

# ***2<sup>nd</sup> INTERNATIONAL CONFERENCE ON BUILT ENVIRONMENT IN DEVELOPING COUNTRIES 2008***

**3<sup>rd</sup> – 4<sup>th</sup> December 2008, Universiti Sains Malaysia**

**“Sustainable Built Environment: Bridging Theory and Practice”**



## ***CONFERENCE PROCEEDINGS***

# ***2<sup>nd</sup> INTERNATIONAL CONFERENCE*** **ON BUILT ENVIRONMENT IN DEVELOPING COUNTRIES 2008**

“Sustainable Built Environment: Bridging Theory and Practice”



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## Message from the Vice Chancellor, Universiti Sains Malaysia

On behalf of the Organizing Committee and Universiti Sains Malaysia, it gives me tremendous pleasure and joy in welcoming all of you to the second International Conference on Built Environment in Developing Countries, ICBEDC 2008. This second international conference comes at a time when we seem to be facing a daunting task in overcoming the challenges of various global issues. The Built Environment has always been the gauge upon which we measure our accomplishments and progress, but alas, often at the expense of the depletion of our natural environment and resources.



We, as the caliphs of the world should heed the signs Mother Nature has begun to show us and there is no better time than the present to start taking pertinent steps in rectifying or even undoing the damage we have wrought on. As such, ICBEDC 2008 should be looked upon as an avenue for those in the Built Environment, either as practitioners or academicians, in bringing safe and sustainable approaches unto the undertakings of the construction industry. If the first ICBEDC was aimed at establishing ideas and notions of sustainable transformation, the theme this year, '*Sustainable Built Environment: Bridging Theory and Practice*' promises to take the next all important steps. Only by bringing all our concepts to practical fruition can we hope to achieve a built environment that will truly be sustainable for the generations to come.

We here at Universiti Sains Malaysia are proponents and advocates of a sustainable tomorrow. Our own transformation plan, which humbly began six years ago, has culminated in a comprehensive approach themed, '*Transforming Higher Education for a Sustainable Tomorrow*'. We firmly believe that through education and knowledge, we can indeed transform the world into a truly better place for all. Thus, this effort by our very own School of Housing, Building & Planning is a concrete leap forward in achieving this noble aim. To all our participants, either my fellow Malaysians or from abroad, I applaud each one of you for taking the effort in making ICBEDC 2008 a success and at the same time wish everyone a delightful and memorable academic sojourn here in Universiti Sains Malaysia and the wonderful island of Penang.

I offer you all my sincerest thanks and my heartfelt regards.

A handwritten signature in blue ink. The signature is stylized, starting with a large 'D' and ending with a flourish that resembles a 'Z' or 'S'.

Professor Tan Sri Dato' Dzulkifli Abdul Razak

## Message from the Dean, School of Housing, Building & Planning Universiti Sains Malaysia

In the name of Allah, the Most Gracious and the Most Merciful.

First and foremost, allow me to convey my warmest welcome and greetings to all participants of the 2<sup>nd</sup> International Conference on Built Environment in Developing Countries, ICBEDC 2008. This second international conference comes at the heels of the successful inaugural conference last year and the theme of this year's ICBEDC 2008, '*Sustainable Built Environment: Bridging Theory and Practice*' can be seen as a continuum of sorts where the first conference left off. If we were initially trying to canvass ideas that can be utilized as seeds of a more sustainable approach to the Built Environment, this second conference aims to sow these seeds and reap a bountiful harvest of practical ways to embed sustainable development notions into our industry.



ICBEDC 2008 this year has managed to attract more than 150 working papers and this truly reflects the general consensus of the important actors within the Built Environment. The idea of sustainable development is no more a mere polemic argument in our minds but rather a valid and workable series of issues that we as a global community should face head on. The efforts of the School of Housing, Building & Planning coupled with the gallant efforts of Universiti Sains Malaysia in providing a strong foundation for a more sustainable tomorrow need a universal and concerted assistance from a global audience. In this vein, ICBEDC 2008 helps to bring together a group of like minded individuals, be them from the academia or from the industry, in congregating to bring about welcomed change to the Built Environment. My hope is that the 2<sup>nd</sup> ICBEDC 2008 will leave a lingering notion of change for all of us to imbue sustainable development approaches in our professional undertakings.

I truly believe all participants will definitely and actively ensure ICBEDC 2008 becomes a veritable success. I offer you my sincerest appreciation for your academic endeavours and hope your brief stay here will be a pleasant one. My cordial thanks to all those involved in enabling the School of Housing, Building & Planning to organize and host ICBEDC 2008. Your contribution and co-operation are of immeasurable value to us.

Thank you.

A handwritten signature in dark ink, consisting of a series of loops and a long horizontal stroke extending to the left.

