Contrary to this, eigenvector centralities for every other site increase.

### A.3.3 The Betweenness Centrality of EC III Combined Proximity Network

#### A.3.3.1 10 km

We only have betweenness scores belong to Karmi and Marki are both 1. The rest have a score of 0.

#### A.3.3.2 20 km

While the betweenness score of Karmi increases to 2 along with Vounous, we again see that Ayia Paraskevi's score jumps and becomes 9. We can attest this jump to Ayia Paraskevi being the link between the north coast and the central plain.

#### A.3.3.3 30 km

This time Karmi and Vounous lose their betweenness but Alambra and Marki gain a betweenness of 2.500 while Ayia Paraskevi still continues to increase (to 12).

#### A.3.3.4 50 km

While the betweenness score of Kalavassos jumps from 0 to 32, we see that the score of Ayia Paraskevi decreases to 6.167 and equalizes with the increased scores of Alambra and Marki. In addition to this the betweenness score of Politiko increases from 0 to 3.750, and Episkopi, Erimi and Sotira increases to 3 (from 0). Again, we see a betweenness score of 0.750 for Vounous but I cannot explain this.

## A.4 MC I Settlement Proximity Network

### A.4.1 The Degree Centrality of MC I Settlement Proximity Network

#### A.4.1.1 10 km

The highest centrality scores belong to Episkopi, Erimi, Marki and Sotira with 2. Alambra and Politiko have a centrality score of 1.

#### A.4.1.2 20 km

Everything else stay the same but the centrality scores of Alambra and Politiko increase to 2.

#### A.4.1.3 30 km

Everything else stay the same but the centrality scores of Alambra and Marki increase to 3.

#### A.4.1.4 50 km

While Ambelikou and Kissonerga have the lowest degree centrality of 2, Kalavassos has the highest with 6. Marki comes next with a score of 5, followed by Alambra, Episkopi, Erimi, Politiko and Sotira with a score of 4. Finally, Kissonerga has a score of 3. Once again, we see that since the settlement data is skewed towards the central plain and the south and the south-west. The most central nodes are either in the central plain or close in distance (Kalavassos).

### A.4.2 The Eigenvector Centrality of MC I Settlement Proximity Network

#### A.4.2.1 10 km

As in the previous period the only eigenvector centrality at 10 km belongs to the group of Episkopi, Erimi and Sotira with 0.577.

#### A.4.2.2 20 km

With the increased radius, now Alambra, Marki and Politiko have a higher eigenvector score of 0.575 while the group of Episkopi, Erimi and Sotira decreases to 0.047.

#### A.4.2.3 30 km

With the introduction of Kalavassos to the network, we see that the eigenvector centralities decrease: Alambra and Marki decrease to 0.557, Politiko to 0.435 and the group of Episkopi, Erimi and Sotira to 0. Kalavassos increases from 0 to 0.435 and matches the eigenvector score of Politiko.

#### A.4.2.4 50 km

This time we see the introduction of Ambelikou, Kalopsidha and Kissonerga to the network with eigenvector scores of 0.159, 0.159 and 0.246 respectively. The eigenvector score of Kalavassos increases to 0.480, and the eigenvector values for the group of Episkopi, Erimi and Sotira increase to 0.339. The score of Alambra decreases to 0.313, Marki decreases to 0.344, and Politiko decreases to 0.313. The increase in the value for the group of Episkopi, Erimi and Sotira can be attributed to their direct connection to Kalavassos.

### A.4.3 The Betweenness of MC I Settlement Proximity Network

#### A.4.3.1 10 km

With a betweenness score of 1, Marki is in between Alambra and Politiko.

#### A.4.3.2 20 km

Interestingly enough, there are no sites in between each other.

#### A.4.3.3 30 km

Alambra and Marki have a betweenness score of 0.500 which indicates that they are in between Kalavassos and Politiko. Since there are actually two possible routes, betweenness value of 1 is shared between Alambra and Marki.

#### A.4.3.4 50 km

The highest betweenness score, once again, belongs to Kalavassos. Interestingly, this time Marki has the second highest betweenness score of 7. Alambra and Politiko come next with 3, followed by the group of Erimi, Episkopi and Sotira with 2. The high betweenness score indicates that Marki is in between Kalavassos and Ambelikou.

## A.5 MC I Cemetery Proximity Network

#### A.5.1.1 The Degree Centrality of MC I Cemetery Proximity Network

#### A.5.1.2 10 km

The group of Episkopi, Erimi and Sotira, and Karmi have a degree centrality of 2. Alambra, Lapithos, Marki and Vounous have a score of 1 when connected to immediate neighbors.

#### A.5.1.3 20 km

We see Deneia for the first time in a proximity network with a degree centrality of 2, ranking in the lower end of the spectrum. Ayia Paraskevi is also introduced with a degree centrality of 3 on the higher end of the spectrum. It is refreshing to see that finally the highest centrality score belongs to Karmi with 4, followed by Ayia Paraskevi, Lapithos and Vounous with a score of 3, then by Alambra, Deneia, Episkopi, Erimi and Sotira with a score of 2 and finally Marki with a degree centrality of 1 which is quite unexpected.

#### A.5.1.4 30 km

When we increase the radius to 30 km, Ayia Paraskevi becomes the most central node with a score of 6, followed by Deneia with 5. Karmi, Lapithos, Marki and Vounous are in the higher end of the middle with a shared score of 4, and Alambra and Kalavassos are on the lower end of the middle with a shared score of 3. Episkopi, Erimi and Sotira rank at the bottom with a shared score of 2.

