DEFINING SPATIAL DISTRIBUTION OF STORAGE VESSELS IN ANCIENT BURGAZ AT THE FOURTH CENTURY B.C.

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İLHAM SAKARYA

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Prof.Dr. Sencer Ayata

Director

I certify that this satisfies all the requirements as a thesis for the degree of Master of Science.

Prof. Dr. Numan Tuna
Head of Program

This is to certify that we have read this thesis and that in our opinion it is fully adequate, in scope and quality, as a thesis for the degree of Master of Science.

Prof. Dr. Numan Tuna
Supervisor

Examining Committee Members

Prof. Dr. Numan Tuna ---

Assoc.Prof.Dr. Murat Güvenç ---

Dr. D. Burcu Erciyas ---

ABSTRACT

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Sakarya, İlham

M.S., Program of Settlement Archaeology

Supervisor: Prof. Dr. Numan Tuna

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This research is an investigation of the spatial organization of household activities and especially the storage facilities in Ancient Burgaz. The four well-preserved houses at the Northeast Sector, their artefact assemblages which come from the final occupation floor level dated to the 4th century B.C., and the storage containers have been evaluated. The spatial distributions of the artefacts were studied through the use of quantitative methods with the objective of identifying storage spaces in Burgaz houses. The results of this quantitative analysis and the observations regarding Burgaz houses have been compared to other contemporary sites in ancient Aegean.

Keywords: Burgaz, Classical Period, Knidos, Spatial Analysis, Domestic Architecture, Household Archaeology

ÖZ

ESKİ BURGAZ'DA M.Ö. 4. YÜZYIL DEPOLAMA KAPLARININ MEKANSAL DAĞILIMI

Sakarya, İlham

Yüksek Lisans, Yerleşim Arkeolojisi Programı

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Bu çalışma, Eski Burgaz'da ev faaliyetleri, özellikle depolama alışkanlıkları, ve bunların mekansal düzenlemesi üzerine bir incelemedir. Çalışmanın konusunu, planları itibariyle iyi korunmuş olan Kuzeydoğu Sektör'deki dört ev ve bu evlerin son kullanım evresi olan M.Ö. 4. yy taban seviyeleri buluntuları ile depolama kapları oluşturmaktadır. Kültürel küçük buluntular istatistiksel yöntemler yardımıyla mekansal dağılımları belirlenerek, Burgaz evlerindeki depolama alanları tespit edilmeye çalışılmıştır. Eski Burgaz evlerinde görülen bulgular Ege Dünyası'ndaki diğer çağdaşı örneklerle karşılaştırılmıştır.

Anahtar Kelimeler: Burgaz, Klasik Dönem, Knidos, Mekansal Analiz, Konut Mimarisi, Evsel Arkeoloji.

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I hereby declare that all information in this document has been obtained and presented in accordance with academic rules and ethical conduct. I also declare that, as required by these rules and conduct, I have fully cited and referenced all material and results that are not original to this work.

Date: 03. 12. 2003 Signature:

TABLE OF CONTENTS

LIST OF TABLES

TABLE

LIST OF FIGURES

FIGURE

CHAPTER 1

INTRODUCTION

The concept of the Ancient Greek city has been investigated according to both its social organization -laws, goverment, tribal structure- and its physical structure –city walls, agora, temples and other public buildings. Physical manifestations' of the "house" and social meanings' of "household" are the explaination of *oikoi,* which is the basis of the Ancient Greek city[1]. Houses were an important spatial expression of the society. For describing the plan of the Greek house in a common sense, even if they showed some variations from town to town and from house to house, the house was a closed unit adjacent to a street but invisible from it. It had a rectangular courtyard which was surrounded by a group of adjoining rectangular rooms. The court was entered directly by the door to the street, height of which was higher in order to prevent visibility to the inside. The court was the main living place of the house. According to the needs of the household activities, rooms were small and easily divided or combined[2]. The *andron* or men's dining room was located close to the door of house. The *oikoi,* which is the main place for social household activities, was placed at the northern part of the court. The workshops were installed at the southern part of the house.

[1] Cahill 2002, p. vii

[2] Jameson 1990, p.98

Traditionally, classical archaeologists showed less interest to domestic architecture as compared to public monuments and cemeteries. The reasons for the neglect of houses can be found in building methods: the monuments of public architecture are better built than houses. The ruins of the houses are generally so poorly preserved that they cannot be well understood. Greek houses have only been the subjects of architectural typology and archaeologists have only categorized the artefacts found in domestic contexts. However, with recent developments in archaeology, the houses have become more important. At many excavations, a large number of houses have come to light. Although the main interest lies in the architecture, the archaeologists raised questions pertaining to activities, which took place in these houses. With these developments, excavation reports started to have the way for provide possibility for analytical studies.

The physical structures are not sufficient in themselves to explain the organization of the domestic space. The archaeological evidence needs to be related with basic aspects of the culture. How the private spaces are constituted and functioned need to be investigated, as well as and how these aspects are reflected in the larger community[3].

In order to understand how household space was organized, it is enough to detect the assemblages of artefacts on occupation floors, which offer unique insights into the kind of activities that went on in rooms[4]. To get an idea of how houses were actually organized and how spaces were used, it is necessary to analyse not only the architecture but also the finds. According to the specific

[3] Ibid, p.92

[4] Cahill 2002, p.74

needs of households, in the same architectural space like courtyards and the like, each household arranged and used their spaces in very different ways, which is reflected in the diversity of assemblages of artefacts found in different spaces.[5]

The relationship between the behaviour and the built environment, which influence each other, is the main interest for detecting the domestic structure organization in order to understand how ancient people performed their lives.

By the end of the 1970s and the beginning of the 1980s, household archaeology, which is a part of social archaeology, started to develop by the augmentation of well-preserved architectural remains of domestic quarters excavations. The aim of household archaeology is to understand how the past societies organized their houses within the site organization. Household analysis would allow archaeologists to find out the order of a society at intrasettlement level of analysis such as how the inhabitants of a house organized their activities which took place in their houses according to their needs. It is not enough to interpret the social organization and relations within the domestic units using only "traditional scientific archaeological methodology"[6]. It is not useful to identify a household by only the information obtained from architectural features or any other archaeological data. Architecture – the built environment- is the essential context inwhich household activities took place. Recent excavations on well-preserved domestic quarters all over the world, such as prehistoric Mesoamerican

[5] Ibid., p.148

[6] Tringham 2001, p.6926

socities, Southwest American pueblo's –Grasshopper-, Europe and the Near East, enable the development of household archaeology. However, in Western Anatolia, although there are many sites at which domestic quarters were dug, such as Klazomenai, Smyrna and Colophon; the primary intent of these excavations were to designate the settlement layout rather than to identify the spatial organization within the houses

My research goal is to investigate the spatial organization of the Burgaz NE sector houses from the point of view of storage behavior. By the excavations carried out for eleven years, it is understood that Burgaz had an orthogonal town planing rather then a Hippodamean types of layout. The focus of the Burgaz excavations intensified on the southeast and northeast sectors because of the remains of well-preserved houses and paved streets. According to the archaeological evidence recovered at Burgaz, there was a continuous settlement from the Geometric Period until the end of third quarter of fourth century B.C. As the focus of this research is on the artifactual remains of activities found in large quantities on the floors of open and covered domestic spaces, the Northeast Sector houses, which were better preserved than Southeast Sector houses, and the fourth century B.C. floor levels and storage containers were chosen. Analyses of the room and floor assemblages provided us a better comprehension of the use of domestic space.

This study provides a broad view on Burgaz houses and domestic storage patterns, and carry out a statistical analysis on fourth century B.C. floor level assemblages. It will hopefully enable us to understand the use of space in terms of storage purposes in Ancient Burgaz.

CHAPTER 2

LITERATURE REVIEW

Since the 1960's and 1970's, with the newly developed scientific aids in archaeology, archaeologists aim not only to establish a chronology for the past, but also to set up new approaches to deal with the problems of archaeological interpretation. To carry out an investigation of social and economic aspects of past societies, there is much archaeological evidence potential that has been realized[7]. To gain a wholly new archaeological perspective, integrated at the household level are "new concepts inferred from architecture" and at the site and region level "new concepts from geography and ecological studies"[8]. With these new developments, the goals of archaeology changed to explaining what happened in the past rather than to just describing it. New archaeology, in terms of behavior, focuses on "what excavated structures and artifacts might mean" in archaeological records[9]. Thus, studying the material culture and behavior of living societies started to play a vital role in the interpretation of the past. With this new approach, quantitative methods became useful aids for the archaeological interpretation.

[7] Renfrew&Bahn 1996, p.36

[8] Ibid, p. 37

[9] Ibid,p.40

There are many studies to develop the use of statistics for archaeological research.

Whallon[10] presented a new statistical method called "dimensional analysis of variances" which was developed in the field of plant ecology. The data which is used in dimensional analysis of variances must be in the form of counts per grid square because this is a method for detecting and defining spatial concentrations in data expressed as counts per grid. As the data has been gathered by grid squares in the excavations and the exact points of the artifacts can never be obtained, this is the most suitable method for analysis. This method requires a square or rectangular grid inwhich each side must be some power of two. Thus, dimensional analysis of variance has severe restrictions in the scale or size of spatial patterns. Dimensional analysis of variance calculates the corrected mean squares as block sizes in which each block doubles the next block. After forming the block size it is very easy to regroup the original data. He applied this method at a preceramic cave in the valley of Oaxaca, Mexico, inwhich was identified three early occupation levels. As these levels were excavated in the grid square method, the application of this method is available for interpreting the collecteced data.

Whallon[11] also explained the "nearest neighbor analysis" for the study of distributional patterns of artifacts over occupation floors. This method requires coordinates for each artifact so it has the advantage of not being restricted in application by problems of size or shape of the studied area when only counts per grid unit are know. Although it is a sensitive method to

[10] Whallon 1973, p.266-269

[11] Whallon 1974, p.16-34

determine non-random spatial clustring, it has some limitation of defining the artifact clusters on an area and in comparing the distribution of several artifact types. To test this method, he choose 4 stone tool types scattered over a Protomagdalenian occupation floor at the Abri Pataud in southwestern France because these artifacts illustrated the strongest spatial patterning. The results for defining the shapes of spatial patterns are shown by a circle which was drawn around each item. Grouping of tool types showed the relations clearly.

Both of these analyses have their own distinctive advantages, disadvantages and possibilities for application to the analysis of spatial patterning of archaeological materials on occupation floors.

Cioleck-Torello[12] revealed that to get information about the organization of past societies, it might be useful to understand the function of rooms and the activities that took place in them. He carried out an ethnographic model with an example from Grasshopper Pueblo, Arizona. According to this model the determinants of function are the architectural characteristics of rooms. To set up a relationship between activities and their remains, several multivariate analytic techniques are used. To gain the information about the room function, artifacts found on floors were analyzed by R-mode analytic techniques which, as with "most clustering methods, measure corrlations between variables on which the original measurements were made, for example, the frequency or relative frequency of artefact classes"[13]. These methods include factor analysis "which is specifically designed to partition out the major linear dimensions of variation that exist in a body of data and to

[12] Cioleck-Torrelo 1984, p.127-153

[13] Ibid, p. 134

approximate them within a smaller number of hypothetical variables called factors"[14]; principal components analysis; multi-dimensional scaling. The results were reanalyzed using a Q-mode technique, which is a clustering procedure to derive a room function typology. As a result, he exposed six types of rooms like limited activity rooms, habitation rooms, domestic storage rooms, multifunctional habitation rooms, manufacturing rooms, storage-manufacturing rooms. At the Grasshopper Pueblo, the domestic storage rooms were situated near the habitation rooms. At storage-manifacturing rooms, the materials of manufacturing were stored rather than used.

Smyth[15] investigated the domestic storage behavior in Mesoamerica in terms of an ethnoarchaeological approach. To understand many aspects of cultural complexity, he analyzed storage activities from several different perspectives. Storage is the sign which reflects main aspects of the economy related to production, consumption and distribution in all societies. First, he discussed the theoretical issues concerning the role of storage and surplus in the rise and functioning of complex societies. By the development in agriculture, storage became an important issue. Preservation and utilization of agricultural surpluses form the social complexity. Controlling the storage of surplus gives birth to class differentiation. With the surplus maintainance, an elite class arised and controlled the use of surplus, trade and exchange. Next he reviewed Mesoamerican storage behaviour in terms of an ethnoarhaeological research into domestic storage among the Yucatec Maya. Although his research area was Mesoamerica he reached general information for

[14] Ibid, p. 134

[15] Smyth 1989, p.89

archaeological method and theory. Because of the archaeological visibility as with monumental architecture, it is easy to recognize the centralized storage systems. In domestic levels it is difficult to designate storage activities.

Gregg, Kintigh and Whallon[16] applied archaeological techniques of spatial analysis to John Yellen's ethnoarchaeological study of Kung sites at Botswana to gain some insights into methods of spatial analysis and clarify our understanding of their strengths and limitations. To test the validity of the quantitative methods of spatial analysis, they chose Yellen's ethnoarchaeological data. They presented a summary of three components of their inquiry using Yellen's camp 14. First is a quantitative spatial analysis of the material distributions recorded from camp 14. Second, they simulated the transformation of this ethnographic camp into three archaeological sites. Third, they analyzed each simulated archaeological site using the same techniques that they had used for analysing the undisturbed ethnographic data, and they compared the results with those of the original data. The results which they reached by using the pure locational analysis and the assemblage composition analysis, fitted with Yellen's results positively. Quantitative spatial analysis is very useful for archaological consideration and interpretation of data structure on a site.

Smyth[17] examined Mesoamerican political economy from the perspective of storage during the Classical Period. He compared Teotihuacan in Highland Mexico and Tikal at the Maya which were two major Mesoamerican centers of the Classic Period. The indicators of storage and

[16] Gregg, Kintigh, Whallon 1991,pp.149-150

[17] Smyth 1996, p.336

economy are subsistence and surplus, specialization and trade, and the degree of political centralization which must be investigated carefully to understand the complexity of the state. At these cities production, consumption, distribution and exchange depended on storage strategies. “How and where goods are stored” and “how stored goods are administered” are the two main questions to reconstruct past economies. He revealed that storage was organized across different societial scales such as the household, community, and state levels. Investigating the economic process of production, distribution and consumption enable us to understand “political economy and its materials foundations” which can be seen in complex societies supported by a storage strategies[18].

LaMotta and Schiffer[19] mentioned that social, economic, and demographic characteristics of past populations can be derived from analysing the house floor assemblages. The variability in the activities carried out in houses can be understood by the differences and similarities in the kind and quantities of artifacts. To construct the life history of a domestic structure, there are three stages to investigate: habitation, abandonment and post-abandonment. Deposition of objects within a domestic structure and to remove or prevent objects within the domestic structure from being deposited at their locations of use are the two phases of the formation of floor assemblages. Habitational stages can be detected by three depositional processes. Primary deposition is a process that artifacts are recorded at their location of use. Secondary deposition is a process which involves the removal of refuse from

[18] Ibid, p.350

[19] LaMotta& Schiffer 1999, p.19-29

an activity area. Provisional discard is a process of keeping useless objects for later use. Abandonment phases can be explained with *de facto* refuse which is left in a structure while it is still in use. This enables archaeologists to reconstruct the household activities. At the post-abandonment stage, the abandoned structure can be reused for many purposes which may introduce a new set of formation process. Studying formation processes of house floor assemblages enable the identification of the household activities and abandonment.

LaMotta and Schiffer[20] also explained behavioral archaeology as a process of formation of the archaeological record and reconstruction of cultural pasts derived from behavioral inferences. Behavioral archaeologists are interested in reconstructing past behavior. Behavioral archaeology is based on the study of interaction between people and material objects. They investigated the types of explanatory questions which behavioral archaeologists faced and developed behavioral method and theory to answer these questions. They examined behavior at different scales such as interaction, activity, systemic scales. They discussed basic definitions and units of analysis including a materialist definition of human behavior, an analytical methodology grounded in the study of artifacts' life histories in comparative behavioral contexts, and the material-behavioral model for describing and explaining change processes in activities and behavioral systems.

