International Journal of Architecture and Urban Studies

CONTENTS

HERITAGE AT RISK REGISTER AS A TOOL FOR MANAGING CULTURAL HERITAGE SITES IN KOSOVO

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Abstract

Kosovo is a country with an ancient history and wealthy cultural heritage. The Ministry of Culture is responsible to manage a list of over 1500 protected assets. However, cultural heritage sites in Kosovo are in a degraded state, mainly because of lack of maintenance, awareness, and improper management. Significant numbers of heritage sites are at risk of being completely ruined. The fragile institutions are heavily suffering due to the lack of human capacities. They failed to create a monitoring mechanism that would provide data of current condition of heritage sites. The local communities are almost ignored in relation to decision-making process. This situation resulted with investments in the field of cultural heritage not being based on the actual needs. Cultural Heritage without Borders, a local NGO working for the preservation and promotion of cultural heritage since 2001, has recently launched a project aiming to map cultural heritage sites in Kosovo. For nearly one year of work, more than 800 architectural and archaeological monuments were identified and documented. The data was collected by field and desktop study, which included information regarding location, protection status, ownership, category and type, statement of significance, physical access, communication of owners with institutions, potential for development and physical condition of assets surveyed on visual basis. The collected data was put in a digital platform, which can generate various reports based on the field of concern and this whole process represents the interaction of heritage to technology.

As a result of data collected and analyzed through mapping, was developed the Heritage at Risk, an online digital platform, which consists of the list of assets on a poor physical condition. This platform is a new opportunity to inform the public, relevant institutions and stakeholders about the condition of cultural heritage sites, and also intends to include them in its assessment and preservation. Apart from this, the platform also offers the possibility for everyone to report online the heritage at risk.

This paper will give an overview of the condition of cultural heritage sites in Kosovo, its management and legal protection. In addition, it will describe the need and process of mapping of assets, as well as the results of Heritage at Risk register. It is essential for every country to have such a platform, to ease the identification and data collection of heritage assets. In addition, the level of damage of cultural heritage assets should be one of the main criteria of every investment and project related to the cultural heritage field. Furthermore, the results of research analysis will give direct recommendations to owners as well as relevant institutions of cultural heritage. Both these parties are given recommendations on the possible ways of preservation and promotion of cultural heritage.

Keywords: Cultural Heritage, Assets, Heritage at Risk, Mapping, Digital Platform

1. The State of Cultural Heritage in Kosovo
1.1 Kosovo- the land of wealth

Kosovo is located inland on the Balkan Peninsula in Southeast Europe. Its fertile highland valleys are separated from the Adriatic Sea by the Prokletije Mountain range yet connected via the Drini River. Kosovo´s history is deeply intertwined with neighboring regions. In the 1st century AD the area was known as Dardania and was a part of the Roman province of Moesia. By the Middle Ages the region was part of many empires: Bulgarian, Byzantine, Albania and the Serbian Medieval States. It was conquered by the Ottoman Empire in 1455 and derives its name from the Kosovo Plain, where the famous Battle of Kosovo was fought between Serbia and the Ottoman Empire 70 years earlier. (Haliti, Thaçi & Eppich, 2016, p.426)

Figure 1. Kosovo map (Encyclopedia Britannica, 2017)

Kosovo is a country with ancient history and wealthy heritage, shaped over eight thousand years ago. These heritage assets are important from historical, aesthetic, architectural and social perspective. They play an important and irreplaceable part of Kosovo's memory. (Hoxha & Thaçi, 2012, p. 1) Cultural heritage of Kosovo is an expression and creativity of life developed from prehistory up to today. This treasure is illustrated by the rich diversity of architectural, archaeological, movable and intangible heritage, as well as with rich cultural landscape. (MKRS, 2016, p. 21)

1.2 The past and its consequences

Until the second half of the last century, cultural heritage properties of Kosovo were maintained and protected intuitively from locals. In the recent past, these properties have been treated with denigrated and degraded methods, as such the lost is enormous. Especially during the '98/'99 War in Kosovo thousands of traditional buildings were burnt and destroyed from the Serbian forces. Thousands of archaeological and ethnological collections, as well as the cultural heritage documentation of Kosovo are still being held unfairly in Serbia. (Hoxha & Thaçi, 2012, p. 1)

Four well-preserved historic urban centers in Gjakova, Vushtrri and Peja had suffered severe devastation. (Herscher & Reidelmayer, 2000) Art objects and important collections of material culture also perished in the flames as Serbian forces burned down an estimated 70,000 homes, including more than 90 percent of Kosovo's 500 *kullas*- traditional vernacular houses. In addition to that, Islamic sacral art in Kosovo, including art objects as well as illuminated manuscripts, suffered large-scale devastation during the war. A major part of the heritage of Kosovo's 600-year-old Islamic tradition was burned, vandalized or looted as more than 200 mosques were destroyed or seriously damaged by Serbian forces. Furthermore, museum collections in Kosovo have also been despoiled, not by acts of deliberate destruction but by appropriation. By order of the Serbian Ministry of Culture, hundreds of the most valuable archaeological artefacts from three important museum collections in Kosovo - the Museum of Kosovo, the Municipal Museum in Mitrovica and the Regional Archaeological Museum in Prizren - were removed to Belgrade at the beginning of 1999, ostensibly for an exhibition. (Riedlmayer, 2000)

Figure 2. Mosque in Deçan burnt during the '98-99 War (Riedlmayer, 2014)

Figure 3. The market mosque in Peja during the '98-99 War (Riedlmayer, 2014)

Unfortunately, the destruction of cultural heritage sites did not end although the war ended in June 1999. During ethnic riots in March 2004, 34 religious and cultural heritage sites, such as Orthodox churches, monasteries, cemeteries, funerary chapels and some traditional houses were destroyed. (CoE, 2004)

1.3 Legal protection of Cultural Heritage

It was not until after the Second World War that cultural heritage management as a state-organized activity was established in Kosovo. (Riza, 2005) In the second half of the 20th century when Kosovo was part of the Yugoslavian state, cultural heritage was re-defined and managed according to the standards set by the political regimes. (Herscher, 2010) As in many South-East European countries, the protection system of cultural heritage of Kosovo is not at the level of modern requirements and trends. This is a result of over half a century history of political instrumentation and its subjective treatment by the former communist regime. Despite the efforts to improve the situation during the transition period, cultural heritage sector remains quite complex and fragile against the new general developments. According to the National Strategy for Cultural Heritage 2017-2027, Cultural Heritage is one of the priority sectors of the Government of the Republic of Kosovo. It includes monuments, sites, artefacts as well as their intangible attributes created by all peoples who have lived in Kosovo throughout the centuries. Above all, the Republic of Kosovo ensures the preservation and protection of cultural and religious heritage. Furthermore, the government is obliged to promote the preservation of religious and cultural heritage assets of all communities. (MKRS, 2016, p.21)

There are 1534 cultural heritage assets protected by the Ministry of Culture, Youth and Sports. These assets are part of the List of Cultural Heritage under Temporary Protection, and includes Monuments/ Ensembles of Archaeological and Architectural Heritage, Architectural Conservation Areas, Movable Objects, Cultural

Landscapes and Spiritual Heritage. This List is updated every year by the Ministry of Culture. In 2017, the Ministry has started to include modern buildings in this list as well as put some of cultural heritage sites under permanent protection.

The conservation and management framework for the preservation of cultural heritage assets is progressing. The basic legal acts have been approved according to the international principles. The Kosovo's authorities have started to pay attention on preservation through application of the preventive conservation, reinforcement of laws, establishment of the proper inventory system, modernization of administration and education system. (Hoxha & Thaçi, 2012, p. 19) However, a lot of effort and immediate steps need to be taken as far as cultural heritage protection and preservation is concerned.

1.4 The challenges of today

In general terms, cultural heritage assets of Kosovo are in a precarious and vulnerable situation arising from the dire consequences of armed conflicts of 1998/1999, natural processes of age and decay greatly exacerbated by environmental pollution, significant long-term neglect and a chronic lack of policy, strategies, proper inventory, conservation plans and funds for preservation and rehabilitation according to the international principles and standards.

The crucial problems to be addressed are:
- Delay in heritage inventory compilation (the Cultural Heritage List), nomination and identification of conservation areas (perimeter, protective zones, protected areas) in spatial plans of architectural and archaeological heritage;
- Unclear approaches in principles and practices in cultural heritage conservation;
- Uncontrolled (both legal and illegal) building boom in urban, peri-urban and rural areas, affecting heritage sites and in general the landscapes;
- New architectural developments affecting the setting and context of cultural heritage sites;
- Limited institutional capacities and power of concerned authorities;
- Limited coordination of activities and stakeholders;
- Limited institutional cooperation, both horizontal and vertical;
- Delay in laws' implementation, lack of professional standards on conservation and licensing system, inspection and supervision;
- Insufficient education offered in managerial, professional and technical trainings in various fields regarding cultural heritage and landscape preservation and management, sustainable tourism development, restoration techniques, promotion, etc. (Hoxha & Thaçi, 2012, p. 16)

2.   Mapping of Cultural Heritage Sites in Kosovo

2.1 The mission of the organization Cultural Heritage without Borders, CHwB Kosovo

The foundation Cultural Heritage without Borders, CHwB Kosovo, has started the contribution in cultural heritage field since 2001, primarily as an international based organization and then as a local NGO, dedicated to rescuing and preserving tangible and intangible cultural heritage affected by conflict, neglect or human and natural disasters. The mission of the organization is to promote cultural heritage as both a right in itself and a resource. CHwB Kosovo works with cultural heritage as an active force in reconciliation, peace building and social and economic development by increasing the awareness, capacities and opportunities of the society for preserving and rescuing cultural heritage. In our country, as in many developing countries, cultural policies and strategies need yet to be integrated into wider political, economic and social agendas. Therefore, our key objective is to strengthen the accountability of institutions and to increase the vibrancy of civil society in the cultural heritage sector. We see our work as a vital contribution to building democracy and supporting human rights. (CHwB, 2013)

Lack of basic information for cultural heritage assets with legal protection status, is a crucial problem, which also points out the need for each monument to be identified and monitored. Mapping cultural assets strengthens the base of information that can be used to inform local and central authorities in future planning and decision-making. Regarding this, we consider cultural heritage mapping as an important part of a successful completion of our mission. Therefore, the project "Mapping of Cultural Heritage Sites in Kosovo", which is one of our three main pillars of the strategy, started to put on the map 870 cultural heritage monuments of architectural and archeological categories, by gathering all the information needed based on the form presented below.

2.2 The methodology of mapping and monitoring cultural heritage assets
2.2.1 The standard form for data gathering
The mapping process comprised of two main phases, based on which the next steps were developed. The first phase was a research based study, aiming to create the most appropriate form for monitoring monuments and the second one, to gather data on site. The form was created by consulting three internationally agreed standards for documentation of cultural heritage: the Core Data Index to Historic Buildings and Monuments of the Architectural Heritage, the International Core Data Standard for Archaeological Sites and Monuments, and the recently agreed core data standard for identifying cultural objects — Object ID. By taking features from all these standards and adopting them on the circumstances of our country, we came up with a form, which included ten categories as listed and elaborated below.

Name and references
Shows a free-test field, which records the official name of the monument and number of characters which uniquely identifies each related record.
Location
Represents the geographical position of the monument expressed in latitude and longitude.
Protection status
Monitored monuments belong to two types of protection: under temporary and permanent protection.
Category and type
The types and categories of monuments vary, from auxiliary buildings up to industrial buildings. Building type is defined by its function.
Ownership
In general the ownership is public or private, but there are also a considerable number of monuments owned by religious entities. Ownership is important especially in the orientation of potential investments.
Statement of significance
Since every asset has the legal protection status, it should also have the statement of significance. This part of description was taken from the responsible bodies- MCYS, with a special request to this institution and as such is written in the form.
Physical access
The information about access to the monument and the level of accessibility of people with special needs are included and treated in this category.
Physical condition of assets
The level of physical damage of monuments was evaluated on visual basis. The Heritage at Risk register was developed based on this category.
Communication of owners with institutions
The responsibilities of the institutions and owners of cultural heritage sites are divided. But, alongside this, there is a point where these responsibilities and benefits meet together. Therefore, the cooperation is crucial. This category treats the communication of institutions towards the owners/users of monuments.
Potential for development
The physical integrity of a monument is not enough for it to be considered as a site with potential for development. The other information like: location, setting, natural tourist attractions etc. play a key role on this, thus they are elaborated in this category.

2.2.2 Challenges of the process
The form initially was created with Microsoft Excel software, printed in hard copy and ready to be filled with information. With all the above-mentioned categories and answer options, the adopted form came up to be four full pages (A4 size). A usual day of fieldwork resulted in monitoring about five monuments. Gathered data were entered in PC on the next day, in Excel file. All these procedures were time consuming whereas the amount of information which was augmented day by day became very difficult to be managed (e.g. one monument had at least 5 photos). Besides this, the number of the equipment needed during fieldwork was another difficulty faced.

Figure 4. Equipment used during the fieldwork (By author, 2017)

2.3 Technology meets culture heritage

A meeting held with the Information Technology team of the office, presenting the needs and stumbles on the way, changed radically the whole working process. From that period, we started building an online platform (database system), where the gathered data would be automatically imported in it. This platform would offer access when connected to internet. Each working group would be able to add, delete and make changes in the assets entered in the system. Most importantly, it would offer enough space to cope with all the entered information. Besides this, project coordinators would have the possibility to create other standards of forms and generate reports automatically, which can be used for internal needs of the organization or future planning related to culture heritage sector. But, how would these data enter into the online platform?

2.3.1 Productivity on the go just got easier

To produce faster and better results, we started using tablets. We created an application, which interconnected very well with the online platform database. The tablet reduced the need for all the equipment used before. There was no need to carry the four pages form, because it was integrated in the application, neither was the need to have GPS tools because when the new form opened, the application generated the geographical coordinates automatically. In addition, no camera was needed because buildings were photographed by tablets. The most useful feature of the application was that it could be used in offline mode as well. It was possible to fill forms for five or more assets during the day and whenever connected to internet, all the data was uploaded in the online database system.

Figure 5. Tablet- the tool which replaced the equipment of the traditional method (By author, 2017)

At this stage of development, the process took another direction, which turned out to be simpler than planned beforehand. The initial planning for the time-frame of the project was reduced in half and the result turned out to be more sustainable. With all this systematic approach of information, by classifying and analyzing it, we could draft local and/or central development plans for economic development, based on cultural heritage. Furthermore, we could generate reports for each category we had integrated in our form. Therefore, we considered we had a weapon in our hand for the opportunities of which we were not aware. In the end of 2016 we have published a small range of this information and its impact was exceptional!

Figure 6. One of the staff members, using the tablet / mapping and monitoring the cultural heritage assets (By author, 2016)

3. Heritage at Risk Register

3.1 What is Heritage at Risk Register and how it was developed?

During the field research we conducted, among other collected information, a special attention was paid towards the condition assessment of monuments. The physical condition of assets has been classified into six categories, including: Good, Fair, Poor, Very Bad, Partially Ruined and Completely Ruined.

Good: Structurally sound; no significant repairs needed.

Fair: Structurally sound; in need of minor repair; showing signs of lack of general maintenance.

Poor: Deteriorating masonry; leaking roof; defective rainwater goods, usually accompanied by rot outbreaks; general deterioration of most elements of the building fabric, including external joinery; or where there has been a fire or other disaster which has affected part of the building.

Very bad: Structural failure or clear signs of structural instability; loss of significant areas of the roof covering, leading to major deterioration of the interior; or where there has been a major fire or other disaster affecting most of the building.

Partially ruined: When not all structural parts of the building are visible, formed and remain on the ground.

Completely ruined: The structure of the building does not exist, or parts of the structure are scattered on site.

This classification was based on the condition assessment of cultural heritage assets from Historic England. (Historic England, 2017)

In order to list an asset in one of the above-mentioned categories, an assessment was conducted to evaluate the type of damage on the elements of the asset/structure, including: wall structure, roofs (covering, chimney, gutters and downpipes), doors and windows, and the interior, where the access was possible. As a result, when different damage aspects of an asset were combined, it was enabled to obtain a clear view on the physical condition of the monument and consequently list it under one of the above-mentioned categories.

HERITAGE AT RISK is an online digital platform, developed as a result of collected data and analyzed through mapping which consists of a list of assets that are classified in the three last assessment categories, meaning their physical condition is very bad, partially ruined or completely ruined.

Figure 7. Print screen of Heritage at Risk Online Platform /www.trashegimianerrezik.com/ (By author, 2017)

This platform is a new opportunity to inform the public, relevant institutions and stakeholders about the condition of cultural heritage sites, and also intends to include these relevant bodies in their assessment and preservation. Apart from this, the platform also offers the possibility for everyone to report online the heritage at risk.

Among 870 assets, which have undergone assessment of their physical condition as part of the wider project Mapping of Cultural Heritage Sites in Kosovo, in total 139 assets are listed in Heritage at Risk Register. Therefore, this means that 17.2% of designated assets in Kosovo are endangered to be demolished, due to their bad physical condition.

Figure 8. The graph showing the condition of all assets evaluated during the process (By author, 2017)

3.2 Updating and monitoring of Heritage at Risk Platform

Since the launching of the online platform Heritage at Risk Register, CHwB Kosovo has been closely following the reports submitted by the community. Furthermore, together with its team, CHwB Kosovo goes on field to assess the condition of the reported assets. After having evaluated them, the assets are listed on the platform, on the reporting part, submitted by the public. So far, 16 assets have been reported by the community. On the other hand, these reported assets are being collected, and then forwarded to the responsible institutions. Besides the reporting aspect, the existing Heritage at Risk Register has been monitored so that competent bodies can prioritize the intervention projects based on the condition of these assets.

In the meantime, we have started to witness some positive results, given that five of the assets categorized as on a very bad physical condition have been already included on the Emergency Intervention Program of the Ministry of Culture, Youth and Sport of Kosovo, and as a result they were saved from demolition.

Figure 9. Kulla of Asllan Tupella in Kqiq Village, Kosovo, listed on Heritage at Risk Register (Left: in a very bad physical condition, right: improvement of the condition by the Ministry of Culture) (By author, 2016)

Figure 10. First Post Office in Prizren, listed on Heritage at Risk Register (Left: in a very bad physical condition, right: ongoing improvement of the condition by the Ministry of Culture) (By author, 2016 and 2017)

Figure 11. Kulla of Sali Kajtazi in Kqiq Village, Kosovo, listed on Heritage at Risk Register (Left: in a very bad physical condition, right: improvement of the condition by the Ministry of Culture) (By author, 2016 and 2017)
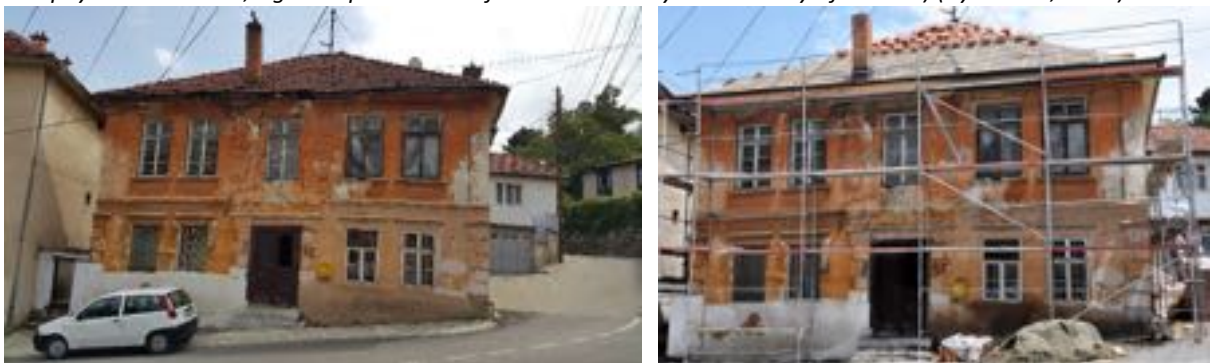
These results motivate us to continue with our work and we are committed to keep on investing our time, research and resources with the aim of finding a solution which would enhance the condition of cultural heritage at risk, through prioritizing the most urgent cases, which need immediate interventions.

4. Recommendations and conclusions
The following recommendations were drafted based on the recent research conducted by CHwB Kosovo, divided into two groups, directed towards relevant state institutions and to the owners of the heritage assets, emphasizing the role of each party in better management of cultural heritage in Kosovo.

Institutions and organization:
- To review the current list of the protected heritage assets. Based on the recent findings there are listed buildings that unfortunately don't exist anymore;
- To establish monitoring departments that will assess buildings consistently, and identify the risk factors that may endanger heritage assets;
- To increase the professional capacities in Disaster and Risk Management (DRM), respectively in monitoring and implementing preventive measurements;
- To establish a Task Force of trained architects and craftsmen that would intervene with the temporary preventive measures in order to prevent the loss of heritage assets;
- To increase the cooperation between central and local level institutions in order to increase efficiency in managing possible risks;
- To prioritize funds for emergency interventions based on the assessment of needs;
- To establish connections with owners of heritage assets, to inform them about their role, train them on monitoring their properties, on where and how to report the damage and risk they notice, and to possibly intervene with simple measures;
- To subsidize or reward owners who regularly maintain their cultural heritage assets;
- To work closely with local and national NGO's, to increase the knowledge about the risk on cultural heritage, to raise awareness of each stakeholders' role by organizing campaigns, debates and public lectures.

Owners:
- To report to institutions/departments about every risk they notice;
- To maintain their properties and on periodical basis to check the structures or possible failures;
- To raise knowledge of owners through trainings on usage of traditional skills, in order to properly maintain their property;
- To learn more about the possibilities of re-usage of properties for possible economic or social benefit;
- Not deliberately ruin buildings for other development of their properties.

Today, with the rapid development of technology, the management of information is being developed and affordable to everyone. By utilizing technology, it is possible to create applications and databases where information can be systematized and accessible to the public and decision-makers.

From this database, the information is filtered and can generate reports of sites that are at risk as a result of their physical condition, lack of maintenance or other threats.

This list is named *Trashegimia ne rrezik* (Heritage at Risk) and is a collection of all sites that are endangered for the above-mentioned reasons. The list trashegimianerrezik.com, is open to everyone and is updated constantly with new data collected periodically. The list will serve to evaluate the efforts of decision-makers to protect cultural heritage as well as to create a public information platform about the state of cultural heritage in the country. This list is the first of its kind in Kosovo and probably in the Western Balkans

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TRANSFORMATION PROCESS AND INDUCED COMFORT IN THE OTTOMAN HOUSES

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Abstract

The old town of Algiers, known as the Casbah, is the product and the place of social relations, but also of cultural models impregnated with history and intrinsic immaterial qualities. It is the manifestation of a superposition of several strata in a complex and original system; it is the trace of successive occupations, the collective memory which preserves and transmits the adopted or rehabilitated cultures to its ways of life. In other words, it is a living whole that has withstood the wear and tear of time.

Algeria has a rich heritage, not only as a historical value and identity, but also for the different solutions used to meet the environmental requirements and more precisely the needs of comfort.

The Casbah of Algiers is an eminent example of a traditional human habitat, representative of the deeply Mediterranean culture, synthesis of numerous stratifications. It composed of the most interesting houses, which have retained their authenticity and integrity, such as the aesthetic characteristics, the materials used and the architectural elements, retaining their original aspects and expressing values that gave it a place in World Heritage in 1992.

They have an old architecture that remains impressive and represents aspects of traditional vernacular architecture, illustrated as an example of a perfect harmony in the built environment with the natural environment, allowing a quality of comfort, ensuring a healthy and comfortable indoor environment.

During the colonial and postcolonial periods, it is clear that the houses of the Casbah of Algiers had a process of transformation/modification that is still undergoing, due to the will of the inhabitants to rise to the standards of modernity. These same transformations have certainly manifested themselves according to the needs, but often at the expense of the environment. They are the result of the overlap and juxtaposition of architectural models (local and colonial ones): each way of life reflects a historical period and a population that is constantly changing.

This paper focuses mainly on the nature of transformations endured by the residential building of the old Ottoman Algiers until now and analyses their impact on thermo-hygrometric comfort and indoor microclimate. Our reflection is linked to concepts with multidisciplinary dimensions that flicker between history, architecture, town planning, geography, socio-cultural, hydraulics and environment. In fact, the environmental issue is becoming more and more dominant in the new orientations and concerns related to the improvement of comfort conditions.