#### A.5.1.5 50 km

Alambra, Ayia Paraskevi and Marki have the highest shared degree centrality score of 8. Vounous has the second highest degree centrality of 7. Deneia, Kalavassos, Karmi and Lapithos have a shared centrality of 6 and they are in the higher end of the middle. Episkopi, Erimi, Kalopsidha and Sotira have a shared score of 4 and they are in the lower end of the middle. Finally, we have Kissonerga with the lowest score of 3. The difference between the higher and lower ends of the middle is more apparent in the eigenvector measurements which is shown in the next section.

### A.5.2 The Eigenvector Centrality of MC I Cemetery Proximity Network

#### A.5.2.1 10 km

Again, the only eigenvector centrality score in 10 km radius belongs to the group of Episkopi, Erimi and Sotira with 0.577. All the rest are 0. At the 10 km mark these sites all connect to one another but none other in the network and this inflates their eigenvector centrality. This situation shifts with the next measurements.

#### A.5.2.2 20 km

As I have stated above, the eigenvector centralities of Episkopi, Erimi and Sotira decrease to 0. Karmi has the highest score of 0.450, followed by Vounous, Lapithos and Ayia Paraskevi with 0.463, 0.450 and 0.387 respectively. Although these three cemeteries have the same degree centrality, the difference comes from their connectedness to other nodes. For instance, while Vounous is connected to Deneia, Karmi and Lapithos, Ayia Paraskevi is connected only to Karmi and Lapithos. Finally, Deneia has an eigenvector score of 0.334, Alambra 0.149, Marki 0.049, and all the rest rate 0.

#### A.5.2.3 30 km

With the increased connectedness of the network, the eigenvector value of Ayia Paraskevi becomes the highest with 0.476, followed by Deneia with 0.438, then by Karmi, Lapithos and Vounous with 0.386, then by Marki with 0.282, Alambra with 0.200, Kalavassos with 0.118. All the rest of the scores are 0.

#### A.5.2.4 50 km

Alambra, Ayia Paraskevi and Marki have the highest shared eigenvector score of 0.386, followed by Vounous with 0.360, and then by Deneia, Karmi and Lapithos with 0.330. Kalopsidha has the fourth highest score of 0.230, followed by Kalavassos with 0.197. On the lower end we again have Episkopi, Erimi and Sotira with a score of 0.047, and Kissonerga ranks the lowest with a score of 0.22. We can attest the high eigenvector value of Kalopsidha to its connection to both Ayia Paraskevi and Vounous (while not excluding Marki). Apart from that, the scores were rather as expected.

### A.5.3 The Betweenness of MC I Cemetery Proximity Network

#### A.5.3.1 10 km

The highest and only betweenness score of 1 belongs to Karmi, since it is located in between Lapithos and Vounous.

#### A.5.3.2 20 km

Ayia Paraskevi has the highest betweenness of 8 since the site is located between the north coast and the central plain. Alambra and Karmi have the second highest shared score of 5. Vounous has a score of 1.500 and Lapithos has a score of 0.500.

#### A.5.3.3 30 km

Being the main link between the north and the central plain, Ayia Paraskevi has the highest betweenness score of 7, even though it is lower than its previous score of 8. Marki, being the link between Kalavassos and the north has the second highest betweenness score of 4. Deneia as a secondary link between the north and the central plain has the third highest betweenness score of 2.500, followed by Alambra with a score of 1.500.

#### A.5.3.4 50 km

Once again, at the 50 km mark, Kalavassos jumps to a betweenness score of 32 being the only link between the central plain and the south and south-west. Alambra, Ayia Paraskevi and Marki have the second highest score of 9.083 connecting the north coast to the rest of the island. Episkopi, Erimi and Sotira have a shared score of 3 connecting Kissonerga to the rest of the island. Finally, there is Vounous with a centrality score of 0.750.

## A.6 MC I Combined Proximity Network

### A.6.1 The Degree Centrality of MC I Combined Proximity Network

#### A.6.1.1 10 km

Karmi and Marki have the highest score of 2 along with the group of Episkopi, Erimi and Sotira. Alambra, Lapithos, Politiko and Vounous have a shared score of 1 and the rest is 0.

#### A.6.1.2 20 km

Ayia Paraskevi has the highest degree centrality of 5 in the 20 km range, followed by Karmi and Politiko with 4. Politiko ranks higher than the others because in the combined network it can link with Deneia. Alambra, Deneia, Lapithos, Marki and Vounous have a degree centrality of 3, and the group of Episkopi, Erimi and Sotira have a score of 2. The rest have a score of 0 and are entirely disconnected from the network.

#### A.6.1.3 30 km

Ayia Paraskevi's degree centrality increases to 7, Deniea's to 6 and Marki's to 5. Alambra, Karmi, Lapithos and Vounous' scores increase to 4. Politiko and the group of Episkopi, Erimi and Sotira remain the same with 4 and 2 respectively. Kalavassos is introduced to the network with a degree centrality of 2. The rest is still disconnected from the network.

#### A.6.1.4 50 km

With the 50 km mark, the network becomes connected to all sites, and Marki's degree centrality increases to 10 and becomes the highest. Following Marki, we have

Alambra, Ayia Paraskevi and Politiko with a score of 9, followed by Deneia, Karmi, Lapithos and Vounous with 8. Kalavassos' score increases to 7. Ambelikou is finally connected to the network and has a score of 5. Episkopi, Erimi, Kalopsidha and Sotira have a score of 4, and the lowest score belongs to Kissonerga with 3. As I have stated above, the most central node is Marki, with closest ones being in the central plain.

### A.6.2 The Eigenvector Centrality of MC I Combined Proximity Network

#### A.6.2.1 10 km

Once again, the only eigenvector value belongs to the group of Episkopi, Erimi and Sotira with 0.577 since they are so well connected to each other.