Although the investigation of activity areas have been mostly carried out for prehistoric settlements, with the augmentation of domestic unit

[20] LaMotta& Schiffer 2001,p.14-20

excavations in Greek archaeology, there is a great tendency to understand the household organization within itself and as the basis of city organization. Olynthos, which was one of the first domestic quarter excavations, gave a general picture for house organization. Because of its importance for the history of Greek architecture, much research has been carried out on it.

Nevett, in her book *House and Society in the Ancient Greek World*, tried to set up the social relationship in the Greek household. Domestic activities were arranged according to gender, which was an important cultural factor. The archaeological material played a vital role to setting up the organization of the household activities. In her book, she studied the house of Olynthos in order to establish how household activities were organized. The publications of the Olynthos excavations include "both the plans of the individual houses and also information about a large number of finds" that inferred "which room of which house each object came from"[21]. To undertake statistical analysis, Olynthos provided a large number of houses to be able to show how domestic activities were organized. To make up functional groups between assemblages of artefacts and architectural features, cross-tabulation analysis was used as the statistical procedure. Floor deposit finds were used in the analysis. According to the results, "some types of pottery occur in association with each other"[22] which enabled an interpretation of the use of the space and to distinguish the space of gender. Then, she gave a general view about house organization from several cities in the Greek World.

[21] Nevett 1999, p.57

[22] Ibid p.67

Another research on Olynthos houses was carried out by Cahill in his book *Household and City Organization of Olynthos.* Olynthos houses had an important place in the history of Greek domestic architecture. With detailed examination of the excavation reports, he described the houses and showed how household space was used by analysing not only the architecture but also the finds. He analysed a few of the houses at Olynthos in order to create a general picture of the house organization, but there were some differentiations in the use of space although these spaces were architecturally similar. By analysing the architecture and contents of houses, he was able to identify different uses of space, such as kitchen space (cooking area or food preparation), food storage or weaving. By this identification we are able to understand the house organization within itself and in the city organization level during the Classical Period.

Another research carried out on household activities on the basis of the subsistence economy based on storage containers, espacially *pithoi*, was done by Chistakis[23]. In his article "*Pithoi and Food Storage in Neopalatial Crete: A Domestic Perspective"*, he studied the storage capacity of Minoan Neopalatial houses dated to Late Minoan IB to be able to understand the storage facilities from a point of view of a centralized to domestic perspective. He gave a brief background of food storage and his methodology on Neopalatial houses' food storage activities, and a detailed ethnohistorical background on storage in pre-industrial Crete. He took into consideration McEnroe's Neopalatial house types in his research on storage facilities. In Type 1 houses, which are distinguished

[23] Christakis 1999, p.1-20

by close similarities in architectural details to the residential areas of the palaces, the storage facilities are related with the processing, preparation and consumption of food, weaving, workshop, cult and record-keeping activities. Within Type 2 houses, which had similar types of rooms as Type 3 houses but in a larger version, food preparation and consumption, weaving, workshop and cult activities took place. Storage facilities can occur at the ground floor near the residential rooms. Small rooms are also used for storage purposes like alongside the corridor and in pillared rooms. Type 3 houses had a simple architectural design and small size. The archaeological evidence of the ground floor showed that food preparation and consumption, weaving and workshop activieties took place in this type of house. Although there were special storerooms for foodstuffs, storage containers were also located in areas used for food preparation, processing and consumption. The differences of the capacity of storage activities in these houses reflected that their relatively weak subsistence potential foodstuffs storage were insufficient to the household during long-term food shortages except for the regional elite household. There was a food storage centralization within palaces to guarantee their sustainability.

The research which has been carried out until now show that the important problems of interpretation of archaeological data can be solved by quantitative approaches to the analysis of spatial patterns on occupation floors. A systematic collection of house floor assemblages during the excavations allows an application of statistical analysis which provide a better understanding of the information inferred from archaeological evidence.

Quantitative methods applied to artefacts that were found in house floors enable us to get more meaningful information regarding archaeological evidence as opposed to pure observation during excavation.

CHAPTER 3

THE DATA CHARACTERISTICS OF THE RESEARCH

3.1. Ancient Burgaz: A Pre-Hellenistic Site of the Knidian Territory

Since the end of 19th century, many scientists have shown interest in Burgaz (see figure 1 in Appendices B) because of the architectual traces and pottery sherds seen in great quantity on the surface. This ancient town, which is surrounded by city walls and located around Dalacak Cape, accepted as "Acropolis", is an important ancient town because of the remains belonging to the Archaic and Classic Periods. The excavations made by Panayiotis Polemikos, a Greek merchant, in 1907 shows the importance of this site[24]. Burgaz -Old Knidos- and Knidos at Tekir Cape are the main subjects of a discussion between archaeologists. Some scholars -Bean[25], Cook[26], Tuna[27]- believed that Burgaz was the Archaic and Classic Knidos. On the other hand, Demand[28] and Love[29] claimed that Knidos was always settled at Tekir Cape. Bean and Cook find Herodotos' (I, 174) description of Knidos more suitable for Burgaz. The passage of Thucydides (VIII, 35) giving more detailed information about Knidos supports this idea too. Demand claims that the town

[24] Bean & Cook 1952, p. 175-176

[25] Bean 1987, p. 160-167

[26] Cook 1962, p. 143-145

[27] Tuna 1982, p. 357-368

[28] Demand 1989, p. 224-237 / 1990, p. 146-150

[29] Love 1973, p. 421

didn't move. She points out that Knidos at Tekir Cape is a typical Archaic colony. She also claims that Bean and Cook interpret the passages of Herodotos and Thucydides wrongly. Demand shows Aristoteles' Historia Animalium as proof. She says that there is no mention of Knidos's being old or new while talking about the pond near Knidos. I. Love[30], who made excavations in Knidos between 1967 to 1973, also says that there is ceramic belonging to Myceanean, Archaic and Classical Periods. But residences from this era have not been located. Not to see any proof later than the Hellenistic Period at Knidos town in the Tekir Cape excavations initiated the search for another place for the settlement of the Knidos' early period. The fact that no finds have been found dating to the period later than the 4th century B.C. at Burgaz supports this idea. But still, to accept Burgaz as Old Knidos shouldn't mean that there is no settlement at Tekir Cape before the 4th century B.C. Also, it cannot be said that the settlement in Burgaz is not the Old Knidos if an early settlement at Tekir Cape exists. There should be a settlement, even if it is little, at Tekir Cape, because it would have been suitable for controlling the sea traffic during the Archaic and Classical Periods when sea trade and sea wars were mumerous. With this information, it is understood that Knidos was established before the 8th century B.C. in Burgaz and moved to Tekir Cape towards the end of 4th century B.C., but also that the settlement at Burgaz was not abondoned[31].

[30] Love 1978, p. 1111-1119-1129 pl. 359 fig. 18-23 / 1972, p. 65 pl. 15 fig. 7

[31] Tuna 1983, p. 63-83

3.2.Archaeological Context of Ancient Burgaz

Archaeological excavations at Burgaz (see figure 2 in Appendices B) have been initiated in 1993. The main work of the Burgaz excavation concentrated on exploring the extent and chronology of occupation levels. Classic Period remains were extended and deeply buried over two meters below the existing topsoil, whereas the Hellenistic and Roman levels show scattered tombs with sporadic habitation areas with mixed uses of agricultural processing, workshops and storage activities[32]. By the end of the third season of the Burgaz excavations, it was understood that since the middle of the 6th century B.C. the settlement had an orthogonal plan[33]. Hence, the excavation was focused on two sectors -southeast and northeast- inwhich were included the domestic quarter of the town.

Form the results of the excavation carried out since 1993 in Burgaz[34], with a number of soundings that were dug in selected areas, it is understood that the early occupation levels are belonging to the 8th century B.C. (Protogeometric Period). Burgaz, which was first established as a planned settlement in the 6th century B.C., was rebuilt with a new design in the middle of 5th century B.C. by preserving the Archaic layout of the settlement, streets aligments and walls of domestic units. The general layout of the 5th century settlement of Burgaz was preserved also in the 4th century B.C. with minor

[32] Tuna, 1994, p.283

[33] Tuna, 1996, p.258

[34] The information about the city plan of Burgaz was obtained by worthwhile discussions with the director of the excavation, Prof. Dr. Numan Tuna, and archaeologist Nadire Atıcı who conducted the Northeast Sector excavations.

alterations in the plan. The last occupation levels in Burgaz are belonging to the third quarter of the 4th century B.C.[35].

According to excavation results, it is observed that the settlement was planned as insulae bordered by streets. Although the streets were not intersected at right angles, the settlement seems to have an orthogonal plan. However, dimension of any insula and how many houses were included in an insula has not yet been completely revealed. The houses in an insula did not have a common dimension and orientation in Burgaz. Burgaz houses have pastas house plan in which the houses have a courtyard and rooms situated around this courtyard. The courts generally include a well as water supply in which rainwaters were collected. The houses were entered directly from the street.

At the Southeast Sector, the main purpose is to understand the plan of insulae and to reveal the house plans of the Classical Period. This sector was highly damaged after abandonment by later activities. For this reason, it is hard to reveal the exact plan of the houses. There is one broad road and one lane which were furnished with stone in the northwest-southeast direction. Only one house plan can be fully identified. Because of the destruction the data of the Classical Period is limited for interpretation.

The Northeast Sector (see figure 3 in Appendices B) is better proteced than the Southeast Sector and gives the best examples for the Classical Period house. In this sector, four house plans in one insula were exposed until now.

[35] Tuna, 1999, p.430

Two main streets have come to light in the northeast-southwest and northwest-southeast directions.

In Western Anatolia, besides Burgaz, 4th century B.C. residental sectors were found at Smyrna, Colophon and Klazomenai. These settlements had some differences according to their plan from Burgaz. In Smyrna, houses had prostas plan in the 7th century B.C. and at the 4th century BC. there occurred some alterations[36]. The 4th century B.C. settlement at Smyrna was reconstructed on a 7th century B.C. settlement so that it did not have a systematic orthogonal plan as at Burgaz[37]. The streets were revealed at an orientation north-south and east-west, but they were not intersected at right angles[38]. The houses were situated in insulae. They had rooms located around the court and entered directly from the street. Smyrna houses were bigger than Burgaz houses. There is not any research to define how the spatial organizations were done.

On the contrary, Klazomenai had an systematic settlement plan. As a result of excavations, it is revealed that at 4th century B.C. levels Klazomenai had a proper Hippodamic plan[39]. The insulae which were bordered by streets had the same dimensions and included six houses[40]. The houses were entered directly from the street, rooms were situated around the court and some courts had a well like Burgaz[41]. The 4th century Klazomenai houses were divided into three distinct areas: a habitation area at the north, workshop and storage

[36] Akurgal 1986, p.2

[37] Ibid., p.3

[38] Akurgal 1980, p.101

[39] Işık 1987, p.49

[40] Ibid., p.49

[41] Ibid., p.34

activities at the south, and the court was situated between them[42]. *Oikoi* were located at the north part of the house. *Androns* were plastered with white, yellow and red stucco and located alongside or opposite the entrance[43].

Colophon is the best example of 4th century houses in Western Anatolia. The houses at Colophon have the *prostas* type of plan. Prostas that served at the same time as a kitchen separated the court and *oikoi,* and its shape was not regular like the other parts of the house. The houses were entered directly from the street. *Oikoi* was situated to the north of the court while *andron* was located to the eastern part of the house[44]. The architectural remains rather than artefactual evidence were used in Colophon in order to designate the room functions[45].

In Mainland Greece, excavations at Halieis, located at the southern end of the Argaolic Peninsula, and Olynthos, situated at the Chalkidi Peninsula in northern Greece, have provide information on 4th century B.C. houses. At Halieis, the regular living quarters were identified at the Lower Town and several houses were excavated in Area 6. Although the aim of the excavation was to reveal an overall idea of the town during the Archaic and Classical Periods, there was little evidence on earlier levels going back to the 7th century B.C. as a result of the destruction at about 350 B.C. It is understood from the results of the excavations, conducted since 1962, that Halieis was laid out

[42] Ibid., p.29

[43] Ibid., p.31-32

[44] Usman 1958, p. 32-39

[45] Holland 1944, p. 123-162

according to an orthogonal plan[46]. Although it is revealed that the Jower Town had an orthogonal layout of streets and avenues where "divided the city into at least two zone of the insulae"[47] the other parts of the city had a different orientation[48]. Most of the houses which were entirely or partially excavated, have been discovered in Area 6. It was observed that the houses are entered directly from the streets or avenues. The entranceways were directly opened up to a court which was surrounded by rooms. The organization of the rooms in Halieis houses were different than each other because of the different sizes of the houses. The usage of the spaces were identified only by architectural evidence. In general, the working area was placed in the eastern corner of the houses, the court was situated in the southeast half of the houses and the habitation quarter or the other rooms that served as storage, kitchen and the like, were located in the northwest half of the house[49].

Olynthos is often considered the main source for the study of Greek houses because of the discovery of the residental sectors dating to Classical Period. The excavations at Olynthos at indicated that North Hill was its domestic quarter and was laid out on an orthogonal plan. A street grid included same size house blocks[50]. Most of the Olyntian houses had an upper storey suggested by the remains of staircases[51]. Olynthian houses were built in pastas

[46] Ibid., p. 339

[47] Ibid., p. 343

[48] Ibid., p. 342

[49] Ibid., p. 347

[50] Nevett 1999, p. 55

[51] Ibid., p. 56

type[52]. They had a courtyard as an open area was located in the southern half the house and the rooms were situated in the north[53]. A detailed examination on Olynthian houses was carried out by Nevett (1999) and Cahill (2002). These studies indicated that although there were some specific spaces such as courtyards, pastas, andron, kitchen, flue, the use of space altered according to the season[54].

3.3. Domestic Units of NE Sector at Burgaz

The excavations carried out at the NE sector indicated that the house types were pastas. It is understood that the 4th century B.C. levels began under the heterogeneous levels, which contain Roman, Hellenistic and late Classical Period materials. Generally, with four levels the fourth century B.C. floor levels and residence walls are reached. These floors were generally made up by gravel-clay or "horasan"[55]. By the soundings, it is understood that the fourth century B.C. floor levels were constructed above the fifth and sixth century B.C. floors with some alterations.

In this research, the NE sector houses were chosen to be analysed because they are better preserved than the SE sector houses and their floors can be more clearly distinguished (see figure 3 in Appendices B).

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[52] Cahill 2002, p. 75

[53] Ibid., p.75

[54] Ibid., p. 78

[55] Horasan is mortar which was made of brick dust and lime found naturally in Datça Peninsula.

NE-1 house (see figure 3 in Appendices B) is the biggest house, which measures 20,85x12,87 m, brought to light in Burgaz until now. NE-1 house is located in the southeast-northwest direction. The first construction phase is belonging to the 6th century B.C. and in this phase it was used as two small separate houses. In the middle of 5th century B.C. these two small houses were combined and rooms were organized according to household needs. The floor levels were raised during the occupation periods. Its seven different places are defined. The rooms situated at the left of the entrance had clay-horasan floors. The court had a broken clay floor. The room located at the right of entrance had a horasan floor. The room at the south corner of the house had a clay floor. The adjacent room of this room had a horasan floor, but the north part of this room had a clay floor. There is found floor materials from the mid to last quarter of the 4th century B.C. NE-1 house is less protected than the other three houses in the NE sector.