Professor Ir. Mahyuddin Ramli

## Message from the Conference Chairman, Organising Committee

*Selamat datang*, welcome to the 2<sup>nd</sup> International Conference on Built Environment in Developing Countries 2008 in Penang, Malaysia. This is the second time that an international gathering in the field of Built Environment is being held in Malaysia. After an overwhelming response to the first ICBEDC 2007 we are honoured to organize the second ICBEDC 2008.

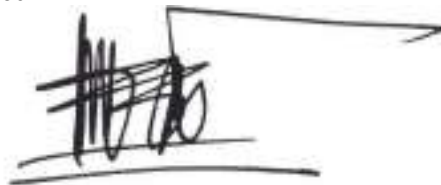


The aim of this conference is to provide a platform for academics and researchers as well as practitioners to present and discuss papers regarding their research and to keep us abreast with the rapidly changing technology and challenges related to the built environment. More than 150 full papers will be presented and discussed. The introduction of refereed papers ensures that a high standard of papers is preserved for this conference. All papers will be edited and published as conference proceedings.

The theme of ICBEDC 2008 “Sustainable Built Environment: Bridging Theory and Practice”, is a reflection of what we here at the School of Housing, Building and Planning believe to be a relevant expression of the times that we live in. Sustainable development has become as late, a key cog in the daily grind of our lives. To paraphrase the United Nation’s Brundtland Commission, development and progress are certainly welcome and needed but never should they be at the expense of our children and the subsequent generations. Sustainable development may appear to be a vast and indistinct notion, but with the right approach and execution, it may soon become a norm that we may not be able to function effectively without.

We look forward to the excellent papers and active discussion of the key Built Environment issues in this conference. Finally, as chairman of the conference, I would like to express my sincere gratitude for all the cooperation given by the School of Housing, Building and Planning and the University and by those who have contributed to the successful planning and execution of this conference. We hope ICBEDC 2008 will continue to grow and contribute towards making this field recognized as a distinct body of knowledge.

Thank you.

A handwritten signature in black ink, consisting of stylized, overlapping loops and lines, positioned above a horizontal line.

*Associate Professor Abu Hassan Abu Bakar*

## Message from the Conference Chief Editors

We would like to express our appreciation to the vice-chancellor, conference advisor, chairman and all members of the organising committee especially to their generous supports during the preparation and publication of this *Conference Programme and Abstracts*. The content of this book comprises conference full papers classified under four categories, which highlight interdisciplinary built environmental discussions and issues in the developing countries. These categories are Architecture and Urban Design (AR), Building Engineering (BE), Urban Planning, Tourism and Landscape (UP), and Construction Project Management (PM). Each category is managed by one editor specialised in his/her field. Assoc. Prof. Dr. Ahmad Sanusi Hassan (Head), Assoc. Prof. Ir. Dr. Abdul Naser Abdul Ghani, Assoc. Prof. Dr. Nurwati Badarulzaman and Assoc. Prof. Abdul Aziz Hussin are the chief editors who are responsible arranging all the related conference papers to the sub-themes for parallel sessions of the oral presentations in the conference programme and abstracts, and for compilation of the proceeding papers.

There are a total of 155 full papers in this conference. In Architecture and Urban Design category, it has 33 full papers. This category has 6 sub-themes which focus on urban design and studies, historic buildings and traditional architecture, and critical issues towards sustainable development. There are 27 papers to be presented and discussed in Building Engineering category. The focuses of the full papers are related to building construction and materials, sustainable technology, building safety and energy efficiency. The category of Urban Planning, Tourism and Landscape has 51 full papers. The discussions are focussed on housing, economy, urban governance, tourism, transportation, heritage revitalisation, landscape and sustainability, and place image and identity. Construction Project Management category has 44 full papers. The focuses of the discussions are on housing, professionalism, finance, economics, social issues and project management. In summary, there are more than 170 full papers submitted to the conference secretariat, but they are not included in the oral presentations either because of late submissions or due to not able to reach the standard of conference full papers.

All in all, we look forward to the excellent papers and active discussions from the participants presenting the built environmental issues at all of these categories in the parallel sessions. There are also ample opportunities to meet and network with colleagues and friends from many parts of the world throughout the conference.