#### A.6.2.2 20 km

Ayia Paraskevi has the highest eigenvector score of 0.482. Although they have the same degree centrality, Politiko ranks higher with a score of 0.397 above the 0.371 of Karmi. This indicates that Politiko is connected to stronger nodes than Karmi. We see the same situation between Alambra and Marki, and Deneia, Lapithos and Vounous. While Alambra and Marki have a shared score of 0.335, the others have lower eigenvector values of 0.285, 0.266 and 0.309 respectively. While they are part of the network, the group of Episkopi, Erimi and Kissonerga have an eigenvector score of 0. The rest are still disconnected.

#### A.6.2.3 30 km

While Ayia Paraskevi still has the highest eigenvector value of 0.474, the situation changes for most of the network. Deneia now has the second highest eigenvector centrality of 0.430. The eigenvector scores of Alambra, Karmi, Marki and Politiko decrease but the scores of Lapithos and Vounous increase. Kalavassos is introduced from the lower end of the spectrum with a score of 0.121.

#### A.6.2.4 50 km

This time, Marki has the highest eigenvector score of 0.362. Politiko comes next with 0.343, and is followed by Alambra and Ayia Paraskevi with a shared score of 0.338. On the lower end we have the group of Episkopi, Erimi and Sotira with a score of 0.034 and Kissonerga is the lowest with 0.013. Deneia, Karmi and Lapithos rank the same with a score of 0.332 and Vounous comes right after them with a score of 0.317. Kalavassos and Kalopsidha are on the lower end of the middle with the scores of 0.187 and 0.171 respectively.

### A.6.3 The Betweenness of MC I Combined Proximity Network

#### A.6.3.1 10 km

Karmi and Marki have the same betweenness value of 1, being in between exactly two sites.

#### A.6.3.2 20 km

Ayia Paraskevi has the highest betweenness score of 6.833 being in between the central plain and the north coast. Politiko has the second highest betweenness score of 3.167 since it is in between Deneia, and Marki and Alambra. Deneia and Karmi have the same betweenness score of 2.167, Vounous has a score of 1.167 and Lapithos has a score of 0.500.

##### A.6.3.2.1.1 30 km

The betweenness scores once again change: while Ayia Paraskevi's score and that of Alambra, Deneia and Marki increase to 8.333, 2, 4, and 4.333 respectively, the north coast loses its betweenness. In addition, the betweenness score of Politiko decreases considerably from 3.167 to 0.333.

#### A.6.3.3 50 km

Along with the addition of both Ambelikou, Deneia and Politiko to the network at the same time, the betweenness score of Kalavassos jumps to 40, being the link between the south and south-west, and the central plain, and indirectly to the north coast. More than that, the second highest betweenness score belongs to Marki with 11.767 suggesting that Marki is also a major link between the south and the north coast. Politiko with a score 8.100, and Alambra and Ayia Paraskevi with 7.667 show their connectivity between the north coast and the central plain. With a shared betweenness score of 3.677 the group of Episkopi, Erimi and Sotira demonstrate that they are the links that connect Kissonerga to the network. Finally, the low betweenness scores of Deneia, Karmi, Lapithos and Vounous along with the non-existent scores of Ambelikou, Kalopsidha and Kissonerga indicate that these nodes are placed on the outer parts of the network and that they are either at the end of receiving or at the start of sending.

## A.7 MC II Settlement Proximity Network

### A.7.1.1 The Degree Centrality of MC II Settlement Proximity Network

### A.7.1.2 10 km

Alambra and Marki have a degree centrality of 1, and Episkopi and Erimi also have a degree centrality of 1. However, the two groups are not connected together. Kalavassos and Kalopsidha are disconnected.

### A.7.1.3 20 km

The situation does not change.

### A.7.1.4 30 km

Kalavassos is introduced to the network, and while the degree centrality scores of Episkopi and Erimi remain the same, the scores of Alambra, Kalavassos and Marki increase to 2. However, these two groups are still not connected. Kalopsidha is disconnected.

### A.7.1.5 50 km

Now the entire network is connected. Kalavassos has the highest degree centrality of 4, followed by Alambra and Marki with 3. Episkopi, Erimi and Kalopsidha have the degree centrality of 2.

### A.7.2 The Eigenvector Centrality of MC II Settlement Proximity Network

### A.7.2.1 10 km

Marki and Alambra have a degree centrality of -0.707. The rest have a score of 0. The negative sign does not affect the magnitude of the score and we can simply multiply it by -1.

### A.7.2.2 20 km

The situation does not change.

#### A.7.2.3 30 km

With the addition of Kalavassos, we see a change in the eigenvector values. Now, the eigenvector values of Alambra, Kalavassos and Marki are 0.577 which means they are the nodes that are connected to the most central nodes or they are themselves are the most central nodes.

#### A.7.2.4 50 km

Kalavassos has the highest score of 0.533, followed by Alambra and Marki with 0.469. Although Episkopi, Erimi and Kalopsidha have the same degree centrality of 2, Kalopsidha ranks higher in the eigenvector value with 0.330 than those of Episkopi and Erimi with 0.290. We can attest this difference to Kalopsidha’s connection to Alambra and Marki.

### A.7.3 The Betweenness of MC II Settlement Proximity Network

#### A.7.3.1 10 km

None of the sites are in between each other.

#### A.7.3.2 20 km

None of the sites are in between each other.

#### A.7.3.3 30 km

None of the sites are in between each other.

#### A.7.3.4 50 km

Kalavassos has the highest betweenness score of 6 since it establishes the connection between Alambra, Kalopsidha and Marki to Episkopi and Erimi. Alambra and Marki have a betweenness score of 1.500 since they establish the connection between Kalopsidha and Kalavassos.