NE-2 house's plan (see figure 3 in Appendices B) is smaller than NE1 house, but it has a southeast-northwest direction too. It measures 17,74x10,38 m. While being separated from the other houses by the peristasises from north, west and east, NE-2 house is restricted by a street on the south. By the results of soundings, it is understood that the outer walls of the house were settled in the 6th century B.C. levels. The general plan of the house mostly stayed stable, but in the beginning of the 4th century B.C. some changes occured in the court of the house. In this phase, some new walls were added and a court divided separate areas for different kinds of activities. The entry of the house is probably on the south front. This house also has rooms around the courtyard.

The courtyard is entered through a corridor made by two rooms near the entry. Some parts are formed like a small corridor in the courtyard. The room located at the left of the entrance had a horasan floor. The room situated at the right of entrance, the court and the rooms located at the north part had clay floors. Floor materials are from the third quarter of the 4th century B.C. After the abondonment of the house at the end of 4th century B.C., the outer wall of the northeast side was abolished and combined with a house, which was situated at its northeast and included on iron hearth, and used as an iron workshop.

NE-3 house (see figure 3 in Appendices B), which had a simpler and smaller plan, was settled in the 6th century B.C. levels that can be inferred from the peristasis walls' soundings. It measures 12,30x8,98 m. There are peristasises on the other sides again. This house has a northeast-southwest direction and sees the street from the southwest side. Four separate parts are brought out. There is a well defined as a courtyard on the south (see figure 10 in Appendices B). There are two small rooms whose floors are protected clearly on the northeast side of the house. This house has also a change in the plan like the other two houses. The courtyard which was large until the end of the 5th century B.C. becomes small by being divided with a wall. The rooms situated at the north part had horasan floors. A lot of red stucco was found in the northwest room. The room which was entered near the well had also a horasan floor. An ashy area that was surrounded by a plane which was made up seashell, horasan and gravel, was found at the south of the court.

NE-4 house (see figure 3 in Appendices B) has a small and simple plan like NE-3 house. It measures 11,50 x 10,14 m. It has a northeast-southwest

direction. There are defined three places in the house. There exist peristasis spaces in the northeast and northwest and there are two different streets on the other sides. The entry of the house is from the southwest. The courtyard is on the west and there are two rooms on the east. The court had a broken horasan floor (see figure 10 in Appendices B). In the big room was seen a clay-horasan floor. It is observed that no alterations occured during the first occupation levels. There were raised clay and horasan floors from the 5th century B.C. to the 4th century B.C. The floor materials of the NE-3 and NE-4 houses belong to the third quarter of the 4th century B.C.

The dominant house plan of Burgaz, the pastas, was also discovered at Colophon, Halieis and Olynthos. However, although the houses at Colophon and Olynthos had an upper storey suggested by the staircases, traces of a second storey was not observed in the Burgaz houses.

CHAPTER 4

STORAGE BEHAVIOR

In the field of archaeology, there is a tendency to use storage behavior in order to understand and to reconstruct the organization of the complex society**.** In other words, the basic organizational aspects of the political economy must be reflected in storage strategies used by a society[56]. "Manipulation and mobilization of surplus, and the rise and functioning of cultural coplexity" were the main interests to grasp the storage behavior[57]. Yet, our understanding of storage is limited.

Production, consumption and distribution of goods which are related with economy are dependent on storage ability in all societies. Storage, which is a behavioral and technological activity, consists in setting aside of a very wide range of products -foods and goods- for future needs and investments. As food storage is an obvious phase between "the production of agricultural surplus and their consumption"[58] storage puposes come out for "averting subsistence shortage or unpredictability in production"[59].

[56] Smyth 1996, p.344

[57] Christakis 1999, p.2

[58] Ibid., p.2

[59] Smyth 1996, p.336

The storage and the distribution/consumption of surplus may differ according to where the surplus is housed, controlled and administered[60]. Storage was organized across different societal scales such as central, community, and household. It is easy to recognize central and community storage because they were practiced on a monumental scale. At the domestic level, recognizing the remains of storage is associated with the archaeologist's aims.

It is enough to detect the storage systems to understand the complexity of a society. Central, community, and domestic storage are three distinct storage systems which can be differentiated[61]. *Central storage* is storing, controlling and administrating foodstuffs by the state. In the *community storage*, surplus goods were produced, collected and controlled at the local level against agricultural famine. *Domestic storage* can be explained as a household with a technique for preserving food for short and long periods of time. Domestic storage can be accepted as the fundamental source for state surplus. On the other hand, during periods of famine, people certainly benefited from community and central storage organizations.

The household economy was based on storing enough food supply besides next year's seed grain[62]. To protect such quantities of food from vermin over long periods of time required specialized storage facilities[63].

[60] Christakis 1999, p.3

[61] Smyth 1989, p.91

[62] Cahill 2002, p.226

[63] Ibid, p.226

The storerooms have common architectural features: they were undecorated, large, closed rooms which had earth floors. In these storerooms the most common storage containers were *pithoi* which were found both buried below floor level and resting on the floor. It can be also inferred that storerooms served not only to store foodstuffs, but also to store household equipments.

Within the domestic units, finding transportable storage containers can imply "the frequent use and mobility of stored commodities"[64] relating with food preparing, processing and consumption that can suggest that storage purposes may alter as these kind of activities occured in different places in houses according to the seasons.

4.1. Storage containers

There have been a variety of containers to store grain and other foodstuffs: *pithoi, amphorae, situlae* and *stamnoi*. Besides these terracotta containers sacks and baskets were also used to store foodstuffs.

Pithoi: They had big, large, global shapes. It was a typical container to store agricultural goods. They were used both for wet storage such as wine, olive oil, honey and for storing dry foodstuffs like grain. They were found both buried below floor level or settled on the floor. Sunken pithoi were convenient to store oil, wine and other liquids in order to easily fill and empty[65]. Pithoi settled on the floor were used for storing grain which must be kept dry. Pithoi were also

[64] Chiristakis 1999, p. 10

[65] Cahill 2002, p.228

used for several different purposes depending on the households requirement: in courtyards to collect water from eaves; to hold olive oil or grape juice from presses; in shops or workshops.

Amphorae: Amphora is a Greek word consisting of *amphi* "on both sides" and *phoros* "carry". It has a narrow, outcurving rim, narrow and relatively long neck, two vertical handles, an oval body and a long foot which served as a third handle. As they were produced in several different regions in the Ancient World, they had different types[66]. They were used both for transport and storage. They were suitable shapes for ship transport. After arriving at their destination, amphorae were reused as storage containers. Amphorae were filled with a great deal of goods such as grain, olive oil, wine, fruit, fish sauce, tuna, olives, honey, lard, eggs and water, and also with inedible commodities such as paint, unguents, pitch and cosmetics. The shapes of the amphorae indicated what was in them: tall and slim for wine; globular or baggy bellied for olive oil; hollow-toed for fish sauce, and pig-shaped for fruits.

Situlai: It had "a sizable tubular jar, swelling towards its base, with a flat lip and a low foot"[67]. It was a kitchenware.

Stamnoi: It had a wide mouth, with a short, wide and usually offset neck. Its upper part of the body was wide. It had a low ring-shapped or disk-like foot. The handles were horizantal loops and attached from belly to shoulder. It was used in the coarser kitchenwares in most periods. Its main function was to

[66] Doğer 1991, p.7-30

[67] Cook & Dupont 1998, p. 116

contain wine. It was also used for other liquids like oil. It had a lid when used as a storage vessel[68].

The most common storage vessels which were observed in Burgaz were amphorae and pithoi. Pithoi are found in fragments which can be easily identified by their clay and shapes. There are no signs that they were sunk in floor levels. As amphora were produced in several different regions and were used in transportation and storage, there were a variety of amphora found in Burgaz such as Chios which can be a sign of trade (see Appendices A and C).

[68] Kanowski 1984, p. 141

CHAPTER 5

METHODOLOGY

With recent developments, the use of statistical analysis has been growing rapidly in order to designate the spatial distribution of artifacts on occupation floors. The aim of such analysis is to find out the activities that went on in occupation floors by investigating the association of the clusters of artifacts and other items[69].

In order to identify the room functions of Burgaz NE houses the *Blockmodelling*[70] method was selected as the statistical procedure. Blockmodelling is a method which was introduced to describe the analysis of social roles. It consists of two things. First, a partition of actors in the network into discrete subsets called positions. Position is a collection of individuals who are similarly embedded in network of relations. Second, for each pair of positions a statement of the presence or absence of a tie within or between the positions on each of the relations. Thus, the blockmodelling is a hypothesis in which a multirelational network indicates the ties between positions. After designating the congruent artefact layer groups by using Blockmodelling, the distribution tables were produced to be able to be further analysed by "*signed chi-square index*"[71]. Then, by using cluster analysis the rooms which have

[69] Wallon 1973, p. 266

[70] Wasserman&Faust 1995, p.394-424

[71] Günenç 2000, p.131

similar distribution were defined**.** At the end of the analysis, SSPS was applied in order to determine the spatial association of pottery. By using *Ward Method*[72] the dissimilarity relation tables were produced (see table 3 in Appendices D). The Ward method is one of the hierarchical methods which is based on the idea that objects can be similar to one another at different levels, so that the results can be represented in the form of a dendogram: a tree diagram representing the relationships between individuals and groups[73]. It is a useful method for archaeology for the analysis of continuous numeric data. The clusters should be as homogeneous as possible. To define homogeneity, it is necessary to show the distance of the members of a cluster from the mean of that cluster.

In this research, NE sector houses and their fourth century B.C. floor levels were chosen to carry out a quantitative method in order to detect the spatial organization of the houses. The fourth century B.C. floor levels were chosen because they were better preserved than the SE sector. The statistical analyses were done on 2412 potsherds (including discarded findings) from 37 types of pottery which were found at the last occupation floor levels dated to the third quarter of fourth century B.C.

Blockmodelling is applied in two different manners: In the first manner, each ceramic type was counted one by one according to each room in these four houses (see table 1 in Appendices D). In the second manner, floor level pottery was clasified according to its function; yet amphorae need to be

[72] Shennan 1997, p.241

[73] Ibid, p.235

considered separatly because of their high numbers. Eleven groups were identified (see table 2 in Appendices D).

Storage wares(**SW**): pithos, situla, stamnos, amphora (as a single group).

Cooking wares(**CW**): lopas, chytra, baking tray, fraying pan, sauce pan, lid, lazana.

Daily use coarse wares(**DCW**): hydria, oinochoe, pitcher.

Preparing and reserving food wares(**PRFW**): lekane, mortar, daily use krater

Food serving wares(**FSW**): bowl, plate, ladle, saltcellar.

Drinking wares(**DW**): skyphos, kylix, stemless, bolsal, kantharos.

Drinking service wares(**DSW**): krater, lebes/dinos.

Pouring and dipping wares(**PDW**): olpe, oinochoe, askos.

Oil wares(**OW**): lekythos.

Toilet wares(**TW**): pyxis, lekanis, amphoriskos.

CHAPTER 6

ANALYSIS OF THE DATA

6.1. Statistical Procedure on Floor Level Assemblages

In these two analyses of blockmodelling as mentioned in previous section, the same statistical procedures were carried out on the data. As the first step, the congruent artefact layer groups were determined by using Blockmodelling. In the second step, these groups were processed in a database.

In the first analysis, nine different groups were observed:

Assemblage 1: amphora, oinochoe, lekane, cup, cooking ware, bowl, plate, skyphos, kylix and krater.

Assemblage 2: pithos, hydria, mortar, daily use krater, saltcellar.

Assemblage 3: situla, stamnos, lopas, baking tray, lazana, cooking ware lid, lekanis.

There is a strong association both within and amongst the three assemblages.

Assemblage 4: olpe, brazier, kantharos. The association is weak.

Assemblage 5: lekythos, ladle. It has a strong association with assemblage 4

Assemblage 6: pitcher, askos. It shows a weak association.

Assemblage 7: lebes/dinos, amphoriskos.

Assemblage 8: loutherion, pyxis.

Assemblage 9: chytra, fraying pan, stemless.

There was no strong association identified.

In the second analysis, six groups were identified:

Group 1: PDW, OW, TW

Group 2: DCW, PRFW

Group3: SW

Group 4: CW, DW, Amphora

Group 5: FSW

Group 6: DSW

In the third step, distribution tables for these groups according to the rooms were produced. In fourth and final step, these distributions were further analysed by using "signed chi-square index"[74]. Then, by using cluster analysis the rooms which have similar distributions were defined. At the end of the analysis, SPSS was applied in order to determine the spatial association of pottery. By using the Ward Method the dissimilarity relation table was produced (see table 3 in Appendix D).

6.2. Spatial Determination of Floor Level Assemblages Throughout the Site

In the first analysis (see figure 4 in Appendices B), the assemblages were scattered according to the rooms (see table 4 in Appendix D).

[74] Güvenç & Akder 2000, p.131

Assemblage 1: It is seen all over the rooms with the exception of 1Ba, 1Bb, 1F, 1H, 1Ia, 2E, 2Fd, 3A, 3B, 3C.

Assemblage 2: 1Ba, 1Bb,1F, 1H, 2E, 3C

Assemblage 3: 1F, 2Fc, 2Fd

Assemblage 4: 2Fa, 2C, 3A, 3B, 4C

Assemblage 5: 1G, 1Ia, 2Fd, 1H

Assemblage 6: 3A, 2E, 2Fc, 2Fd

Assemblage 7: 1H

Assemblage 8: 2A, 2B, 2C, 2E, 2Fb

Assemblage 9: 4C

Assemblages 1, 2 and 3, which consisted of household, storage and cooking wares, are relatively closely correlated which suggests that they were used together. According to the distribution tables for these assemblages in respect to the rooms, assemblage 1 was seen in all rooms of these four houses except for 1Ba, 1Bb, 1F, 1H, 1Ia, 2E, 2Fd, 3A, 3B, 3C. The content of assemblage 1 is the most widespread pots used in household activities. The co-absence between assemblage 1 and assemblage 2 in rooms 1F, 1H, 1Ba, 1Bb, 1Ia, 2E, 3C can be explained as these rooms were used as food preparing areas. By the co-presence of assemblage 2 and 3 in room 1F and the co-presence of assemblage 1 and 3, in room 2Fc and 2Fd, it can be inferred that these rooms were used for food processing activities. According to the dispersion of the storage wares, we can identify places which were used for storage purposes. In *NE-1 house*, storage pots are seen in most of the rooms. However, in rooms 1A, 1E, 1G they are not seen in a high enough concentration to be able to

identify it as storeroom. Room 1Ba and b, which had a high concentration of assemblage 2, served as a storage room for foodstuffs and other household equipment. The high concentration of assemblage 2 and 3 in room 1F indicate that this room also served as storage purposes. In *NE-2 house,* the co-presence of storage vessels with daily use coarse ware show that in the courtyard (2Fc, 2Fd), which was the main living area of the house, the storage facilities were related to cooking activities, room 2E was a special storeroom that held the household equipment and stored smaller quantities of foodstuffs. The other rooms 2A, B, C, D Fa, Fb included some quantities of storage containers relating with household activities. In *NE-3 house,* the co-presence of assemlage 1, 2 and 3 in the courtyard (3Da,b) showed that the court was used for storage purposes relating to food preparing activities. Room 3C can be interpreted as a storeroom for household supplies. In *NE-4 house,* although there are not any special spaces for storage purposes, all places include some quantities of storage vessels relating to some household activities.

In the second analysis (see figure 5 in Appendices B), the groups were scattered according to the rooms (see table 5 in Appendix D).