Thank you

*The Chief Editors*

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## **VISUAL FORMS OF CARVED COMPONENTS IN TRADITIONAL TIMBER HOUSES OF KELANTAN AND TERENGGANU**

**Zumahiran Binti Kamarudin<sup>1</sup>, Ismail Said<sup>2</sup>**

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**ABSTRACT:** Malay traditional timber houses of Kelantan and Terengganu are normally adorned with decorative carved components which represent excellent carvings in its specified design motif, shape, size and layout. Various carved components with specific features are fabricated according to its placement and configuration in the interior as well as exterior setting of the houses. Woodcarving as an embellishment is a significant unifying architectural element between the house forms and its building components. This paper presents an explorative study of the visual forms and placement of carved components in the vernacular houses of Kelantan and Terengganu which denotes its significant attributes and uses. A set of 13 case studies, nine houses in Kelantan and four houses in Terengganu were referred to as the research base. The methods of investigation include analytical review of measured drawings and reports of the Kelantan and Terengganu timber houses from the Centre for the Study of Built Environment in the Malay World (KALAM) at the Department of Architecture in the Universiti Teknologi Malaysia (UTM) and narrations from the prominent woodcarvers on art and crafts of woodcarving. Apart from these methods, interviews with the allied professionals for scholastic information on art and architecture of the Malay world were also conducted. The analysis of the documents revealed that several types of carved components with distinctive visual forms in two and three dimensional composition were placed in certain orders within the fabrics of the houses. Wall, door and window ventilation panels, railings, gate panel and stringers are types of components characterized by the shape of perforation and incision with relief and/or non-relief carvings. These components were crafted in relation to the house form and architectural elements such as wall, door, window, stair and gate. The significant aspect of the placement of the carvings in the houses is that it enhances beautiful ambiance and signifies regional identity to the vernacular architecture of these two states.

**Keywords:** Woodcarving, traditional timber house, architectural elements, visual forms, carving motifs and visual orders

### **1. INTRODUCTION**

Woodcarving is considered as an integral component to the vernacular Malay houses of Kelantan and Terengganu which are located in the east coast of Peninsular Malaysia. These states are situated on the northeast of the Peninsular Malaysia. The fabrication of the woodcarving as carved ornament reflects the specific style of Malay architecture which spring from the east coast region. According to Farish and Eddin (2003) the architecture of this region has possibly originated from the Langkasuka as early as 14<sup>th</sup> century. Great influence on the cultures of the local people including art and architecture came from the neighboring border, the Patani which is located in further south of Thailand on northern of Kelantan. As such, the development of house design in this region has given identity to a vernacular type of

architectural forms of its own. The regional identity of this house is enriched by the Malay woodcarving in a beautiful spectrum of ornamentation. From the design aesthetics, Raja Bahrin (1988) and Syed Ahmad Jamal (1994) note that the carvings from Kelantan and Terengganu are the most refined and beautiful of all Malay woodworks in terms of shape and carving techniques which exhibit a degree of beautification not found elsewhere. A large quantity of carvings with high levels of artistry and technique could be found in Kelantan and Terengganu (Syed Ahmad Jamal, 1994). The carvings were crafted with certain characters, showing their regional identity and often much-admired for its distinctive beauty.

Beauty in the carving form is discernible by the rhythm of curvilinear and rectilinear lines, textures and shapes of motifs, pattern, perforation and depth of incision. Carving techniques and arrangement of motifs faithfully follow shapes and layouts in traditional Malay woodcarving, the most common being perforated panels with relief and non-relief carving in horizontal rectangles. Visually, the forms of motifs and patterns, types of perforation and incisions of the carvings give the distinct characteristics and features of carved panels which are fused with the designated use as house components. These carved panels are produced for decorative as well as functional components. Carvings for the houses are crafted in a variety of forms including wall ventilation panels, door and window panels, wall panels, railings, panels of gable ends, gate panels and stringers. The physical forms are in parallel to the architectural elements and its placement and distribution in the interior and exterior fabrics of the houses. Carving forms were made out as integral components to the Kelantan and Terengganu timber Malay houses with a distinct composition and configuration.

The aim of this paper is to present a preliminary finding of the various forms of carved components in relation to its layout and significant uses in the traditional timber houses of Kelantan and Terengganu. This initial stage of research highlights the visual description and interpretation of the carvings with the specific features within the context of its placement and configuration in the interior as well as exterior setting of the houses. The focus of this paper is considered as the early version of the preliminary study of the 13 houses from a total of 30 houses. On this basis, the study reveals the physical forms, visual attributes and principles of composition that are apparent in the carved components of the selected houses.

Literature survey indicates that there was lack of in-depth research on traditional woodcarvings pertaining to certain language of design qualities in the fabrication of carved components and its placements in the timber houses of Kelantan and Terengganu. As such, the study formulates four research questions which include (1)

What are the visual attributes of Malay woodcarving placed in the timber houses?, (2) What are the pattern of regularity of carving motifs and visual forms developed in the woodcarvings?, (3) Do craftsmen produce the woodcarvings in relation to its significant functions?, and (4) Do Malay craftsmen use certain ordering principles for compositional guidelines in the fabrication of the beautiful woodcarvings as house components? This research is timely especially in a current period where the old timber houses are diminishing or no longer in existence and being replaced by the concrete and masonry architecture which dominate the scene of rural and urban communities. Traces of these houses and its carved ornaments could only be gathered and studied through a proper review of archival documents from related organizations.