## A.8 MC II Cemetery Proximity Network

### A.8.1 The Degree Centrality of MC II Cemetery Proximity Network

#### A.8.1.1 10 km

Karmi has the highest degree centrality of 2, and Alambra, Episkopi, Erimi, Lapithos, Marki and Vounous have the degree centrality of 1. The rest are disconnected from the network.

#### A.8.1.2 20 km

Karmi once again has the highest degree centrality this time with 4, it is followed by Ayia Paraskevi, Lapithos and Vounous with 3. Alambra and Deneia have a degree centrality of 2. Episkopi, Erimi and Marki have a degree centrality of 1. The rest are still disconnected from the network.

#### A.8.1.3 30 km

The degree centrality of Ayia Paraskevi increases to 6, and Deneia to 5. Karmi, Lapithos, Marki and Vounous balance out at 4. Alambra increases to 3 and Kalavassos joins the network with 2. Episkopi and Erimi stay at 1 and they are still disconnected from the network.

#### A.8.1.4 50 km

The degree centralities of Alambra, Ayia Paraskevi and Marki increase to and equalize at 8. Vounous has the second highest degree of 7, followed by Deneia, Karmi and Lapithos with 6. Kalavassos has a degree centrality of 5, followed by Kalopsidha with 4. Finally, we have Episkopi and Erimi with a score of 2 and they are connected to the network.

### A.8.2 The Eigenvector Centrality of MC II Cemetery Proximity Network

#### A.8.2.1 10 km

Karmi, because of its location in the group, has an eigenvector centrality of 0.707. Lapithos and Vounous have a score of 0.500. The rest of the scores are 0.

### A.8.2.2 20 km

Although it decreases, Karmi still has the highest eigenvector degree of 0.547, followed by Vounous with 0.463, Lapithos with 0.450, and Ayia Paraskevi with 0.387. This difference between eigenvector values can be attested to Vounous being connected to the structurally stronger node of Ayia Paraskevi which in turn has connections to Alambra and Marki, and Lapithos being connected to Deneia. Finally, we have Alambra with 0.146 and Marki with 0.049. The rest of the scores are 0.

### A.8.2.3 30 km

Now, the highest eigenvector value belongs to Ayia Paraskevi with 0.476, followed by Deneia with 0.439. Although Karmi, Lapithos, Marki and Vounous have the same degree score of 4, Marki's eigenvector score is lower than the others. We can trace this to Marki's not being connected to Deneia. Finally, Alambra has an increased score of 0.199 and Kalavassos enters the picture with 0.110. The rest are valued 0.

### A.8.2.4 50 km

A shared highest eigenvector value of 0.387 belongs to Alambra, Ayia Paraskevi and Marki. The second highest score belongs to Vounous with 0.362. The third highest eigenvector score belongs to Deneia, Karmi and Lapithos with 0.332. Although Kalopsidha has a lower degree centrality (4) than Kalavassos (5), it has a higher eigenvector centrality of 0.231 than that of Kalavassos (0.186). We can attribute this to Kalopsidha's connection to Vounous which has an eigenvector centrality 0.362 and connection to the north coast via Vounous. Contrarily, Kalopsidha is connected to the south coast sites of Episkopi and Erimi which have shared eigenvector centrality of 0.33.

## A.8.3 The Betweenness of MC II Cemetery Proximity Network

### A.8.3.1 10 km

The only betweenness value belongs to Karmi since it is in between Lapithos and Vounous.

#### A.8.3.2 20 km

The highest betweenness score belongs to Ayia Paraskevi with 8 since it is the main link between the north coast and the central plain. Alambra and Karmi have a betweenness centrality of 5, Vounous 1.500 and Lapithos 0.500. We can trace Alambra's betweenness to being the connection between Marki and the north coast and the north of central plain.

#### A.8.3.3 30 km

Ayia Paraskevi's betweenness score decreases to 7, Alambra's to 1.500, and Lapithos, Karmi and Vounous' to 0 while Marki's score increases to 4 and Deneia's to 2.500. This shows that now the links to the north coast are not just established by Ayia Paraskevi but Deneia is also included. In addition, Marki establishes the link between Kalavassos and the north of central plain and the link between Alambra and Deneia, and Kalavassos.

#### A.8.3.4 50 km

Once again, when we increase the radius to 50 km, we see that Kalavassos' betweenness increases immensely (from 0 to 169. Alambra, Ayia Paraskevi and Marki have a shared score of 5.750 and Vounous has a score of 0.750. Again, the reason behind the rise of Kalavassos is that Kalavassos establishes the link between the south and the north.

## A.9 MC II Combined Proximity Network

The MC II Combined Network Proximity Network is comprised of 11 sites. Since the sites are exactly the same as those in the MC II Cemetery Proximity Network, the measurements do not change. Therefore, I will not repeat the same results.