Group 1: 1D, 1H, 1Ia, 2Fd

Group 2: 1F, 2Fd, 3Da, 1H, 3Db

Group 3: 1Ia, 1Bb, 2E, 3C, 1Ib, 3Db, 1F,1Ba,

Group 4: 2C, 2D, 4A, 4C

Group 5: 1A, 1Ba, 1E, 1G, 1Ib, 2Fb

Group 6: 1H, 2A, 2Fc, 3Db

According to the second analysis, the concentration of the storage vessels shows that some places in the houses were used for storage purposes. In *NE-1 house,* in the middle of the courtyard (1Ia) group 1 and 3 are seen in co-presence, which suggested that this part of the court was used for food preparing activities, and the association of group 3 and 5 in 1Ib indicated that this part of the court was used for food processing activities; in room 1F the association between group 2 and 3 indicated that this room was used as a storage room and for food preparing activities. In room 1Bb the concetration of storage pots together with food preparing and serving vessels indicated that this room was used for food processing activities. Whereas in *NE-2 house,* there is a high concentration of amphorae as storage wares and these are found together with cooking and drinking wares in rooms 2C and 2D. It can be suggested that the amphorae were used to store wine, oil and foodstuffs. In room 2E there is a concentration of group 3, but there is no sign that pithoi were buried into the floor level. Therefore, pithoi must have been used to store grain and the like. In *NE-3 house,* storage vessels are widely dispersed in room 3C, which indicates that this room was used for the storage of foodstuffs. The correlation of group 2, 3 and 6 in the courtyard (3Db) shows that the inhabitants of this house performed their daily use activities in the court. In *NE-4 house,* the courtyard (4C) and room 4A had a concentration of amphorae together with cooking and drinking wares, which can infer that these areas are, used for food preparing and storage purposes.

6.3. Designation of Similarities of the Distributions of Assemblages Throughout the Site

Statistical analyses that were carried out in order to identify the storerooms in Burgaz houses illustrated various correlations between the pottery groups and rooms. When these two analysis results are compared:

At *NE-1 house,* 1Ia which is located in the middle of the courtyard was used for storage purposes. Yet, this was in the middle of the courtyard it can be thought that it was used for storage purposes relating with food processing activities. The northwest corner of the courtyard 1Ib was also used for storage purposes related with food preparing activities. The rooms 1Ba and b were also used for storage purposes, but in 1Ba household equipment and 1Bb foodstuffs were stored. In room 1F, the co-presence of storage vessels with daily use activity vessels shows that this room was used for multifunctional purposes.

At *NE-2 house,* in room 2C the concentration of storage containers together with cooking and drinking wares indicated that this room was used for food processing activities. In room 2D the co-presence of storage pots with drinking and cooking vessels related with ashy area showed that this room was used for cooking activities. In room 2E, the high concentration of storage vessels indicated that this room served as a special storeroom. The concentration of storage containers with daily use coarse wares and cooking wares at the north part of the courtyard (2Fa and c) showed that this part of the court was used for daily use activities.

At *NE-3 house,* although there is a low concentration of storage vessels in room 3B, it cannot be assumed that this room was used for storage facilities.

In room 3C the storage containers had a high concentration so that it can be supposed that this room served as a special storeroom for foodstuff supply. The north part of the court (3Da), which was a semi-closed area, was an area where the inhabitants performed their daily use activities.

At *NE-4 house,* the storage vessels were seen both in the court and in the rooms together with daily use coarse wares and cooking pots. It can be interpreted that all places of this house were used for multipurposes activities.

As a result of these two analyses, the rooms 1Ba and b, 2E, 3C were used for storage purposes whereas the others were used for multipurpose activities.

In these two analyses, the aim is to create how domestic activities were organised in a general settlement pattern, and to isolate recurring assemblages of artefacts in use at selected floor levels. In order to produce the maps for NE sector houses, it is taken into consideration the high concentration of groups to make the map colourful. In the view of the general picture of the NE sector, there was not a common orientation for household activities. In other words, because of their size, each house had their own spatial organization according to their needs. In *NE1 house*, the activity of storage was located at the south of the house and the court was used for storage related to daily works such as food preparation or cooking. In *NE2 house*, storage activity took place at the north of the house, whereas ın *NE3 house* at the south of the house. In *NE4 house,* rooms were used for multifunctional aims (see Appendix B).

6.4.Analysis by Individual Houses

After depicting the general organization of the Burgaz NE houses, these four domestic units were analysed separately. In the first step, it is calculated the frequencies of pottery groups on observed values. In the second step, the expected values of groups were computed. In the third step, it is figured the difference between observed and expected values. And, in the final step the degree of these differences, which showed with values between –1 and +1 were calculated. –1 shows a lower degree and +1 shows a higher degree than the expected values. Then, by using signed chi-square index the relation of presence/absence of groups according to each room was indicated. Higher index values suggest overrepresentation of certain types of in certain rooms. In determining the legend of the map the highest concentration of pottery is taken into consideration.

At *NE1 house* (see figure 6 in Appendices B), a part of the courtyard (1Ia) was used for storage purposes relating with daily household activities such as food serving or cooking activities. The concentration of amphorae in room D indicated that this room was used for foodstuffs storage, or, as it is known that amphorae were used as trade containers, this area was maybe used to store the commercial goods. In room B, the result showed that this room was used, at the same time, to store foodstuffs and household equipments (see table 6 in Appendix D).

At *NE2 house* (see figure 7 in Appendices B), Room 2C was used to store the commercial goods whereas Room 2E was used to store foodstuff supplies of the household (see table 7 in Appendix D).

At *NE3 house* (see figure 8 in Appendices B), Room 3A was used for storing the household equipment. In Room 3C the correlation of storage wares and drinking wares indicated that this room was used to store liquids. The southwest corner of the court (3Da) was used to keep the household foodstuffs supply (see table 8 in Appendix D).

At *NE4 house* (see figure 9 in Appendices B), Room 4A and 4B were used to store household equipment and the foodstuffs supply (see table 9 in Appendix D).

6.5. Discussion of the Statistical Analysis Results

These three analyses have some similarities and differences. The first analysis, where all the artefacts were counted one by one, has some disadvantages. Because of the different amount of numbers of each artefact, the assemblages which were produced are not very meaningful within themselves, such as assemblages 4,5,6,7,8,9. On the other hand, the second analysis, where the artefacts were grouped according to their function, gave more expressive results. Finally, the analysis of each house gave more precise results to identify the room function. When comparing these three analysis:

At *NE1 house,* which is the biggest house of NE sector, the concentration of the storage wares showed that I1a, although it was located in

the middle of the courtyard, was an area for storage purposes relating with food processing activities. As the court was the main living place in houses, it can be thought that this area was used to store some daily use materials used for food preparing activities. In room 1B the dispersion of storage wares together with daily use coarse wares like krater, oinochoe, lekane, mortar and food serving wares such as bowls, plates, and saltcellars; indicated that this room was used for storing the foodstuffs supply together with household equipment. Although it is designating that in room 1F occured storage vessels together with food preparing pots in the first two analyses, in the third analysis the storage containers are seen together with cooking and daily use coarse ware. This can suggest that the room was used for multipurpose aims.

At *NE2 house,* which is big in size, these three analyses showed that room 2E was used as a special storeroom (see figure11 in Appendices B). There is no sign that pithoi were buried under the floor level. The southeast of the room was ruined by a kiln of a metal workshop which was established after the abondonment. Unlike the first analysis, the second and third analysis demonstrated that room 2C was used for storage purposes too (see figure 12 in Appendices B). The difference of the second and third analysis can be seen in room 2D. In the second analysis the amphorae were seen together with cooking and drinking wares, but in the third analysis the cooking wares had a high concentration in this room. Taking in consideration the ashy area in this room, it can be suggested that this room functioned as a cooking area.

At *NE3 house,* which is small in size, three analysis results indicated that room 3C was a special storeroom. In the first and third analysis room 3A

had a concentration of daily coarse wares and amphorae. It can be suggested that this room was used for daily household activities. The courtyard (3D) was used for food preparing activities according to the results of the second and third analysis (see figure 13 in Appendices B).

At *NE4 house,* which is the smallest house of the NE sector, according to the third analysis, the dispersion of storage wares were concentrated at room 4A and 4B. In room A amphorae were found with daily use coarse wares. In room 4B storage wares were found together with cooking and preparing and reserving food wares. It can be suggeested that this room was used for daily activities.

CHAPTER 7

CONCLUSION

By the recent developments in archaeology mentioned above, the aim of archaeologists began to change not only with the interpretation of the materials but also in the understanding of past human behavior and spatial organization. The relationship between social behavior and material culture offers an ideal opportunity for household archaeology. In this research, I try to designate the storerooms in Burgaz NE sector houses at fourth century B.C. floor levels. To assess the spatial organization of houses, archaeological data is used to designate the room function[75] in terms of storage behavior by undertaking statistical analysis.

The evidence of activities taken place in rooms can be derived from archaeological remains[76]. The best source for Classical houses was excavated by Robinson at Olynthos. The research made by Nevett and Cahill on Olynthian houses showed that there was not a common organization of household activities amongst houses. Although Olynthos had an orthogonal town plan, each house had their own spatial organization according to their needs. There were a variety of storage strategies at Olynthos houses, like large capacity storerooms for a great amount of foodstuffs supply; small quantities of foodstuffs stored in a room in which there occured other activities such as the

[75] Nevett 1999, p.10

[76] Ibid, p.21

kitchen, or held other household equipment; and so on. The storerooms at Olynthian houses were located on the side of the house adjacent to the north-south avenue[77]. At Halieis houses, the court consisted of a large quantity of artefacts and played a vital role in domestic activity. The cooking area was placed in the east of the court. The *andron*, men's dining room, and anteroom were located close to the street door.

In Western Anatolia, the best examples of Classical houses were excavated at Smyrna, Colophon and Klazomenai. Although the settlement organization at Smyrna is revealed there is not any information about the house organization. The archaeological evidence is used to identify the space usage at Colophon houses and they had an upper storey. However, at Klazomenai, there is a systematic settlement organization and houses are defined according to spatial arrangement. Their habitation parts are situated at the north, whereas workshops and storage activities took place at the south.

To be able to designate the room functions at Burgaz NE sector houses, a statistical analysis is carried out on the remains of activities on room floors. According to these three analyses, the location of storage areas did not have a common orientation in house organization. Because of the difference in dimension between these four houses, each house has their own spatial organization. According to statistical analysis results, in *NE1 house,* storage went on at three different places: storage vessels were seen in room 1F together with food preparing pots, cooking and daily use coarse wares that can be suggested as *oikoi*. In room 1B, the association of storage containers with daily

[77] Ibid, p.230

use coarse wares and food serving pots can be interprted as a storeroom for foodstuffs supply together with household equipment. Although it was situated in the middle of the court, storage took place relating with food processing activities. Room 1A can be thought as *andron* with respect to the artefacts found in it. In *NE2 house,* storage activities took place in two different rooms. Room 2E served as a special storeroom whereas room 2C was used to store commercial goods. Because of the association of amphorae with cooking and drinking wares, room 2D can be thought of as the *oikoi* of this house. In respect to the artefacts found in room 2A, it can be said that this room served as *andron.* In *NE3 house,* room 3C was used as a special storeroom. The north part of the court, which was a semi-closed area, was used for storage relating with daily household activities. In *NE4 house,* special storeroom was not defined. The storage activities were relating with daily household activities.

Although the Southeast Sector of Burgaz was ruined by later activities after the abandonment, a detailed examination of the excavation results would allow an identification of the spatial organization of the 4th century B.C. houses. Especially a statistical analysis as was applied for the Northeast Sector houses would have revealed valuable information for the whole site. This is a subject of further research task. The aim of this research is to serve as a model for applying statistical methods when identifying spatial organization at ancient sites and give the opportunity to use of such techniques in future studies at other West Anotolian Settlements.

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APPENDICES

A. CATALOGUE

This catalogue includes a representative selection of storage vessels which were found at fourth century BC floor levels of Burgaz NE sector houses. They are cataloguing according to their types. Munsell Colour Catalogue is used to identify their colours.

Plate 1

Pithos

Inv No: BZ.00.NE.5.7.D7.1

Diam. of rim: 40 cm

H: 7,7 cm

Clay: 5 YR 6/6 reddish yellow

Flat projecting rim profilled beneath.

Plate 2

Amphora

Inv. No: BZ.00.NE.5.7.B5.2

Diam. of rim: 14 cm

H: 5,2 cm

Clay: 7,5 YR 8/4 pink

Mushroom rim

Amphora

Inv. No: BZ.00.NE.5.6.C6.9

Diam. of rim: 11 cm

H: 4,1 cm

Clay: 5 YR 6/6 reddish yellow

Surface: 7,5 YR 7/6 reddish yellow

Mushroom rim.

Amphora

Inv No: BZ.98.NE.2.8.A5.25

Diam. of rim: 11 cm

H: 5,2 cm

Clay: 5 YR 7/6 reddish yellow

Mushroom rim.

Amphora

Inv No: BZ.99.NE.2.7.D12.97

Diam. of base: 5,4 cm

H: 4,1 cm

Clay: 5 YR 7/4 pink

Surface: 5 YR 8/3 pink

Knob base.

Plate 3

Situla

Inv. No: BZ.01.NE.5.6.D6B.5

Diam. of rim: 13,5 cm

H: 9,5 cm

Clay: 5 YR 7/8 reddish yellow

Prjecting rim profilled beneath.