Therefore, the applied methodology is based on two approaches: a historical one, aiming to identify the architectural changes into old Ottoman houses, transforming the space and the openings (*patio or chebâk* roofing "it is a house with a courtyard that is either covered with a fence called *chebâk*, or discovered called patio", close off openings, ventilation, new openings, kitchens and bathrooms renovation, heating plant system, etc.), and an environmental one in order to measure the effect of these transformations on the thermo-hygrometric comfort. These practices have generated sometimes small or even enormous disorders, which have brought changes also in the indoor comfort.

Archives consultation, field investigations, modeling and numerical simulations will be essential tools, which will allow us to achieve the expected results. A detailed corpus, considering the least transformed houses to the most transformed ones, will be presented, accompanied by an accurate evaluation of the parameters influencing the thermo-hygrometric comfort.

Keywords: Transformations, colonial/postcolonial Casbah houses, thermal comfort, modeling / simulation, Multidisciplinary approach.

1. Introduction

Algeria has a rich heritage, recognized not only for its historical value and identity, but also for the different solutions used in response to environmental requirements and more precisely to the needs of comfort. It harbors an invaluable variety of heritage, whether natural or cultural, tangible or intangible.

One of the most emblematic testimonies of this rich heritage remains the "*casbah of Algiers*" whose values of authenticity and integrity have made it a world heritage. It has always been a living place inhabited until today and has undergone various transformations over the centuries in both structural and spatial aspect as well as architectural one. Whether beneficial or detrimental, these transformations introduced during the colonial and post-colonial period had an impact on hygrothermal comfort.

Figure 1. Aerial view of the Casbah of Algiers
Source: Algeria discovery, discover Algeria simply, Casbah of Algiers published on over blog, by Mérimèche

Given that the environmental issue is becoming increasingly dominant in relation to new orientations and concerns related to the improvement of comfort conditions, this work focuses on the impact that these different transformations appear to have on performance of hygrothermal comfort of the residential building in the old Ottoman Algiers.

The approach is based on two complementary investigations: a first historical approach aimed at identifying the transformations that have undergone the Ottoman residential building followed by another, generally focusing on the environmental approach, and more specifically on the effect that these transformations had on hygrothermal comfort.

The "Casbah of Algiers" is located on the Mediterranean coast. The studied urban site was inhabited at least as early as the 6th century BCE, as evidenced by the Phoenician counter that was installed there. The Casbah, which originally designated the culminating point of the medina of the Zirid era, now applies to the whole of the old city of El Djazair, within the limits marked by the ramparts of the " Ottoman era, built at the end of the 16th century.

Figure 2. View of the Kasbah of Algiers
Source: site; Mémoires d'Alger, réalisé par Marc Morelle

Thus, the residential heritage, faced with environmental challenges, is comparing with major deterioration which has produced irrevocable consequences in terms of discomfort; hygrothermal comfort being recognized as a target of the high-quality environmental approach, is part of the developmental efforts to improve the standard of living of man without compromising natural environment and his surrounding. The objective is somewhere to regain comfort by renewing the good gestures in terms of design and construction, to reconcile the building with the natural climatic factors.

In the context of our research we are led to identify a typical model of a house that has undergone the least transformation possible, while taking into account the parameters affecting this comfort, such as: moisture transfer within porous walls thermal or evaporation-condensation phenomenon), heat transfer, solar radiation, rain or mixed convection phenomena, ambient and wind air temperature or ventilation systems to evaluate its response to climatic stresses. This contribution of knowledge regarding comfort will help to correct the caused deterioration and to reconcile the building with its environment by responding to the new requirements of comfort.

2. Typologies and characteristics of the Casbah houses

2.1. Typologies of the houses of the Casbah

Studies on the domestic architecture of the Kasbah of Algiers are reduced and do not deep into the residential building analysis; nevertheless, among the existing literature, one of the most recent books is that of (Missoum, 2003)[1]; which consists of classification of original Ottoman houses typologies.

Also the work of the Atelier Casbah (ETAU-UNESCO/ PNUD, 1981)[2]; presents the general types of original houses accompanied by surface transformations and spatial-functional changes they have undergone.

These two documents dealing with the domestic architecture of the *medina* of Algiers, based on the use of Ottoman archival documents, also emphasize the specific terminology the domestic architecture which is designated in archival documents by three terms : *al-dâr* (house), *al-dwîra* (little house) et *al-ulwî* (upstairs House).

From the point of view of spatial organization, (Missoum, 2003)[1]; defines two main typologies: the house with *wast al-dâr* and the house without *wast al-dâr*, the Arabic word meaning the courtyard:

a)   The house with *wast al-dâr* Includes two variants: with discovered *wast al-dâr* or with a *wast al-dâr* partially covered with *chebâk,* an Arabic term representing the cover of the roof of the courtyard by a screen, in the form of a well of light allowing to regulate the light and air to have a regular flow of ventilation.

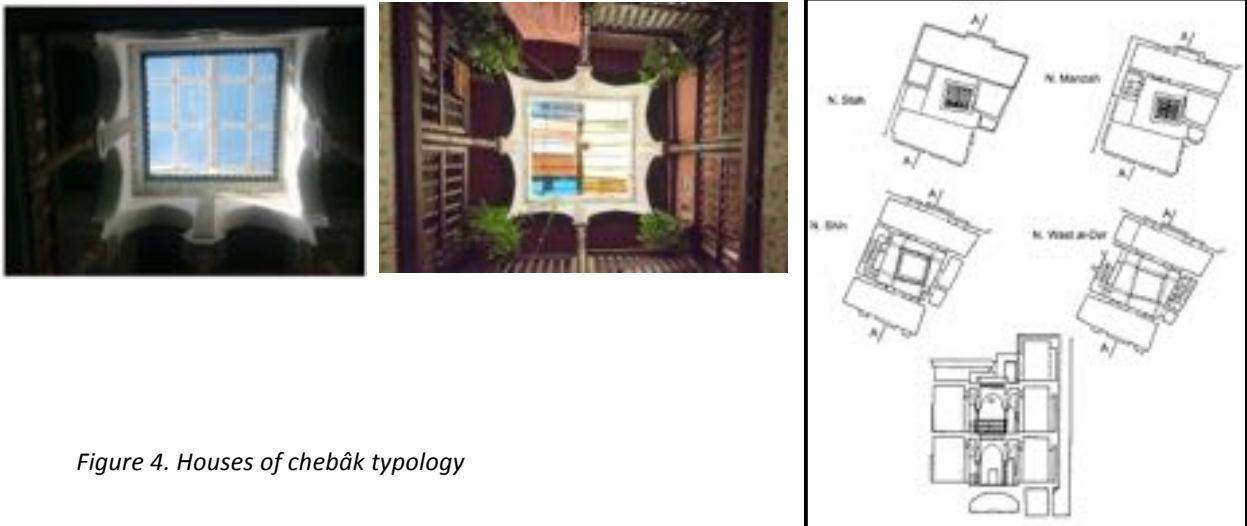*Figure 3. Houses of wast al-dâr typology*

Figure 4. Houses of chebâk typology

b)   The house without *wast al-dâr* called *al-ulwî:* which is a small house that is organized in height, which develops around a staircase illuminated by a skylight and whose rooms may be lit from the street unlike the other two types
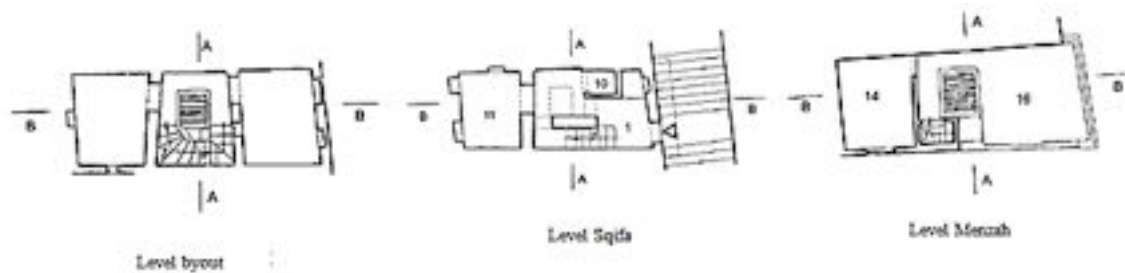

Level byout   Level Sqifa   Level Menzah

Figure 5. House of al-ulwî typology

In this article, the work will be on a single house typology (with wast al-dâr), in order to identify the nature and type of transformations that the house has undergone using archival documents and transformation report results / hygrothermal comfort will be presented while using the thermal dynamic simulation of the Design Builder Software.

2.2. Characteristics of the Houses of the Casbah

The old houses of the Casbah of Algiers border the narrow and winding alleys of this traditional medina and their traditional architecture testifies a rich past; seen from the outside, the dwellings look dark and devoid of all decor, but inside, the space is harmoniously arranged. The house is generally composed of a ground floor and a first floor, lined with galleries and arcades or open large rooms, in the center. The patio or the inner courtyard, often without any cover, is an element of thermal regulation and a passive cooling device with an influence on the internal comfort; all these traditional Mediterranean houses of the Casbah have in common, even in their diversity, to be adapted to the climatic constraints of the basin. Buildings often have thick walls constructed of limestone and clay brick (with small openings) that preserve them from heat during the day, then restore them at night, the materials used, the position of the house , the topography of the site and the old design of these buildings provide solutions that can still inspire in the construction of cities today.

However, the few houses in the Casbah of Algiers represent, in a way, this aspect of traditional vernacular architecture, which is illustrated as a good example of a built environment in perfect harmony with the natural

environment, allowing the same quality of comfort, while ensuring healthy and comfortable indoor environments.

Nevertheless, these houses have an ancient design which remains imposing not only for its heritage value but also for the environmental criteria that contribute to the new requirements and conditions of the current comfort, there are also some parameters that have allowed these houses to ensure the physical environment (topography, location of houses, configuration, position, orientation), climate and natural environment (temperature, humidity, solar radiation), social factors (type of occupancy, family number), architectural factors (stair position, opening, size of openings, orientation, materials [clay brick, earthenware, lime, stone, wood, ceramics] , type of cover, presence of wells and *djeb* that "is an Arabic name meaning a type of well for the recovery of rainwater", kitchen and bathroom numbers), these parameters at all times were used by man to design his shelter in order to ensure favorable living conditions and they influenced his comfort, they will be developed throughout this article.

3. The Aspect of Comfort / Discomfort

Historically, man has tried to adapt to the external climate that may be hostile to him by building shelters. Then the evolutions of his expectations in terms of comfort allowed him to modify these shelters so that they are illuminated, heated, decorated and so on. However, at first, he rationalized the elements of his direct environment. The designers made shelters with local materials taking into account the free supplies and protecting themselves from unfavorable elements.

The search for comfort is recognized as one of the first engines that pushed man to achieve his first shelter. As a result, comfort is declared as an ecological relationship between the individual and his environment. It requires an interdisciplinary approach.

The concept of comfort evolved over time on the basis of architectural design. In antiquity and in the Middle Ages comfort appeared in space. Before the French revolution, it was an "ornament", but in the middle of the 20th century, comfort was associated with the addition of sanitary facilities and the rationalization of facilities to satisfy the requirements of the user. Currently, it is a part of an environmental approach.

Comfort contributes to the definition of well-being. "Comfort is related to feelings, perception, mood and situation. Its definition involves both a negative approach (absence of discomfort, which is characterized, for example, by the absence of pain, anxiety, etc.) and a positive approach (well-being and satisfaction). "(Moser, 2009)[3]. This definition of comfort puts us face to face with the complexity of measuring comfort since a high number of physical, psychological, physiological, cultural and personal parameters influences more or less the different comforts defined by (Moser, 2009)[3]; – Sensory comfort: refers to the quality of the environment (light, sight, air, tactile quality of materials ...) – Existential comfort: is related to the environmental quality of the living environment having psychic repercussions (in relation to its identity or its development) – Material comfort: corresponds to the satisfaction of primary and material needs – Aesthetic comfort: subjective, it depends on individual perceptions – Social comfort: balance between the need to be with others and the need for intimacy – Comfort of conformity: belonging to a social group The notion of comfort is then difficult to define. These aspects of comfort are approached in numerous research in various disciplines: physics, psychology, architecture, biology ... In our study, we will try to describe the conditions of comfort in the traditional houses of the old town of Algiers, some houses are very well maintained and preserved, which gives them a quality of life, comfort, well-being. Every construction should achieve these goals, and this is a teaching that has lasted for decades, (Roulet, 2008)[4]; explains the different transformations that these houses have undergone and what they have generated as an impact on comfort; more specifically on thermal or hygrothermal comfort he details the conditions for optimum comfort.

The study of the vernacular architecture shows that the designers of these buildings knew the climate and the solutions to protect themselves. Thus, at the Casbah of Algiers where the winds of the North can be violent and cold in winter, the windows of the north facades are small. On the contrary, in the South, they are large enough to capture free solar energy. In the same way, the walls are very thicker thick which allows, thanks to the thermal inertia, to maintain the freshness in the traditional houses in summer. Moreover, the occupants had an adapted behavior: they lived with their environment in order to protect themselves from the heat in summer or the cold in winter. The occupant is "active" within his residential building. Throughout the day, depending on the seasons and the climate, it acts on its solar protections, windows, etc. The occupant is an actor of his thermal environment and lives with his climate, he participates in improving his comfort and not action which allowed him to live in harmony with the surrounding environment while respecting the climate

and the surrounding nature, as stated (Heschong, 1981)[5]; « Since ancient times, the maintenance of heat or freshness is part of the everyday human activities and participates in an almost unconscious cultural plan ».

However, during the colonial and post-colonial period, major economic and social changes led to an acceleration of development, which resulted in major changes in all its aspects, notably in the cultural, social, urban and, above all, architectural fields.

Moreover, the great economic and social changes of the last decades have led to an acceleration of development never equaled. The speed with which we are able to plan and realize new "turnkey" urbanizations and architectures have enabled major transformations of the city in all its aspects, in particular: cultural, social, urban and, above all, architectural.

This situation has led to the importation of architectural models that are not adapted to the local socio-cultural characteristics and human identities of the houses in the Algiers Casbah as well as the non-consideration of local architectural models better adapted to the climatic and topographical data specific to this Mediterranean city.

All these parameters mentioned above created a discomfort in these traditional houses in the Casbah because the new occupants thinking to do what is best to embellish his home and makes a gestures that does not give any consideration to the aspect of comfort and reduced these houses to simple residences that no longer enjoy any comfort so valued in his time.

4. Phenomenon of Transformation / Modification

The study analyses the transformations suffered in the Ottoman residential patrimony during two crucial periods favorable to our research, the colonial period (1830-1962) and post-colonial period (1962 until the current period).

(Benmeddour, 2016)[6]; explains in his book that the transformations that these residential buildings underwent during the colonial or post-colonial period were sometimes positive and sometimes harmful and had an impact on hygrothermal comfort.

During the colonial and post-colonial period, the houses of the Casbah of Algiers, as elsewhere, are seized by the process of transformation / modification, a will of the inhabitants to confuse with the actuality to satisfy their needs and their comfort. The transformations have generated disturbances that are sometimes small and sometimes enormous, which have led to changes in the hygrothermal comfort of space.

Concerns expressed by several researchers, such as (Lesbet, 2007)[7] and (Ichboudene, 2007)[8]; confirm the absence of a global vision at the Casbah of Algiers, which must take into account socio-cultural and environmental data of the traditional inhabited site.

We can divide these practices into two types: the first one regards the internal transformations such as the installation of washrooms, the new openings, and the obstruction of *djebs* and wells which transforms them into sanitary voids, transformations that are made by the inhabitants of the Casbah who take the initiative to transform their spaces. Man brushes or adds a part to his façade, for example, piercing a window, or introducing bathrooms in an unthinking way, thinking that it improves the living conditions of the house he occupies, when in fact he destroys the originality of what remains this heritage. The second kind of actions consists of external transformations such as adding new windows, closing others due to alignments that there were in the period colonial.

(LesbeT, 2007)[6]; emphasizes that the majority of houses has undergone transformations or modifications over the centuries that have had major impacts on the hygrothermal comfort of this building. This is the basis of our reflection, which requires first of all to identify the theoretical nature of "hygrothermy" but also practical one.

Researchers such as (Croiset, 1968)[9]; define it in a measurable and quantifiable metrological sense (the sensorial comfort), through "a frequent measure in the building sector where the ideal comfort is sought for the safety of the inhabitants and the infrastructures", he also specifies that several parameters related to comfort and indoor microclimate are taken into consideration such as humidity, temperature, ambient air, ventilation).

All the researchers are agreeing on the transformations suffered by the Ottoman houses during the colonial and post-colonial periods and their impact on hygrothermal comfort. However, it is difficult to rely on such findings to assess the impact of these transformations on hygrothermal comfort. The latter remains difficult to define, due to the divergence of the opinions of the researchers, with respect to the nature of this hygrothermia, and the necessity or not to include the human factor (perception) in the evaluation of this comfort.

5. Presentation of the case study (N ° 05 Impasse Bachara)

The traditional house, the object of our study is located in Algiers and more precisely in the upper Casbah, it is a building that has a single facade on the *impasse bachara*, typology *wast el-dar*, it covers an area of 120 m² and has a height of 10.33 m. It was built with ancient local materials (limestone and terracotta bricks and a mortar of lime), it is organized spatially by a court in the middle that is discovered (one and the rooms all around, it has a ground floor where one finds two large rooms, a kitchen and a room of water, on the first level the distribution is the same except for a room which is covered by a dome, on the terrace there is a part that is built representing the Menzah (a large space where women gather to discuss all kinds of activities) and the other part terrace for the machine.

Our choice was based on this house because it presents suitable criteria such as archival documents and field investigation have allowed us to identify a battery of transformations that it has undergone over the years. A few of them are listed here:

At the level of the ground floor; the development of a new kitchen with an opening on the courtyard, a functional change of the old laundry room in the kitchen, construction of two new rooms at the entrance of the house which was a courtyard, closing all openings, the addition of a toilet and two water points, the use of new materials such as concrete and paint, the increasing of families number living in the house (20 people live in this house currently).

Figure 6. Situation of the house 5 impasse BACHARA, Source: Author
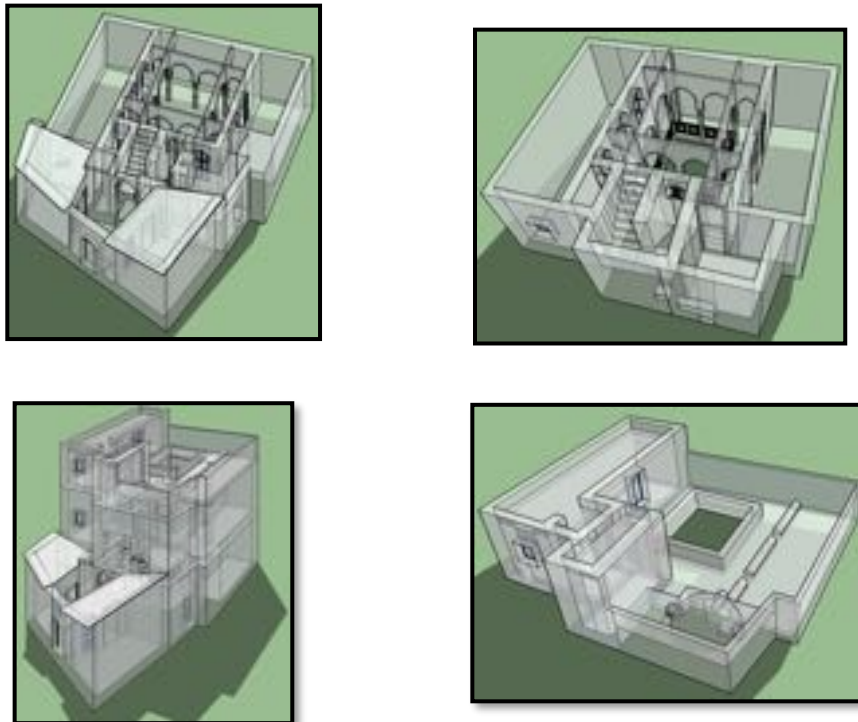
Figure7. Pictures of the modeling of the house by sketchup software

Figure 8. Roof top view, Source: Author

Figure 9. The new kitchen
Source: Author

Figure 10. The House entry
Source: Author

Figure 11. Water points
Source: Author

6. Methodology

In order to identify the transformations and to study their impact on interior comfort, we have used as primary source the archive from OGEBC (Organisme de Gestion des Biens Culturels). It is a cultural property management agency located in Bab El Djdid in Algiers, it is the graphic archive of the ottoman house plans, the documents useful to determine the nature of the transformation that the house has undergone. This tool enabled us to establish the old state of the house studied. Once the building was identified, we went on to field investigation, which enabled us to locate the house on the ground, update the survey and identify the transformations it underwent, and then we carried out the modeling and numerical simulation through the use of Design Builder software.

Figure 12. Software Builder Overview, Source: Author

7. Design Builder Software

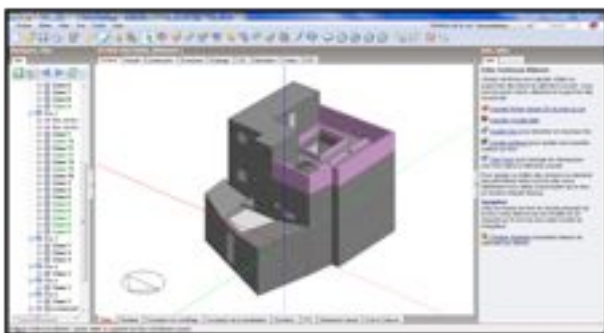**7.1 Software Overview**

The Design Builder software is based on the Energy Plus engine, developed by the US Department of Energy, to carry out dynamic energy simulations of the energy behavior of the building. DesignBuilder/EnergyPlus is used first to evaluate a building's energy consumption or demand, but also to assess the comfort of users in the building.

DesignBuilder/EnergyPlus is one of the most advanced software packages that can be used to integrate heating or cooling systems in addition to the need calculation. It also calculates different parameters allowing evaluating the thermal comfort through algorithms allowing to treat this data. Thus, we can list the calculated parameters and those that are not calculated among those that are commonly used to evaluate comfort.

Parameter	
air temperature	calculated
radiant temperature	calculated
operating temperature	calculated
air humidity	can be calculated, but most often fixed
CLO	input data that can be changed over the year
air flow rate	imposed equal to 0,137m / according to ASHRAE
metabolism	defined by the user
PMV	3 types of index

Table 1. Table showing the parameters of Design Builder

it should be noted that the algorithms for calculating the PMV are proposed making the tool particularly interesting for the analysis of comfort. However, since several of the variables taking into account in the algorithm are either fixed or input data fixed by the user, the interest is then more relative. The remaining calculated variables are air temperatures and radiant temperatures. The operative temperature translating the two is then a relevant indicator of the comfort of the user.

Parameters influencing comfort are numerous and are composed of two types: physical parameters and human variables which can be measured by the following climatic variables: such as Air temperature, Ta (or ambient temperature), Tr (mean temperature of radiation), Va (air speed), w (air humidity), and physiological variables, such as Metabolic heat production, M (AFNOR standard X35205), factors related to the isolation of clothing, Fcl (ISO 9920 standard), thermal insulation, resistance to evaporation, skin temperature and internal temperature and the rate of moisture production (sweating).

For this work, the parameters studied are the different temperatures, humidity and ventilation for the case of traditional and current house.

7.2. Simulation methodology

In this work that we propose, dynamic thermal simulation aims to provide a method that allows the improvement of the behavior of the building in terms of energy consumption and comfort of the user.

Thus, it is primarily used for comparative studies: two different architectural solutions or two different systems are studied in terms of the impact on energy consumption and user comfort. Our work consists in establishing virtual simulations in the summer period for the case of the house in the old state as well as the current state in order to identify that there are bad transformations that were made to meet the requirements of comfort but have had a negative impact on the hygrothermal comfort of this house.

The idea here is to compare the difference between what was comfort in ancient times and what it has now become, the house in his original state and the different transformations it has undergone during years and to see if there has been an impact on the interior comfort, to carry out comparative simulations, based on the archives documents of the house (5 impasse Bachara) as well as his current statement.