# APPENDIX B

Dataset of EC III Settlements with RP.

| | RP | WP | DP | BP |
|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 1 |
| Epi. | 1 | 1 | 1 | 0 |
| Eri. | 1 | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 | 1 |
| Kis. | 1 | 0 | 1 | 0 |
| Mar. | 1 | 1 | 1 | 1 |
| Pol. | 1 | 1 | 0 | 1 |
| Sot. | 1 | 0 | 1 | 0 |

Dataset of EC III Cemeteries with RP.

| | RP | WP | DP | BP |
|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 1 |
| Ayi. | 1 | 1 | 0 | 1 |
| Epi. | 1 | 1 | 1 | 0 |
| Eri. | 1 | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 | 1 |
| Kar. | 1 | 1 | 0 | 1 |
| Kis. | 1 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 | 1 |
| Sot. | 1 | 0 | 1 | 0 |
| Vou. | 1 | 1 | 0 | 1 |

Dataset of EC III Combined with RP

| | RP | WP | DP | BP |
|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 1 |
| Ayi. | 1 | 1 | 0 | 1 |
| Epi. | 1 | 1 | 1 | 0 |
| Eri. | 1 | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 | 1 |
| Kar. | 1 | 1 | 0 | 1 |
| Kis. | 1 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 | 1 |
| Pol. | 1 | 1 | 0 | 1 |
| Sot. | 1 | 0 | 1 | 0 |
| Vou. | 1 | 1 | 0 | 1 |

Dataset of EC III Settlements without RP.

| | WP | DP | BP |
|---|---|---|---|
| Ala. | 1 | 1 | 1 |
| Epi. | 1 | 1 | 0 |
| Eri. | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 |
| Kis. | 0 | 1 | 0 |
| Mar. | 1 | 1 | 1 |
| Pol. | 1 | 0 | 1 |
| Sot. | 0 | 1 | 0 |

Dataset of EC III Cemeteries without RP.

| | WP | DP | BP |
|---|---|---|---|
| Ala. | 1 | 1 | 1 |
| Ayi. | 1 | 0 | 1 |
| Epi. | 1 | 1 | 0 |
| Eri. | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 |
| Kar. | 1 | 0 | 1 |
| Kis. | 0 | 1 | 0 |
| Lap. | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 |
| Sot. | 0 | 1 | 0 |
| Vou. | 1 | 0 | 1 |

Dataset of EC III Combined without RP.

| | WP | DP | BP |
|---|---|---|---|
| Ala. | 1 | 1 | 1 |
| Ayi. | 1 | 0 | 1 |
| Epi. | 1 | 1 | 0 |
| Eri. | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 |
| Kar. | 1 | 0 | 1 |
| Kis. | 0 | 1 | 0 |
| Lap. | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 |
| Pol. | 1 | 0 | 1 |
| Sot. | 0 | 1 | 0 |
| Vou. | 1 | 0 | 1 |

Dataset of MC I Settlements with RP.

| | RP | WP | DP | BP |
|---|---|---|---|---|
| Amb. | 1 | 0 | 1 | 1 |
| Ala. | 1 | 1 | 1 | 1 |
| Epi. | 1 | 1 | 1 | 0 |
| Eri. | 1 | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 | 1 |
| Kis. | 1 | 0 | 1 | 0 |
| Mar. | 1 | 1 | 1 | 1 |
| Pol. | 1 | 1 | 0 | 1 |
| Sot. | 1 | 0 | 1 | 0 |

Dataset of MC I Cemeteries with RP.

| | RP | WP | DP | BP |
|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 1 |
| Ayi. | 1 | 1 | 0 | 1 |
| Den. | 1 | 1 | 1 | 1 |
| Epi. | 1 | 1 | 1 | 0 |
| Eri. | 1 | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 | 1 |
| Kar. | 1 | 1 | 0 | 1 |
| Kis. | 1 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 | 1 |
| Sot. | 1 | 0 | 1 | 0 |
| Vou. | 1 | 1 | 0 | 1 |

Dataset of MC I Combined with RP.

| | RP | WP | DP | BP |
|---|---|---|---|---|
| Amb. | 1 | 0 | 1 | 1 |
| Ala. | 1 | 1 | 1 | 1 |
| Ayi. | 1 | 1 | 0 | 1 |
| Den. | 1 | 1 | 1 | 1 |
| Epi. | 1 | 1 | 1 | 0 |
| Eri. | 1 | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 | 1 |
| Kar. | 1 | 1 | 0 | 1 |
| Kis. | 1 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 | 1 |
| Pol. | 1 | 1 | 0 | 1 |
| Sot. | 1 | 0 | 1 | 0 |
| Vou. | 1 | 1 | 0 | 1 |

Dataset of MC I Settlements without RP.

| | WP | DP | BP |
|---|---|---|---|
| Amb. | 0 | 1 | 1 |
| Ala. | 1 | 1 | 1 |
| Epi. | 1 | 1 | 0 |
| Eri. | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 |
| Kis. | 0 | 1 | 0 |
| Mar. | 1 | 1 | 1 |
| Pol. | 1 | 0 | 1 |
| Sot. | 0 | 1 | 0 |

Dataset of MC I Cemeteries without RP

| | WP | DP | BP |
|---|---|---|---|
| Ala. | 1 | 1 | 1 |
| Ayi. | 1 | 0 | 1 |
| Den. | 1 | 1 | 1 |
| Epi. | 1 | 1 | 0 |
| Eri. | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 |
| Kar. | 1 | 0 | 1 |
| Kis. | 0 | 1 | 0 |
| Lap. | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 |
| Sot. | 0 | 1 | 0 |
| Vou. | 1 | 0 | 1 |

Dataset of MC I Combined without RP.

| | WP | DP | BP |
|---|---|---|---|
| Amb. | 0 | 1 | 1 |
| Ala. | 1 | 1 | 1 |
| Ayi. | 1 | 0 | 1 |
| Den. | 1 | 1 | 1 |
| Epi. | 1 | 1 | 0 |
| Eri. | 0 | 0 | 1 |
| Kala. | 1 | 1 | 1 |
| Kalo. | 1 | 1 | 1 |
| Kar. | 1 | 0 | 1 |
| Kis. | 0 | 1 | 0 |
| Lap. | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 |
| Pol. | 1 | 0 | 1 |
| Sot. | 0 | 1 | 0 |
| Vou. | 1 | 0 | 1 |

Dataset of MC II Settlements with RP.