B. FIGURES

Figure 1. Geographical Location of Burgaz in Knidian Peninsula

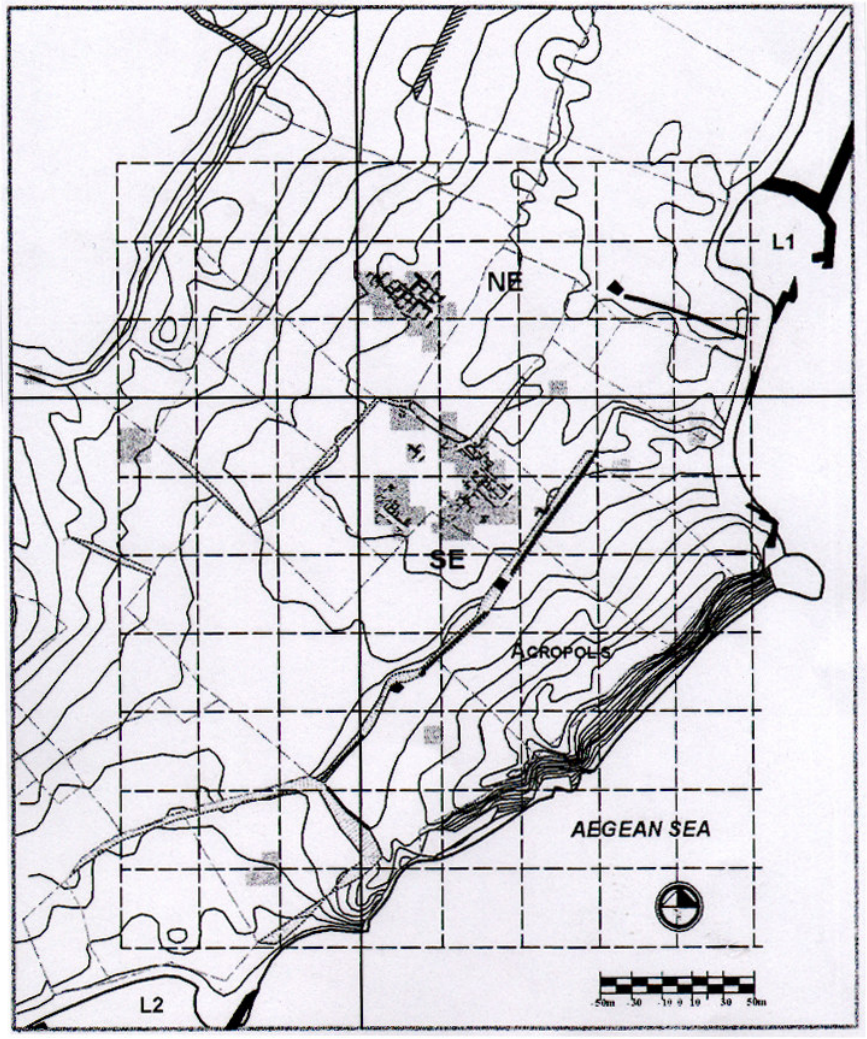


Figure 2. Burgaz Site Plan

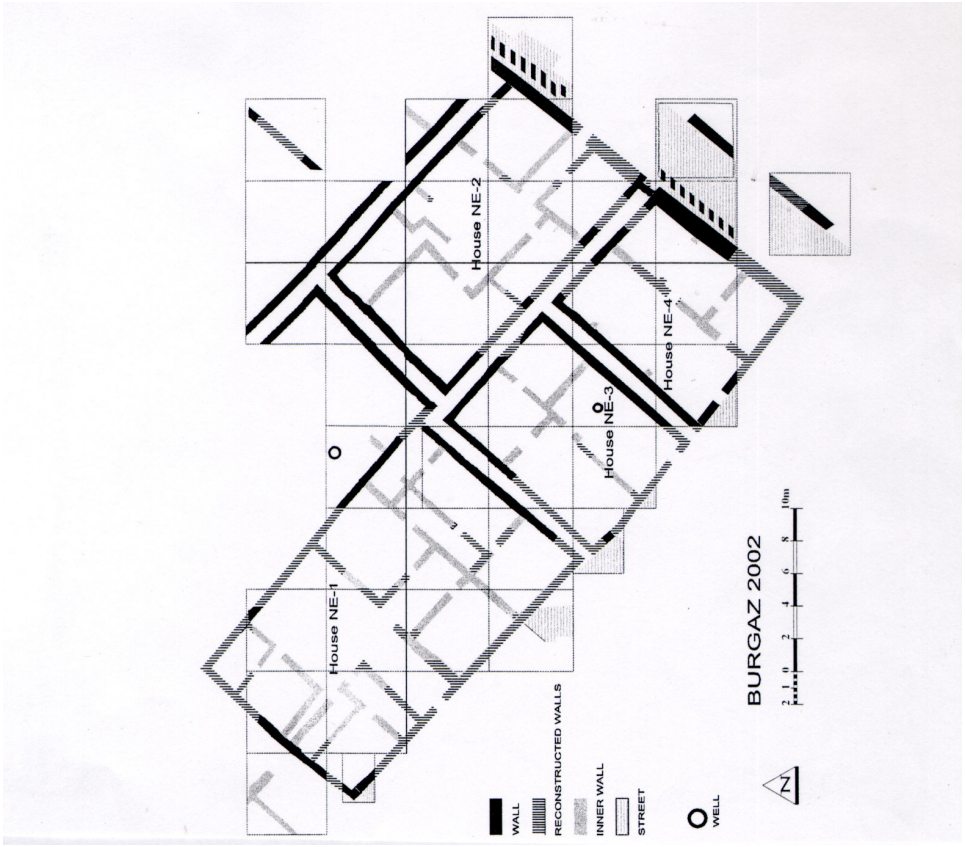


Figure 3. NE Sector of Burgaz

Figure 4. Analysis in Distribution Pattern of Pottery Types

Figure 5. Analysis in Distribution Pattern of Pottery Groups

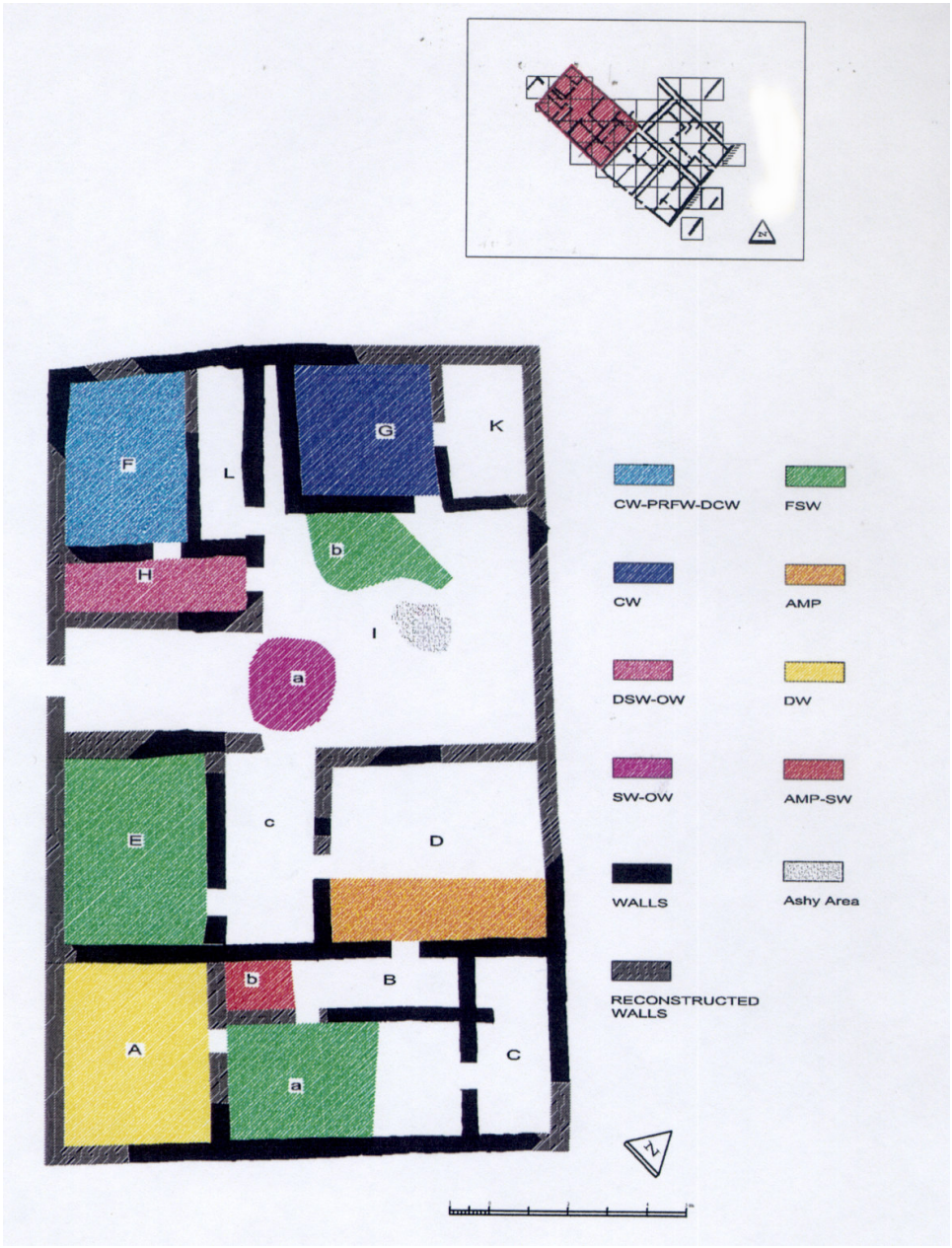


Figure 6. Analysis by Individual Houses
Distribution of Pottery Groups in NE-1 House

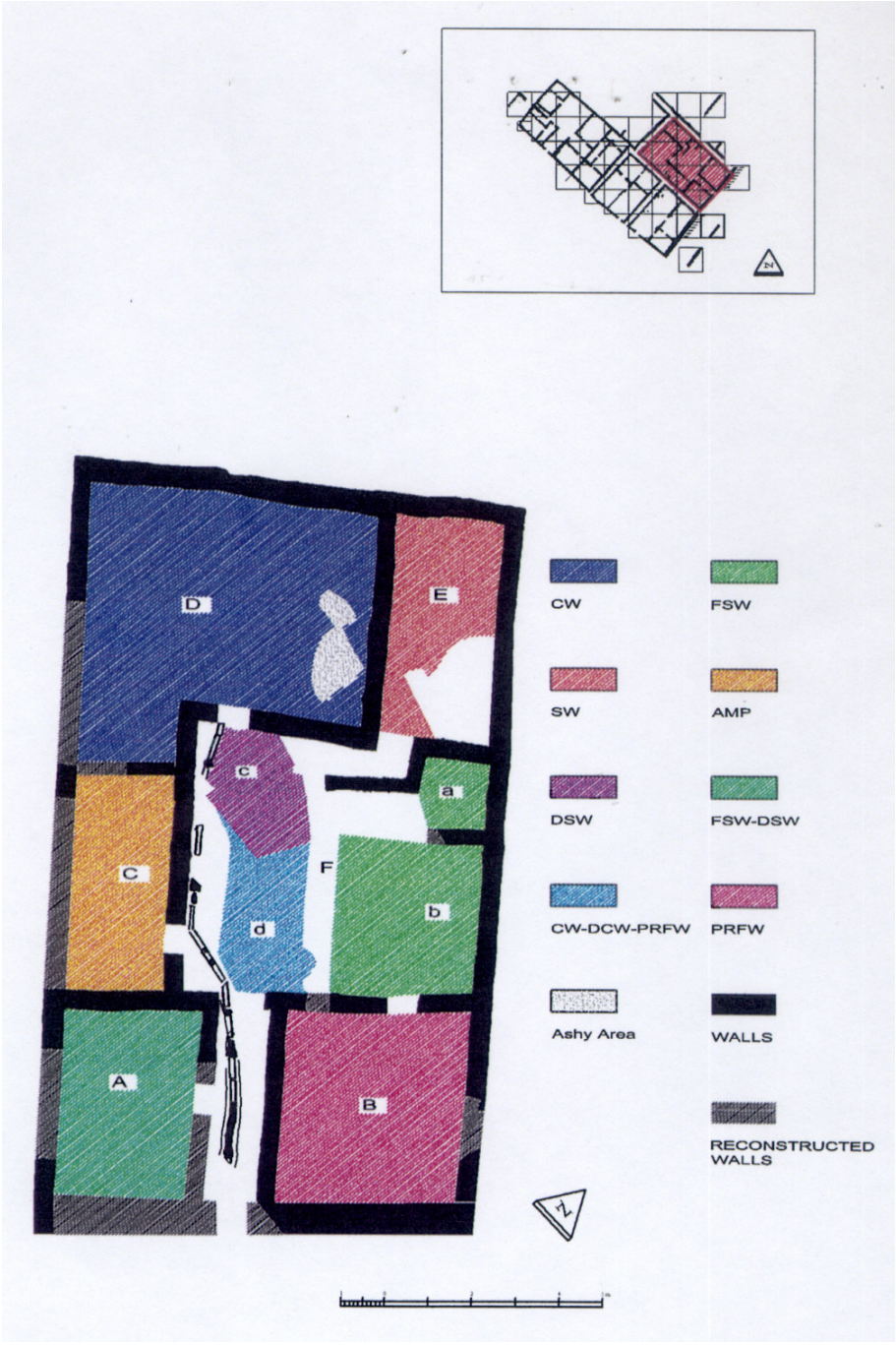


Figure 7. Analysis by Individual Houses
Distribution of Pottery Groups in NE-2 House

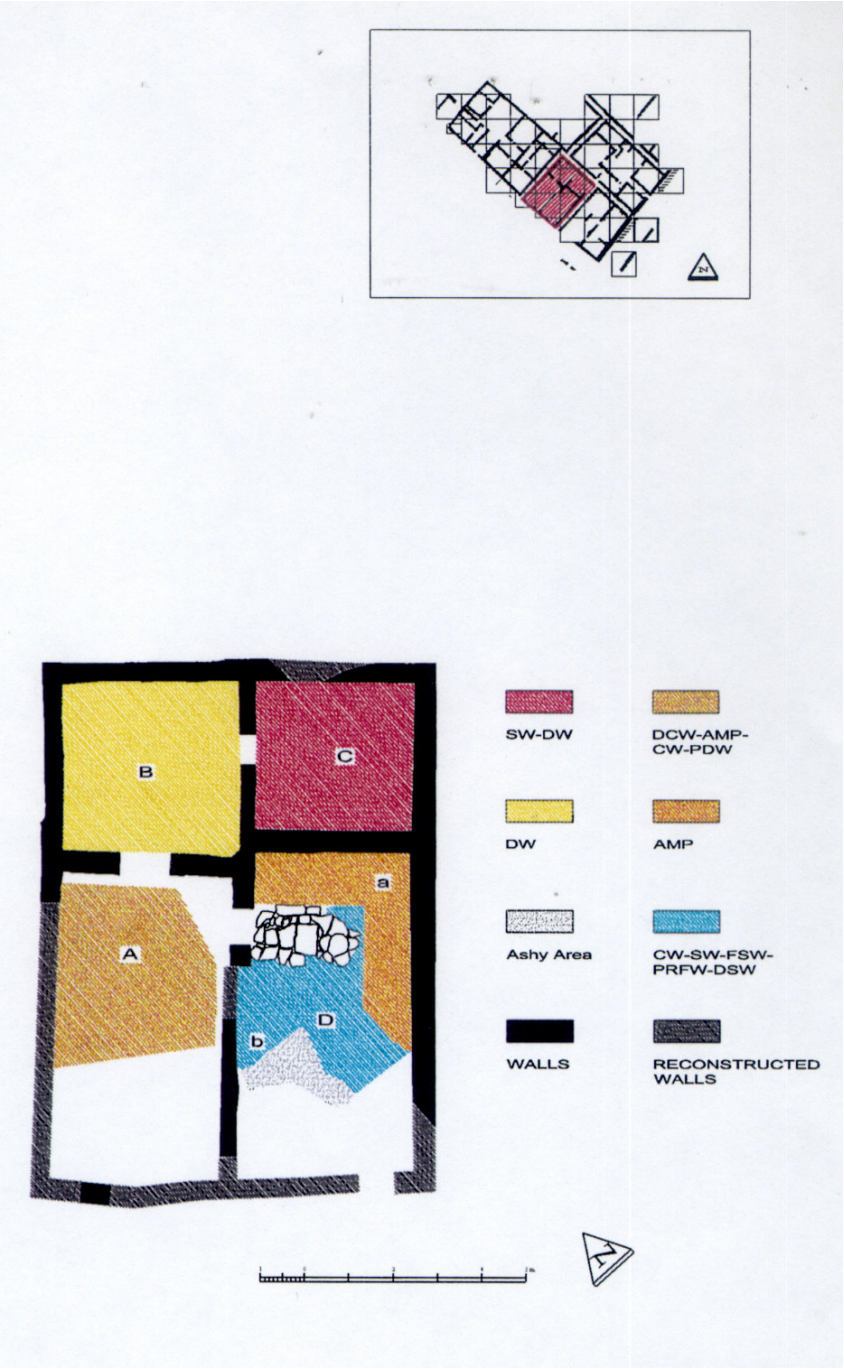


Figure 8. Analysis by Individual Houses
Distribution of Pottery Groups in NE-3 House