8. Mathematical Equations

Operating temperature

It is the temperature of a fictitious room, assimilated to a black body at uniform temperature, in which an occupant would exchange the same total amount of energy (radiative and convective) as in the real room. It is given by the expression

$$T0 = h* \text{ T air} + (1-h)* \text{ Tr}$$

-         T air, the air temperature
-         Tr, the average radiant temperature
-         h, coefficient of weighting between convective and radiative exchanges

For the mean radiant temperature, we consider a person located in the middle of the room, and it is then the mean surface temperatures weighted by their surfaces.

$$Tr = \frac{\Sigma_i \, T_i \cdot S_i}{\Sigma_i \, S_i}$$

Most often the weighting coefficient h is taken to be equal to 0.5. The operative temperature is then the mean of the air and radiant temperatures.

DesignBuilder and EnergyPlus simulations can generate in-depth data on the environmental conditions in the building and the resulting levels of occupant comfort. In our case the chosen indicator of comfort is the temperature; operating temperature, radiant temperature, air temperature and outdoor dry temperature, as well as another parameter which is the sum of the mechanical ventilation + the external ventilation + the infiltration:

<u>Indoor air temperature</u>: calculation of the mean air temperature.

<u>Indoor radiant temperature</u>: mean radiant temperature (MRT) of the area, calculated assuming that the person is placed in the center of the zone, without weighting a particular surface.

<u>Indoor operating temperature</u>: average of indoor air temperatures and radiant temperatures.

<u>External dry temperature</u>: data from the site.

<u>Relative humidity</u>: calculation of the relative relative humidity of the air.

<u>Wind Meca + Vent Nat Ext + Infiltration</u>: sum of the outside air (in Vol / h) entering the zone:

HVAC system + natural ventilation + infiltration, Mechanical ventilation + external natural ventilation + Infiltration data, represent the sum of the fresh air supplied by the HVAC system, infiltrations and external natural ventilation at renewal rate d air per hour (Vol / h). These data used with other environmental results can be very useful to check the discomfort of the occupants.

<u>Minimum temperature</u>: it represents the internal temperature below which the ventilation will be stopped

<u>Maximum temperature</u>: it represents the internal temperature above which the ventilation will be stopped.

9. Simulation and results

The graphs represent the results obtained by virtual simulation of the house No. 05 Impasse Bachara in its old and current state. The parameters studied are the different temperatures as well as the ventilation. In the case of the old house there is a natural ventilation without any cooling system, we note that the difference in temperature is constant between the inside and outside, as for the ventilation it is also constant with respect to the temperature, as soon as the external ventilation and the infiltration increases the temperature decreases and viceversa.

In the current house, in its transformed state, the transfer of temperature between the interior and the outside is destabilized.

Graph 01 and 02. Ventilation and different temperatures for the old state during the summer period
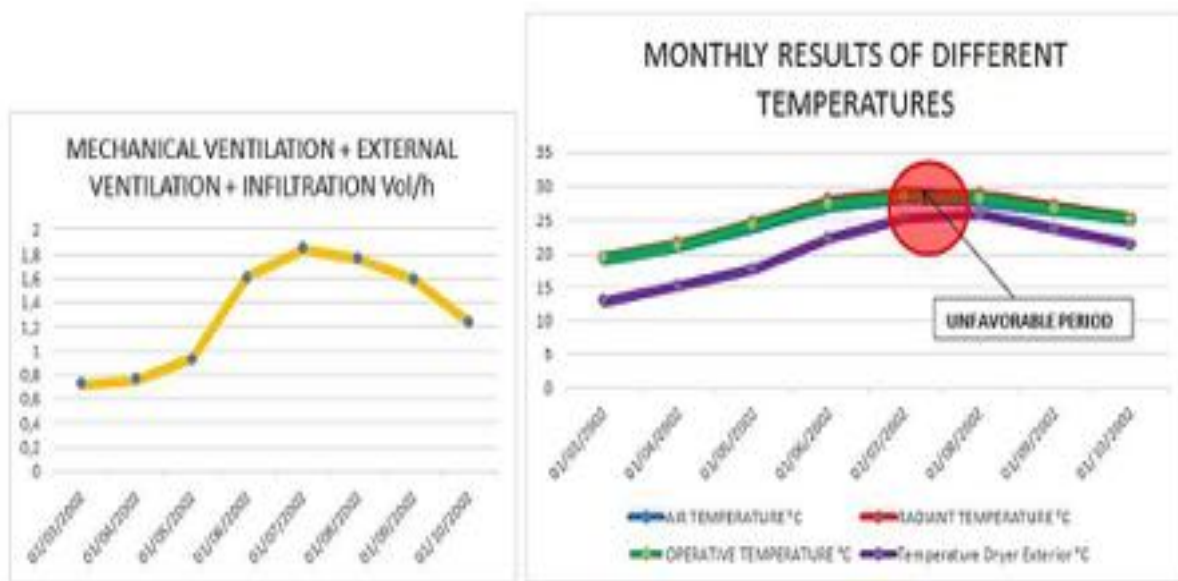
Graph 03 and 04. Ventilation and different temperatures for the current state during the summer period

Graph 05 and 06. Ventilation and different temperatures for the old state during the two months (July-August)

Graph 07 and 08. Ventilation and different temperatures for the current state during the two months (July-August)

Graph 09 and 10. Ventilation and different temperatures for the old state during the hottest week

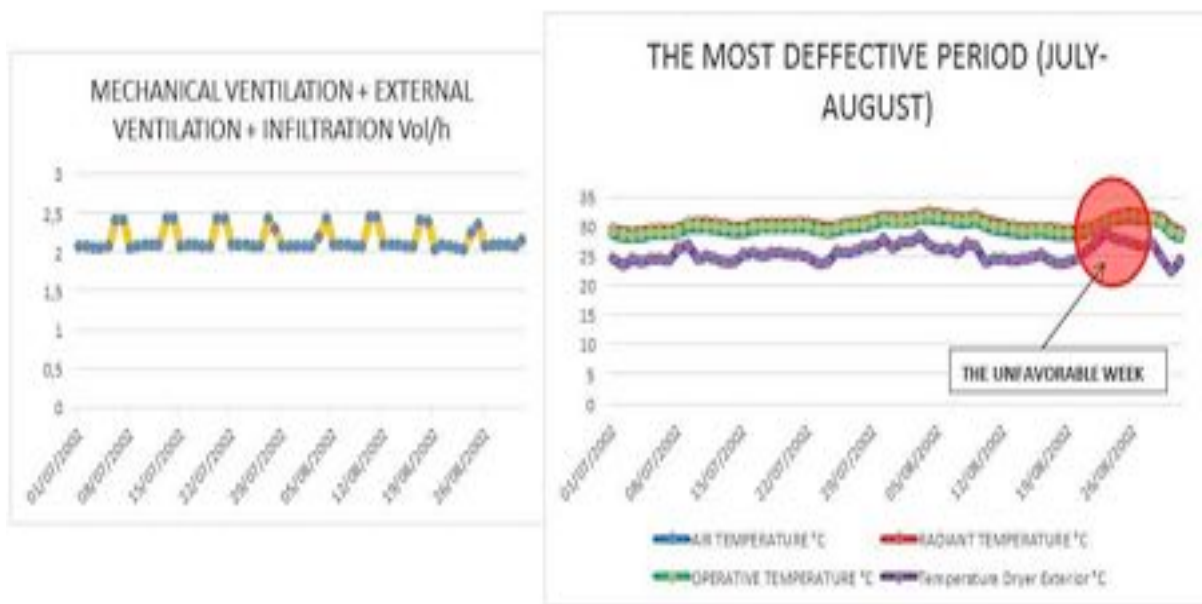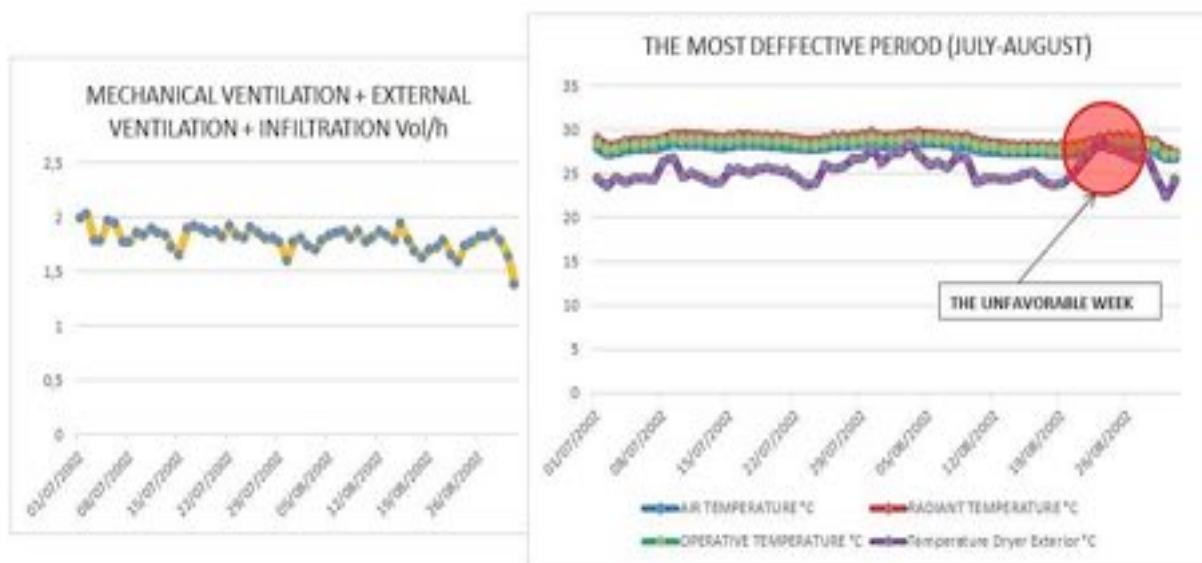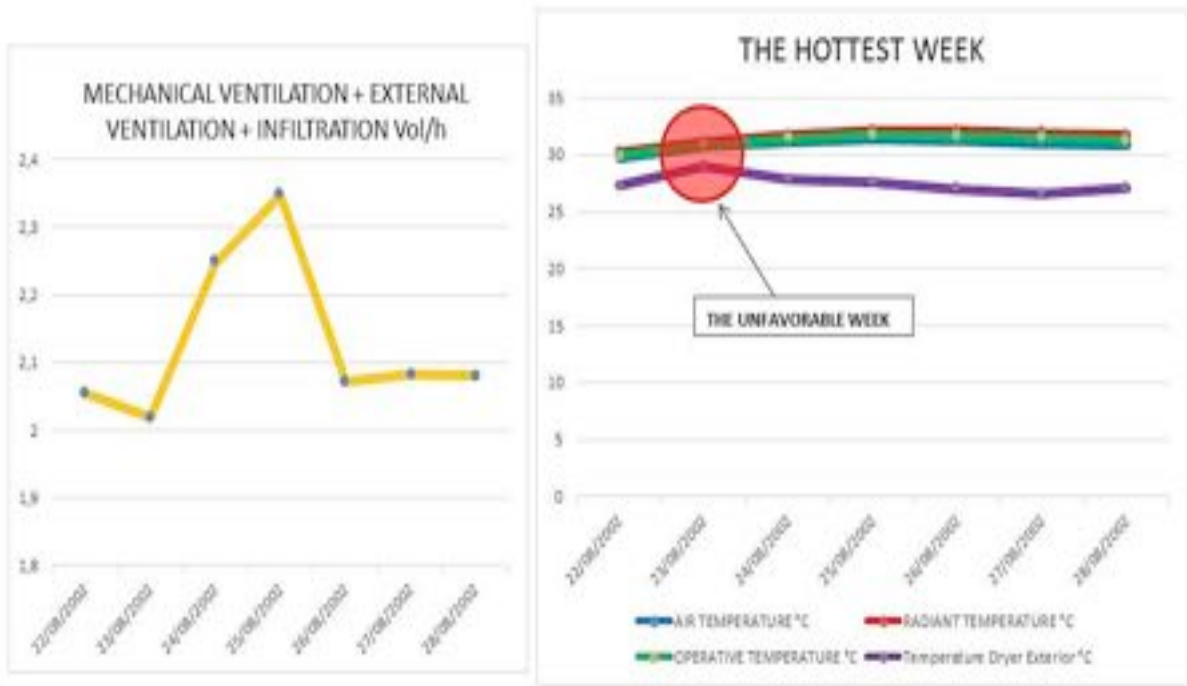*Graph 11 and 12. Ventilation and different temperatures for the current state during the hottest week*
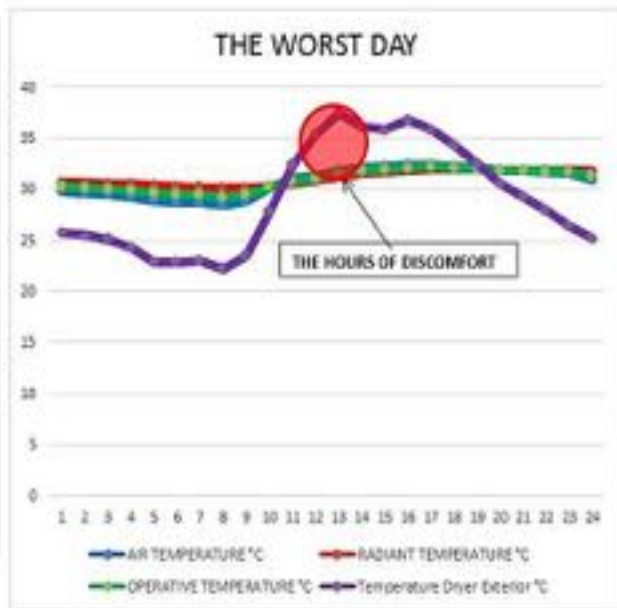
Graph 13 and 14. Ventilation and different temperatures for the old state during the worst day

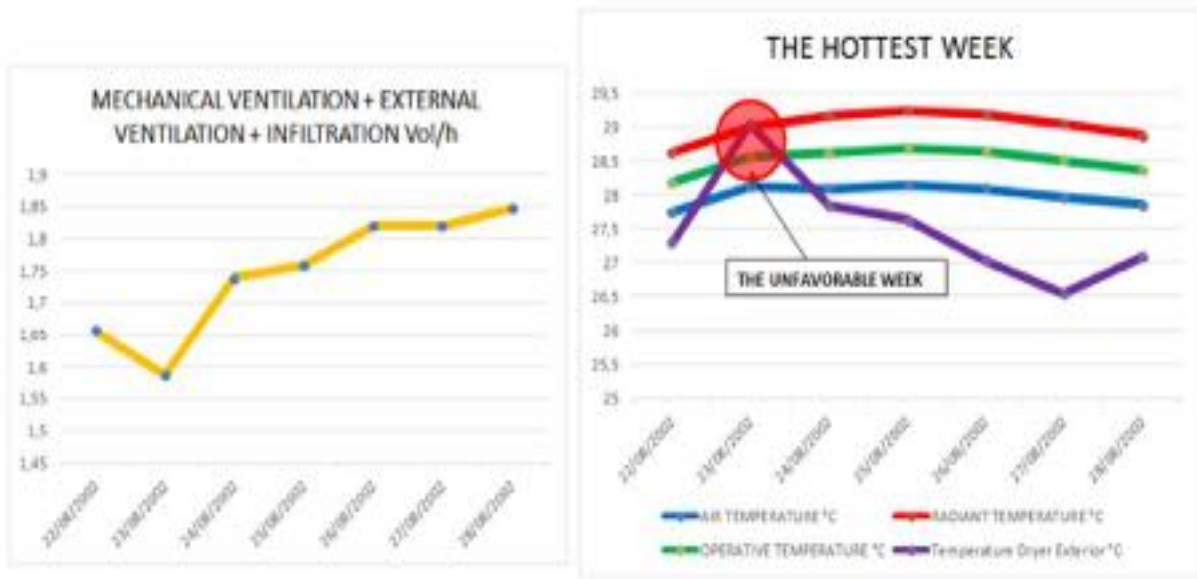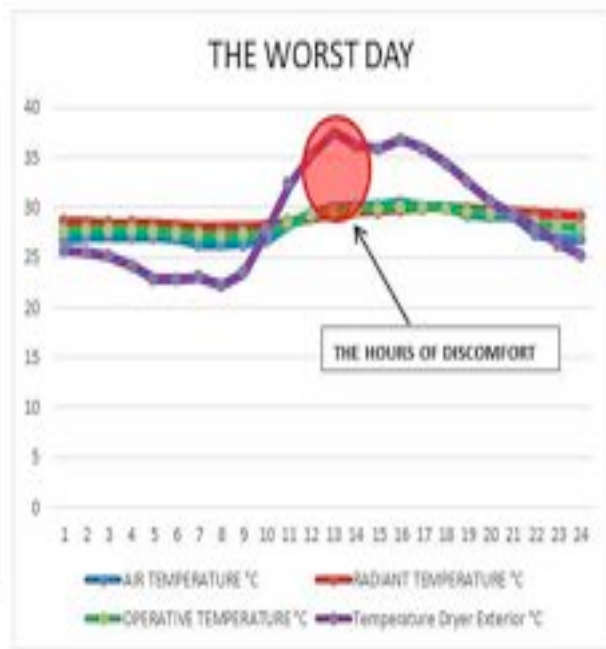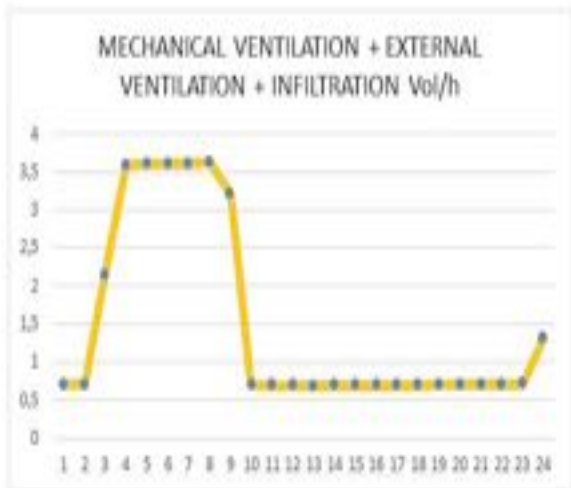*Graph 15 and 16. Ventilation and different temperatures for the current state during the worst day*

From the monthly study of our study case in both periods, we were able to determine the worst period, the warmer months (July-August).

We observe in the former case that the difference between the external dry, radiant, air and operative temperature is constant, confirming that there is a balanced temperature transmission compared to the current state of the house. We see that this difference in temperature outside and inside is almost non-existent, which explains why the temperature transmission is insufficient due to the architectural modifications carried out on the house.

As for the ventilation graph during the monthly period, we notice that the air flow increases as soon as the worst period for both (old and current) is reached.

For the worst period (July and August), on the former case mechanical ventilation is non-existent since it is a natural ventilation, we notice on the graph of spikes of 2.5 vol / h, explained by phenomena such as thermal inertia, humidity, air inlet and outlet. For the present case, there is the presence of mechanical ventilation (air conditioning) which influences the temperature so that it can increase or decrease the temperature.

From graphs 5 and 6, 7 and 8, we were able to define the warmest week from 22 to 28 August in order to be able to interpret and explain the results more precisely.

During this week, we note that for the old case of the house, the transmission of temperature between the inside and the outside is balanced, even if the outside temperature is lower, as for the present case; we note that the difference is unbalanced and we can observe it more precisely during the worst day (August 23).

According to the obtained results, it can be said that the house N ° 05 impasse Bachara in its two cases (old and present) presents an overheating, since the internal temperature is higher than the outside temperature; however, in the former case, the temperature difference between the interior and exterior is constant, as in the present case, has undergone various transformations over the years, such as the introduction of the toilet, the new opening, use of new materials (Concrete, tarnishing, etc.), as well as the modification of the floor and roof covering, resulted in a remarkable temperature difference and therefore destabilization.

10. Conclusion

The study focuses on the transformations that the house underwent during the colonial and post-colonial period and its impact on hygrothermal comfort. This work allowed us to study this house from a new angle, combining a multidisciplinary and more precisely between the knowledge of physics (hygrothemic comfort) and the heritage as well as the architecture of this building (the different stratifications that have undergone this house for centuries).

From the obtained results, it can be concluded that the various transformations that have undergone the traditional house N ° 05 Impasse Bachara such as [the closure of openings reserved for aeration, the arrangement of new kitchens, the use of concrete to reinforce certain parts or the introduction of electronic devices (refrigerator, microwave, air conditioner, washing machine, etc.) have led to modifications of the microclimate inside the house, making the living conditions worse.

This work allowed us to examine two parameters (temperature and ventilation) and their influence on the heat transfer inside and outside the house.

Through these results, we can confirm one of the hypotheses that some houses (like the one studied in this article) of the Casbah have undergone negative transformations and that have modified the hygrothermal comfort negatively.

In the prospects; it would be interesting to enrich this work with:

- A study on other parameters of comfort: humidity, orientation of the house, energy consumptions.
- A thermal dynamic simulation study extends to the annual period.
- Conduct an in situ measurement campaign to verify the results obtained by thermal dynamic simulation.

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COMMUNITY PARTICIPATION IN LOW-INCOME COMMUNITY DESIGN IN THAILAND

SADANU SUKKASAME

Abstract

This paper focuses on a complex community design and community upgrading project in Thailand and reconsiders the role of the community architect as designer, coordinator, and planner to achieve people's participation in the community design. The Mettatham community occupied the land of a Thai temple many years ago. After a period of negotiation, an agreement was reached to rent and share the land between the community and other low income living nearby. Land sharing and settlement upgrading were employed to achieve a win-win compromise. The project was financed by the Baan Mankong Programme (BMP) under the Thai Community Organizations Development Institute (CODI). I was appointed to lead the project as a community architect. This paper examines how a participatory design approach can contribute to solving housing problems and promote sustainability for the future. A participatory design approach to build 56 housing units was undertaken through community design workshops and meetings. Working and interacting closely with people who experience poverty and have great ambition to improve their living conditions is the key to engaging with the poor. Employing simple tools and flexible budgets opened new methods and collaborations within the community and people became increasingly involved in the process to ensure their needs were met.

Introduction

Land Problems and Opportunities

Land is a crucial issue in urban poor housing. Without land, there can be no housing. Lacking strong power to negotiate with landowners particularly the state or religious institutions also becomes a fundamental problem for the poor. In turn, secure rights to land can encourage people to improve their land and dwellings.

In 2010, a survey in Koktoom and Nikom Sangton-eang districts, in the Lopburi province by the Koktoom urban poor network, found that around 42 per cent of land was private, 10 per cent was the Buddhist temple land and the rest of land was the state. Furthermore, around 1,500 households have occupied the state land and Buddhist temple without documentation. However, opportunities for the poor to settle on state lands are difficult and declining due to their lack of negotiating power. Many private landowners and state agencies evict poor people or let them lease individual plots for high rents or for commercial development.

The land held by Buddhist temple is much more than they need for occupying. Many households traditionally donate lands to temple when they die. These donations of land leading to temples become a land rich. The donated land has been employed for religious activities and social purpose within local community, and also allows people to occupy and rent for doing business. In Thailand, there are thousands of urban poor communities occupying land owned by Buddhist temples. This data represents an important resource and opportunity that urban poor are able to access possibly to create communities.

In 2010, a squatter community of 13 families was occupying 1.12 ha of land without any documentation which was owned by the Samakkeethammaram temple in Koktoom district. At the same time, many urban poor were seeking land to build secure dwellings and together they formed a new group with the squatters. They realized that secure tenure would be essential for future dwelling. Thus, after being registered as a cooperative, they started negotiating with the temple for a long-term lease. They planned to develop housing by sharing the land and upgrading the old houses for the original group through participatory process.

After negotiation, a land sharing and readjustment agreement was reached in which the temple agreed to share land. So, each household could gain a plot of land 30 square meters totally 1.12 ha for 56 units on a long term collective lease. In 2012, we began working with people to develop a new layout plan and housing design under the limited budget. Through the BMP, the community received a total subsidy of US$ 222,000 for infrastructure and housing upgrading through a participatory process. Most people agreed with a detached twin house type to save cost of construction and they completed the construction in 2015. Therefore, this paper aims to present how a participatory design approach can contribute to solve housing problems and promote sustainability for the future.