| | RP | WP | DP | BP | RonB |
|---|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 1 | 0 |
| Epi. | 1 | 1 | 1 | 0 | 0 |
| Eri. | 1 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 1 | 1 | 1 |
| Mar. | 1 | 1 | 1 | 1 | 1 |

Dataset of MC II Cemeteries with RP.

| | RP | WP | DP | BP | RonB |
|---|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 1 | 0 |
| Ayi. | 1 | 1 | 0 | 1 | 0 |
| Den. | 1 | 1 | 1 | 1 | 1 |
| Epi. | 1 | 1 | 1 | 0 | 0 |
| Eri. | 1 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 1 | 1 | 1 |
| Kar. | 1 | 1 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 0 | 1 | 0 |
| Mar. | 1 | 1 | 1 | 1 | 1 |
| Vou. | 1 | 1 | 0 | 1 | 0 |

Dataset of MC II Combined with RP.

| | RP | WP | DP | BP | RonB |
|---|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 1 | 0 |
| Ayi. | 1 | 1 | 0 | 1 | 0 |
| Den. | 1 | 1 | 1 | 1 | 1 |
| Epi. | 1 | 1 | 1 | 0 | 0 |
| Eri. | 1 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 1 | 1 | 1 |
| Kar. | 1 | 1 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 0 | 1 | 0 |
| Mar. | 1 | 1 | 1 | 1 | 1 |
| Vou. | 1 | 1 | 0 | 1 | 0 |

.

Dataset of MC II Settlements without RP.

| | WP | DP | BP | RonB |
|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 0 |
| Epi. | 1 | 1 | 0 | 0 |
| Eri. | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 1 | 1 |
| Mar. | 1 | 1 | 1 | 1 |

Dataset of MC II Cemeteries without RP.

| | WP | DP | BP | RonB |
|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 0 |
| Ayi. | 1 | 0 | 1 | 0 |
| Den. | 1 | 1 | 1 | 1 |
| Epi. | 1 | 1 | 0 | 0 |
| Eri. | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 1 | 1 |
| Kar. | 1 | 0 | 1 | 0 |
| Lap. | 1 | 0 | 1 | 0 |
| Mar. | 1 | 1 | 1 | 1 |
| Vou. | 1 | 0 | 1 | 0 |

Dataset of MC II Combined without RP.

| | WP | DP | BP | RonB |
|---|---|---|---|---|
| Ala. | 1 | 1 | 1 | 0 |
| Ayi. | 1 | 0 | 1 | 0 |
| Den. | 1 | 1 | 1 | 1 |
| Epi. | 1 | 1 | 0 | 0 |
| Eri. | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 1 | 1 |
| Kar. | 1 | 0 | 1 | 0 |
| Lap. | 1 | 0 | 1 | 0 |
| Mar. | 1 | 1 | 1 | 1 |
| Vou. | 1 | 0 | 1 | 0 |

# APPENDIX C

Dataset of EC III Settlements within 10 km.

| | Ala. | Epi. | Eri. | Kala. | Kalo. | Kis. | Mar. | Pol. | Sot. |
|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Epi. | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Eri. | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 1 |
| Kala. | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kis. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Mar. | 1 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 |
| Pol. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 |
| Sot. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |

Dataset of EC III Settlements within 20km.

| | Ala. | Epi. | Eri. | Kala. | Kalo. | Kis. | Mar. | Pol. | Sot. |
|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Epi. | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Eri. | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 1 |
| Kala. | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kis. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Mar. | 1 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 |
| Pol. | 1 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 |
| Sot. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |

Dataset of EC III Settlements within 30 km.

| | Ala. | Epi. | Eri. | Kala. | Kalo. | Kis. | Mar. | Pol. | Sot. |
|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Epi. | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Eri. | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 1 |
| Kala. | 1 | 0 | 0 | | 0 | 0 | 1 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kis. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Mar. | 1 | 0 | 0 | 1 | 0 | 0 | | 1 | 0 |
| Pol. | 1 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 |
| Sot. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |

Dataset of EC III Settlements within 50 km.

| | Ala. | Epi. | Eri. | Kala. | Kalo. | Kis. | Mar. | Pol. | Sot. |
|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Epi. | 0 | | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| Eri. | 0 | 1 | | 1 | 0 | 1 | 0 | 0 | 1 |
| Kala. | 1 | 0 | 0 | | 0 | 0 | 1 | 1 | 0 |
| Kalo. | 1 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 |
| Kis. | 0 | 1 | 1 | 0 | 0 | | 0 | 0 | 1 |
| Mar. | 1 | 0 | 0 | 1 | 1 | 0 | | 1 | 0 |
| Pol. | 1 | 0 | 0 | 1 | 0 | 0 | 1 | | 0 |
| Sot. | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | |

Dataset of EC III Cemeteries within 10 km.

| | Ala. | Ayi. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Ayi. | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 |
| Mar. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | |

Dataset of EC III Cemeteries within 20 km.

| | Ala. | Ayi. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Ayi. | 1 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 1 |
| Mar. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | |

Dataset of EC III Cemeteries within 30 km.

| | Ala. | Ayi. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Ayi. | 1 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Lap. | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 1 |
| Mar. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | |

Dataset of EC III Cemeteries within 50 km.

| | Ala. | Ayi. | Epis. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Ayi. | 1 | | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 1 | | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 1 | 1 | | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 1 |
| Kar. | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 1 | 0 | 1 |
| Kis. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 0 | 1 |
| Mar. | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | | 0 | 1 |
| Sot. | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | | 0 |
| Vou. | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | |

Dataset of EC III Combined within 10 km.

| | Ala. | Ayi. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lapi. | Mar. | Pol. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Ayi. | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | 0 |
| Mar. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 | 0 |
| Pol. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | |

Dataset of EC III Combined within 20 km.

| | Ala. | Ayi. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Pol. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Ayi. | 1 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | 1 |
| Mar. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 | 0 |
| Pol. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | |

Dataset of EC III Combined within 30 km.

| | Ala. | Ayi. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Pol. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Ayi. | 1 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | 1 |
| Mar. | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | | 1 | 0 | 0 |
| Pol. | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | |

Dataset of EC III Combined within 50 km.

| | Ala. | Ayi. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Pol. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Ayi. | 1 | | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 1 | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 1 | 1 | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Kar. | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 1 | 1 | 0 | 1 |
| Kis. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 | 0 | 1 |
| Mar. | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | | 1 | 0 | 1 |
| Pol. | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 1 |
| Sot. | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 |
| Vou. | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | |

Dataset of MC I Settlements within 10 km.

| | Amb. | Ala. | Epi. | Eri. | Kala. | Kalo. | Kis. | Mar. | Pol. | Sot. |
|---|---|---|---|---|---|---|---|---|---|---|
| Amb. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ala. | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 1 |
| Kala. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Mar. | 0 | 1 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 |
| Pol. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |

Dataset of MC I Settlements within 20 km.

| | Amb. | Ala. | Epi. | Eri. | Kala. | Kalo. | Kis. | Mar. | Pol. | Sot. |
|---|---|---|---|---|---|---|---|---|---|---|
| Amb. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ala. | 0 | | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 1 |
| Kala. | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Mar. | 0 | 1 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 |
| Pol. | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |

Dataset of MC I Settlements within 30 km.

| | Amb. | Ala. | Epi. | Eri. | Kala. | Kalo. | Kis. | Mar. | Pol. | Sot. |
|---|---|---|---|---|---|---|---|---|---|---|
| Amb. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ala. | 0 | | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 |
| Epi. | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 1 |
| Eri. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 1 |
| Kala. | 0 | 1 | 0 | 0 | | 0 | 0 | 1 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 |
| Mar. | 0 | 1 | 0 | 0 | 1 | 0 | 0 | | 1 | 0 |
| Pol. | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 |
| Sot. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | |

Dataset of MC I Settlements within 50 km.

| | Amb. | Ala. | Epi. | Eri. | Kala. | Kalo. | Kis. | Mar. | Pol. | Sot. |
|---|---|---|---|---|---|---|---|---|---|---|
| Amb. | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Ala. | 0 | | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 |
| Epi. | 0 | 0 | | 1 | 1 | 0 | 1 | 0 | 0 | 1 |
| Eri. | 0 | 0 | 1 | | 1 | 0 | 1 | 0 | 0 | 1 |
| Kala. | 0 | 1 | 0 | 0 | | 0 | 0 | 1 | 1 | 0 |
| Kalo. | 0 | 1 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 |
| Kis. | 0 | 0 | 1 | 1 | 0 | 0 | | 0 | 0 | 1 |
| Mar. | 1 | 1 | 0 | 0 | 1 | 1 | 0 | | 1 | 0 |
| Pol. | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | | 0 |
| Sot. | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 0 | 0 | |

Dataset of MC I Cemeteries within 10 km.

| | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Ayi. | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Den. | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Epi. | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 |
| Mar. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Sot. | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | |

Dataset of MC I Cemeteries within 20 km.

| | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Ayi. | 1 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 |
| Den. | 0 | 0 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 |
| Epi. | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 1 |
| Mar. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Sot. | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | |

Dataset of MC I Cemeteries within 30 km.

| | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Ayi. | 1 | | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Den. | 0 | 1 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Lap. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 1 |
| Mar. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 |
| Sot. | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | |

Dataset of Cemeteries within 50 km.

| | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Ayi. | 1 | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 0 | 1 |
| Den. | 1 | 1 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | 0 | | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 0 | 1 | | 1 | 0 | 0 | 1 | 0 | 0 | 1 | 0 |
| Kala. | 1 | 1 | 0 | 1 | 1 | | 0 | 0 | 0 | 0 | 1 | 1 | 0 |
| Kalo. | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 1 |
| Kar. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 1 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | | 0 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | | 0 | 1 |
| Sot. | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | | 0 |
| Vou. | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 0 | |

Dataset of MC I Combined within 10 km.

| | Amb. | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Pol. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amb. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ala. | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Ayi. | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Den. | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Epi. | 0 | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | 0 |
| Mar. | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 | 0 |
| Pol. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 0 |
| Sot. | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | |

Dataset of MC I Combined within 20 km.

| | Amb. | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Pol. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amb. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ala. | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Ayi. | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 | 1 | 0 | 1 |
| Den. | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 1 | 0 | 0 |
| Epi. | 0 | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | 1 |
| Mar. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 | 0 |
| Pol. | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 0 |
| Sot. | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | |

Dataset of MC I Combined within 30 km.

| | Amb. | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Pol. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amb. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Ala. | 0 | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Ayi. | 0 | 1 | | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Den. | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Kar. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 0 | 0 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Lap. | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 0 | 0 | 0 | 1 |
| Mar. | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 0 | | 1 | 0 | 0 |
| Pol. | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 0 |
| Sot. | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 0 | 0 | 0 | |

Dataset of MC I within 50 km.