## 2. METHOD

This study was conducted as explorative and interpretive research, where a significant number of required information was gathered from three sources: (1) measured drawing and reports of timber houses from the Centre for the Study of Built Environment in the Malay World (KALAM) at the Department of Architecture in the Universiti Teknologi Malaysia (UTM), (2) personal communication with two woodcarvers on art and crafts of woodcarving, and (3) informal interview with the professional architect on traditional art and architecture of the Malay house. The data from the KALAM documents was triangulated with information gathered from the two woodcarvers and the architect for the data reliability (Figure 1.0). As noted by Neuman, (2000), Patton (2002) and Berg (2004) the purpose of methods triangulation is to relate the multiple data-collection methods leading to the reliability of data. The information gathered from the experts was needed to substantiate the results obtained from the analytical review.

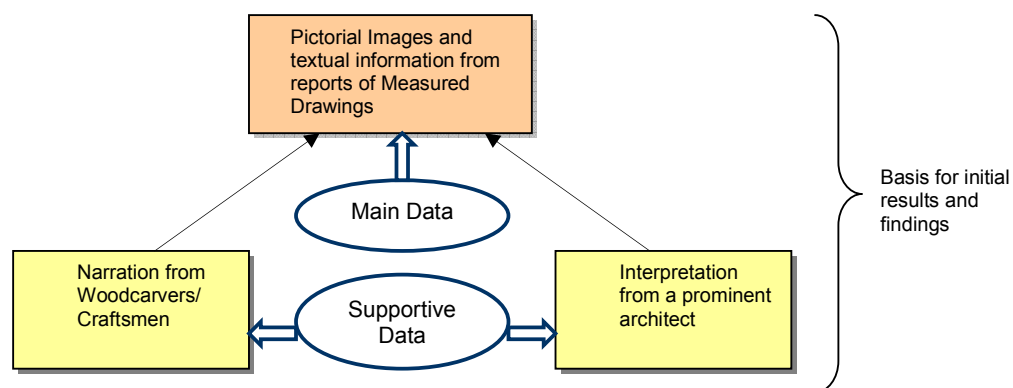


Figure 1.0: Sources of data in triangulation

## 2.1 Analytical Review on Archival Documents

The analytical review was conducted on thirteen prominent Malay timber houses. Nine houses are located in Kelantan and the other four houses are sited in Terengganu. Table 1.0 shows the information of the selected case studies including the types of architectural forms and year of construction, owners and locations of the houses. Several factors determine the selection of the houses which include: (1) the houses represent the type of dwelling architecture that originated from the east coast region of Peninsular Malaysia, (2) the houses were decorated with excellent carvings which are regional and distinctive in character, (3) the houses provide a comprehensive collection of carved components which are relevant for visual analysis purpose.

**Table 1.0:** *The Kelantan and Terengganu timber houses as the case studies*

No	Type of House	Year Built	Owner	Location of House
1	Rumah bumbung perabung lima	1920's	Encik Hassan Mohd Amin	Jalan Pengkalan Chepa, Kota Bharu, Kelantan
2	Rumah Bujang Berserambi Dua Beradik	1850's	Tuan Mohamad Dobah (Tuan Mohamad Abdullah)	1408, Jln. Post Office Lama, Kota Bharu
3	Rumah Bujang	1800's	Wan Aisyah	Jalan Sultanah Zanab, Kota Bharu
4	Rumah bumbung perabung lima	1920's	Wan Ahmad Abdullah	Jalan Post Office Lama, Kota Bharu, Kelantan
5	Rumah bumbung perabung lima	1930's	Yaakub Mohammad	2623, Kampung Sireh, Kota Bharu
6	Rumah bumbung perabung lima	1937	Wan Hussain Wan Abdul Rahman	4962, Kampung Sireh, Kota Bharu
7	Rumah bumbung perabung lima	1933	Hassan Yusof	4963 Lorong Tukang Perak, Kampung Sireh, Kota Bharu
8	Twelve-pillared house/ Long-roofed house	1800's	Tok Yakub	Kampung Belongan, Bachok, Kelantan
9	Rumah bujang berserambi dua beradik	1920's	Wan Sulong	Jalan Sultanah Zanab, Kota Bharu, Kelantan
10	Rumah Bujang Berkembar Dua Beradik	188?	Mariam Mat	168, Kampung Hiliran Masjid, Kuala Terengganu
11	Rumah bujang berselasar	1850's	Awang	Kampung Losong Haji, Su, Kuala Terengganu
12	Rumah bumbung limas	1914	Dato' Biji Sura (Nik Mohamad bin Hitam)	Duyong Kecil, Kota Duyong, Kuala Terengganu
13	Rumah bujang berserambi dua beradik	1800's	Tok Ku Paloh	D62, Paloh Makam Tok Ku, Cabang Tiga, KT, Terengganu