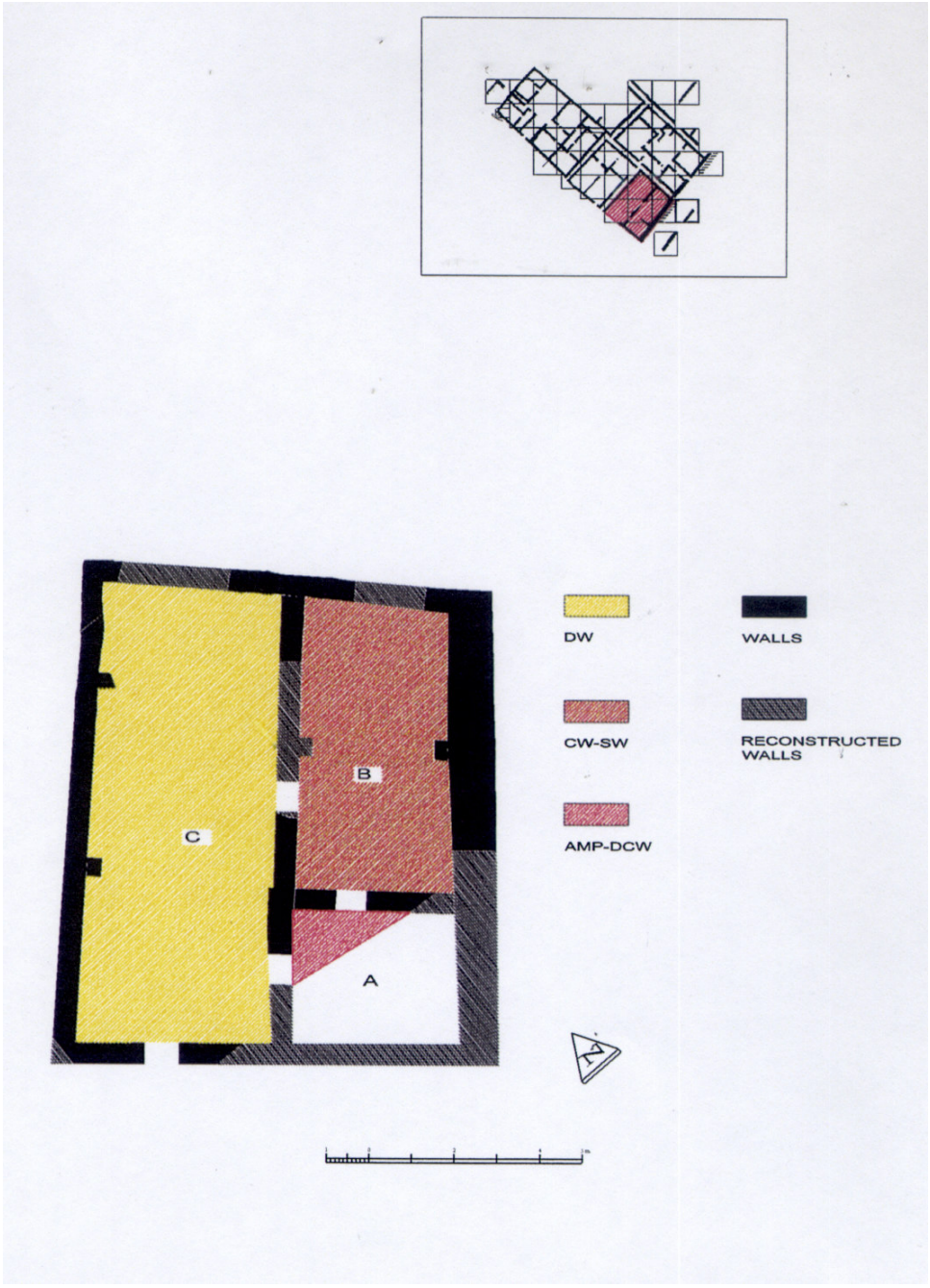


Figure 9. Analysis by Individual Houses
Distribution of Pottery Groups in NE-4 House

Figure 10. View of the Courts of NE-3 and NE-4 Houses

Figure 11. Room 2E Suggested as Storage Space in NE-2 House

Figure 12. Room 2C Suggested as Storage Space in NE-2 House

Figure 13. Southwest Corner of the Court (3Da) Suggested as Storage Space in NE-3 House

C. PLATES

Plate 1

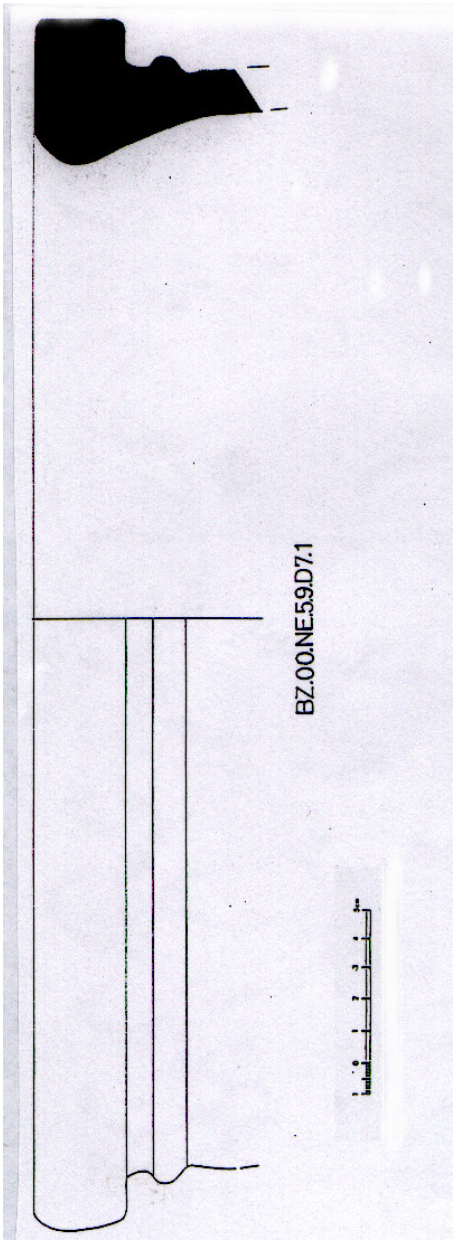
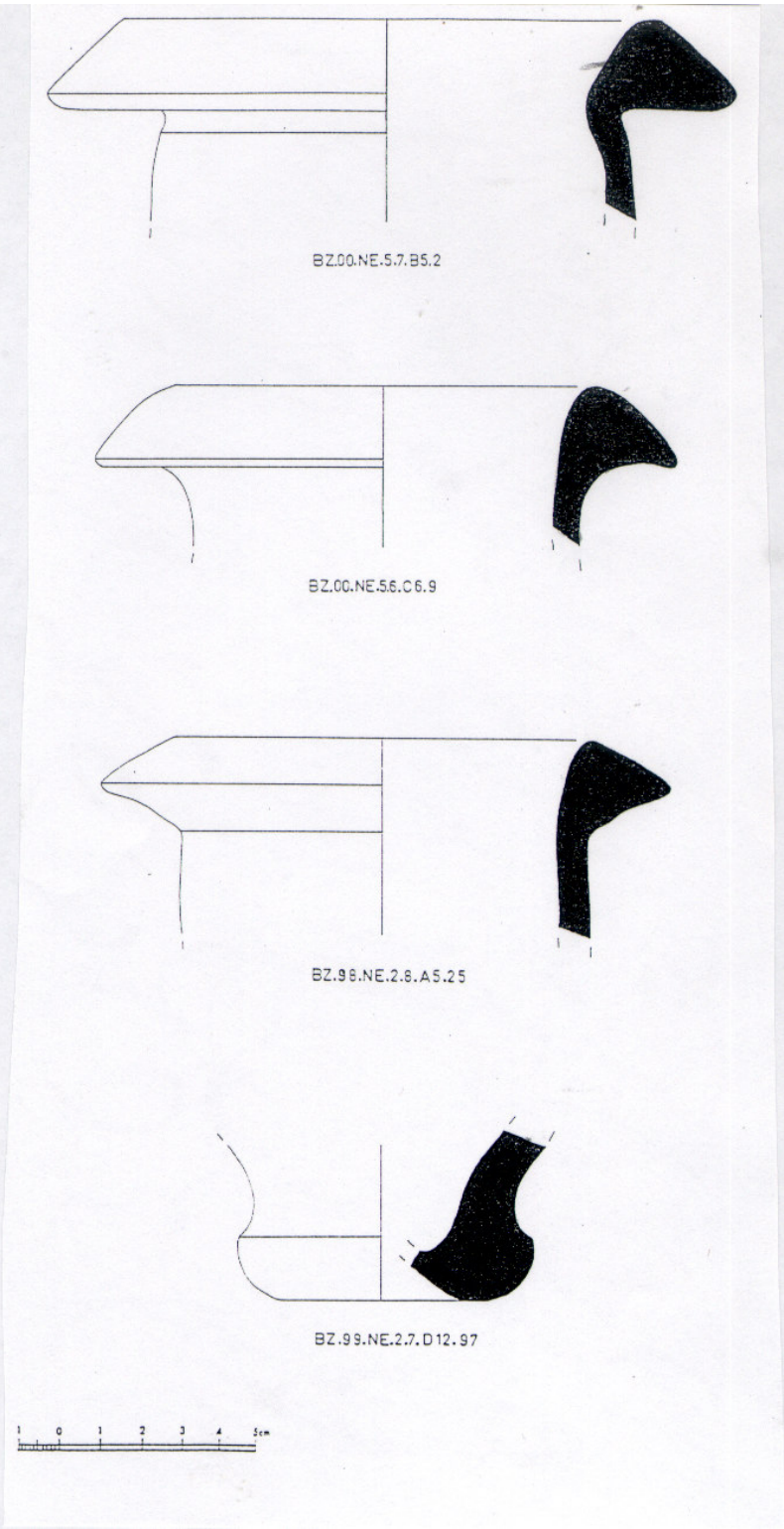


Plate 2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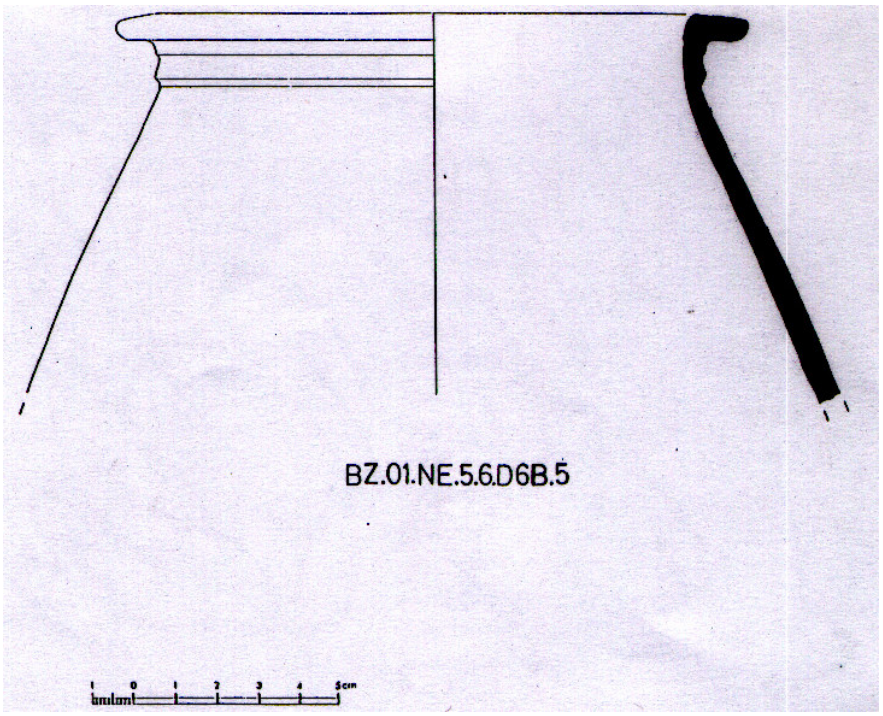
BZ.00.NE.56.C6.9
BZ.98.NE.2.8.A5.25
BZ.99.NE.2.7.D12.97
1 0 1 2 3 4 5cm

Plate 3



D. TABLES

Table. 1 Pottery Types Observed on Floor Level

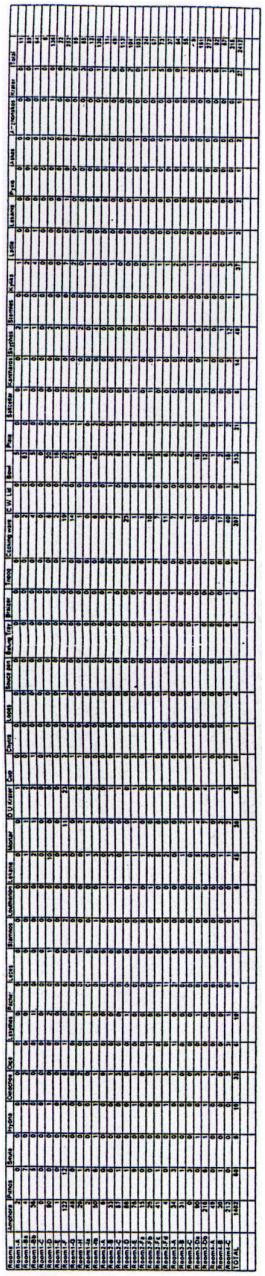


Table 2. Pottery Groups Observed on Floor Levels

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW	TOTAL
Room1A	2	0		0	1	5	3	0	0	0	0	11
Room1Ba	4	7	2	4	4	64	4	0	0	0	0	89
Room1Bb	36	5	4	0	6	6	5	0	1	1	0	64
Room1C	0	0	0	0	0	0	0	0	0	0	0	0
Room1D	90	0	6	1	13	20	2	0	1	2	1	136
Room1E	1	0	2	0	0	16	3	0	0	0	0	22
Room1F	122	16	25	9	40	26	10	1	2	0	1	252
Room1G	48	0	14	0	4	24	5	0	0	0	0	95
Room1H	29	1	1	2	9	5	2	0	4	2	0	55
Room1Ia	2	3	0	0	2	3	1	0	0	1	0	12
Room1Ib	50	8	6	2	7	47	9	0	1	0	0	130
Room2A	6	0	0	0	0	3	0	0	1	0	0	10
Room2B	33	0	6	1	4	3	1	0	0	0	0	48
Room2C	87	1	7	3	2	9	3	0	0	0	0	112
Room2D	66	1	23	0	1	6	4	0	2	1	0	104
Room2E	76	9	1	2	6	5	1	1	0	0	1	102
Room2Fa	15	0	2	0	1	5	0	0	1	0	0	24
Room2Fb	26	0	11	3	5	16	2	1	1	0	1	66
Room2Fc	41	1	10	2	6	6	2	0	5	0	0	73
Room2Fd	4	0	13	5	4	8	1	1	0	1	0	37
Room3A	34	3	8	3	0	3	2	1	0	0	0	54
Room3B	31	1	4	0	5	6	7	0	1	0	0	55
Room3C	0	3	1	0	1	2	2	0	0	0	0	9
Room3Da	90	1	12	3	18	17	7	0	2	1	0	151
Room3Db	21	7	11	2	14	13	4	0	3	0	0	75
Room4A	49	0	0	1	1	1	0	0	0	0	0	52
Room4B	30	1	17	0	4	3	1	0	1	0	0	57
Room4C	212	0	45	2	8	21	19	4	3	1	0	315
TOTAL	**1205**	**68**	**231**	**45**	**166**	**343**	**100**	**9**	**29**	**10**	**4**	**2210**