| | Amb. | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Kis. | Lap. | Mar. | Pol. | Sot. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|---|
| Amb. | | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 0 |
| Ala. | 0 | | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Ayi. | 0 | 1 | | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Den. | 1 | 1 | 1 | | 0 | 0 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 0 | 1 |
| Epi. | 0 | 0 | 0 | 0 | | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Eri. | 0 | 0 | 0 | 0 | 1 | | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Kala. | 0 | 1 | 1 | 0 | 1 | 1 | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 |
| Kalo. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Kar. | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 1 | 1 | 1 | 0 | 1 |
| Kis. | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 |
| Lap. | 1 | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 0 | | 1 | 1 | 0 | 1 |
| Mar. | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 0 | 1 | | 1 | 0 | 1 |
| Pol. | 1 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 1 | | 0 | 1 |
| Sot. | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 0 | 0 | 1 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 0 | 1 | 1 | 1 | 0 | |

Dataset of MC II Settlements within 10 km.

| | Ala. | Epi. | Eri. | Kala. | Kalo. | Mar. |
|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 0 | 0 | 1 |
| Epi. | 0 | | 1 | 0 | 0 | 0 |
| Eri. | 0 | 1 | | 0 | 0 | 0 |
| Kala. | 0 | 0 | 0 | | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | | 0 |
| Mar. | 1 | 0 | 0 | 0 | 0 | |

Dataset of MC I Settlements within 20 km.

| | Ala. | Epi. | Eri. | Kala. | Kalo. | Mar. |
|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 0 | 0 | 1 |
| Epi. | 0 | | 1 | 0 | 0 | 0 |
| Eri. | 0 | 1 | | 0 | 0 | 0 |
| Kala. | 0 | 0 | 0 | | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | | 0 |
| Mar. | 1 | 0 | 0 | 0 | 0 | |

Dataset of MC II Settlements within 30 km.

| | Ala. | Epi. | Eri. | Kala. | Kalo. | Mar. |
|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 1 | 0 | 1 |
| Epi. | 0 | | 1 | 0 | 0 | 0 |
| Eri. | 0 | 1 | | 0 | 0 | 0 |
| Kala. | 1 | 0 | 0 | | 0 | 1 |
| Kalo. | 0 | 0 | 0 | 0 | | 0 |
| Mar. | 1 | 0 | 0 | 1 | 0 | |

Dataset of MC II Settlements within 50 km.

| | Ala. | Epi. | Eri. | Kala. | Kalo. | Mar. |
|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 1 | 1 | 1 |
| Epi. | 0 | | 1 | 1 | 0 | 0 |
| Eri. | 0 | 1 | | 1 | 0 | 0 |
| Kala. | 1 | 0 | 0 | | 0 | 1 |
| Kalo. | 1 | 0 | 0 | 0 | | 1 |
| Mar. | 1 | 0 | 0 | 1 | 1 | |

Dataset of MC II Cemeteries within 10 km.

| | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Lap. | Mar. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Ayi. | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Den. | 0 | 0 | | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 |
| Epi. | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eri. | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kala. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kar. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 1 | 0 | 1 |
| Lap. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | | 0 | 0 |
| Mar. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | |

Dataset of MC II Cemeteries within 20 km.

| | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Lap. | Mar. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 0 |
| Ayi. | 1 | | 0 | 0 | 0 | 0 | 0 | 1 | 0 | 0 | 1 |
| Den. | 0 | 0 | | 0 | 0 | 0 | 0 | 1 | 1 | 0 | 0 |
| Epi. | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eri. | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kala. | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kar. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 1 | 0 | 1 |
| Lap. | 0 | 0 | 1 | 0 | 0 | 0 | 0 | 1 | | 0 | 1 |
| Mar. | 1 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 0 | 0 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | |

Dataset of MC II Cemeteries within 30 km.

| | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Lap. | Mar. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 0 | 0 | 0 | 1 | 0 | 0 | 0 | 1 | 0 |
| Ayi. | 1 | | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| Den. | 0 | 1 | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| Epi. | 0 | 0 | 0 | | 1 | 0 | 0 | 0 | 0 | 0 | 0 |
| Eri. | 0 | 0 | 0 | 1 | | 0 | 0 | 0 | 0 | 0 | 0 |
| Kala. | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 1 | 0 |
| Kalo. | 0 | 0 | 0 | 0 | 0 | 0 | | 0 | 0 | 0 | 0 |
| Kar. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | | 1 | 0 | 1 |
| Lap. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | | 0 | 1 |
| Mar. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 0 | 0 | | 0 |
| Vou. | 0 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | 1 | 0 | |

Dataset of MC II Cemeteries within 50 km.

| | Ala. | Ayi. | Den. | Epi. | Eri. | Kala. | Kalo. | Kar. | Lap. | Mar. | Vou. |
|---|---|---|---|---|---|---|---|---|---|---|---|
| Ala. | | 1 | 1 | 0 | 0 | 1 | 0 | 1 | 1 | 1 | 1 |
| Ayi. | 1 | | 1 | 0 | 0 | 1 | 1 | 1 | 1 | 1 | 1 |
| Den. | 1 | 1 | | 0 | 0 | 0 | 0 | 1 | 1 | 1 | 1 |
| Epi. | 0 | 0 | 0 | | 1 | 1 | 0 | 0 | 0 | 0 | 0 |
| Eri. | 0 | 0 | 0 | 1 | | 1 | 0 | 0 | 0 | 0 | 0 |
| Kala. | 1 | 1 | 0 | 1 | 1 | | 0 | 0 | 0 | 1 | 0 |
| Kalo. | 1 | 1 | 0 | 0 | 0 | 0 | | 0 | 0 | 1 | 1 |
| Kar. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | | 1 | 1 | 1 |
| Lap. | 1 | 1 | 1 | 0 | 0 | 0 | 0 | 1 | | 1 | 1 |
| Mar. | 1 | 1 | 1 | 0 | 0 | 1 | 1 | 1 | 1 | | 1 |
| Vou. | 1 | 1 | 1 | 0 | 0 | 0 | 1 | 1 | 1 | 1 | |