A set of measured drawings which consists of plans and elevations of the 13 houses including cross sectional and detail drawings was referred for detail descriptive analysis to identify the types of carved components and determine its physical attributes including visual forms and ordering principles of composition. These measured drawings and the reports were produced and documented by the students of architectural programme from the University of Technology Malaysia. Edition and reproduction of a few documented drawings were made to improve its visual quality and accuracy for the purpose of analysis and data display. The

objects which provide raw materials for visual investigation must be also viewed, understood, or placed in some analytical framework before they can be regarded as data (Emission and Smith, 2000).

## **2.2 The Interviews**

Personal interviews were conducted with the two prominent woodcarvers for obtaining information on art and crafts of woodcarving. The first woodcarver interviewed was Norhaiza Nordin from Kampung Raja in Terengganu and the second one was Muhaimin Hasbullah from Temerloh in Pahang. Each interview was carried out in approximately two hour period with the adoption of standardized open-ended interview questions. This type of question allowed for supplemental information provided by the woodcarvers. A set of questions was solicited to each woodcarver in the same order but without restraining them from offering the required information. The interview questions was categorised in relation to the research questions pertaining to visual attributes of woodcarvings including: (1) What are the types of woodcarving forms and features produced as architectural components?, (2) What are the types and contents of carving composition and motifs depictions that are applied in woodcarving?, 3) What are the types of carving techniques that contribute to distinct characteristics and features of woodcarving? Apart from these, informal interview was conducted with a professional architect from Terengganu, Raja Bahrin Shah who has been well-known for his directly involved with the preservation of East Coast Malay architecture. Narration and interpretation from the woodcarvers and professional architect on design aspects and craftsmanship of the traditional woodcarving and dwelling architecture from the states of Terengganu and Kelantan were needed to support the main data gathered from the KALAM. Their opinions and inferences serve as verification and supplementary information to the analysed data.

## **3. INITIAL FINDINGS AND INTERPRETATION**

The traditional Malay timber houses represent the significant craftsmanship of the past tradition. According to Lim (1987) the Malay houses represent the skills and aesthetics of the traditional craftsmen and builders which have been passed down from generations to the following ones. Most of the embellishments found in the houses were done by the Malay craftsmen who also built the house. The vernacular forms of the timber houses were built to meet specific needs of the users according to their ways of life based on regional cultures and values. Social



and economic activities like craft-making alongside with other essential livelihood activities including fishing, agricultural and trading are dominance within the traditional Malay community from eastern coastal states like Terengganu and Kelantan. The lifestyles of these people are closely influenced by the belief system which is succumbed to the teaching of Islam (Othman, 1995), the advent of Islamic influence brought by the Persians and Arabs in the fourteen century lead to the acceptance of Islamic way of life by the Malay culture. Inasmuch, their expression in art and architecture is influenced by this way of living system which has strong adherence to the tenet of Islam. Within this society the unique and rich customs and traditions evolved around the Islamic way of life where the artistic traditions developed accordingly.

The Kelantan and Terengganu timber houses are considered as vernacular architecture which exhibit distinct regional characteristics. Gokhan (2002) defines vernacular architecture as the forms of architecture built for the common people and it is an embodiment of common characters, materials and aesthetic value of a particular region. The timber houses as dwelling architecture which are situated in the east coast of Peninsular Malaysia exhibit distinct regional characteristics with its own identifying building features including carved ornaments. This architecture represents the simple vernacular forms in the use of local materials. Most of the old traditional houses are made of cengal (*Balanocarpus heimii*). Cengal is a heavy hardwood species used for structure of Malay houses and their carvings (Lim, 1987; Ismail, 2005). According to Raja Bahrin (1998) the task of constructing the timber houses was a difficult and long process. This is because most of the construction process including the search for the hardwood timber was dependably carried out manually.

### 3.1 House Forms and Layout of Spaces

Raja Bahrin Shah (2008) posits that Kelantan and Terengganu traditional timber houses are appreciated for two reasons. First, its building forms are efficiently designed to suit local climate condition and timber-based construction materials. Second, the embellishments in forms of intricate carvings on various panels are found in integral with the architecture of the houses. *Rumah perabung lima* (five-ridged roof house) and *rumah bujang berserambi/berselasar* (verandah house) were the most common types of houses found in Kelantan and Terengganu. *Rumah perabung lima* is characterized by the a hipped roof. Most of timber houses in five-ridged roof type were identified in Kelantan as highlighted in Table 1.0. For example, Hassan house as shown in Figure 2.0 exhibits the timber house form with

hipped roof, raised on stilts and with wall made of timber. Rumah bumbung perabung lima is a type of house with pyramidal roof and it was the first type of house with the roof form introduced in Kelantan (Abdul Halim and Wan Hashim, 1996).