1. Theoretical Contexts

1.1. Participatory Design

Participatory design is a process with many approaches and techniques. It is more than a design method that influence the housing, it is also a human dimension and social process which facilitated with exchange of information and enhanced the designers' understanding of the needs and expectation of the future building users (Luck, 2003). Sanoff (2007 p.213) mentions that participatory design is an attitude about a force for change in the creation and management for people. Design ideas therefore arise in collaboration with participants from diverse backgrounds. As such, it can be said that participatory design is not only for achieving specific purposes but it also engages people in meaningful and purposeful adaptation to their daily environment (Sanoff, 2000, 2007).

1.2. Community Participation

A community is a group of people with face-to-face contact producing a sense of belonging, common interest and values together (Sheng, 1987 p.77–78). While participation reflects the ways in which individuals view their rights and responsibilities in society, all activities are intended to influence decision making and allocation of resources. Community participation is generally taken as the successful implementation of rehabitation by involving people in the planning process by employing the slogan 'planning is for people' (Soen, 1981 p.105). Community participation is a perquisite to community acceptance of public works projects and a framework for participation was structured as the concept of representative and participatory democracy (Amundsen: 1982). People will share the responsibilities, profits and risks of what they decide to do (Hamdi, 1991 p.75)

However, some studies argue that the community participation process, in some instances, is not a genuine attempt to empower communities to choose development options freely (Botes & Van Rensburg, 2000 p.43). In their study, community participation is used by governments as a means of legitimizing the political system

and as a form of social control, and assumes the notion of common purpose and good. Sheng (1987 p.78) also argues that community participation is often not successful as most government policies are not conducive to community participation. Community participation is often managed by a host of consulting agencies on behalf of pre-designed, party-directed planning programs and is quite clearly not fostered to empower local communities (Williams, 2006 p.198).

In view of all that has been mentioned, it seems that participation allows people to gain access to ritual information with regard to the method used to compile it. It stands out as interrelated key factors that promote community development to actively solve problems and promote social empowerment (Talo et al, 2014 p.2). Community participation is therefore concerned with community member engagement and active involvement in issues affecting people's lives and communities.

3. Methodological approach

The methodological approach of the study follows fundamental steps of action research: observing, reflecting, planning and implementation stages. The beginning of the development process is identifying stakeholders and forming groups of formal and informal leaders. Initial trust was created through meetings and design stages in the early sessions, stakeholders were brought to know each other and encouraged to develop collective decision-making.

At the same time, we established a community committee which divided into management, craftsmen, social and data teams in order to bring people to work together and produce new relationship of cooperation. Furthermore, community collective saving also encouraged collective management skills by integrating these processes into community development to provide secure tenure.

The design stage is a part of the empowering process providing an opportunity for learning and designing their community under the limited loans and funding. This is a kind of bottom-up and self-organization approach. Also, it encourages actively involvement in the design process to ensure that the results meet the needs of the community.
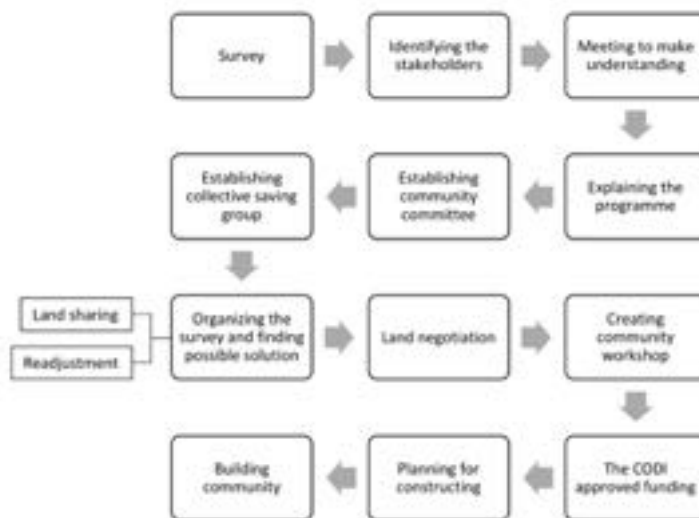
Figure 1. The process of community participation of the Mettatham Community. Land sharing and readjustment are an option that people agreed to improve the community.

Figure 2. Left: people participate in the meeting and workshop to design the housing layout concentrating on sharing equal plot of lands and readjustment. Right: people draw lines to reveal plot of lands and maximum possible house size. The agreement is to build 17 twin houses and 9 detached houses for new occupants, and to upgrade 13 houses for the original dwellers.

4. Results and Discussion

4.1. Land Sharing and Readjustment Processes

Achieving a long-term leasing contract is an ambition of the urban poor. The original occupants as a squatter group, were 13 households living in scattered positions on the temple land. Meanwhile, 43 households are new occupants coming to share the land under the collective lease. As a result, the original occupants received occupancy rights from the temple. Importantly this reduces the threat of eviction and ensures they can continue to live on the land.

A 30-year collective lease is an effective way to ensure that they remain, and offers many advantages particularly to secure and keep land for their descendants. Land readjustment is a step that connects several household lands to create a new boundary and allows people to express ideas to develop a form of secure dwelling on the same piece of land (UN-HABITAT, 2008a p.29). Consensus is required through meetings and workshops to make proposals to the land owner.

Both new and old residents selected land sharing and readjustment to create a brand-new community with more efficient layout of plots. The negotiation between them took time, as some original households complained that their plots are smaller than they had initially. However, the participatory planning and design processes were stages of negotiation to achieve consensus to provide similar plot sizes of around 30 square metres with secure tenure.

Figure 3. The change of a house of a squatter who joined the project in 2010. In 2012, he demolished the old house (left) built from bricks and galvanized iron sheets, and he built a new twin house (right) for himself and his daughter.

4.2. Informal to Formal Land: An Opportunity

The United Nation declares that adequate housing and secure tenure are a rights under international human rights law (UN-HABITAT, 2004). Informal residents are more or less free to build creativity, according to their needs and constraints of space and budget (UN-HABITAT, 2008b p.6). The improvement of informal to formal land can provide them opportunities, for instance, secure tenure, necessary utilities, basic services and infrastructure.

Secure land tenure is essential in allowing them to improve the community and to create opportunities for other urban poor communities to ensure that they can develop by themselves. Becoming formal through upgrading activities produces improvement of their livelihoods and also the finances which enable the community to create and develop welfare activities to look after each other (UN-HABITAT, 2009). In terms of repayment, they have to repay their land and housing loans approximately of US$ 20-37 per month for 15 years. In the long term, everyone has to manage their finance responsibilities as a group. This helps to generate social cohesion to manage the finances and to assist members in case somebody cannot pay (UN-HABITAT, 2009).

Although many people in the community work in low-paid jobs, some people have been able to get higher-paid skilled jobs through the transformation of informal to formal community. For example, they generate new careers as craftsmen, from the building and managing of community skills. In the same vein, collective development keeps people together to find ways to generate collective income, for example, they created a community shop for selling community products and storing handmade crafts to sell in the city centre. This is because having a legal address gives them the confidence to build shops or get better-paying jobs in the formal sector. This demonstrates the close relationship between housing and work which enables housing improvement through providing opportunities for income generation (Gough & Kellett, 2001)

Eventually, people have the confidence and improved management skills when they are the key development actors providing the space to manage their own settlement. The advantage of development programmes is that they can continue to live in the same area that means they also keep their jobs or income-earning opportunities.

4.3. Collective Development Towards Sustainable Community

The community achieved a favourable deal with the landowner. They succeeded in negotiations with the Buddhist temple to get a 30-year land lease agreement with the rental cost of only US$ 3 per a year per household. The land lease is based on a collective lease provided to housing cooperatives that have full rights to the development of land.

Additionally, the collective development programme supports the dynamics of human relationships, which relies essentially on the people who participate in the participation process through a democratic system. This can be a key instrument of social inclusion reflecting the strategies of grassroots and social movements (UN-HABITAT, 2005). Improvement of existing housing is also a strategy for people to achieve collective community management, which keeps people together in the same place. Collective development stimulates people to improve their housing and living environments by leasing long-term land rights to occupy, and reorganizing plots and making space for infrastructure and public spaces to achieve sustainable dwelling.

4.4. Roles of the Community Architect

The Community Architect plays an essential role in changing an old paradigm by synthesizing the knowledge learned from working and engaging with the people in the community. Low-income communities need a new vision to create sustainable dwellings by employing the power of imagination of people. This serves as a tool to empower people to move from their existing knowledge and experience to a new idea of the world. Importantly we need to learn how to encourage and convince people of the need to get involved. In fact, forming a sustainable group is probably more important than designing houses. At this point, the role of the Community Architect becomes a tool to link social, design, and building processes, focusing more on the process than the product. Also, there is no "best formula" in terms of process because communities will need different processes depending on the current situations or particular circumstances.

Low-income people desire to create social change by looking for a possible way to improve their circumstances, whilst the community architect's vision is seeing the aspect of a place to understand how people may live or communities evolve and to understand the dynamic background of the community. Although low-income people can build houses without architects, however, architects can produce more graphic and visual design techniques that can help people effectively follow their imagination. Also, people get enormous satisfaction

and fun in participating more in designing their own community. Therefore, I would like to present three roles of the community architect in community design.

Firstly, a designer should not only work with stakeholders in terms of the physical appearance of the built environment, but also encourage and enable them to work through and begin to solve their own dwellings problems. They must consider the existing non-physical aspects such as budget, regulations, culture and a belief, and a confidence in the design process. Creating flexible processes in terms of building is also essential, hence, the designer should be careful and consistently listening to the voice and knowledge of the community. Secondly, a coordinator's role is to create and encourage community networks, both inside and outside communities, for instance, creating networks between urban poor networks and academic institutions or enabling urban community networks to share knowledge and experiences with each other. A community architect is therefore a middleman to connect people, organizations and government agencies to journey together. Lastly, a planner role is helping people to develop and plan housing their project to complete on time and to engage with strategy and action planning.

These roles have enabled me to realize that there is no best formula for planning, it depends entirely on the circumstances. We should create spaces for participation that enable communities to act and implement effectively, and to create relationships with their own working environments.

5. Conclusion

This paper has examined how a participatory design approach can contribute to solve housing problems and promote sustainability for the future in Thailand. The challenges faced in the diverse knowledge system of productive collaboration, is an important learning opportunity. This study has found that a community participation process as a mechanism to enhance people, can change and improve a social situation and dwelling by focusing on "people processes". For example, a collective saving group and participatory budget have changed the dynamics of relationships and built constructive engagement. An essential role of the community architect is connecting social and design processes together through participatory processes. Although this study is based on a small sample of participants, the findings propose a variety of areas that might provide knowledge that will benefit through future study. For instance, comparing the results of this project with the success of other urban poor communities in the province of Koktoom, in both suburban and city centre areas. Further study is badly needed to account for the variability in terms of cultural origins, contributions, and cultural change within diverse environmental conditions in the city.

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PALACE GARDENS IN ISTANBUL; THE EXAMPLE OF TOPKAPI

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Abstract

Historical gardens as an important type of green areas are important for today's societies in terms of their natural characteristics as well as their historical, cultural and aesthetic values. These historic gardens, which provide an environment for period buildings, are an important part of our cultural heritage, as well as evidence of the past and historical-social change. Palaces and their gardens, which were often built centuries ago, have significant environmental and cultural importance for today's cities and the societies that inhabit them. Istanbul, together with its other natural and cultural features, is also intimately associated with its historical environment of palaces. Istanbul, which is the most populated city in Turkey, possesses a number of palaces, namely Topkapı, Dolmabahce, Cırağan, Yıldız, and Beylerbeyi. The oldest one among them is Topkapı Palace, located on the peninsula where the Bosporus, Golden Horn and Marmara Sea interconnect. Topkapı Palace was the seat of government of the Ottoman Empire and the residence of the sultans for centuries.

Keywords: Ottoman, Palace, Topkapı, Garden, Historical Landscape

1. Introduction

Historical gardens as an important type of green areas are important for today's societies in terms of their natural characteristics as well as their historical, cultural and aesthetic values. These historic gardens, which provide an environment for period buildings, are an important part of our cultural heritage, as well as evidence of the past and historical-social change (Looker and Patrick, 1987). Palaces and their gardens, which were often built centuries ago, have significant environmental and cultural importance for today's cities and the societies that inhabit them. Among other features, some cities are often closely identified with their famous palaces inherited from the past, for example, Schönbrunn Palace in Vienna, the Palace of Versailles in Paris, and the Alhambra in Granada. Istanbul, together with its other natural and cultural features, is also intimately associated with its historical environment of palaces (General Directorate of Population and Citizenship Affairs, 2012). Istanbul, which is the most populated city in Turkey, possesses a number of palaces, namely Topkapı, Dolmabahce, Cırağan, Yıldız, and Beylerbeyi.

The oldest one among them is Topkapı Palace, located on the peninsula where the Bosporus, Golden Horn and Marmara Sea interconnect. Topkapı Palace was the seat of government of the Ottoman Empire and the residence of the sultans for centuries.

2. The Topkapi Palace and Gardens

The Topkapı Palace is situated on the most beautiful site in Istanbul, on the historic peninsula where the Sea of Marmara, Bosphorus and the Golden Horn meet. It is a complex of buildings built in the Turkish architectural style where the most magnificent treasures of the Ottoman Empire are displayed. Topkapı Palace was built up on top of a hill from where vineyards and gardens sloped down to the seashore (Necipoğlu, 1991).

Although the palace construction in the second half of the 15th century seems to have been completed, it has been under the influence of changes for a long time. Due to the increase in the palace population, the palace was constantly enlarged with the additions and various changes were observed due to the fires and earthquakes, and it took its present state in the late 16th century (Müller-Wiener, 2001).

Topkapı Palace was isolated from the city by high, irregular walls, some of which dated back to the Byzantine acropolis, because it wasn't considered appropriate for the sultan to live close to the public. Thus, when viewed from the outside, the palace presented a powerful image and resembled a fortified castle (Necipoğlu, 1991). In order to improve the safety measures within the palace, the area containing the main buildings was also surrounded by high walls (Uzunçarşılı, 1984). Topkapı Palace is consisted of an inner core and outer gardens defined by the high walls.

2.1. Design Characteristics of the Topkapı Palace Gardens

Turkish gardens can be subdivided into two groups in terms of scale and ways of use. The first group is made up of large-scale green areas like vegetable gardens, parks for public recreation (mesire), and meadows.

As for the second group, it is made up of small and enclosed areas like house, mansion, and palace gardens. The first group is made up of external gardens that mark a transition to nature, while the second group is made up of internal gardens that mark a transition to architectural spaces. While the first group is closely connected through nature, the second group is closely connected through architecture. This two groups of garden in the Topkapı Palace can be defined as 'architectural gardens' or 'geometrical gardens' (Aksoy, 2007).

2.2. Courtyards

The Topkapı Palace consisted of four courtyards. In the Topkapı palace garden, there are various built-in entrances from the inner courts. The layout of the courtyards are usually plain.

2.2.1. The First Courtyard

The First Courtyard is the largest of all the courtyards of Topkapı Palace. This courtyard, which also functions as a gathering area due to its features of various functions such as royal buildings, fountains and service, and at the same time being an open space, was also a kind of exhibition area of various exotic animals. The fact that it houses the rather long tall trees allows him to create the air of a village square (Eldem and Akozan, 1982).

From the main entrance, Bab-ı Hümayun, spacious and tree-lined First Courtyard is reached (Figure 1). The main gate which is the Imperial Gate (Bab-ı Hümayun) opens to the First Courtyard of the palace was built in 1472. There was a manor style flat that was used as a Treasury Room above the wall (Beytül Mal), which did not arrive today because it was destroyed in 1866 (Eldem and Akozan, 1982).

Figure 1. Imperial Gate (Bab-I Hümayun)

In this courtyard; warehouses, structures for guards and services were located. Also it was the place for courtiers to ride horses. The first courtyard, which is the transition place between the inside and outside of the palace, has shrunk with new structures that have been added to the courtyard over time. Trees are the only plant elements that are remained along the way which associate the two entryways (Figure 2).

Figure 2. First Courtyard Of The Palace

First Courtyard was also the ceremonial place. Gateway pictures are drawn here. This courtyard, that public to enter easily, was a social area. In this courtyard that surrounded by buildings, the Byzantine Church of Hagia Eirene stands (Figure 3 and 4).

Figure 3 and 4. Church Of Hagia Eirene in the First Courtyard

Hagia Eirene, the church just next to the entrance of Topkapı Palace, was a Byzantine church, today is a museum. It is the only Byzantine church with its atrium intact. Courtyard I, is a gateway in between the inner and outer places of the palace, was shrunked with the buildings attached later (Aksoy, 2012).

In this courtyard, a functional and informal group of trees, linking important doors are dominant. These trees in the surrounding are only landscape elements in the courtyard.(Figure 5).

There are platanus trees, some of which is 400 year-old in this courtyard. The body of one of the platanus tree is 14 meters around in the court (Figure 6).

Figure 5. A Long The Path Of First Courtyard

Figure 6. Platanus Orientalis Which 400 Year-Old

Figure 7 and 8. The Second Gate Of The Palace (Babüsselam)

2.2.2. The Second Courtyard

The gate of the second courtyard is called Bab-i Selam and today it is the entrance to the museum. It was built in the time of Fatih Sultan Mehmet and was later repaired in the 16th century by Kanuni Sultan Süleyman (Figure 7 and 8). The second gate of the palace, the gate of Salutation with two towers on each side (Babüsselam), opens to the second courtyard of the palace. The Second Courtyard is surrounded by the Imperial Council (*Divan-i Humayun*) Building, the Tower of Justice, the kitchens, the Imperial Stables, the Dormitories of the Halberdiers with Tresses, and the Imperial Treasury Building (Figure 9).

The Conqueror's Pavilion, also called the *Conqueror's Kiosk,* houses the Imperial Treasury. The foreign ambassadors and officers were free to enter within this area, as if reflecting the character of the garden. The second courtyard, called the divan square or "Justice Square, is smaller, but more beautiful. It is surrounded by, fountains, shaded paths with high cypresses and lawns (Figure 10 and 11).

Five paths that are scattered like a fan from the entrance, one of which is now destroyed, are reaching to the Kubbealtı, Treasury Room and Audience Hall (Arz Odası) (Figure 12). The most important building of this courtyard was the "Kubbealtı".

The courtyard is encircled by a portico. The ground tilted towards the center is paved with stone (Figure 13).

Figure 9. Conqueror's Pavilion

Figure 10 and 11. Divan Square And Cypresses Trees

Figure 12. Kubbealtı

2.2.3. The Third Courtyard

The third courtyard which is known as the "Enderun Square" is entered through the door called "Babü-Sa'ade" (Figure 14). It opens to the inner third court and the fourth court including privy (Has) gardens and kiosks.

This door was given its present day shape in the 18th century. Many ceremonies took place at this gate; that include the accession to the throne of a new Sultan, Bayram ceremonies and the ceremony of the handing over the flag of the Prophet to the Grand Vizier before a war.

The Third Courtyard was a semi-private space. The Sultan, his family and some of those who worked in the palace lived in the buildings that located around this part. Important officials could enter this place only when they were granted the authorization of the Sultan. Similar to the First and Second Courtyards, the Third Courtyard is also enclosed by various buildings.

From the Second Courtyard, through the "Bab-i Saadet" Gate, Third Courtyard is reached where the private parts of the palace are located. Living areas were starting in this courtyard. In this courtyard, as seen in the first and second courtyard, a number of centenarian (100 year-old) trees are on a flowered or grassy raised platform (Figure 15).

There is also some small courtyards in the Harem where reaches through this courtyard. According to the tradition, the Harem is a collection of buildings which is enclosed, covering their own outdoor spaces and Safa gardens. The most important of the Harem courtyards are, Queen Mother Courtyard, The Courtyard Favorite Wives of the Sultan and Courtyard of the Princes (Figure 16).

Figure 13. Portico

Figure 14. The Last Main Gate (Babüssaade)

Figure 15. Centenarian (100 Year-Old) Trees

Figure 16. Queen Mother Courtyard

Figure 17. Marble Floor—Atrium

The garden was seen from the Princes courtyard. The pool that Eremya Çelebi told as "There is a big pool here, the water of the pool comes to the overflow, and the musicians are rippling around," may be here.

This pool is in the same plane as the pool that Sultan Ibrahim fed the fish with pearls which is a smaller pool under a building structure between the pillars, but not finished. The garden in the lower level of the large pool contains a structure where wild animals fed.

The courtyard that Sultan Osman III pavilion and Sultan Selim III room were located looks through this garden. This courtyard is marble paved and there is a fountain pool in the middle. Also openings in the floor was allowed flower beds. In addition to the slope on the marble floor, waterway for the drainage is also worth considering (Figure 17).

The Third Courtyard which has the private parts of the palace within the gate of "Bâbı Saadet". It is a smaller perystyle than the second court. This court is surrounded with the important buildings of the palace as Harem, the Treasury and Supply Room. At the same time, the third court was a university where the precious artists and scholars of the palace lived and worked. It was called Enderun (Figure 18). The entry of Harem is from this court (Mutlu, 2006).

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Figure 18. Enderûn Library, Or Library Of Sultan Ahmed III

Figure 19. Concubine's Garden

Figure 20. Courtyard Of The Concubines

The construction of the Harem complex was begun in the 16th century and by the 17th century it occupied a very large area. The Harem buildings lay on the slope between the Gülhane Park and the Second Courtyard. Harem is a withdrawn collection of buildings, containing own outer space and Safa gardens. The most important ones of Harem gardens are Valide Sultan Garden, Concubine's Garden and the garden of Princes (Figure 19 and 20).

The Harem, which was planned to be placed on a steep slope of the location where the palace was located, was separated from the other courts by high walls. While this isolation process emphasizes the importance of secrecy, it is also noteworthy that none of the harem hunters have plant traces. Although there is no vegetation arrangement in it, it is seen that some courtyards dominate the beautiful scenery. For example, Boxwood Garden can be watched from the Courtyard of the Favorites. This courtyard was used by the women for playing ball, strolling about or sitting. Formerly, it featured a pool, 18.40 x 32.40 m in size and 1.10 m in depth, which had been the gathering place of the Sultan's family. However, this pool was covered with soil and later used as a garden (Anhegger-Eyuboglu, 1986).

As well as the courtyards, the Harem also has small gardens enclosed by high walls. The other garden of the Harem, located at the basement level in front of the dormitories of the concubines, is called the Harem Garden. Neither the Boxwood Garden nor the Harem Garden has an all-encompassing perspective due to the high dividers walling them in.

2.2.4. The Fourth Courtyard

The Fourth Courtyard also known as the Imperial Sofa (*Sofa-ı Hümâyûn*). This was the private garden of the Sultan in which there are many pavilions. All of these pavilions, which are famous for their internal decoration, are open for visiting as Palace buildings (Figure 21).

Figure 21. Revan Pavilion

The Fourth Courtyard acts as a transition zone between the successive courtyards and the outer gardens surrounding the palace. It has views towards the Golden Horn, the Bosporus and the Sea of Marmara, as well as the Asian and European shores.

Both the Marble Terrace of Sultan Ibrahim and gardens at different levels make up the Fourth Courtyard. As stated by various writers, this part of the palace was allocated to the sultan to be used for recreation and other activities. The Marble Terrace, with its marble pool, was a place for musical and theatrical entertainments. The terraced gardens, as well as the numerous kiosks dispersed around in the Fourth Courtyard, were used by the sultans for relaxing, thinking, eating, reading, writing, listening to music, watching sports activities, and for surveying their vast surrounding land holdings. Various plant species were found in these gardens.

The areas outside of the first three courtyards of the palace are called the fourth courtyard but these are garden groups with mansions inside more than a courtyard. Although the main settlement structures are on the top of the hill, in the gardens and on the skirts, there is a link between the greenery and the individual mansions and this relationship is extended to the sea with graded slopes by the coastal palaces.

This part is the most suitable place for the settlement of Safa gardens, with the view to Marmara Sea and the Bosphorus and the breezes from the sea (Aksoy, Evgüzel and Kemer, 2009)

The fourth courtyard is a natural garden which is built on four terraces. Buildings are located in this courtyard in the form of very elegant pavilions. In the garden, well-formed pools take place. The Fourth Courtyard is a place dominated on a unique landscape to the horizon of Marmara, the beauty of the Bosphorus and Golden Horn. The arrangement style of this garden completely comes from the need of life and function.