Table 3. Dendogram Showing Produced Pottery Groups

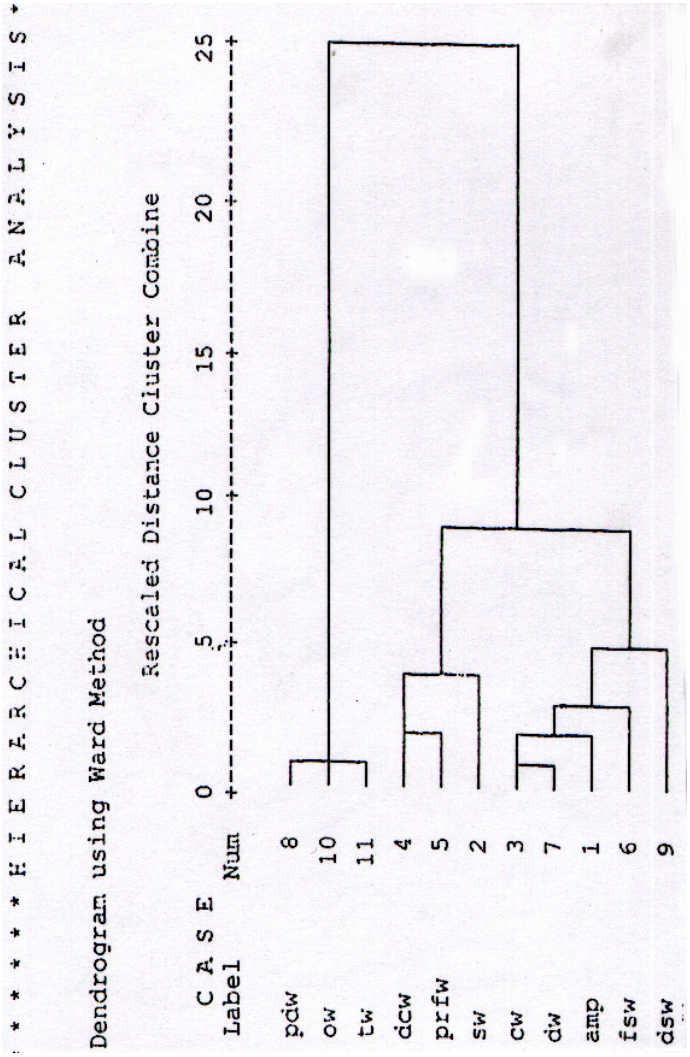


Table 4. Distribution of Pottery Types Throughout the Site

ROOMS	ASSEMBLAGE1	ASSEMBLAGE2	ASSEMBLAGE3	ASSEMBLAGE4	ASSEMBLAGE5	ASSEMBLAGE6	ASSEMBLAGE7	ASSEMBLAGE8	ASSEMBLAGE9	CLU5_1	CLU8_2	CLU7_2	CLU6_2	CLU5_2
Room1A	00,00	00,04	-00,13	-00,11	-00,06	-00,03	-00,01	-00,03	-00,01	01,00	01,00	01,00	01,00	01,00
Room1E	00,29	-01,63	-00,26	-00,22	-00,12	-00,05	-00,03	-00,05	-00,03	01,00	01,00	01,00	01,00	01,00
Room1G	00,63	-02,33	-01,10	-00,95	-00,51	-00,24	-00,12	-00,24	-00,12	01,00	01,00	01,00	01,00	01,00
Room1Ib	00,01	00,19	-01,29	-00,70	-00,32	-00,16	-00,32	-00,16	-00,16	01,00	01,00	01,00	01,00	01,00
Room2D	00,57	-05,85	-01,21	00,90	00,34	-00,26	-00,13	-00,26	-00,13	01,00	01,00	01,00	01,00	01,00
Room3Da	00,00	00,06	00,89	-01,50	00,04	-00,38	-00,19	-00,38	-00,19	01,00	01,00	01,00	01,00	01,00
Room3Db	00,23	-00,07	-00,42	-01,08	-01,47	-00,68	-00,34	-00,68	-00,34	01,00	01,00	01,00	01,00	01,00
Room4A	00,47	-02,12	-00,60	-00,52	-00,28	-00,13	-00,06	-00,13	-00,06	01,00	01,00	01,00	01,00	01,00
Room4B	00,09	-00,01	-00,66	-00,57	-00,31	-00,14	-00,07	-00,14	-00,07	01,00	01,00	01,00	01,00	01,00
Room1F	-5,65	55,78	22,29	-0,91	-1,36	-0,63	-0,31	-0,63	-0,31	4	4	4	3	2
Room1H	-1,01	6,93	-0,64	-0,55	24,66	-0,14	12,69	-0,14	-0,07	5	2	2	2	1

ROOMS	ASSEMBLAGE1	ASSEMBLAGE2	ASSEMBLAGE3	ASSEMBLAGE4	ASSEMBLAGE5	ASSEMBLAGE6	ASSEMBLAGE7	ASSEMBLAGE8	ASSEMBLAGE9	CLU5_1	CLU8_2	CLU7_2	CLU6_2	CLU5_2
Room3C	-01,14	16,82	-00,10	-00,09	-00,05	-00,02	-00,01	-00,02	-00,01	03,00	04,00	03,00	03,00	03,00
Room1Ba	-00,24	06,19	-01,03	00,01	-00,48	-00,22	-00,11	-00,22	-00,11	01,00	02,00	01,00	01,00	01,00
Room1Bb	-00,16	02,22	-00,74	-00,64	07,94	-00,16	-00,08	-00,16	-00,08	02,00	03,00	02,00	02,00	02,00
Room1Ia	-01,28	10,86	-00,14	-00,12	13,53	-00,03	-00,01	-00,03	-00,01	02,00	03,00	02,00	02,00	02,00
Room2E	-00,37	03,75	-00,03	00,00	-00,56	02,16	-00,13	02,16	-00,13	01,00	02,00	01,00	01,00	01,00

ROOMS	ASSEMBLAGE1	ASSEMBLAGE2	ASSEMBLAGE3	ASSEMBLAGE4	ASSEMBLAGE5	ASSEMBLAGE6	ASSEMBLAGE7	ASSEMBLAGE8	ASSEMBLAGE9	CLU5_1	CLU8_2	CLU7_2	CLU6_2	CLU5_2
Room2Fc	00,01	-02,16	05,47	00,10	-00,39	03,69	-00,09	-00,18	-00,09	01,00	01,00	01,00	01,00	01,00
Room2Fd	-00,48	00,02	05,74	-00,37	03,21	39,55	-00,05	-00,09	-00,05	05,00	07,00	06,00	05,00	05,00

ROOMS	ASSEMBLAGE1	ASSEMBLAGE2	ASSEMBLAGE3	ASSEMBLAGE4	ASSEMBLAGE5	ASSEMBLAGE6	ASSEMBLAGE7	ASSEMBLAGE8	ASSEMBLAGE9	CLU5_1	CLU8_2	CLU7_2	CLU6_2	CLU5_2
Room3A	-00,03	-00,25	-00,63	03,98	-00,29	25,91	-00,07	-00,13	-00,07	05,00	08,00	07,00	06,00	05,00
Room2C	00,39	-04,86	-01,31	03,13	-00,81	-00,28	-00,14	01,84	-00,14	01,00	01,00	01,00	01,00	01,00
Room2Fa	00,12	-01,78	-00,28	02,43	-00,13	-00,06	-00,03	-00,06	-00,03	01,00	01,00	01,00	01,00	01,00
Room3B	-00,02	00,21	-00,64	03,66	-00,30	-00,14	-00,07	-00,14	-00,07	01,00	01,00	01,00	01,00	01,00

ROOMS	ASSEMBLAGE1	ASSEMBLAGE2	ASSEMBLAGE3	ASSEMBLAGE4	ASSEMBLAGE5	ASSEMBLAGE6	ASSEMBLAGE7	ASSEMBLAGE8	ASSEMBLAGE9	CLU5_1	CLU8_2	CLU7_2	CLU6_2	CLU5_2
Room2A	00,00	-00,82	-00,13	-00,11	-00,06	-00,03	-00,01	34,57	-00,01	04,00	05,00	04,00	04,00	04,00
Room2B	00,04	-01,91	00,33	00,54	-00,26	-00,12	-00,06	06,33	-00,06	01,00	01,00	01,00	01,00	01,00
Room2Fb	00,00	-00,78	00,06	00,17	-00,36	-00,17	-00,08	20,17	-00,08	04,00	06,00	05,00	04,00	04,00

ROOMS	ASSEMBLAGE1	ASSEMBLAGE2	ASSEMBLAGE3	ASSEMBLAGE4	ASSEMBLAGE5	ASSEMBLAGE6	ASSEMBLAGE7	ASSEMBLAGE8	ASSEMBLAGE9	CLU5_1	CLU8_2	CLU7_2	CLU6_2	CLU5_2
Room1G	0,79	-8,19	-1,58	-1,35	2,19	-0,34	19,82	-0,34	-0,17	3	3	3	1	1
Room4C	0,82	-14,45	-0,75	4,77	0,05	-0,78	-0,39	-0,78	17,36	8	7	3	1	1

Table 5. Distribution of Pottery Groups Throughout the Site

ROOMS	Group1	Group2	Group3	Group4	Group5	Group6	CLU8_1	CLU7_1	CLU6_1	CLU5_1	CLU4_1	CLU3_1
Room1E	-0,23	-2,1	-0,68	-5,64	**46,39**	-0,29	3	3	3	3	3	3
Room1Ib	-1,35	-0,94	**4,00**	-7,11	**35,66**	-0,29	3	3	3	3	3	3
Room1A	-00,1145	-00,0024	-00,3385	-00,9153	**06,3508**	-00,1443	9	1	1	1	1	1
Room1G	-00,9887	-02,8342	-02,9231	00,0143	**05,8102**	-01,2466	9	1	1	1	1	1
Room2Fb	02,5103	00,4579	-02,0308	-01,0293	**03,2350**	00,0207	9	1	1	1	1	1
Room1Ba	-0,93	-0,03	**6,63**	-43,47	**182,34**	-1,17	2	2	2	2	2	2

ROOMS	Group1	Group2	Group3	Group4	Group5	Group6	CLU8_1	CLU7_1	CLU6_1	CLU5_1	CLU4_1	CLU3_1
Room1D	**01,7741**	00,0794	-04,1846	00,1279	-00,0581	-00,3450	1	1	1	1	1	1
Room2B	-00,4995	00,0380	-01,4769	01,3212	-02,6579	-00,6299	1	1	1	1	1	1
Room2Fa	-00,2498	-00,7278	-00,7385	00,0061	00,4365	01,4902	1	1	1	1	1	1
Room3A	00,3414	-00,9013	01,0782	01,1149	-03,4549	-00,7086	1	1	1	1	1	1
Room3B	-00,5724	-00,0120	-00,2832	00,3726	-00,7535	00,1073	1	1	1	1	1	1
Room3Da	-00,2078	**03,0062**	-02,8614	00,1564	-01,7673	00,0002	1	1	1	1	1	1
Room4B	-00,5932	-00,3821	-00,3240	01,7742	-03,8639	00,0849	1	1	1	1	1	1

ROOMS	Group1	Group2	Group3	Group4	Group5	Group6	CLU8_1	CLU7_1	CLU6_1	CLU5_1	CLU4_1	CLU3_1
Room2C	*-01,1656*	*-03,0311*	*-01,7363*	**04,7148**	*-04,0426*	*-01,4697*	5	5	1	1	1	1
Room2D	*-00,0063*	*-08,0301*	*-01,5125*	**05,9381**	*-06,3715*	00,2957	5	5	1	1	1	1
Room4A	*-00,5412*	*-01,7704*	*-01,6000*	**04,5751**	*-06,1945*	-00,6824	5	5	1	1	1	1
Room4C	00,9042	-13,3997	-09,6923	**14,8756**	-15,9095	-00,3108	8	7	6	5	4	3

ROOMS	Group1	Group2	Group3	Group4	Group5	Group6	CLU8_1	CLU7_1	CLU6_1	CLU5_1	CLU4_1	CLU3_1
Room1H	**03,5605**	**06,2938**	-00,2832	-01,0141	-01,4649	**14,8910**	3	3	3	3	1	1
Room2Fc	-00,7597	00,1523	-00,6914	00,1010	-02,5073	**17,0562**	3	3	3	1	1	1
Room2A	-00,1041	-00,9548	-00,3077	-00,1299	01,3509	**05,7519**	1	1	1	1	1	1

ROOMS	Group1	Group2	Group3	Group4	Group5	Group6	CLU8_1	CLU7_1	CLU6_1	CLU5_1	CLU4_1	CLU3_1
Room1a	**06,1321**	00,6370	**18,7442**	-03,4194	00,6948	-00,1575	4	4	4	4	3	2
Room3C	-00,0937	00,0230	**26,7769**	-01,6940	00,2605	-00,1181	4	4	4	4	3	2
Room2E	00,8297	-00,3103	**10,9473**	00,7126	-07,4100	-01,3385	6	4	4	4	3	2
Room1Bb	00,1674	-00,0020	**04,6645**	00,0060	-01,5573	00,0306	1	1	1	1	1	1

ROOMS	Group1	Group2	Group3	Group4	Group5	Group6	CLU8_1	CLU7_1	CLU6_1	CLU5_1	CLU4_1	CLU3_1
Room2Fd	**06,7728**	**08,4620**	-01,1385	-02,3151	00,8874	-00,4855	7	6	5	2	2	2
Room3Db	-00,7805	**10,9117**	**09,5410**	-04,9892	00,1588	**04,1290**	7	6	5	2	2	2
Room1F	-00,1478	**25,8530**	**08,7697**	-01,8800	-04,3953	-00,5164	2	2	2	2	2	2

Table 6. Anlysis of NE-1 House

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW	TOTAL	
Room1A	2	0		0	1	5	3	0	0	0	0	11	0,01277
Room1Ba	4	7	2	4	4	64	4	0	0	0	0	89	0,10277
Room1Bb	36	5	4	0	6	6	5	0	1	1	0	64	0,07396
Room1D	90	0	6	1	13	20	2	0	1	2	1	136	0,15704
Room1E	1	0	2	0	0	16	3	0	0	0	0	22	0,02541
Room1F	122	16	25	9	40	26	10	1	2	0	1	252	0,29099
Room1G	48	0	14	0	4	24	5	0	0	0	0	95	0,1097
Room1H	29	1	1	2	9	5	2	0	4	2	0	55	0,06351
Room1Ia	2	3	0	0	2	3	1	0	0	1	0	12	0,01386
Room1Ib	50	8	6	2	7	47	9	0	1	0	0	130	0,15012
TOTAL	384	40	60	16	66	216	44	1	9	6	2	866	1
	0,443418	0,0461894	0,069284	0,020785	0,099307	0,249423	0,050808	0,001155	0,0104	0,006928	0,0023095	1	

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW
Room1A	4,8775982	0,5080831	0,762125	0,228637	1,092379	2,743649	0,558891	0,012702	0,1143	0,076212	0,0254042
Room1Ba	39,464203	4,1108545	6,166262	1,849885	8,838337	22,19861	4,52194	0,102771	0,9249	0,616628	0,2055427
Room1Bb	28,378753	2,9561201	4,43418	1,330254	6,355658	15,96305	3,251732	0,073903	0,6651	0,443418	0,147806
Room1D	60,30485	6,2817552	9,422633	2,82679	13,50577	33,92148	6,909931	0,157044	1,4134	0,942263	0,3140878
Room1E	9,7551963	1,0161663	1,524249	0,457275	2,184758	5,487298	1,117783	0,025404	0,2286	0,152425	0,0508083
Room1F	111,74134	11,639723	17,45958	5,237875	25,0254	62,8545	12,8037	0,290993	2,6189	1,745958	0,5819861
Room1G	42,124711	4,3879908	6,581986	1,974596	9,43418	23,69515	4,82679	0,1097	0,9873	0,658199	0,2193995
Room1H	24,367991	2,5404157	3,810624	1,143187	5,461894	13,71824	2,794457	0,06351	0,5716	0,381062	0,1270208
Room1Ia	5,3210162	0,5542725	0,831409	0,249423	1,191666	2,993072	0,6097	0,013857	0,1247	0,083141	0,0277136
Room1Ib	57,644342	6,0046189	9,006928	2,702079	12,90993	32,42494	6,605081	0,150115	1,351	0,900693	0,3002309

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW
Room1A	-2,877598	-0,508083	-0,762125	-0,228637	-0,092379	2,256351	2,441109	-0,0127	-0,1143	-0,07621	-0,025404
Room1Ba	-35,4642	2,8891455	-4,166262	2,150115	-4,838337	41,80139	-0,52194	-0,10277	-0,9249	-0,61663	-0,205543
Room1Bb	7,6212471	2,0438759	-0,43418	-1,330254	-0,355658	-9,963048	1,746268	-0,0739	0,3349	0,556582	-0,147806
Room1D	29,69515	-6,281755	-3,422633	-1,82679	-0,505774	-13,92148	-4,90993	-0,15704	-0,4134	1,057737	0,6859122
Room1E	-8,755196	-1,016166	0,475751	-0,457275	-2,184758	10,5127	1,882217	-0,0254	-0,2286	-0,15242	-0,050808
Room1F	10,258661	4,3602771	7,540416	3,762125	14,9746	-36,8545	-2,8037	0,709007	-0,6189	-1,74596	0,4180139
Room1G	5,8752887	-4,387991	7,418014	-1,974596	-5,43418	0,30485	0,17321	-0,1097	-0,9873	-0,6582	-0,2194
Room1H	4,6120092	-1,540416	-2,810624	0,856813	3,538106	-8,718245	-0,79446	-0,06351	3,4284	1,618938	-0,127021
Room1Ia	-3,321016	2,4457275	-0,831409	-0,249423	0,808314	0,006928	0,3903	-0,01386	-0,1247	0,916859	-0,027714
Room1Ib	-7,644342	1,9953811	-3,006928	-0,702079	-5,909931	14,57506	2,394919	-0,15012	-0,351	-0,90069	-0,300231