Rumah bujang berserambi was the most common type of house found in Terengganu, for example, Tok Ku Paloh house as illustrated in Figure 3.0. One of the dominant features for this type of house is a long single-ridged roof with two gable ends. The two ends of the long roof have curved frames known as *pemeleh* fixed to the roof edge. The term of *pemeleh* is used to refer to the decorative frames for the gable ends of the roof (Abdul Halim and Wan Hashim, 1996). Another distinctive feature found at rumah bujang berserambi is convex wall panels fixed on the wall facades of the house. The convex wall panel was made of thick wooden frames in a vertical layout and usually equipped with carved panels within the wall. Convex wall panels have become one of the most noticeable features of rumah bujang berserambi where carvings in forms of perforated ventilation panels are normally found here and usually on the upper part of the wall. For example as appeared on the wall facade of rumah ibu found at the house of Tok Ku Paloh. The houses with this type of architecture were the oldest dwelling form identified in Kelantan and Terengganu. Many of them were constructed in the early nineteen century that had reached over a hundred years old. The earliest type of Terengganu traditional Malay house has a high, steeply sloped and single-ridged roof with a ridge cover running the length of the house (Raja Bahrin Shah, 1988).



Figure 2.0: Front elevation of Hassan house

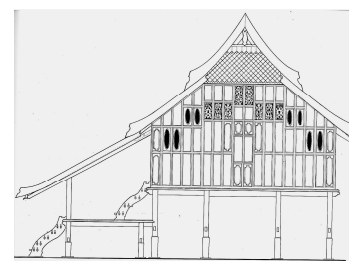


Figure 3.0: Front elevation of Tok Ku Paloh house

Most of Kelantan and Terengganu traditional Malay houses were equipped with basic areas including *rumah ibu*, *pelantar*, *serambi/selasar* (long verandah) and *dapur* (kitchen). This basic layout of spaces with simple concept of living was evidence in the two types of house form. Both types of house possessed the simple layout of spaces to accommodate the family way of living and needs with *rumah ibu* as the largest and principal area that serves most of household activities such as

sleeping, praying or gathering. Rumah ibu is the main part or core of the traditional Malay house (Lim, 1987; Abdul Halim and Wan Hashim, 1996). The serambi (verandah) is an area situated next to the *rumah ibu* as appeared in Rumah Tok Ku Paloh. Serambi was also known as *selasar* which means the reception area (Raja Bahrin Shah, 1988). Serambi is the transition space between the public and private domains of the house. This is where the rumah berserambi (verandah house) differs greatly from the concept of space configuration of rumah perabung lima. It is most common for rumah perabung lima to be equipped with *pelantar* as entry porch where most of guests are greeted here. The pelantar is the transition space that leads up to the core area of the house, rumah ibu. It is an important focal point that serves as the principal entrance where stairs is located. Most traditional timber houses of Kelantan and Terengganu have stairs at the front and rear entrances that lead up to pelantar or serambi and kitchen. The traditional Malay house can be divided into the front and back portions which are centered around the rumah ibu and the *dapur* (kitchen) (Lim, 1987)

### 3.2 Location of the Traditional Houses

Eight of nine Kelantan timber houses were located in Kota Bharu, the capital state of Kelantan. The remaining one house was situated in a district of Bachok which is located not far from Kota Bharu. All four Terengganu timber houses were located in Kuala Terengganu. Figure 4.0 shows the location of the houses in the two states. As previously mentioned, detail information on the timber houses are shown in Table 1.0.