The Fourth Courtyard, as the highest degree of privacy held by the sultan and his family and Harem, and the most prestigious venue, is reached with the corps away from the monumental unlike the entrance of other courts, by treasury ward and created using the stairs and ramps in the 19th century.

From the terrace, with the stairs, Tulip Garden, (Figure 22) which has a pool with fountain on one of its corners, is reached.

Which is mistakenly known as Tulip Garden (Lale/Tulip), is limited along with on the one hand the Treasury Department, on the other side with Mustafa Paşa Pavilion (Figure 23).

Terrace Kiosk also known as Kiosk of Kara Mustafa Pasha was built in the second half of the 16th century.
 It was restored in 1704 by Sultan Ahmed III and rebuilt in 1752 by Mahmud I in the Rococo style. It is the only wooden building in the innermost part of the palace. It consists of rooms with the backside supported by columns.

Figure 22. Tulip Garden

Figure 23. Terrace Kiosk

2.3. Tulip Garden

The Fourth Courtyard, which is the prestige place where the highest degree of privacy is held and the Sultan and his family live; which is far from monumental, compared to the other courtyard entrances, is located near the treasury room and is reached by using stairs and ramps in the 19th century.

The Fourth Courtyard, also known as Tulip Garden; is surrounded by Baghdad mansion, Sofa mansion, Hekimbaşı tower and is bordered by the Mecidiye mansion. Among the palace mansions dominating the view there is a pooled stone terrace, a fig garden where the lotus pool seen from this terrace and the elephant garden on its lower level which are open to the view of the pavilion's private mansions and pools in sets that the unique silhouette of Istanbul can be watched (Erdoğan, 1958).

Square shaped, carefully crafted marble fountain in the middle of the 14x15m sized pool located in the stone floor, which can be considered as the focus of the fourth courtyard, is the most prominent landscape element of the courtyard.

The pergolas used to strengthen the relationship between the building and the wall in Turkish gardens and to decorate and revive the wall at the same time have been used to bring mobility to the courtyard as another part of the courtyard landscape. Unlike the other courts, the fourth courtyard, which is dominant in the Istanbul Bosphorus; trees that bring the texture of the Bosphorus such as ash, linden, elm, lote, oak, bay, judas and pear trees, as well as rose plants, hyacinths and lilies are used to create proper landscape design for this prestigious courtyard (Erdoğan, 1958).

With the stairway descends from the other side of the terrace, the Tulip Garden with a fountain pool on one side is reached. This garden mistakenly referred to as the Tulip Garden; bordered by Treasury departments and Mustafa Pasha Pavilion. This pavilion staircase descends to the Şimşirlik mansion where the two pools are symmetrically located. Şimşirlik mansion has two floors.

The bottom floor is surrounded by pillards and two small stone courtyards form on both sides of the stair. There is a large pool in the garden close to the mansion of Baghdad.

2.4. Safa Garden

Inside the Safa garden and by the seaside, there were the Sultans' small palaces and mansions as summer houses. Just to the north of the Çinili mansion, the first item of the palace group, was the mansion of Sultan Mehmet III, in the place of the present archeology museum, was the Sand mansion and Sand Square where javelin games played and watched from the Çinili mansion. On the outside, beside the Soğukçeşme gate, which is opened to the city, The Alay Mansion located where the sultan watches the army parades, feast festivals, weddings of the sultans.

In the gardens, at the beginning of the fourth yard, there are Baghdad and Revan Pavilions, built with inspiration at the wartime of Baghdad of Sultan Mehmed. The terrace, surrounded by Baghdad, Revan and Sünnet Pavilions, is one of the most beautiful outdoor space of the collection of the palaces. The use of marble for flooring, fountains and bars by the seaward, gives unity to the expression of the space (Figure 24). The Revan Kiosk served as a religious retreat of 40 days. It is a small pavilion with a central dome and three apses for sofas and textiles.

Figure 24. The Revan Mansion

The terrace, surrounded by Baghdad, Revan and Sunnah mansions, is one of the most beautiful outdoors of all the palace community (Figure 25). Baghdad mansion built by Murat IV in 1639.

Marble in the sea-side railings, in the ground floor and in the fountain with the pool, completes the space. In the middle of the edge there is a small terrace pavilion called "iftariye", where, a garden in its lower level and a silhouette of Istanbul can be seen (Figure 26).

Iftariye Pavilion, also known as İftar Kiosk or İftar Bower offers an impressive panorama that is dominated by Golden Horn and Galata. The large pool next to the Sünnet mansion, is a cool and beautiful corner among the staves of the structure, being behind itself (Aksoy, Evgüzel and Kemer, 2009).

There were mansions and palaces, which the sultans had them built as summer house, in the sofa gardens and by the sea. There were also the mansion of Sultan Mehmet III in the north of Çinili pavilion, the first element of the group of palaces, around Ağa Garden called as Kalferi, now used as Archaeological Museum, there was Kum Square, in which javelin games can be watched through Kum and Çinili pavilion. Outside there is Alay pavilion next to the door opening to Soğukçeşme, known as found in the wood in the era of Sultan Murad III. Where the sultans watched the pass of the sultan's army, and holiday festivities, engagement and wedding of the sultan, to be adopted by grand vizier for the regiment of foreign ambassadors.

The functional gardens are next to the Safa gardens can be seen in European gardens. Park and gardens, whose samples could be found in the 17th and 18th centuries, are in accordance with the collections of Turkish palaces like Topkapı. Whereas the palace structure, in European samples, can be seen as in a large land, without having relation with the land and impact to the general location, In Turkish samples, the gardens follow the structures of the palaces, that's to say, structure first comes, and garden follows it (Aksoy, Evgüzel and Kemer, 2009).

2.5. Sofa-i Hümayun's Lower Gardens

The marble terrace surrounded by a wall called "Hisarpece" in front of the Sultan's room and the area under the flower garden where some sultans watch sports such as javelin, archery, wrestling. The stone throne of the 4. Murad period, which located in front of the Hekimbaşı tower, was where the sultans sit.

A variety of mansions and buildings was built starting from the 15th century in the Marmara Sea side of the garden. In this part of the garden there were gates for the passage to the third courtyard and to the great

gardens of the palace. Today there is the Sofa Mosque which was built here in the 19th century and Mecidiye mansion and the Esvap room which is connected to the mansion (Figure 27).

The Terrace Mosque, also called Sofa Mosque was constructed in Mahmud II era in the Empire style. The Kiosk of the Swordbearer used to stand in its place. It is known that there used to be a mansion where the Conqueror Sultan Mehmet built, a door to the lower gardens, and Çadır Mansion on it.

In this yard, some sultans did some sports such as javelin, wrestling and archery. This field is the part under the marble terrace and the flower garden of Sofa Pavilion, and Hisarpeçe, which is in front of the sultan flat, marble terrace as well surrounded by walls. It is also a place where the stony throne sultans, belonging to the period of Murat IV, in front of Hekimbaşı Tower, watched the activities. In the part of this garden, which has the view of The Marmara Sea, there were various pavilions and buildings as of the 15th century. Also, there are huge gates, providing passing to the third yard and the other big gardens of the palace from this space.

2.6. Privy Gardens of the Sultans (Hasbahçe)

Greatest amount of green area in the palace complex is covered by the outer gardens that are used for recreational activities by the Sultans consisting of cultivated lands, pastures, meadows, vineyards, stables, sports grounds and the Privy Gardens of the Sultans.

The Sultans had to rest after activities such as hunting, archery and javelin throwing. In order to meet the needs of the Sultans, there are various buildings such as summer palaces, pavilions and pavilions in the palace complex. At the same time they could follow the foliage, watch the races, wrestle and ceremonies, or simply enjoy the perfect view while relaxing in these kiosks. These structures were also used to make calls for important events as well as resting activities (Necipoğlu, 1991).

Has garden, surrounding the collections of the palaces in the north, south and east, is a park, as Gülhane Park, which is served for public. This wide part was in fact departed for hunting and sport activities, but it collected flower, fruit and vegetable gardens within itself.

While Hasbahçe was generally known as the sultan's private garden, Topkapı Hasbahçe had also art and science education buildings. It was the arts and sciences academy of that period. Here, artists such as Mimar Sinan and Mimar Mehmet were educated.

Figure 25. Baghdad Mansion

Figure 26. Iftariye Pavilion

Figure 27. Sofa Mosque

Growing flowers in the Hasbahçe has become an important passion in every period. Beginning from Fatih, most of the sultans were garden lovers and interested in the selection of the best flower species. They brought roses from Edirne, lilies from Halep, also wanted lilac, carnation and tulips in their gardens. It is known that the tulip love went so far as to give an era name (Aksoy, Evgüzel and Kemer, 2009). The Austrian ambassador who came to Istanbul at the time of the Kanuni Sultan Suleyman, stated the flower passion in the Turks as, "The flowers smelled so good that they were spinning their heads, which were unusual like us. Turks, are very fond of flowers. They do not hesitate to give a lot of money for a beautiful flower. Turks do not drop their rose petals, because according to their beliefs, roses are create from the sweat of Prophet Muhammad."

3. Conclusion

Topkapı palace garden has four courtyards. Lala, Sofa and Hasbahçe are located in these courtyards. Islamic, Ottoman and Turkish water culture have been used frequently in pools and fountains. The element that is never missing in the Turkish garden is water. There are various water elements such as sea, creek, pool, and fountain. Turkish gardens usually have pool. The water of the pools is activated by fountains. Pools are built as square or four corners. Round and curved pools started to be built in the 18th century (Evyapan, 1972).

There are walls and fences that are characteristic of the palaces. The walls play an important role in garden architecture. Walls; do the task of partitioning and dividing, as they are done to hold paths, sets, and pools. So it is necessary to distinguish them according to their functions. Carrier walls are built under terraces and roads, around the set and pools. They are made in a pillar shape,or just made entirely solid.

The pillars are made up of wide legs and arches connecting them. Another way is to apply the cut stone to the carved terrace or roads in a technique mixed with brick. The same arches are also used for fortifying the retaining walls.

In this case the wall is separated by niches. The most beautiful examples of these pedestal and arched walls are found in the Topkapı Palace. Most of them made of cut stone. Walls and iron bars, used to distinguish palaces from other structures.

In the palace gardens there are plants of various species as well as centenarian trees (Plane tree, horse chestnut, lote, ash, linden, elm, bay, judas). Functionality and visual aesthetics are the basic criteria that are considered in outdoor gardening. The carefully designed official gardens are positioned towards the Golden Horn and can be used for different plant species such as cypresses (Cupressus sempervirens), pines (Pinus sp.), Tulips (Tulipa sp.), Narcissus (Narcissus sp.), Jasmine (Jasminum sp.), and pavilions, fountains and pools. Flowers, fruits and vegetables, animals and raw materials from all corners of the Ottoman Empire were grown and collected in these vast gardens. In terms of these horticultural gardeners were also responsible for the guard.

Various animal and plant species that provided food for the royal table and for visitors to the palace could be obtained from these gardens, and water could be supplied through the underground cisterns. The excess of vegetables and fruits which were harvested in the gardens of the palace, as well as those brought in from various places throughout the Empire, were sold by the chief gardener in the public square which was located in front of the Imperial Gate. The money gained from the sale of food produced in these gardens was used to pay for the expenses incurred in connection with the palace kitchens (Necipoğlu, 1991).

Despite their beauty and functionality, the outer gardens of the palace began to deteriorate in the 19th century, due both to neglect and ongoing 'Westernization'. After the sultan's residence had moved from Topkapı to Dolmabahce Palace in 1856, the historical peninsula lost its significance.

The few guards who were left behind to care for Topkapı could not keep up the maintenance of the gardens. In addition, a destructive fire swept the coastal area of Topkapı in 1863, and a new railway was constructed there

in 1871. The gardens were abandoned, factories were built in their place, and the traditional appearance of the city was transformed as a result of the chaotic industrial growth which took place from the mid-19th century onwards (Ministry of Culture and Tourism, 1983).

The deterioration of the outer gardens of Topkapı Palace has been described in various sources. A detailed plan of Istanbul dating from 1875– 1882 illustrates the loss of gardens and kiosks, and the guide of Istanbul which dates back to the beginning of the 1900's draws attention to a park and an outdoor café located in the area between the railway and the seashore (Kayra, 1990).

Today, it is possible to create fertile green areas inspired by the outdoor gardens located within the Topkapı Palace complex. In addition to the entertainment environment and visual aesthetics that are provided, the green areas where food production is also carried out, people, especially children, can witness the growth of the plants they consume.

The outer gardens of Topkapı Palace, with their kiosks, sports areas and privy gardens, met the recreational needs of the sultans in the past, whereas the inner core was mainly used for official and ceremonial events.

Today Topkapı Palace Gardens, having historic worth, are spaces, lived, used and investigated with taste. Also, they have versatile, meaningful and effective functions. It is necessary that palace gardens be accepted as live cultural statues, depending on biological aspect and, relating past, now and future to the each other (Öztan and Yazgan, 1984).

The gardens of the Topkapı Palace come into monumental value like constructions in times. For this reason, It is a part of the historical, cultural landscape and architecture of Istanbul.

Palace gardens have a complex feature, functionally and aesthetically, which is coming from the design of the herbal and architectural elements, either combined or distinct. They also have a form of documentary as they reflect the concept of outdoor life of the past, and bring it so far. Palace gardens are precious historical ones which make Istanbul gain importance. They annex Istanbul to fame and quality. It is possible to divide the problems of arrangement and maintenance of the palace gardens into two groups.

The gardens of the palaces, sustaining the general characters of Turkish and European gardens, must be inherited in good repair with all the special features. For it, the subject matter is needed to be undertaken with the methods of traditional and scientific protection.

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CAPTIONS OF VISUAL MATERIALS

Figure 1. Imperial Gate (Bab-I Hümayun)

Figure 2. First Courtyard of The Palace

Figure 3 And 4. Church of Hagia Eirene in the First Courtyard

Figure 5. A Long The Path Of First Courtyard

Figure 6. Platanus Orientalis Which 400 Year-Old

Figure 7 and 8. The Second Gate of the Palace (Babüsselam)

Figure 9. Conqueror's Pavilion

Figure 10 and 11. Divan Square And Cypresses Trees

Figure 12. Kubbealtı

Figure 13. Portico

Figure 14. The Last Main Gate (Babüssaade)

Figure 15. Centenarian (100 Year-Old) Trees

Figure 16. Queen Mother Courtyard

Figure 17. Marble Floor—Atrium

Figure 18. Enderûn Library, or Library of Sultan Ahmed III

Figure 19. Concubine's Garden

Figure 20. Courtyard Of The Concubines

Figure 21. Revan Pavilion

Figure 22. Tulip Garden

Figure 23. Terrace Kiosk

Figure 24. The Revan Mansion

Figure 25. Baghdad Mansion

Figure 26. İftariye Pavilion

Figure 27. Sofa Mosque

TRANSFORMATION OF CANALS IN COLONIAL BATAVIA

EUIS PUSPITA DEWI, KEMAS RIDWAN KURNIAWAN, EVAWANI ELLISA

Abstract

This study aims to explore the changes in form and function of canals as important elements in the colonial city of Batavia. Historically, in the 17th Century, Batavia was built as the trading and colonial administrative centre for the Verenigde Oost-Indische Compagnie (VOC). The VOC was a trading company backed by the Dutch East Indies colonial government, as part of the Dutch empire. The presence of the canals in Batavia made a significant contribution to the development of the colonial and indigenous civilization in Batavia. However, the canals in colonial Batavia underwent a process of transformation, from the beginning of the 17th Century to the end of colonialization in 1949. Through investigating maps, photos, and historical texts, a morphological analysis is used within a historical research method to review the form and function of the canals and their transformation. This paper maps out and identifies the differences occurring between three periods of 1) 'The Heydey of Canals' Period, 2) 'The Deterrioration of Canals' Period during the VOC colonial, in the 17th century until the 18 the century, and the last, 3) 'The Function Changes of Canals' Period during the Dutch Colonial State in the 19th century. During the early VOC period, Batavia had many canals that formed an urban grid and these canals were used effectively in an urban context as the entrance or the 'front yard.' The canals formed a compact city and had many roles, such as for defense, as a medium of segregation, as a means of transportation and as a representation of a preferred colonial lifestyle. However, in the 18th century, the canals physically deteriorated due to lack of maintenance and natural sedimentation. Socially,life along the canals was compromised with poor health conditions attributed to mosquitoes and pollution from surrounding plantations. Meanwhile, in the 19th Century, the canals of the Dutch Colonial State period were reduced in number and no longer formed a transportation grid. The role of the canals as a means of transportation was fulfilled instead by roads with various vehicles. The canals' role was then relegated in people's perception to the 'back yard.' During this time, the canals served as service areas fro waste and to contain flood waters. The canals also had many functions related to the livelihood of indigenous people in Batavia, including transportation, washing, bathing, drinking water and sanitation.

Keywords: Batavia, canal, colonial, morphology, transformation

1. Introduction

A canal is a man-made element that physically connects the city with waterbodies and is an essential part of a city (Moore, 1994). Besides being a container and carrier of water or other fluids, a canal is also a life-giving source for humans, just as the veins and arteries of the body (Moore, 1994). Historically, Batavia was a city of canals. As a pioneer, VOC Governor-General J.P. Coen built the first canals in the Dutch East Indies.The Jayakarta Kingdom was selected as the location for the city of Batavia as a colonial city because it was located in a strategic region for the port as a trade center. In 1617, the VOC conquered the Jayakarta kingdom. The existence of the Ciliwung River in Batavia was a great incentive to build the city in that area and it was the forerunner to the construction of canals. The presence of the canals in Batavia made a significant contribution to the development of western and indigenous civilization in Batavia. However, in colonial Batavia, the canals underwent many changes, both in terms of physical form and cultural attributes. In the early colonial period, the canal was used as an element of defense, transportation, water supply and symbol of glory for the European colonizers. Subsequently, the canals were damaged by environmental factors. The canal functions changed at the end of the colonial period into a 'back yard' that was used only by indigenous communities. The research discusses the morphological transformation of the canals in Batavia, both physically and in relation to cultural aspects. Some research studies about the canals in Batavia have been undertaken, but all sources have highlighted the systemic use of the canal city in order to control flooding in Jakarta (Caljouw and Nas, 2005) and most researchers regard flooding problem in terms of a structural approach, which concerns historical urban and geographic aspects (Gunawan, 2010).

2. Method

This study employed a diachronic approach to reconstruct events over time and a synchronic approach to study historical events and relevant attributes over a particular time in greater depth. A morphological analysis was used as a method to collect and analyze data related to the form and the function of canals, based on spatial quality, figure, form, and context-forming space. This method was also used to review the changes in the physical attributes or the form and function of canals and to explore the underlying economic and social processes. Data was collected through the investigation of 1) maps from Atlas Maior, (Breuning, 1954), The National Archive of the Republic of Indonesia (Arsip Nasional Republic Indonesia, ANRI), which are collected in the Grote Atlas van de VOC (Comprehensive Atlas of the Dutch United East India Company); 2) photos from many different sources, i.e., ANRI, KIT Library, KITLV, COLLECTIE_TROPEN MUSEUM, etc.; and 3) the text of travel records, newspapers, affidavits, decrees, and other related items.etc.; and 3) the text of travel records, newspapers, an affidavit, decrees, and other related items.

## 3. Periodization Of Canals In Colonial Batavia

Generally, as Grijns and Nas (2000) state, during the colonial era, Batavia underwent two major phases in its development. The first phase was the development of the city as an ideal canal city, while the second phase involved the expansion of the suburbs, due to the movement of Batavia, instigated for health reasons, away from the city and the construction of Weltevreden to the south (2000). However, this study resulted in the classification of three chapters of canal transformation, consisting of: 1) the 'Heyday of the Canals' Period, in which Batavia was built in order to realize the ideal canal city; 2) the 'Deterioration of Canals'' Period and 3) the Period of function changes on Canals. During the 'Heydays of the Canals' Period, the canals were designed through careful planning and with development principles that were adopted from the city of Amsterdam. In fact, the 'ideal city' period lasted for no more than 100 years, until the 'The 'Deterioration of Canals' Period. This was the period of excessive pollution and burial of the canals. The final period was the 'Period of function changes on Canals, which was the time of new construction of the canals in some areas of the city, the recovery of damaged canals, and the utilization of the canals with new functions.

3.1. 'The Heydey of Canals' Period (The Early 17th Century – The Middle of 18th Century)

This period represents the VOC's most powerful phase, marked by the construction and the utilization of the canals as an important trading area. Morphologically, during this period, Batavia was built from the edge of the river into the surrounding territories with straight canals, forming a grid pattern. These canals shaped the urban macro form of Batavia in two ways. The first was as hard infrastructure to facilitate the movement of goods and flow of water. The second aspect was cultural, in that being located along a canal had a higher status. Figure 1 shows the transformation from Batavia's early development to the east of the still curvaceous Ciliwung River (*Groote Rivier*) up to the final construction of Batavia, which was considered to be a perfect

canal city. In the maps of 1619 and 1622, the initial canal construction process in Batavia was to the east of the Ciliwung River. The castle (Aanleg Kasteel) was the first building that was constructed in Batavia. At the mouth of the Ciliwung River, there was a water toll (tolhuisken) and a boom that served as the entrance for ships.

Map of 1619   Map of 1622   Map of 1627

Map of 1632   Map of 1635   Map of 1650
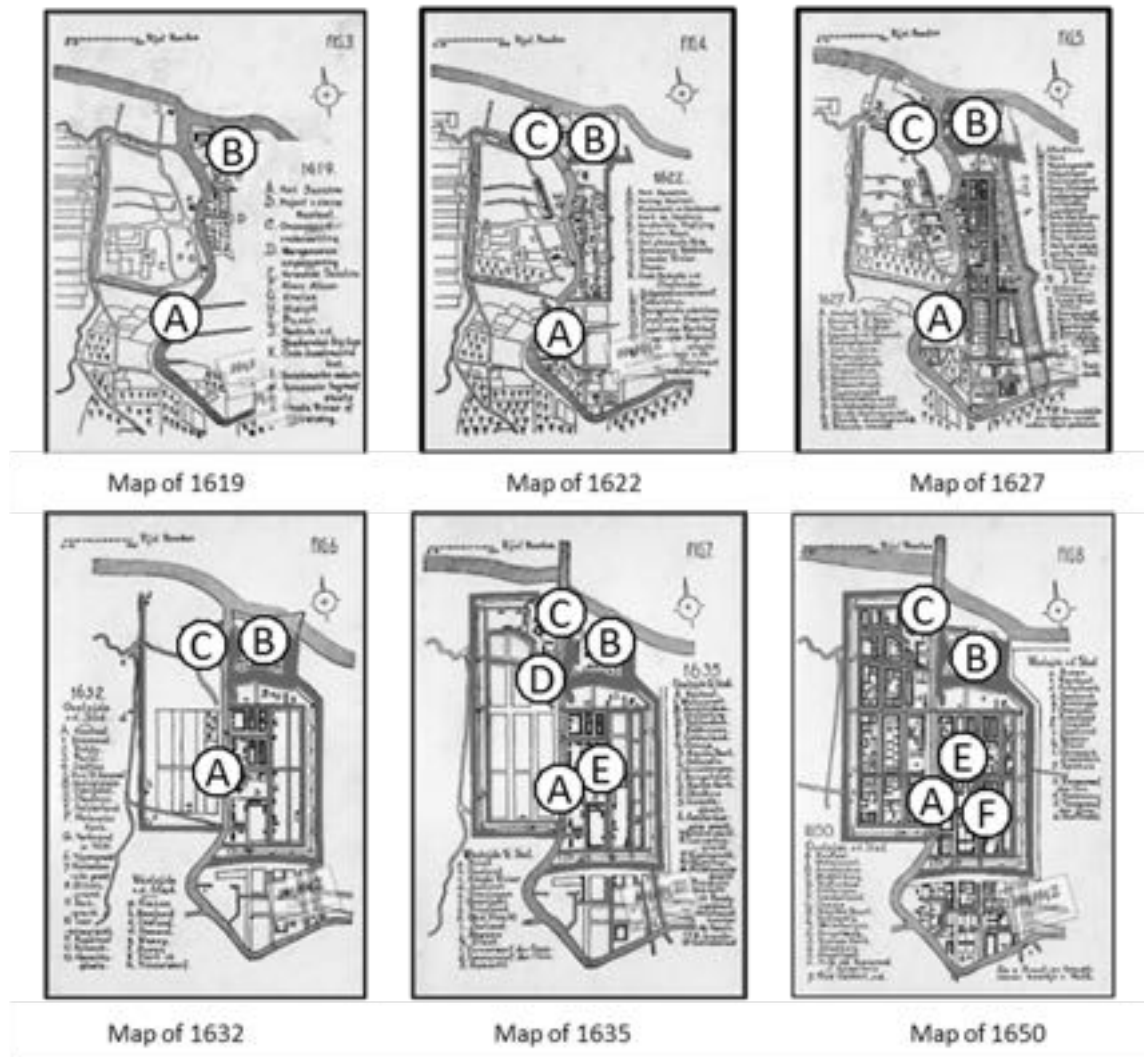
Legend:
A: Great River; B: Anleeg Castle; C: Toll House and Boom;
D: Fish Market; E: Church of Stadhuis F: Plaisant Huis

Figure 1

The map of 1627 shows the eastern part of city building that extended to the south. This map shows Batavia Castle surrounded by moats of varying depth. Many canals had been created, such as Tigers Canal (*Tijgersgracht*), Tayole Canal (*Tayolingracht*), *Vierdedwargracht, Oudekerkgracht*, and *Derdedwarsgracht* canals. The width of 300 feet with a depth of 10 feet in the southern part of the city demonstrates the defenses of the city (Haris, 2000). To the south of the city, there was the entrance and the bridge over the Ciliwung River, at Brasserburg. The city was surrounded by walls, which included a number of bastions and lookouts (Haris, 2000). Batavia had a variety of public buildings, such as churches, hospitals, schools, town halls, and markets.