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW
Room1A	-1	-1	-1	-1	-1	1	1	-1	-1	-1	-1
Room1Ba	-1	1	-1	1	-1	1	-1	-1	-1	-1	-1
Room1Bb	1	1	-1	-1	-1	-1	1	-1	1	1	-1
Room1D	1	-1	-1	-1	-1	-1	-1	-1	-1	1	1
Room1E	-1	-1	1	-1	-1	1	1	-1	-1	-1	-1
Room1F	1	1	1	1	1	-1	-1	1	-1	-1	1
Room1G	1	-1	1	-1	-1	1	1	-1	-1	-1	-1
Room1H	1	-1	-1	1	1	-1	-1	-1	1	1	-1
Room1Ia	-1	1	-1	-1	1	1	1	-1	-1	1	-1
Room1Ib	-1	1	-1	-1	-1	1	1	-1	-1	-1	-1

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW
Room1A	-1,7	-0,5	-0,8	-0,2	0,0	1,9	10,7	0,0	-0,1	-0,1	0,0
Room1Ba	-31,9	2,0	-2,8	2,5	-2,6	78,7	-0,1	-0,1	-0,9	-0,6	-0,2
Room1Bb	2,0	1,4	0,0	-1,3	0,0	-6,2	0,9	-0,1	0,2	0,7	-0,1
Room1D	14,6	-6,3	-1,2	-1,2	0,0	-5,7	-3,5	-0,2	-0,1	1,2	1,5
Room1E	-7,9	-1,0	0,1	-0,5	-2,2	20,1	3,2	0,0	-0,2	-0,2	-0,1
Room1F	0,9	1,6	3,3	2,7	9,0	-21,6	-0,6	1,7	-0,1	-1,7	0,3
Room1G	0,8	-4,4	8,4	-2,0	-3,1	0,0	0,0	-0,1	-1,0	-0,7	-0,2
Room1H	0,9	-0,9	-2,1	0,6	2,3	-5,5	-0,2	-0,1	20,6	6,9	-0,1
Room1Ia	-2,1	10,8	-0,8	-0,2	0,5	0,0	0,2	0,0	-0,1	10,1	0,0
Room1Ib	-1,0	0,7	-1,0	-0,2	-2,7	6,6	0,9	-0,2	-0,1	-0,9	-0,3

Table 7. Analysis of NE-2 House

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW	TOTAL	
Room2A	6	0	0	0	0	3	0	0	1	0	0	10	0.017361
Room2B	33	0	6	1	4	3	1	0	0	0	0	48	0.083333
Room2C	87	1	7	3	2	9	3	0	0	0	0	112	0.194444
Room2D	66	1	23	0	1	6	4	0	2	1	0	104	0.180556
Room2E	75	9	1	2	6	5	1	1	0	0	1	102	0.177083
Room2Fa	15	0	2	0	1	5	0	0	1	0	0	24	0.041667
Room2Fb	25	0	11	3	5	16	2	1	1	0	1	66	0.114583
Room2Fc	41	1	10	2	6	6	2	0	5	0	0	73	0.126736
Room2Fd	4	0	13	5	4	8	1	1	0	1	0	37	0.064236
TOTAL	354	12	73	16	29	61	14	3	10	2	2	576	1
	0.614583	0.020833	0.126736	0.027778	0.050347	0.105903	0.024306	0.005208	0.017361	0.003472	0.003472	1	

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW
Room2A	6.145833	0.208333	1.267361	0.277778	0.503472	1.059028	0.243056	0.052083	0.173611	0.034722	0.034722
Room2B	29.5	1	6.083333	1.333333	2.416667	5.083333	1.166667	0.25	0.833333	0.166667	0.166667
Room2C	68.83333	2.333333	14.19444	3.111111	5.638889	11.86111	2.722222	0.583333	1.944444	0.388889	0.388889
Room2D	63.91667	2.166667	13.18056	2.888889	5.236111	11.01389	2.527778	0.541667	1.805556	0.361111	0.361111
Room2E	62.6875	2.125	12.92708	2.833333	5.135417	10.80208	2.479167	0.53125	1.770833	0.354167	0.354167
Room2Fa	14.75	0.5	3.041667	0.666667	1.208333	2.541667	0.583333	0.125	0.416667	0.083333	0.083333
Room2Fb	40.5625	1.375	8.364583	1.833333	3.322917	6.989583	1.604167	0.34375	1.145833	0.229167	0.229167
Room2Fc	44.86458	1.520833	9.251736	2.027778	3.675347	7.730903	1.774306	0.380208	1.267361	0.253472	0.253472
Room2Fd	22.73958	0.770833	4.689236	1.027778	1.862847	3.918403	0.899306	0.192708	0.642361	0.128472	0.128472

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW
Room2A	-0.14583	-0.20833	-1.26736	-0.27778	-0.50347	1.940972	-0.24306	-0.05208	0.826389	-0.03472	-0.03472
Room2B	3.5	-1	-0.08333	-0.33333	1.583333	-2.08333	-0.16667	-0.25	-0.83333	-0.16667	-0.16667
Room2C	18.16667	-1.33333	-7.19444	-0.11111	-3.63889	-2.86111	0.277778	-0.58333	-1.94444	-0.38889	-0.38889
Room2D	2.083333	-1.16667	9.819444	-2.88889	-4.23611	-5.01389	1.472222	-0.54167	0.194444	0.638889	-0.36111
Room2E	13.3125	6.875	-11.9271	-0.83333	0.864583	-5.80208	-1.47917	0.46875	-1.77083	-0.35417	0.645833
Room2Fa	0.25	-0.5	-1.04167	-0.66667	-0.20833	2.458333	-0.58333	-0.125	0.583333	-0.08333	-0.08333
Room2Fb	-14.5625	-1.375	2.635417	1.166667	1.677083	9.010417	0.395833	0.65625	-0.14583	-0.22917	0.770833
Room2Fc	-3.86458	-0.52083	0.748264	-0.02778	2.324653	-1.73090	0.225694	-0.38021	3.732639	-0.25347	-0.25347
Room2Fd	-18.7396	-0.77083	8.310764	3.972222	2.137153	4.081597	0.100694	0.807292	-0.64236	0.871528	-0.12847

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW
Room2A	-1	-1	-1	-1	-1	1	-1	-1	1	-1	-1
Room2B	1	-1	-1	-1	1	-1	-1	-1	-1	-1	-1
Room2C	1	-1	-1	-1	-1	-1	1	-1	-1	-1	-1
Room2D	1	-1	1	-1	-1	-1	1	-1	1	1	-1
Room2E	1	1	-1	-1	1	-1	-1	1	-1	-1	1
Room2Fa	1	-1	-1	-1	-1	1	-1	-1	1	-1	-1
Room2Fb	-1	-1	1	1	1	1	1	1	-1	-1	1
Room2Fc	-1	-1	1	-1	1	-1	1	-1	1	-1	-1
Room2Fd	-1	-1	1	1	1	1	1	1	-1	1	-1

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TW
Room2A	0.0	-0.2	-1.3	-0.3	-0.5	3.6	-0.2	-0.1	3.9	0.0	0.0
Room2B	0.4	-1.0	0.0	-0.1	1.0	-0.9	0.0	-0.3	-0.8	-0.2	-0.2
Room2C	4.8	-0.8	-3.6	0.0	-2.3	-0.7	0.0	-0.6	-1.9	-0.4	-0.4
Room2D	0.1	-0.6	7.3	-2.9	-3.4	-2.3	0.9	-0.5	0.0	1.1	-0.4
Room2E	2.8	22.2	-11.0	-0.2	0.1	-2.1	-0.9	0.4	-1.8	-0.4	1.2
Room2Fa	0.0	-0.5	-0.4	-0.7	0.0	2.4	-0.6	-0.1	0.8	-0.1	-0.1
Room2Fb	-5.2	-1.4	0.8	0.7	0.8	11.6	0.1	1.3	0.0	-0.2	2.6
Room2Fc	-0.3	-0.2	0.1	0.0	1.5	-0.4	0.0	-0.4	11.0	-0.3	-0.3
Room2Fd	-15.4	-0.8	14.7	15.4	2.5	4.3	0.0	3.4	-0.6	5.9	-0.1

Table 8. Analysis of NE-3 House

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW	TOTAL	
Room3A	34	3	8	3	0	3	2	1	0	0	54	0,156977
Room3B	31	1	4	0	5	6	7	0	1	0	55	0,159884
Room3C	0	3	1	0	1	2	2	0	0	0	9	0,026163
Room3Da	90	1	12	3	18	17	7	0	2	1	151	0,438953
Room3Db	21	7	11	2	14	13	4	0	3	0	75	0,218023
TOTAL	176	15	36	8	38	41	22	1	6	1	344	1
	0,511628	0,043605	0,104651	0,023256	0,110465	0,119186	0,063953	0,002907	0,017442	0,002907	1	0,002907

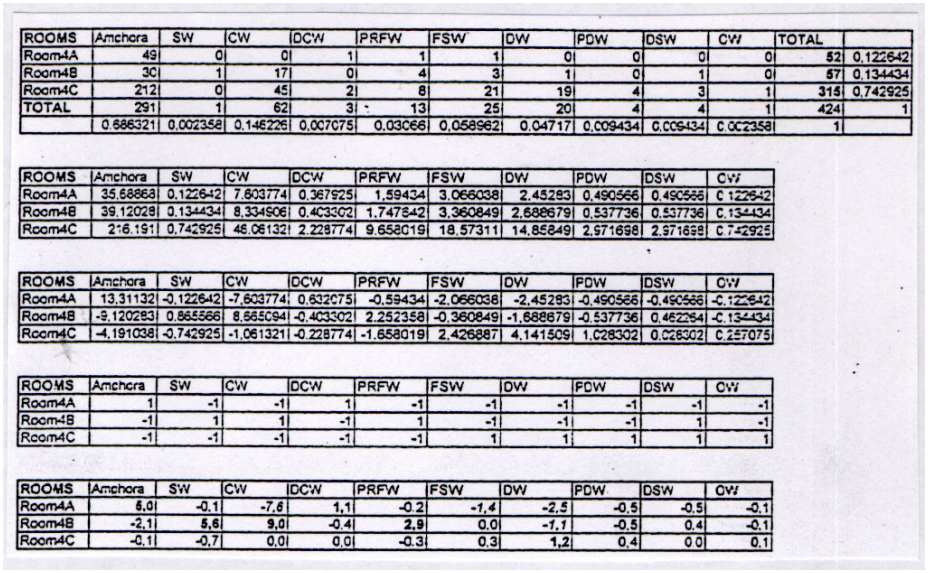
ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW
Room3A	27,62791	2,354651	5,651163	1,255814	5,965116	6,436047	3,453488	0,156977	0,94186	0,156977
Room3B	28,13953	2,398256	5,755814	1,27907	6,075581	6,555233	3,517442	0,159884	0,959302	0,159884
Room3C	4,604651	0,392442	0,94186	0,209302	0,994186	1,072674	0,575581	0,026163	0,156977	0,026163
Room3Da	77,25581	6,584302	15,80233	3,511628	16,68023	17,99709	9,656977	0,438953	2,633721	0,438953
Room3Db	38,37209	3,270349	7,848837	1,744186	8,284884	8,938953	4,796512	0,218023	1,30814	0,218023

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW
Room3A	6,372093	0,645349	2,348837	1,744186	-5,965116	-3,436047	-1,453488	0,843023	-0,94186	-0,156977
Room3B	2,860465	-1,398256	-1,755814	-1,27907	-1,075581	-0,555233	3,482558	-0,159884	0,040698	-0,159884
Room3C	-4,604651	2,607558	0,05814	-0,209302	0,005814	0,927326	1,424419	-0,026163	-0,156977	-0,026163
Room3Da	12,74419	-5,584302	-3,802326	-0,511628	1,319767	-0,997093	-2,656977	-0,438953	-0,633721	0,561047
Room3Db	-17,37209	3,729651	3,151163	0,255814	5,715116	4,061047	-0,796512	-0,218023	1,69186	-0,218023

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW
Room3A	1	1	1	1	-1	-1	-1	1	-1	-1
Room3B	1	-1	-1	-1	-1	-1	1	-1	1	-1
Room3C	-1	1	1	-1	1	1	1	-1	-1	-1
Room3Da	1	-1	-1	-1	1	-1	-1	-1	-1	1
Room3Db	-1	1	1	1	1	1	-1	-1	1	-1

ROOMS	Amphora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	OW
Room3A	1,5	0,2	1,0	2,4	-6,0	-1,8	-0,6	4,5	-0,5	-0,2
Room3B	0,3	-0,8	-0,5	-7,3	-0,2	0,0	3,4	-0,2	0,0	-0,2
Room3C	-4,6	17,3	0,0	-0,2	0,0	0,8	3,5	0,0	-0,2	0,0
Room3Da	2,1	-4,7	-0,9	-0,1	0,1	-0,1	-0,7	-0,4	-0,2	0,7
Room3Db	-7,9	4,3	1,3	0,0	3,9	1,8	-0,1	-0,2	2,2	-0,2

Table 9. Analysis of NE-4 House.



ROOMS	Amchora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	CW	TOTAL	
Room4A	49	0	0	1	1	1	0	0	0	0	52	0.122642
Room4B	30	1	17	0	4	3	1	0	1	0	57	0.134434
Room4C	212	0	45	2	8	21	19	4	3	1	315	0.742925
TOTAL	291	1	62	3	13	25	20	4	4	1	424	1
	0.686321	0.002358	0.146226	0.007075	0.03066	0.058962	0.04717	0.009434	0.009434	0.002358	1	

ROOMS	Amchora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	CW
Room4A	35.68868	0.122642	7.603774	0.367925	1.59434	3.066038	2.45283	0.490566	0.490566	0.122642
Room4B	39.12028	0.134434	8.334906	0.403302	1.747842	3.360849	2.688679	0.537736	0.537736	0.134434
Room4C	216.191	0.742925	46.06132	2.228774	9.658019	18.57311	14.85849	2.971698	2.971698	0.742925

ROOMS	Amchora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	CW
Room4A	13.31132	-0.122642	-7.603774	0.632075	-0.59434	-2.066038	-2.45283	-0.490566	-0.490566	-0.122642
Room4B	-9.120283	0.865566	8.665094	-0.403302	2.252358	-0.360849	-1.688679	-0.537736	0.462264	-0.134434
Room4C	-4.191038	-0.742925	-1.061321	-0.228774	-1.658019	2.426887	4.141509	1.028302	0.028302	0.257075

ROOMS	Amchora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	CW
Room4A	1	-1	-1	1	-1	-1	-1	-1	-1	-1
Room4B	-1	1	1	-1	1	-1	-1	-1	1	-1
Room4C	-1	-1	-1	-1	-1	1	1	1	1	1

ROOMS	Amchora	SW	CW	DCW	PRFW	FSW	DW	PDW	DSW	CW
Room4A	6.0	-0.1	-7.6	1.1	-0.2	-1.4	-2.5	-0.5	-0.5	-0.1
Room4B	-2.1	5.6	9.0	-0.4	2.9	0.0	-1.1	-0.5	0.4	-0.1
Room4C	-0.1	-0.7	0.0	0.0	-0.3	0.3	1.2	0.4	0.0	0.1