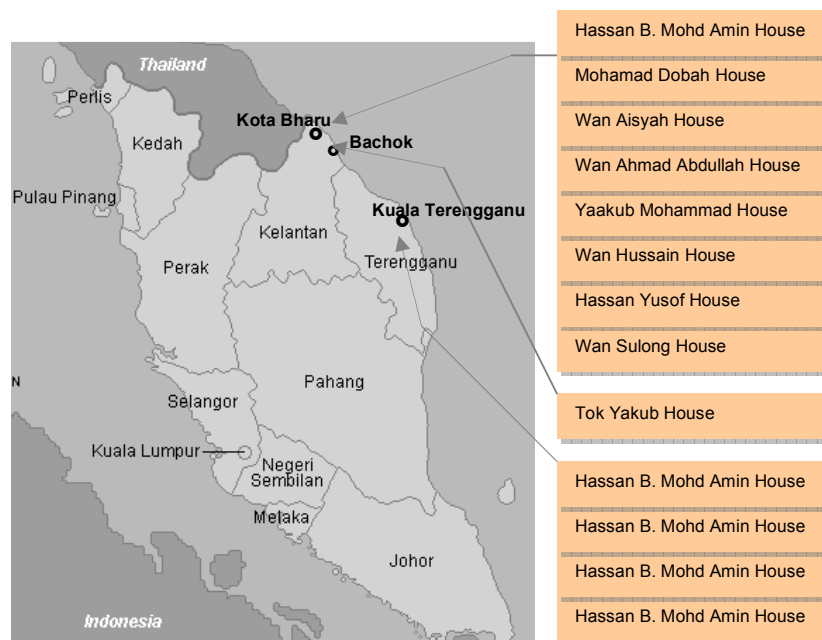


Figure 4.0: Location of the traditional houses in Peninsular Malaysia

#### 4. ARCHITECTURAL CARVED COMPONENTS

The analysis revealed that a collection of seventy two different forms of woodcarvings with certain features were found in the timber houses of Kelantan and Terengganu. The visual forms of the carved components were fabricated with specific carving motifs, types of incision, shapes, sizes and layouts. The distinctive forms of the various carved components are apparent with respect to its placement and layout in the interior as well as exterior fabrics of the timber houses. A variety of carved panels with interesting visual forms and layout were juxtaposed on seven components of the house such as walls, doors, windows, railings, stairs, gates and roof. The placements of the carved components were fixed within the specific arrangement and significant purpose. There are thirteen types of carved components found in the houses which are shown in Table 2.0.

**Table 2.0:** Carved components found in the selected timber houses

No.	Name of house	Types of Carved Components found in the Timber Houses												
		Window ventilation panel (WVP)	Door ventilation panel (DVP)	Wall ventilation panel (PWVP)	Window railing (RP1)	Railing at serambi/ Sorong (RP2)	Railing at Staircase (RP3)	Wall panel (WP)	Door leaf (DP)	Stringer (S)	Gate leaf (GP)	Roof eave (REP)	Bracket (BP)	Gable end (GEP)
1	Hassan Mohd Amin	1	1	1	0	0	0	0	0	0	0	1	0	0
2	Mohamad Dobah	0	0	8	0	0	0	0	0	0	0	0	0	0
3	Wan Aisyah	0	0	3	0	0	0	0	0	0	0	0	1	0
4	Wan Ahmad Abdullah	0	1	2	0	0	0	0	0	0	0	0	0	0
5	Yaakub Mohammad	0	2	1	0	0	0	0	0	1	0	0	0	0
6	Wan Hussain Wan Abdul Rahman	0	1	1	0	0	0	0	0	1	0	0	0	0
7	Hassan Yusof	0	2	1	0	0	0	0	0	1	0	0	0	0
8	Tok Yakub	0	1	1	0	0	0	1	0	0	0	0	0	0
9	Hjh MariamMat	0	2	2	0	1	0	0	0	0	0	0	0	0
10	Kampong Lososng	0	0	3	0	0	0	0	0	2	0	0	0	0
11	Dato' Biji Sura	2	6	0	1	3	1	1	1	0	3	0	0	0
12	Wan Sulong	1	1	1	0	0	0	1	0	0	0	0	0	2
13	Tok Ku Paloh	0	0	3	0	0	0	0	0	2	0	0	0	0
	TOTAL	4	17	27	1	4	1	3	1	7	3	1	1	2

##### 4.1 Distribution of Wood Carvings in the Houses

The analyses signified a certain pattern of distribution of carved components in each house and its compositional motifs in relation to the architectural elements and the house form. The outlines of the placements of carved components in each house and its distribution pertaining to motifs are shown in Table 3.0. It appears that the carved components were widely found on walls at rumah ibu as appeared in the table. Most of them are in forms of ventilation panels fitted on the upper sections of walls as well as on top of doors and windows. From the analytical

review of the reports and measured drawings, the timber houses from both states exhibited distinctive carvings with excellent features which differ from those found in traditional houses of other states in Peninsular Malaysia. Woodcarving from this region reflects its unique characteristics, particularly in the forms of carving techniques and motifs. In general, woodcarvings from Kelantan and Terengganu have different forms in which a thick plank is used for cut out technique according to a specific design motif with different depth of incision (Norhaiza, 2008). The various types of architectural woodcarvings with a certain degree of low or high relief carving motifs which are mostly derived from flora demonstrate a mastery of designs with a highly technical competence.