The map of 1632 indicates that the canals surrounding the castle appeared to be finished. Some buildings, such as churches and the *Stadhuis* (City Hall), were also shown on this map. During the administration of Governor-General Hendrik Brouwer (1632-1636), built Rotterdam-styled gates, breakwaters and sea walls along the 810-meter pier at the mouth of the Ciliwung River (de Haan: I, 1922). This infrastructure was constructed to avoid either sedimentation from the rivers or sand intrusion from the sea. Batavia was divided into 10 blocks (Haris, 2000) which were formed by the grid of intersecting streets and canals.

The map of 1635 shows the completed canals, although the sides of the canals were not yet completed. At this time, many canals had been created, such as the Jonker Canal (Jonkergracht), Rhinoceros Canal (*Rhinocerosgracht*), and Melayu Canal (*Melayugracht*). In the eastern part of the city, Banda Canal (*Bandagracht*) and Malabar Canal (*Malabargracht*) were excavated. The completion of the canals in Batavia was also achieved through the improvement of the buildings in the city. At this time, the VOC issued a prohibition against using wood materials and instead advocated the use of stone in buildings by providing soft loans and remitting tax rebates for homeowners and landowners (Breuning, 1954).

The canals began to be fully utilized starting in 1645, after the construction work in Batavia had been completed on both sides, on the east and west of the Ciliwung River (Abeyasekere, 1989).

In this period, the canals were built to meet the strategic and functional conditions needed to fulfill the city's purpose as a trading post. Also, a canal is a representation of defense, whether physical, economic or cultural. The castle fortifications, city walls, and canals had guard posts at each corner. These guardposts formed a system of defense for the VOC to protect themselves from outside attack, namely the local army of Mataram and the British as their rivals. Culturally, the canal was a medium used to accommodate the living habits of Europeans. The canals and the culture around the canals mirrored their country of origin, including how to live, dress, clean, move, and transport goods, and so forth. The grid patterns of the canals were built not only in order to separate buildings but also to divide a diverse group of populations, consisting of native Europeans, Batavians composed of mixed Europeans and Asians (Eurasians), Chinese, Indians, Moors, Javanese, Malay, Balinese and slaves of unknown origin. The canals in this period had the function of maintaining the pride and the representation of the European lifestyle in Batavia. The level of prestige of a person or group of people in Batavia was determined by which canal they lived (de Haan, I., 1922). The closer to the channel, the higher the value of the area, and the more expensive and prestigious the canal would be. The channel was not only related to economic needs but also served as a convenient means of transportation, so it can be said that the canal, in its heyday, was able to meet the recreational needs of its people.

However, the glory of the canal in this period did not last long. By the middle of the 18th Century, the canals were degraded in quality, both due to natural conditions and as a result of human actions. Therefore, after their heyday, the canals experienced periods of destruction and closure in Batavia.

3.2. 'Period of Canals Deterioration' (Middle of 18th Century - Early of 19th Century)

The early 18th Century was the most prosperous period for Batavia. Many people had benefited from the spending of the VOC throughout this time, when the city's population was about 20,000, with about 15,000 people in the suburbs (de Haan, II, 1922). On the contrary, this period saw the degradation in the physical conditions of the canals, which led to their deterioration and further demise. The canals were filled with mud, dirt, and garbage, and eventually underwent sedimentation, thereby blocking the flow of water. The various attempts at dredging the canals to solve these problems were unsuccessful. Batavia was surrounded by marshes, causing an epidemic of malaria. The city had an increasingly dense population with unhealthy lifestyles. This led to outbreaks of cholera and mumps, thus reducing the population of the city. Finally, Batavia was not a compassionate city and it even became a "ghost town".

For some Europeans, Batavia at this time was considered to be a place unfit for human habitation (de Haan: I, 1922). The canal system could not solve the problems of drainage. The tide carried sand into the canals and mud washed from upstream impeded the flow of water in the canal. The increasing population with their bad behavior of throwing garbage and sewage into the water also added to the canal blockage (Blackburn, 2000). Travelers who knew the beauty of Batavia when it was once "the Queen of the East" felt disappointment. Stavorinus (1798) stated that Batavia had become a dead city with canals that were buried and neglected. Various efforts had been made to tackle river and canal pollution, but these did not solve the environmental problems in Batavia. Canals filled with mud, dirt, and garbage could not be maintained, and eventually, Batavia became a dormant city. Furthermore, one-by-one, canals were destroyed and removed, until only a few remained. Figure 2 shows the process of the decreasing number of canals from 1770 to 1904. The 1770 map shows the original number of canals passing through the city. Whereas the 1853 and 1904 maps show only a few canals were left after many canals were closed.
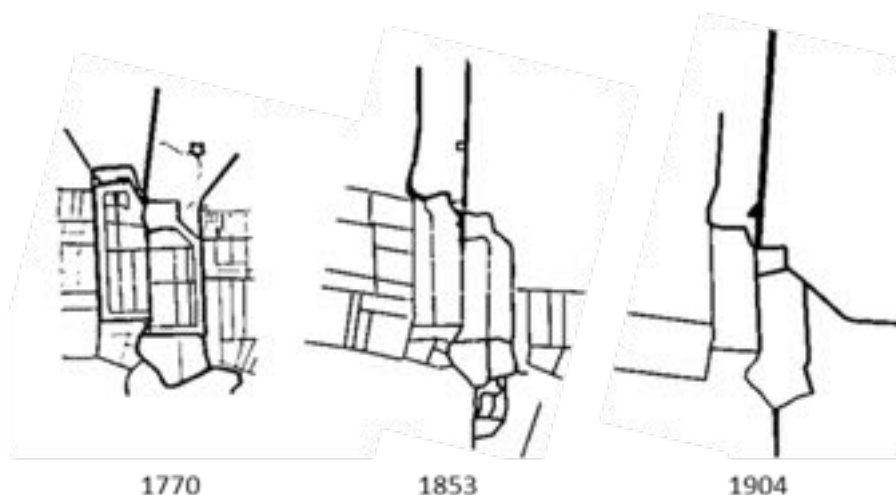
Figure 2

The beauty and splendor of Batavia as "the Queen of the East" was increasingly not found. Canals were ever buried and the city was hollow, flat and neglected. This condition worsened when Daendels decided to dismantle almost all entire buildings in Batavia. As a result, most Batavian people, especially rich Europeans and Chinese, moved to higher and healthier areas, such as Molenvliet, Rijswijk, and Noordwijk (Blussé, 1988). The decline in the quality of the canals was finally in line with the bankruptcy of the VOC. Batavia was taken over by the Dutch East Indies government also went and Weltevreden was built. Under the rule of Daendels, the city center was moved to Weltevreden and Old Batavia was no longer much told. Old Batavia came to be known as "the Graveyard of the East". It was newly rebuilt in the late 19th century as a commercial and service area of Batavia. A residential area of low status society (Merrillees, 2000),

Low geographical location, population growth and bad behavior towards the canals contributed to canals damage. Population growth causes the expansion of the region to the suburbs (*Ommelanden*) and coastal area in the North with various plantation activities. Blusse (1986) mentions that sugar cane plantations in Omenlanden contributed greatly to the decline of conditions in Batavia in the mid-18th century. While in the northern region, Brug (2007) ensured that the construction of ponds in coastal muddy seaside areas worsened the canal conditions in Batavia. New canals that have been built since the century to the south, east and west to support urban development. Due to the city's canals had been damaged and lost, new canals were built into the south, east and west of Batavia city. In addition to getting a cleaner water supply, the canals were built to support urban development activities to the suburbs as a means of transportation.

3.3. 'The Function Changes of Canals' Period (Middle of 19th Century- Early of 20th Century)

Damage to canals and the unhealthy environment in Batavia caused the movement of cities from low areas to higher and healthier areas. The higher region was named Weltevreden (derived from the Dutch language) which means ''very satisfactory''. The new city was expected to be a city that could provide greater satisfaction and comfort for the people of Batavia. In the 19th Century, the focus of the Europeans was on Weltevreden, as a new city center. The nickname of "the Queen of the East" moved to this area (Abeyasekere, 1989), thus restoring the image that was upheld during the heyday of Old Batavia (Hanna, 1988). The government, led by Daendels, successfully relocated the administrative center in Old Batavia port (downtown) to a cleaner area on higher ground (uptown) in Weltevreden. Batavia was divided into benedenstad (downtown) and bovenstad (uptown), as shown in Figure 4. With the creation of the Batavia City Council in 1905, the separation between "downtown" and "uptown" was finally formalized (Abeyasekere, 1989).

Canals in this period had a different role in terms of commerce and water management when compared with the Heyday Period. The six remaining canals, such as the Grand Canal (Kali Besar) was the only the remaining original canal within Old Batavia), Ancol Canal, Molenvliet Canal, the New Market (Pasar Baru) Canal, Gunung Sahari Canal, and the West Flood Canal (Banjir Kanal Barat) (see Figure 3) gave new life to the New Batavia. As the name indicates, the West Flood Canal was built as an attempt to control annual flooding from the monsoon rains. Molenvliet Canal was a liaison canal and a corridor between Old Batavia and Weltevreden. Along the sides of this canal, there were buildings erected in conjunction with the movement of the city. With the development of the city, Batavians witnessed the progress of civilization over time. Important buildings, such

as European housing and military buildings, were located along the canals. Slum dwellings called Kampongs also occurred in the face of the New Batavia (Weltevreden) as the dwelling of the workers for residential, hotel, and infrastructure workers. Kampongs, where the indigenous people lived, were behind the European buildings (see Figure 4). This arrangement demonstrates that Europeans still favored living along the canals. The traditional status symbol of living along the canals was still apparent. However, in this period, the canals were functioning neither as a means of transportation nor as a recreation place nor a water supply for the Europeans. Canals at this time were also no longer regarded as an element of pride for Europeans. As a function of pride, the city of the canals had been replaced by large garden squares, surrounded by large houses in a tropical context of a garden city. The canals' transportation facilities had been replaced by roads and various alternative land vehicles, such as the tramway. Bataviasche Tramweg-Maatschappij or BTM (Dutch "Batavia Tramway Company") started with horse-drawn trams in 1869. The washing areas along the canals were replaced by private and luxurious bathrooms with amenities.
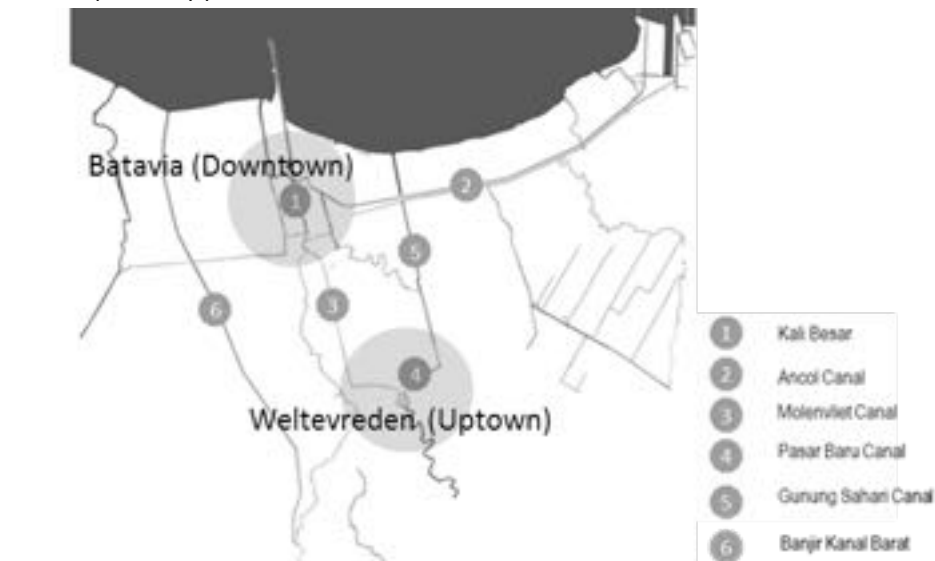

Figure 3

Figure 4

4. The Transformation Of Canals In Colonial Batavia

4.1. From Canals with A Grid Pattern into A Canals without A Grid Pattern

As mentioned above, the canals of Batavia were amended from time-to-time. At the time of the VOC, Batavia was a city that was divided in two vertically by Kali Besar. This was the main canal that bisected the city and canals and connected the secondary canals. A grid pattern of canals was the method used to divide the land and as a means of organizing the population (Kostof, 1992). A grid is a way of spatially defining the social, political and economic order (spatial imagination) (Upton, 2009). The lower the occupant status (such as a laborer, etc.), the further away from the canal (in a less desirable zone or hidden from public view). The grid was identified as a form of egalitarianism and pragmatism (Higgins, 2009). Canals were created to fit the grid, with the wall surrounding the city of Batavia functioning as a barrier (see Figure 5). The walls and canals of the city constituted a further barrier to some segments of the Batavian population, though they were initially intended to be a form of defense against competing sea powers and indigenous armies (Kehoe, 2015).

The grid pattern and geometric design of canals in Batavia were inspired by Simon Stevin's Ideal Plan for a City, (1590). Kostof (1992) states that canals were prepared based on this ideal port plan, with the aim of meeting the needs of the economy and defense. This concept is in line with the objective of building the VOC's Batavia as a trading center and a place to defend the inhabitants against enemies, both from sea and land. Batavia was a city made up of a mix of people; as such, the grid concept was likely considered appropriate to divide or separate the various community groups in Batavia. Locations closer to the canal were of higher value due to the ease of access to transportation and the good view towards the canal they provided (Kehoe, 2015).

Canals in the post-VOC period no longer formed a grid (see Figure 5) . Many canals in the Batavia area were not visible any longer. Although the canals in the post-VOC period did not form patterns or a geometric grid, they were still considered to be the determinant of a new life in Weltevreden. In fact, since the 17th Century, along with the Molenvliet canal, there were several buildings that were used as resting places for rich Europeans. One of these was the residence of Governor-General Reinier de Klerk (1777-1780) and it is now the site of the National Archives building. Until the 19th century, Batavia was expanding towards the south. Along the Molenvliet Canal to the areas of Noordwijk and Rijswijk, there were expensive residential and commercial buildings. The Molenvliet canal was a witness to Batavia's development and it became a connecting area between the old and new Batavia.
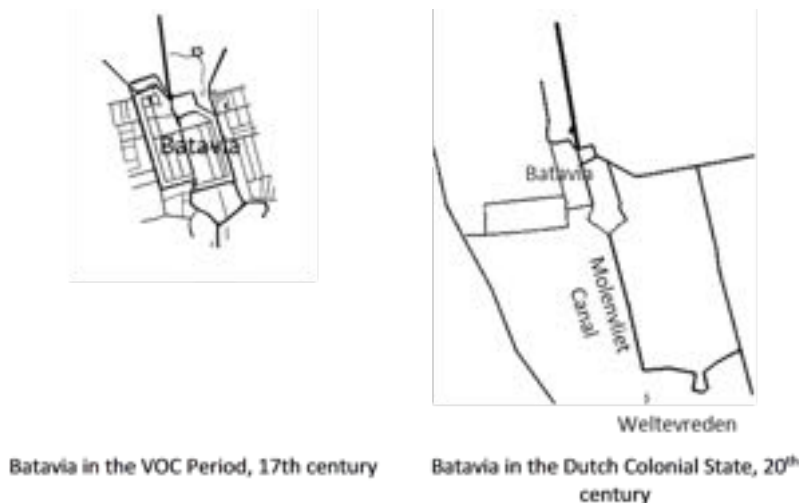

Batavia in the VOC Period, 17th century   Batavia in the Dutch Colonial State, 20th century

Figure 5

The residential concept of Weltevreden was very different from that of Old Batavia. In the 17th Century, Europeans constructed buildings along the canals. The houses were built to resemble the houses in the Netherlands: single story buildings, huddled together beside the wall, with closed windows. The insides were cramped and stuffy so that the hot air was trapped in the narrow courtyard. There was a compromise in the architecture with a slanted roof that protruded outward (see Figure 6). Meanwhile, Weltevreden was transformed into a city with large buildings and open spaces. Existing buildings along the canals had plenty of ventilation due to air circulation in the rooms to avoid the hot and stuffy conditions. The front yard of the building was made spacious with lush trees and a fairly wide range of roads and canals. Structuring processes

for the city and the buildings were based on an awareness of Batavia's tropical climate with high humidity levels. In this period, Europeans were already aware of the tropical climate in Batavia (see Figure 7)

Figure 6   Figure 7

4.2. From the Canals City into the Streets City

Canals built in colonial Batavia continued to change, both in form and function. During the time of the VOC, canals were very important for the city. However, in the Dutch Colonial State period, canals had changed and were no longer important as a means of transportation. The development of transportation technology shifted the role of the canals and they were replaced by roads as a means of transportation. Batavia changed from a city filled with canals (see Figure 8) to a city that was full of streets (see Figure 9).

Starting in the 20th century, the means of transportation had become increasingly diverse and there were numerous alternatives. Tanjung Priok Port, which was built in 1877, provided significant changes to the development of transportation in Batavia. Batavia experienced a threefold increase in population from 1900 to 1930 (Blackburn, 2010). Population growth resulted in the expansion of Batavia and demanded the additional transportation. Migration from one place to another in Batavia added to the need for alternative transportation. In the end, the need for highways was increasingly high in order to facilitate the movement of people in Batavia. The early colonial canals, which had been the primary means of transportation, continued to be replaced by increasingly numerous roads.

Figure 8   Figure 9

Efficiency in time became the reason Batavia people used motor vehicles as an alternative to canals. However, beyond that, they eventually became a growing parameter for demonstrating a person's class. Land transportation by private vehicle was more dominated by upper-class society, while the canals were used only by indigenous people. The canal was no longer a choice for a means of transportation for the European community in the last period. Finally, Batavia increasingly has shown its identity as a city of streets.

4.3. From the Front Yard into the Back Yard

During the VOC period, the canals were very important as a representation of life in Batavia. Physically, canals became a major consideration in building the city of Batavia. The canals served as a tool to defend the city and to accommodate the living habits of Europeans, as in their in countries of origin, including how to live, dress,

cleanse, and transport. The canals in Batavia held the position of a high-value front yard. The canals acted as determinants of the level of establishment (de Haan, 1922) and were a form of pride for Batavian society at that time. Living in front of a canal was the ultimate source of pride because this area had the best view. The Tiger Canal (*Tygersgracht*) was the most luxurious location in which to reside. In this area, the line of houses was displayed regularly, in the shadow of the trees. In 1678, most Europeans lived around the Tiger Canal (*Tijgersgracht*). Luxury buildings in the Dutch style and the rows of coconut trees along the side of this canal added to the area's beauty and luxury. The front area of this canal was the most enjoyable area, so it was often used as a social and recreational space.

In the heyday period, the Europeans used the canals for many activities that could be seen by all people, such as bathing, swimming, fishing, boating, and playing music. The canals were clean and beautiful and these canals determined the comfort of the city of Batavia. The people of Batavia used the canals as a recreational area in which to relax in the evenings and on weekends and holidays, bringing umbrellas and food, and listening to the live music. The canals that were designated as front yards demonstrated the people's pride in the existence of canals in Batavia.

In the post-VOC period, the canals no longer had important roles, as they had in the early days of the VOC. The canals were used only as a space for the cleanliness and daily activities of the indigenous people, such as washing, bathing, taking the water, as well as for sanitation (see Figure 10). Canals were the source of water for all the necessities of life. The indigenous people were faced with poor conditions, but they did not have a choice because they could not afford to buy clean water. As a result, Batavia experienced the growth of pockets of indigenous settlements behind European community buildings called *kampong*. *Kampongs* have the characteristics of a house made of bamboo and wood, with a roof of rumbia. There were no hygiene or sanitation facilities. Therefore, the canal became an area for washing and bathing for indigenous communities.

At the end of the 19th century, Batavia had two faces. There were the kampongs and the city (see Figure 11). These two areas are seen as a contrast: the city for the European community, which is beautiful and full of facilities, coupled with the country, which lacks public facilities and sanitation (Blackburn, 2010). Batavia was transformed into a beautiful city that was convenient for Europeans, while the indigenous villages were left in poor conditions that went relatively unnoticed.

Figure 10

Figure 11

5. Conclusion

The canals in colonial Batavia changed over time and produced the morphological and functional differences between the periods of the VOC and Dutch Colonial State. The canals were transformed from bringing an element of romanticism and colonial exoticism to merely being flood canals in a cosmopolitan city. There were three important differences between the two periods: 1) differences in form, with a grid-patterned city in the VOC period, and the absence of grid patterns during the Dutch Colonial State period; 2) the difference in character between the city of canals and the city of streets; and 3) the functional difference of the canals from their role as a front yard to being relegated to the back yard.

This study yielded the findings of a transformation process that could contribute knowledge, both scientifically and practically to the canals in Batavia (now Jakarta). Scientifically, this process of transformation has shown that canals can also serve as subjects able to construct life between people and to build a civilization. Practically speaking, the planning and design of the canals were not only related to the basic conception of texture, smell, or color and visibility but these canals can also be defined as part of the ideology and culture of Batavia. In planning and designing the canal as part of the urban space, it is not enough to emphasize beautification, but the canal must be seen as an element that is integrated with other aspects, such as environmental, social, cultural, and political attributes.

Acknowledgment

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Captions of Visual Material

Figure 1. Maps of the Construction Period, 1619-1650 (Source: Breuning, 1954)

Figure 2. Transformation of Canal's Existence (Source: Tracing of Maps from Het Nationaal Archief of Netherlands

Figure 3. Existence of Canals in the Development Period, 1878

Figure 4. Land Use of European Housing and *Kampongs*, 1878

Figure 5. Canals with and without Grid Patterns

Figure 6. House of 17th Century (Source: van der Zee, D., 1926)

Figure 7 Typical House of the 19th Century Dutch-Indies Style
     (Source: Collectie_Tropenmuseum)

Figure 8. Canals in Batavia, 17th century (Source: KITLV Collectie, Leiden)

Figure 9. Street in Batavia, 20th century (Source: Collectie_Tropenmuseum)
Figure 10. Washing Activity, 20th century (Source: KITLV Collectie, Leiden)
Figure 11. Map of European Housing and Kampong, 20th century (Source: ANRI)

A SENTIMENTAL INTEGRATION – DIMITRIS PIKIONIS' PLAYGROUND AND ITS EASTERN ORIGINS

ZHANG YINGLE

Abstract

Between 1961 and 1964, the Greek architect Dimitris Pikionis (1887, Piraeus - 1968, Athens) designed and conducted one of his last works, the children´s playground at Philothei district, Athens. In this garden-like playground located between residential areas and pine woods, Pikionis introduced expressive references to create a scenario that reveals a latent unity between two different cultures, the Western and the Eastern. Apart from those Byzantine archetypes that historically show a close affinity to Greek culture, the garden's loose layout with meandering flagstone paths, the entry gate's simple construction, the pure manifestation of panels and frames of the elevated pavilion, and those clear details on straw roof, wooden structure and stone footings, drive this exoticism to the remote region, evoking the images and spirit of traditional Japanese Zen gardens. Pikionis' early pictorial education in Munich and Paris offered him insights into Eastern and especially the Japanese culture. Oriental motifs subsequently became a recurring reference in his projects, as an ascent that first rose from the Athenian Open-Air theatre (1933), developed in the landscaping work at Acropolis (1951-1958) and came to its crest in the playground. By combining various methods of designing and building, the Greek architect systematically sought out the "fundamentally and inevitably homogeneous" among different architectural traditions in this oneiric place. Pikionis took advantage of the topography, using geometric matrix of visual control to establish a layered structure in the garden space. This order results in a particular experience of movement that, from entry to the inner place, adapts to the ritual walk in Japanese tea gardens. Hybrid character also can be found in architectures, whose simplicity integrates construction of traditional Japanese villa and Greek vernacular houses. Then, the metaphorical ambience rendered by those symbolic elements, the straw hut, the wreckage besides dry pond, evokes Greek archaic images as well as the particular sentiment of "quietness" in Zen spirit. Spatial order, constructive manner, materials and spiritual monuments are those factors that compose the oriental tone in this daily and casual site in Athens. Far more than a play of *Japonesque,* this ambitious yet humble-look garden stretches over time and space, over the history of modernity in relation to antiquity, echoing the remote world across its proper culture. The value conveyed by Pikionis half a century ago is still shinning today: to repudiate our habitual fixation on technology and globalization as aesthetic system, the practice of seeking the common value from individual traditions and fixing their differences into the universal backdrop is more necessary than ever before.

Key words: Dimitris Pikionis, Athens, playground, oriental

1. "A Man Of The East"

"Someone said correctly that the trajectory of the Greek nation will depend on our responsible position between East and West. I will add: Also, on the suitable composition of antithetic currents in a new form. I could analyze how this problem is presented in architecture. But suffice it to say here that I am a man of the East." （Pikionis, 1989:37）

Dimitris Pikionis (1887-1968) (Figure 1.) was born in Piraeus, Greece. He showed the gift of painting when he was young. After graduating from Athens Polytechnic University on civil engineering in 1908, he went to Munich to study painting. There, Pikionis got to know the expressionism works and admired, above all, Cezanne's works so much. Then he moved to Paris to study architecture for three years. During that period, the young architect had the chance to deepen his insight into the Eastern traditional culture which, as he said compared to the Western, excelled in spirituality.

Being the origin of the Western civilization, Greece has been holding a close relation with the Eastern world as well due to its great geographical advantages. Pikionis thought highly of the pureness and spiritual expression in the Oriental art, and he insisted that such narrative inherited from the antique period is still living in Greece today. Pikionis devoted his lifelong career in studying the similarities and differences between West and East. As a painter prior to an architect, his pictorial works have interpreted both of the two artistic languages, on the one hand, the technique of impressionism, originally derived from Japanese *Ukiyo-e*, were applied, and on the other hand, Greek myths and landscape were depicted as recurring theme. Such combination also played a key role in Pikionis' concept of space and architecture. Simple construction, raw materials and ritual establishment of the Eastern buildings, especially Japanese vernacular architectures and gardens, had a great impact on Pikionis. Such oriental motifs subsequently became an important reference in his work. It first rose from the Athenian Open-Air Theater (1933), developed in the landscaping work at Acropolis (1951-1958) and came to its crest in the children playground in Philothei, Athens, built between 1960 and 1964. Pikionis organized this garden-like playground in a loose layout. Its meandering pathways, simple pavilions of wooden structure, straw roof and stone footings, not to mention the metaphorical ambiance rendered by those symbolic elements, clearly evoke the Oriental aesthetic of Japanese tea garden.

Figure 1   *Figure 2*

2. Hierarchical Layout

The composition of traditional paintings shows one of the essential differences between the Western and the Eastern concept about space. Unlike the accurate perspective in the Western paintings which has been refined since Renaissance, indicating particular angle of observation, Chinese and Japanese drawings always divide the entire image into smaller parts (Figure 2.) to avoid a dominant structure. This arrangement results in a composition consists of independent systems that show the scene part by part. The absence of unified measurement converts the whole image into a game of scale, in which dimension of objects and distance between them are more expressive and subjective than accuracy.

The different concept of space, seen from paintings, naturally conducts the design of traditional gardens. European gardens are normally distinguished by the organization of perspective from the central avenue as axis that enables visitors to get a dominant view (Figure 3.); while the Oriental ones were made based on the unpredictable scene from nature. Any structures that may lead to an overall read are avoided. Like the paintings, Chinese and Japanese gardens are usually composed of several smaller parts of own character (Figure 4.). They are relatively independent so that visitors can enjoy the changing scenery while walking through.

Besides the spatial composition, the symbolic narrative in Japanese tea gardens fascinated Pikionis so much to develop his own work. In fact, a great Japanese garden is always seen as an art of arranging thresholds. Those borders, some are physical and others are more abstract, play the key role in delimiting parts and guiding the itinerary. The garden's main gate sets the first threshold to separate the interior pathway and the outside

street. Entering the gate, visitors are led to a promenade before reaching to the middle gate as the second threshold. This second gate, usually arranged as a simple wooden structure, reduces its physical function yet gives a symbolic tone that implies the entryway into a deeper space. Further on, the plowed ground of Karesansui, known as dry landscape, stands for the third threshold aims at clean the mind. The last threshold appears at the low entrance of the teahouse that forces everyone bowing before entering. It means the equality of all visitors and to show respect to the host. These four thresholds form an ascent of symbolism and spiritual expression that transcends functionality, composing the spatial sequence of Japanese tea garden.

Figure 3

Figure 4

Pikionis' playground shows a great inspiration from such Oriental layout. The architect has made use of the subtly centralized structure of the give site, whose outmost area is a little bit higher than the central ground, to introduce his geometric matrix as the manner of dividing the layout into phases and establishing spatial order from the peripheral part to the core space. (Figure 5.) The site is surrounded by fence to give the interior privacy. A simple gate of wooden structure and straw roof (Figure 6 and 7.) recalls the entrance of the plaza of Church of St. Dimitris Loumbardiaris on the Acropolis path. It establishes the first threshold. Such enclosure resembles those Oriental gardens that, on the one hand, detaches the site from outer space, and on the hand, intervenes into the natural context through humble installation instead of outstanding mark.

Like the Japanese tea gardens, Pikionis' playground is made of several smaller parts of individual character. Pathways are arranged as the secondary thresholds to connect these parts and transit visitors from one to another. An axis does lead the way from the gate into the playground, yet with much weaker capacity compared to the one in traditional Western gardens. Pikionis extended the axis only to the middle of the site. The unsymmetrical layout and several narrow branches derived from the axis deprive the privilege from this central path. It indicates the orientation in a casual and natural way in order to avoid dominating the place.
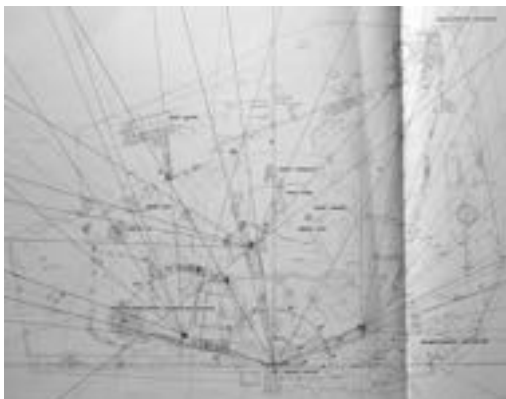

Figure 5

Figure 6

3. Transcendence Through Pathways

As in his pedestrian project of Acropolis, pavement was treated as an important theme in Pikionis' work of itinerary since it helps to indicate the changes in space and makes people to focus on their movement as method to experience the space. In the playground, Pikionis used different floor materials to meet the characters of each part. A small entry plaza in semicircle shape was assumed to be a transitional space to

separate the inner garden from the outside. (Figure 8.) Big slabs in loose arrangement on the floor distinguish this initiation as well as attach great importance to delimit. Following the plaza, there are four pathways moving towards different directions.(Figure 9.) Surrounded by trees and buildings, these routes create narrow corridors into the place. The middle path over which bush is covered even reduces the axis to a slender "tunnel" (Figure 10.). Pikionis used vegetation to control visitors' view so to induce their movement. In contrast with the loose composition of the plaza, these routes are paved tightly with smaller pieces, marking a clear change of the rhythm on the floor. After passing through pathways, visitors have entered into the inner part of the playground. Vegetation and narrow access make this interior phase well enclosed and hermetic. Pikionis kept the routes yet greatly reduced the importance. The intermittent pavement is barely distinguished from the large area covered with earth and grass. Bushes are planted as division of several open yards where facilities, huts, benches and other objects are arranged for children and parents.

Figure 7   *Figure 8*

Spatial dimension and pavement vary along with the itinerary from the entry to the inner part of the playground. They are the key factors that underline the process of transition, while indicating architectural intervention into the natural context through phenomenal narrative. The plaza, flat and paved, introduces visitors from the city street into a void space where their paces are arrested. Surrounded by pavilions and vegetation, this semicircle plot implies a new start yet it holds the extension of the outside space; while the inner part reveals the minimum intervention. Pathways connect the two phases. Through these passages of "return", visitors step onto a natural domain. Pikionis composed the spatial order to symbolize the relation between human and nature, as well as to convey the sensibility of picturesque ideal to complete the transcendence from the exterior to the interior.

Figure 9   *Figure 10*

4. Gaze of Metaphors

Actually the Greek architect was accomplished in symbolic paintings before his architectural work. It is well known his life-long friendship with Giorgio de Chirico, the Italian surrealism artist born in Greece who shared university period with the young architect. The influence from friends and lasting interest in painting deepened his metaphysical study on art.

When De Chirico first showed his painting series Piazze d'Italia (Figure 11.), Pikionis was deeply touched by the mystery and metaphors, the symbolic meaning of time, the history and the destination. He described:

"the delicate line that separated light from shade on rain-drenched soil was equally mysterious. In one, there was a tall building with a clock telling the time. I also remember a picture in which the half-glimpsed mast of a ship conveyed the mystery of departure, exile... heavily marked by the shadow of destiny. Enigmatic, too, the vaults and arcades, the statue of Ariadne touched by the autumn light. All the paintings had the same limpid autumn sky."（Pikionis, 1989:36）
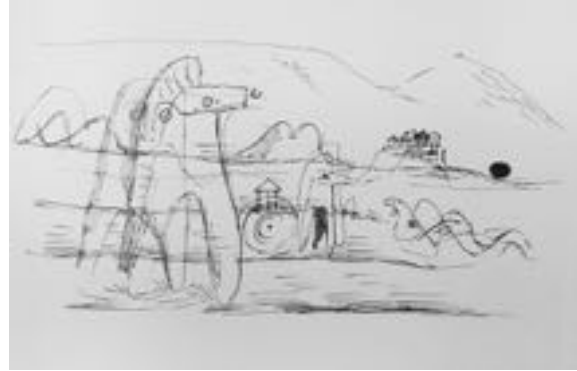

Figure 11

Figure 12

Metaphor is a recurring theme that rendered Pikionis' own art works. His paintings series Attica (Figure 12.), drawn around 1940, depicted the landscape around Acropolis when the architect was wondering around the districts all days and studying the site. The hybrid quality of these sketches composed of the Western and the Eastern inspiration is represented by Pikionis' composition technique, symbolic and abstract narration, which then had been developed in his projects and helped to organize the playground.

Pikionis drew in simple lines, leaving large blank area that implied interval space. It resembles the composition in traditional Oriental paintings. Vacancy takes over connection between objects; absence of reference confuses the measurement of the scene so to intensify the depth and massiveness. Apparently the architect had applied this spatial effect and made it come to the real world. Within the inner part of the playground, sandpit, swings, huts and other facilities are arranged around the open site and kept a certain distance from each other. Instead of directly reaching to the installations, those routes which barely pass by or vanish before these points seemingly enlarge the space dimension.

Apart from practical technique, Pikionis' pictorial narration is always composed of two things, landscape and mythology. The sun, the ocean, the mountains where stand the temples contribute to the backdrop that contains the gods' figure. In one of his Attica works (Figure 13.), in front of the rolling Acropolis hills, Athena grips her lance, holding up her gorgons head on the horse adjacent to the serpent, incarnation of the god Erichthonius, creeping on the ground, symbolizes the birth from earth and eternal regeneration. Pikionis' sketches were concerned much with the process of creation of Hellenic civilization. He was fascinated by the pyramid composition to emphasize the role of earth as the origin from which the Greek landscape and culture were cultivated.

A relevant metaphor in the playground is tracing the "origin" along the itinerary and comes to its crest on two points of the site, the shipwreck and the straw hut. Both of them are arranged within the inner part, the former is close to the axial pathway and the other is located on the west side next to the sandpit.

Figure 13

Figure 14

Reclining beside the dry pond and the bridge, the shipwreck (Figure 14.) reproduces a common scene of the Greek coastline - a boat stranded on the beach or the riverbank. The shipwreck appears as the symbol of Greek marine civilization, and is telling dual meanings. It can be seen as a tragic play of the ever great power being ruined by the passage of time, or a story about generating and growing. This art of scenography in the heart of the playground represents a bridge with the Oriental ideas. A great part of traditional Chinese and Japanese gardens were designed based on imitating and reproducing the natural scenery. Rockeries, pounds and vegetation are arranged to have the composition and contrast of the landscape painting, as well as to give a story, myth or fable, to tell as a part of the entire narrative.

On the other side, the architect shows his inclination of simple construction on the hut (Figure 15.), as the entry gate and the pavilion at the plaza. Supported by thirteen wood pillars, its conical body is covered with several straw layers which make it as a primitive shed. The 1.5 meter-high entry is proportionate to the hut volume and appears even larger. (Figure 16.) Its dimension privileges children because adult have to bow to enter in. Not like the shipwreck that concerns about symbolization, Piklionis devoted concrete architectural elements to the hut so to evoke visitors' memory of antique forms. The wooden triangle over the entrance draws the gable of classical buildings while the exposed pillars project shadow on the ground even recall the typical atmosphere of lithic colonnade. The hybrid qualities appeared from this small hut interpret some essence of architecture, that is, over the long period of development and renewal of architectural language, there have been two inexhaustible power, the wisdom of vernacular forms and the spiritual value from grand monuments.

Figure 15

Figure 16

5. A Sentimental Universe

Pikionis thought highly of natural essence of objects, in the article *A Sentimental Topography*, he wrote

"I stood and pick up a stone…Fire molded its divine shape, water sculpted it and endowed it with this fine covering of clay…All the force of nature converge and work together to produce this particular configuration: the refined air, the bright light, the color of the sky… " (Pikionis, 1989:68)

He made the ship and hut in barely "naked" structure to show their original forms which appeal to the primitiveness. The primitive era for the human history is equal to the childhood for a person. While observing the scenes that Pikionis composed, one would feel the closeness to earth and water, which are the origin of not

only the Greek, but our human civilization. Pikionis returns visitors to the enigma of antiquity while showing the development in which materiality and temporality of a place have been merged with each other in a historic narration.

"… has something transcendental, something more than the solution to a problem, a particular, intangible spiritual grace, a love which is the privilege of the East, which envelopes all aspects of the Eastern Christendom art. In painting you can see transcendental form, intuitive vision coming from deep within. The craftsman has a full knowledge of the real, but does not succumb to the external phenomenon like the craftsman of the West· he represents it as an inner reality through spiritual symbols." (Loukaki, A. 2014: 316)

"… I am weighing up the various visions that our time is about to shape. There is one that is the glorification of the ephemeral and another that would be the symbolic expression of the eternal." (Loukaki, A. 2014: 317)

It is this almost spiritual insistence on the interdependency of the East and the West, and of the turn things of time, which gives Pikionis constant motivation to seek out the *"fundamentally and inevitably homogeneous"* among different architectural traditions, and therefore renders his work a mixed character, the combination of the exotic and the domestic. Far more than a play of *Japonesque*, his ambitious yet humble garden stretches over time and space, over the history of modernity in relation to antiquity, echoing the remote world across its proper culture. At the same time, the critical edge in Pikionis' work half a century ago is still shinning today: to repudiate our habitual fixation on technology and globalization as aesthetic system, the practice of seeking the common value from individual traditions and fixing their differences into the universal backdrop is more necessary than ever before.

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Captions of Visual Material

Figure 1. Dimitris Pikionis (1887-1968). Image from: Pikionis, 1989:1

Figure 2. The Philothei playground, view to the entrance. Image from: Ferlenga, 1999:315

Figure 3. Maple Viewing at Takao, Kanō Hideyori, 16th century

URL: https://www.google.com/culturalinstitute/beta/asset/maple-viewers/oQF0nQM_PVBZeQ

Figure 4. Plan of Versailles, 1789.

URL:https://i.pinimg.com/736x/8b/c3/2c/8bc32c0ba5d1bdfeb74d83b0f30208d4--paris-plan-palace-of-versailles.jpg

Figure 5. Plan of Kyoto Garden

Figure 6. Plan of Philothei Playground. Image from: Ferlenga, 1999:309

Figure 7. The Playground entry gate. Image from: Pikionis, 1989:60

Figure 8. The entry plaza and pavilion. Image from: Ferlenga, 1999:319

Figure 9. The pathway. Image from: Ferlenga, 1999:318

Figure 10. The axial pathway.

Figure 11. Piazza d'Italia, Giorgio de Chirico , 1913. URL:https://educacion.ufm.edu/wp-content/uploads/2014/02/Giorgio-de-Chirico.-Piazza-dItalia.-1913.-Oil-on-canvas.-Art-Gallery-of-Ontario-Toronto-Canada.jpg

Figure 12. Attica, Dimitris Pikionis, around 1940. Image from: Pikionis, 1989:30

Figure 13. Attica, Athena and Erichthonius. Image from: Pikionis, 1989:18

Figure 14. The Shipwreck. Image from: Ferlenga, 1999:316

Figure 15. The Hut. Image from: Pikionis, 1989:58

Figure 16. The Hut and sandpit. Image from: Ferlenga, 1999:318

CONSTRUCTION OF CHUANDOU TIMBER HOUSES IN SOUTHWEST CHINA: TECHNOLOGY AND COMMUNITY

REN CONGCONG, BIAN RUCHEN,LI SIMIAO

Abstract

For people living in the rural mountainous areas in Southwest China, building a chuandou timber house means more than merely making a shelter in which to live. Constructing a house involves multiple events and rituals that bestow an emblematic quality on the dwelling. In addition, these varied activities unite the home owner, the carpenters and the villagers who participated in the construction as an integral community. By studying the role of each group in the construction process, we can understand how this mutual building system is sustainable in a less developed society with fewer commodities. Mountain settlements are rich in forest resources but depend mainly on manual labour and suffer from a lack of building space. This research focused on the construction technology system involved. The research also investigated the rituals that the master carpenter performs, with the aim of establishing how he cooperates with other helpers and how he establishes his role as a spirit medium on the construction site. We found that the mark-ink craftsman holds the knowledge of certain building skills, which are passed down to disciples and relatives and are unique to the areas they are practised. In addition, the mark-ink craftsmen hold power in their relationship with home owners because of their ability to curse the house. This affects fee negotiations and conflict resolution. We examined the special techniques that mark-craftsmen use to mark mortise dimensions and match tenons and how these skills are performed with precision and agility. In addition, the skills and tools used for this vary from culture to culture in the mountainous regions. Chuandou timber houses currently face two problems: They need to be reformed to meet the needs of modern life but also need to maintain their original features to maintain their relevance for the tourism industry. Nowadays, many houses that are made of concrete and bricks are being covered with timber boards to make them look like traditional timber houses. Through this research, we hoped to show that chuandou timber houses, along with their technologies, are products of the living culture of the mountain villages. These houses have their own vitality and the potential to be adapted to the needs of modern society.

Keywords: Chuandou, Technology system, Rituals, Community, Carpentry

1. Introduction

1.1. Concept of *Chuandou*

The term chuandou was initially borrowed from the local carpenter vocabulary in Sichuan Province. The term was noted by Zhiping Liu (刘致平), who was a part of one of the first groups of Chinese architectural historians (营造学社) to investigate vernacular building types in Southwest China（Zhiping, 1990）. Later, by the time Building types and structures in China (《中国建筑类型与结构》) was first published in 1957, chuandou had become an important timber structure term (Zhiping, 1957).

Chuandou houses are widely distributed in South China, located mainly to the south of the Qinling mountain range and the Huai River (秦岭、淮河以南). Some are found in the southern areas of Shanxi (陕西) (Qiang Zhang and Peng Yong, 2010) and Henan (河南) Provinces (Ying Fan et al., 2009).

Unlike the *tailiang,* a term created by architectural historians to describe the building structures that originated in North China, *chuandou* is a different type of building that originated in the South China (Xunxiang Qiao 乔迅翔, 2014). With the evolution of these influential approaches distinguishing between the timber structures of *tailiang* (official buildings in North China) and *chuandou* (residential buildings in South China), some hybrid structures evolved, the origins of which are difficult to define (Dazhang Sun 孙大章, 2001). Thus, a new trend in architectural research has emerged that attempts to re-examine the historical origins of traditional timber structures.

Unlike many other historical building, the construction of *chuandou* structures is still occurring in many places, with the most well-known place being the Dong people's community located at the juncture of Guizhou, Hunan and Guangxi Provinces. This area has attracted the attention of both domestic and foreign scholars.

Klaus (2012, p.269) summarised *chuandou* structures as *"Vertical elements, posts or columns bearing purlins at their upper ends, play a visually dominant role. In its basic form, each purlin is born by a column standing on the ground"*. He also insightfully noted the following: *"The principle attraction of this construction lies in the ability to use timber elements with a very slender cross section. The drawback is that the floor plan is rigidly determined"*. The structure of a *chuandou* home is limited by various engineering elements, which will be discussed in this article.

1.2. Study Methodology

In this study, we examined chuandou houses from the perspective of its construction process, rather than its architectural appearance. We focused on the engineering technology that was and still is used by carpenters who specialise in the structures.. According to Pfaffenberger (1988, pp.236-252), technology is basically a social phenomenon—it is 'Humanized Nature'. He termed the concept of the 'technology system'. In this study, we examined each factor in the engineering technology system used for building chuandou houses, such as the role of different people in various construction activities, their relationship with each other and the utilised tools. In addition, we examined the natural environment surrounding the settlements and the rituals that were conducted during the construction process. As Klass (1993) pointed out in his research regarding the Lu Ban jing(鲁班经), 'Yet from all available sources it appears that in the building field, technique, ritual and magic were linked closely from the beginning'. We are inclined to view the development of chuandou houses as a derivative of a particular traditional timber building technology system- what we refer to as chuandou system.

Go a step further, we compare the chuandou system with different technology systems found in Dai people (傣族) settlements located in Yunnan Province （云南版纳地区）. Even though research examining the building technology used by the Dai people has only recently begun, we illustrate distinctions between the two systems. By doing so, we hope to connect traditional Chinese architectural techniques with the overall development of construction technology in China.

2. Case Study of Chuandou Houses' Construction Process

The construction process of a chuandou house is recorded in the historical writings related to anthropological methods of ethnographic fieldwork. The time required to construct a chuandou house can vary from several months to years. We investigated and combined several field work materials to form an understanding of the construction process of a chuandou house, which is completed in four phases.

Our main field work took place in the Dong people settlement of Dali Village in Rongjiang County, Guizhou Province. We visited the settlement twice in July and November, 2016, and at the second visiting we were able to observe two assembly processes. The remaining field work for this study took place in Hunan and Guangxi of

the Sichuan and Yunnan Provinces (Table 1). The extent of the chuandou technology system covered all the four provinces mentioned above.

We got to know details in phase 1 and phase 2 mainly through interviews. For phase 3 and 4 we were able to witness the process at the construction site. We marked each sources used in the progress' description, one can inquire its reference in Table 1.

Time	Places	Interviewee		
		Name	Age	Profession
07-15/11/2016	Dali Villiage, Rojiang County, Guizhou Province (贵州省黔东南州榕江县大利村)	Shengwen Yang(杨胜文)	70s	Mark-ink craftsman
		Youguang Chen(陈有光)	40s	
		Xianming Yang(杨显明)	70s	Cooper
		Shengan Long(龙胜安)	50s	Fengshui master
10-15/08/ 2016	Tongdao County, Hunan Province& Sanjiang County, Guangxi Province (湖南省通道县-广西省三江县)	Fengan Li (李奉安)	70s	Mark-ink craftsman
		Yunqing Yang(杨云青)	30s	
12-20/11/2016	Dali Villiage, Rojiang County, Guizhou Province (贵州省黔东南州榕江县大利村)			
11-15/12/2016	Junlian County, Sichuan Province(四川省宜宾筠连县)	Chunze Zhang(张春泽)	70s	Mark-ink craftsman
12-17/04/2017	Xishuangbanna County,Yunnan Province(云南省西双版纳景迈)	Maiwen Zhang(张迈文)	70s	Carpenter
14-25/06/2017	Tongdao County, Hunan Province& Sanjiang County, Guangxi Province (贵州省黔东南州-广西省三江县)	Yonghua Wu(吴永华)	70s	Mark-ink craftsman

Table 1, Field work area and time

2.1. Phase 1: Material Preparation 伐木备料

As mentioned, it was found through field work that the construction of a *chuandou* house occurred in four phases. Phase 1 comprised log harvesting and preparations. Dali Village residents harvest trees from their own mountain lands for building purposes. This practice is also prevalent in other mountainous areas where Chinese firs grow in great quantities and people own their land. Logging is usually carried out at the end of spring, when the bark is easy to peel off. Prior to logging, a ritual is usually conducted to pacify the mountain spirits.

When harvested, peeled logs were transported to the village and stored to dry in the air, as shown in Figure 1. It takes at least six months for logs to be ready for use, which is why logging usually occurs in the spring. Thus, construction can begin in the winter.

Figure 1. Logs stored on the ground at a construction site, Dali Villiage, 13/11/2016

2.2. Phase 2: Design and Processing of Timbers (设计下料)

After the logs were harvested, peeled and dried, a mark-ink craftsman (掌墨师傅) was invited to the site. The home owner (主人) showed the craftsman the site and they discussed the design together. The choice of a site location is often omitted because new homes are built on previous sites in most cases given the lack of land usable for construction in mountainous villages. The design of the village was previously determined in accordance to Taoist fengshui theory. This occurred when the area was first settled. Only new land used for housing requires a fengshui master (风水先生), who chooses the right direction (depth direction) for the home owner. In this case, he used a compass (风水罗盘, shown in Figure 2) along with the home owner's birthday to choose the best direction. There is a fengshui algorithm that corresponds to a person's birthday to find his or her good fortune direction.

According to the wishes of the homeowner and the limits of the site, the mark-ink craftsman designed the timber frame of the home. The layout and façade was designed in Phase 4. One section drawing (水卦图, shown in Figure 3, which is a 1:10 section drawn on a paper box) was included. This drawing expresses the mark-ink craftsman's design adequately. Later, all the vertical dimensions from the section drawing were transcribed in a 1:1 ratio on to a long pole (杖杆, shown in Figure 4) made of bamboo or timber. Each bay's width dimension was determined by the width of the site. There were usually three bays in the longitudinal direction, and the middle bay was wider than the bays on either side. When all the component dimensions were decided, logs were processed according to the correct measurements.

The design process may seem rather simple, but it embodies the basic methodology of timber structure design. The design and construction process belongs to a profound technological tradition which has a long history and wide applications in China. According to Yuyu Zhang (2010), its more sophisticated application and achievements are evident in the monumental buildings of Fujian Province (福建).

After the dimensions were decided, logs were ready to be cut into the necessary components. First, according to each log's size, they were either rough planed for column material or split into slabs for beam material. After the rough work had been done by either the home owners or helpers they had employed, the mark-ink craftsman and his disciples processed timbers into their final components. Their professional work included the marking of ink lines on to each column according to the dimension pole (杖杆), the drilling of mortise holes to columns and the crafting of tenons on to the ends of the beam planks. The detail of the technology used in this process will be discussed in Section 3. The work in this phase always began with a grand ritual called Xinggongfamo (兴工发墨), which means to begin the ink work, conducted by the mark-ink craftsman. The research team was unable to witness this ritual, but we did observe a rest-on-beam short column covered with an unusual number of horizontal ink lines, which was evidence that ritual had been performed (Figure 5).

Figure 2. Fengshui compass and notes, photo taken from fenshui master Shengan Long's home, Dali Villiage, 14/07/2016
（大利龙胜安师傅家的风水罗盘和马前卦笔记）

Figure 3. 1:10 Section drawing, photo taken from mark-ink man Youguang Chen's home, Dali Villiage, 09/07/2016 (大利陈有光师傅家的水卦图和弯尺、直尺)

Figure 4. Dimension pole, photo taken from a construction site, Tongdao County, 12/08/2016 (木制杖杆, 拍摄于湖南通道某建筑工地)

Figure 5. Short column marked with numerous ink lines, Dali Villiage, 18/11/2016

2.3. Phase 3: Assembling and Erecting the Structure (组装立架)

The rituals performed that are associated with the erection of the timber structure (立架) and the placement of the middle beam (上梁) are crucial to the homeowner's happiness. The time these rituals are conducted were carefully chosen by a *fengshui* master. He calculated the best time for these rituals down to the hour of day. The two rituals were usually separated by 12 hours. For example, if the erection time was 2 am, then the beam would be placed at 2 pm the next day.

Prior to the selected day, the mark-ink craftsman arrived with his disciples. They assembled the components of the trusses and leaned them on temporary supports, waiting for the appropriate assembly time (Figure 6).
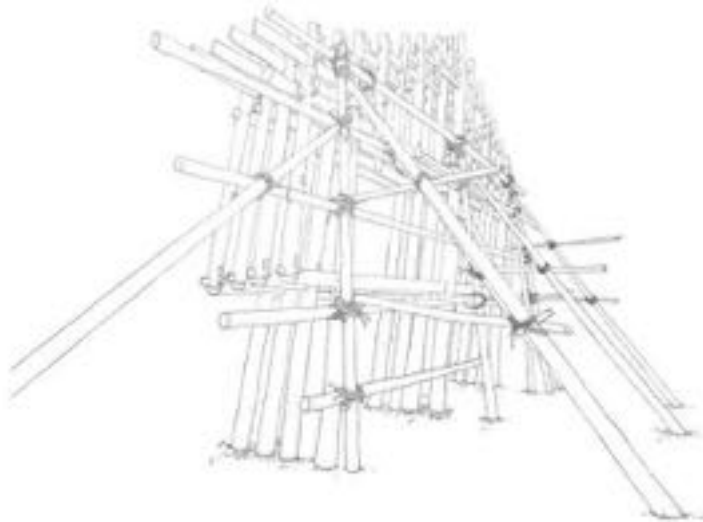

Figure 6. Trusses leaning on the supports, sketched by Ruchen Bian, Daili Village, 14/11/2016

During the proper ritual time, people gathered from the village and relatives came from other villages and stayed for at least three days to finish the work as helpers. In the four Southwest provinces we investigated, the erection time occurred between midnight and dawn. The erection work for a two-story building usually required about 30 men, working simultaneously. When people were ready, the mark-ink craftsman performed the Fachuishuzhu ritual (发槌竖柱, which means the erecting of columns), which consisted of a series of activities, including a dedication tribute to the gods, the chanting of spells while simultaneously writing them in the air and the cutting of a rooster's throat and pouring its blood over the roots of each column. After the ritual was completed, people began to work together under the mark-ink man's instructions (Figure 7).

With 30 labourers, the work of erecting the trusses, connecting them with the beams and placing them in the right places was completed in a few hours. This work needed to be finished by the morning so that people had time to go home and rest before attending the Shangliang ritual (上梁: the placement of the beam on the top) in the afternoon, when all members of the village joined the ritual. The mark-ink craftsman assumed the responsibility of performing the ritual. He first dedicated some tributes to the gods and blessed the 'beam', which played an important role in this ritual. It was regarded as the tree of heaven and its selection and felling had to follow a certain rule. It was placed right above the ridge of the middle bay. The beam was then no longer a structural component but a symbol. After the placement, the mark-ink craftsman took a pair of new shoes from the owner of the house and began to climb the structure using his bare hands while chanting spells. When he reached the top, two men needed to be waiting there. One had to be a cousin from the owner's father's family and the other a cousin from his mother's family. These men pulled the beam up while the mark-ink craftsman threw candies to the crowd below. This was the climax of the ritual.
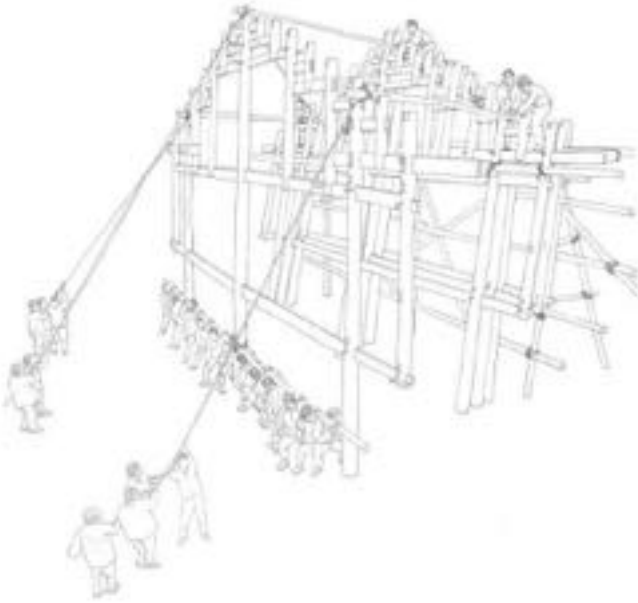
Figure 7. Erecting the structure, sketched by Ruchen Bian, Daili Village, 14/11/2016

2.4. Phase 4: Completion (装修)

On the next day of the Shangliang ritual and the third day of the whole event, after a feast at noon, people went to their own mountain land to cut a Chinese fir as a gift for the home owner. It was quite an experience to hear the logging sounds emanating from all directions at once during that time.

The completion of the *chuandou* house included the work necessary to make all the walls, roofs and floors. Thus, a large quantity of wood was needed. Gifts of wood helped the home owner a great deal. The final carpentry required for the completion of the construction is an expertise different from that of the mark-ink craftsman. There was no ritual or magic involved in the finish work. Usually, local carpenters are hired for this work because they do not need to be paid for their accommodation. Finishing work usually takes more than three months, depending on how many carpenters the home owner hires.

3. Mark-ink Craftsman in the Community

In this chapter, we attempt to interpret the role of the mark-ink craftsmen as the leader of carpenters and their relationship with other people involved in the construction activities to show how their professions are established as architects.

Mark-ink craft is one of China's oldest professions and one that requires high skill levels in multiple areas such as engineering, organising and chanting. Their organisational abilities are highly appreciated in a piece of ancient Chinese prose called 梓人转 ('A biography of a mark-ink craftsman') by Zongyuan Liu (柳宗元), a famous littérateur during the Tang Dynasty (唐). In this prose, the excellent organisational skills of a mark-ink craftsman are even compared to the management of a government.

In this study, through field observation and a literature review, we found that the charismatic capacity of mark-ink craftsmen comes from their magic practice used in rituals. The rituals of the mark-ink craftsman are described in recent books by Fengan Li (2015) and Shiwu Li (2016). As seen in Figure 8, each ritual is acted before the skilled work is begun. The purpose of the rituals differs depending on the occasion, but they include conciliating spirits, praying for safety and blessing the residents, among others. The most important purpose appears to be what could be called a séance, which is used to invite the patron saint of carpenters, Lu Ban (木匠祖师爷鲁班), to infuse the divine power to the mark-ink masters. Thus, their role as a carpenter is combined with the role of a Taoist priest, and this enhances their authority at the construction sites.

Figure 8 shows the different groups of people involved in the construction, the rituals they perform and the steps in the construction process. The solid lines link the people with their jobs, whereas the broken lines link the people who are the ritual executors. We can see clearly that the whole network is a mutual building system. However, people's identities are not fixed in such systems. As Xi Pan (2015) pointed out in a study of the Naxi people's building activities, people's roles as home owner, mark-ink craftsman, helper and even the *fengshui*

master can be converted for different occasions. People who have expertise in only one particular field are limited in their job opportunities. Therefore, experience in a variety of roles allows them to have jobs throughout the season. It is the same in other Southwest mountainous villages. This is also why the major construction events take place during winter, which is the inactive period. In rural societies, a complete differentiation of occupation has not been achieved, at least in the field of construction.
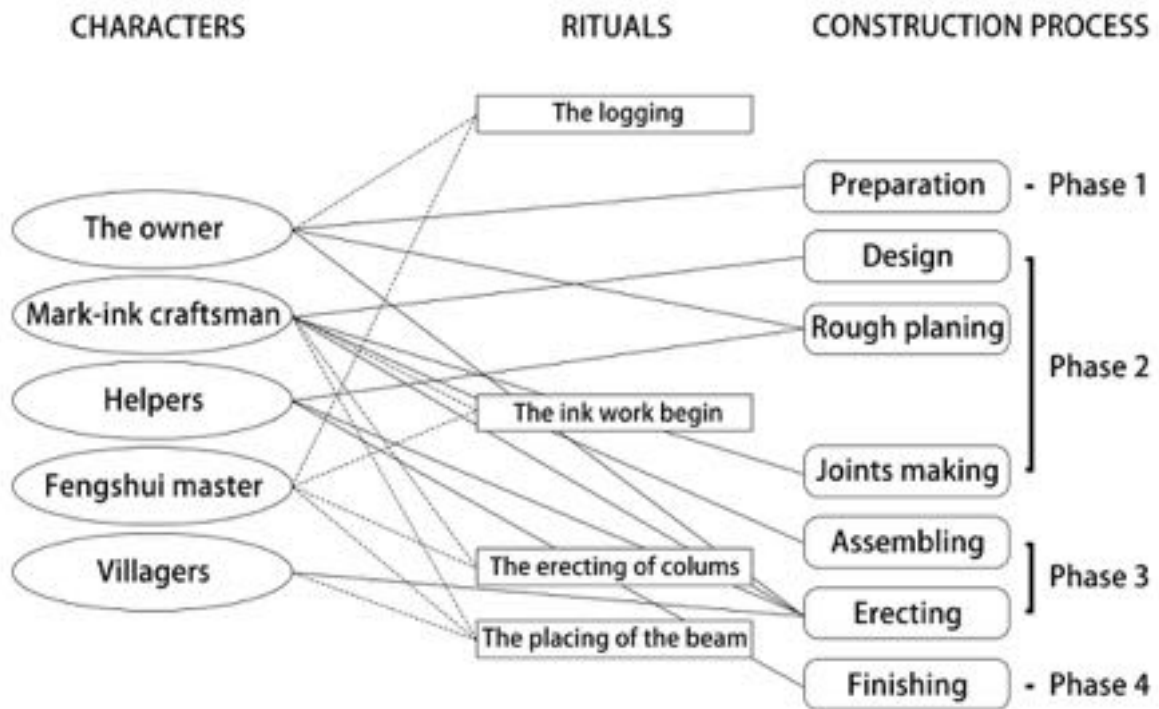

Figure 8. Social network in the Chuandou technology system

3.1. Mark-ink Craftsmen and Home Owners

In a majority of these relatively isolated country villages, people tended to hire mark-ink craftsman from other villages that their acquaintances had recommended. If they did hire a local mark-ink craftsman, fee negotiations could prove to be troublesome, especially when it came to commission work.

When a conflict between the owner and the invited mark-ink craftsman did occur, it was usually regarding money. The mark-ink craftsman is also regarded as a Taoist master and he has the power to curse a home owner if treated unjustly. We found from many sources that this mark-ink craftsmen's exorcism (the so-called 厌胜) does exist. Shiwu Li (2016) has reviewed many literature records regarding this subject.

3.2. Mark-ink Craftsmen and Their Competitors

The competition between mark-ink craftsmen can be intense. There exists anecdotal evidence relating instances on how mark-ink craftsmen sabotage their competitors' work. On some occasions, two mark-ink craftsmen were purposely invited to the same project. Each of them was in charge of half of a house. They then started to work at the same time from both sides of the house to see who was better and faster. Sometimes, they even hung a piece of cloth in the middle of the house so that their competitor could not see their work.

3.3. Mark-ink Craftsmen and Their Disciples

Taoqian-Jiaoqian (套签-交签) is the technique used to survey the form of a mortise hole drilled in a column using a stick and mark the dimensions on it (套签). According to the marked stick, ink lines were drawn on the end of a beam plank, which would cross the same hole later (交签). It is a demanding job. For a typical dwelling, there are hundreds of holes to be surveyed and even more for public buildings, such as towers and bridges. Each stick represents one hole and a notation system was used to number sticks.

Why bother using this one-to-one survey method to make joints?

Chuandou houses rely on strong joints to maintain their stability, instead of using braces. In addition, the columns are made of natural peeled fir. These cylinder-like trunks are highly asymmetric. To make each tenon perfectly match the mortise to achieve the maximum friction force requires the development of this Taoqian-Jiaoqian skill.

On the construction site, the mark-ink carpenter is the only one who masters this skill. Disciples follow his ink lines and process the timbers. The mastery of this skill becomes the watershed moment that defines a mark-ink craftsman from an ordinary carpenter.
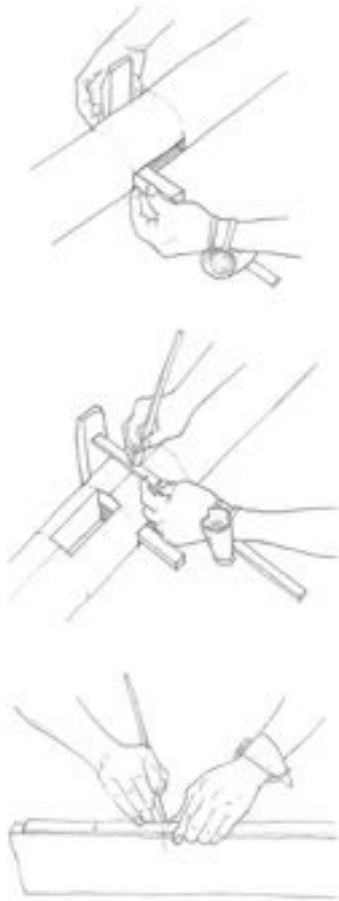

Figure 9. The Taoqian-Jiaoqian technology

The techniques used to master the skill are usually kept secret in one carpentry genealogy. The mark-ink craftsmen we interviewed in our field work informed us that they each have their own way to number the sticks (Figure 11). Carpenters from other genealogies would find the writings of others hard to recognise.

The *Taoqian-Jiaoqian* technology requires both mental ability and physical skill. Figure 9 illustrates the decomposition movements of the mark-ink man's hand. In reality, the whole process was done in just seconds. The mark-ink craftsman placed a *douchi* (斗尺) and a stick across the column. Then, he used his finger nail to mark the position for the depths of the hole (both the higher and lower edges, so he must use both his thumb and his index finger). He then pulled the stick out, with the position of both fingers maintained and drew the marks with ink. The mark-ink craftsman's speed was directly related to the number of disciples and helpers he could work with at once. Only after he marked the ink lines on to the beams could wood processing begin. One mark-ink craftsman we interviewed told us proudly that he could work with 11 helpers at one time.

Figure 10. Tools used for the mark-ink work (left). Douchi (right).

Figure 11. Different kinds of measuring sticks

4. Comparison With other districts
4.1. Other *Taoqian-Jiaoqian* Tools

Figure 12. Taoqian-Jiaoqian tools in Dongyang, Zhejiang

Figure 13. Taoqian-Jiaoqian Tools in a Naxi settlement, Yunnan

The *Taoqian-Jiaoqian* skill is the core technology for *chuandou* building and is practised in different ways in other districts. Despite using different tools and techniques, the purpose of the *Taoqian-Jiaoqian* skill is the same—to obtain the dimensions of a mortise hole from a round column and mark them correctly on the beam. However, different ways lead to different accuracies in the processing of the tenons.

As seen in Figure 12, the mark-ink craftsman in Dongyang, Zhejiang (浙江东阳), used two plates connected with strings that are fixed at the both ends of a column. Instead of using a *douchi*, he measured the distance

between the string and the surface of the column to get the depth's dimension. This was more accurate than using a *douchi* because a string is much thinner and can be held steadier than with finger nails.

As seen in Figure 13, in the Naxi people's settlement of Yunnan (云南丽江), the mark-ink craftsman used a plank (套榫板) to do his *Taoqian-Jiaoqian* work. This plank can be regarded as a combination of a *douchi* and a stick. It is rewritable and can be reused multiple times. The drawback is that the craftsman must move from column to beam and back and forth. The number of round trips between columns and beams equals the number of mortise holes. Fortunately, the structure of the *manlou* (蛮楼) in a Naxi settlement is rather simple and there are not many joints.

As long as it is a post-and-tie structure and the structure uses round posts, the *Taoqian-Jiaoqian* skill is useful. This unique skill requires occupational education and occupation differentiation subsequently arises.

4.2. *Zhulou:* A Different Technology System

Figure 14. Zhulou in the Dai settlement and the joint details

Figure 15. Tools to make a Zhulou

Zhulou (竹楼), used in the Dai (傣族) people's settlement, illustrates a different technology system. Instead of Chinese fir, this system requires beech wood in buildings. By using a rectangular cross section, the mortise holes for the columns can be standardised. Thus, the *Taoqian-Jiaoqian* skill is of no use in this system. Craftsmen can use axes, as shown in Figure 15, to build the entire house. In a technology system such as this, the division of labour is not obvious. In addition, we did not find the belief in Saint Luban (鲁班) in this area.

Zhulou's appearance, along with the building technology system used in this area, perhaps indicates its roots in a rather primitive building system called *Ganlan* (干阑). According to Hongxun Yang (杨鸿勋 1999), *Ganlan* architecture may date back to the age of Emperor Huangdi and the spread of the Empire to Japan. Further research is needed to understand the biogeography of building system types in China and Japan.

5. Conclusion

We found that belief in Saint Luban still prevails in the rural societies of the Southwest mountainous areas in China. As early as the 15th century, according to the carpenter's manual, *Lu Ban jing*, both the technical and non-technical aspects of building are described. The mark-ink craftsman, the master of builders, is also in charge of Taoist priest work and is sometimes even the *fengshui* master. The mark-ink craftsman's style of work is limited by principles of Taoist theory. Therefore, the building types are also limited. For example, houses with four bays or with any braces can never be built. Any diagonal constructional element is seen as an ill-omen in Taoist theory. This explains why trusses for large spans have never developed extensively in China. More research on the period and application range of this combined construction expertise with the Taoist belief system is needed.

In this article, we attempted to decode the conventional architectural term *chuandou* as a timber structure type. We considered this word to be two verbs combined together, expressing the very core technology of building: to cross a beam through a column and to meet two beams in the middle of a column. This technology guarantees stiffness of the wood joints, which assures that the parallelogram timber frames will be steady in *chuandou* houses.

In other regions where the typical *chuandou* house is not the prevalent structure, there existed similar technologies for surveying mortise holes, such as those adopted for *manlou* (蛮楼) in Lijiang, Yunnan (云南丽江), or residential houses in Dongyang, Zhejiang (浙江东阳). The tools they used were different, but their purpose was the same. It was interesting to compare them to *zhulou* (竹楼) in Banna, Yunnan (云南版纳), which is also considered to be a *chuandou* type of structure. However, we could clearly see the differences from the tools that local carpenters used for the joint details. Further, we did not find any belief in Saint Luban in these areas. Local carpenters began to use saws and planes only after the 1980s, when carpenters from Sichuan brought these tools to the area.

We tend to call the architecture seen in Figure 16 as architecture without an architect. In fact, mark-ink craftsmen are the traditional architects in China. Their expertise, along with their belief in Saint Luban (鲁班), makes them craftsmen of a unique profession in society. If given autonomy and information from the outside world, they could possess the ability create modern houses that are different from any other building types in the world.

Figure 16. Architecture created without an architect

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