**Table 3.0:** Layout of carved components and types of motifs

No	Name of House	Area of placement	Carved components	Types of Motifs						
				Flora	Calligraphy	Geometry	Fauna	Cosmos	Abstract	Combination
1	Yaakub,	Main bedroom's door	DVP1							✓
		Above rear door (kitchen)	DVP2	✓						
		External walls (rumah ibu)	PWVP1	✓						
		Doorway to kitchen	DP1		✓					
		Stairs at front and rear verandah	S1						✓	
2	Mohamad Dobah	Rumah Ibu (front and rear wall)	PWVP1	✓						
		Rumah Ibu (front and rear wall)	PWVP2	✓						
		Rumah Ibu (front and rear wall)	PWVP3	✓						
		Rumah Ibu (front and rear wall)	PWVP4	✓						
		Rumah Ibu (front and rear wall)	PWVP5	✓						
		Rumah Ibu (front and rear wall)	PWVP6	✓						
		Rumah Ibu (front and rear wall)	PWVP7			✓				
		Rumah Ibu (front and rear wall)	PWVP8	✓						
3	Hassan Mohd Amin	Above window at guest area (male)	WVP1	✓						
		Bedroom's front door	DVP1							✓
		Wall at Guest area (male)	PWVP1	✓						
		Roof eaves at front façade	REP1							✓
4	Wan Aisyah	Wall at Serambi lelaki	PWVP1	✓						
		Wall at Serambi lelaki	PWVP2			✓				
		Walls at Serambi perempuan	PWVP3	✓						
		Doors at Serambi lelaki	BP1							✓
5	Wan Ahmad Abdullah	Main bedroom's front door	DVP1	✓						
		Walls at Ruang tamu and ruang tengah	PWVP1	✓						
		External walls next to anjung	PWVP2							✓
6	Wan Hussain	Main bedroom's front wall	DVP1	✓						
		External walls next to the guest area	PWVP1	✓						
		Front verandah	S1						✓	
7	Hassan Bin Yusof	Main bedroom's front door	DVP1							✓
		External walls next to Rumah Ibu	PWVP1	✓						
		Serambi hadapan	S1						✓	
8	Tok Yakub	Main bedroom's door	DVP1	✓						
		External and side walls (rumah ibu)	PWVP1			✓				
		Next to front door at front façade	WP1	✓						
9	Mariam Mat	Above door next to rumah ibu	DVP1	✓						
		Above door next to rumah ibu	DVP2	✓						
		Front and external wall next to the rumah ibu	PWVP1	✓						
		Front and external wall next to the rumah ibu	PWVP2			✓				
		Selasar	RP1	✓						
		Front stair	S1						✓	
		Stair leading up to rumah ibu	S2						✓	
		Roof beam at front façade of rumah bujang	CC1							✓
10	Kampung Losong	exterior walls (rumah ibu and main bedroom)	PWVP1	✓						
		exterior walls (rumah ibu and main bedroom)	PWVP2	✓						
		exterior walls (rumah ibu and main bedroom)	PWVP3	✓						
11	Wan Sulong	Exterior wall of serambi and main bedroom	WP1	✓						
		Exterior wall of serambi and main bedroom	PWVP1							✓
		Front wall of serambi and main bedroom	WVP1	✓						
		Doorways between bedrooms and serambi	DVP1							✓
		Gable end panels at front and rear facade	GEP1	✓						
		Gable end panels at front and rear facade	GEP2	✓						
12	Tok Ku Paloh	Rear and front external walls of rumah ibu	PWVP1	✓						
		Rear and front external walls of rumah ibu	PWVP2	✓						
		Rear and front external walls of rumah ibu	PWVP3	✓						
		Stair leading to pelantar	S1						✓	

13	Dato' Biji Sura (Nik Mohamad bin Hitam)	Stair leading to <i>rumah ibu</i>	S2							✓		
		Side Gates and gates at <i>sorong bawah</i>	GP1	✓								
		Main entrance gates	GP2	✓								
		Side gates	GP3	✓								
		<i>Serambi</i> (verandah) and window railing ( <i>sorong depan</i> )	RP1								✓	
		Railing at <i>sorong bawah</i>	RP2								✓	
		Railing at <i>Lumbor</i>	RP3								✓	
		Railing of staircase linking to <i>lumbor</i>	RP4								✓	
		Front house and <i>rumah bujang</i>	DVP1								✓	
		Front house and <i>rumah bujang</i>	DVP2								✓	
		Doors of Rumah depan (front house), rumah tengah and second bedroom	DVP3								✓	
		Above doors of main bedroom	DVP4		✓							
		Above doors of <i>rumah depan</i>	DVP5		✓							
		Above doors of <i>rumah tengah</i> and <i>bujang</i>	DVP6		✓							
		Windows at <i>Sorong depan</i> , <i>rumah depan</i>	WVP1								✓	
		Windows at <i>Sorong depan</i> , <i>rumah depan</i>	WVP2								✓	
		Wall of main bedroom	IWP1								✓	
		Doors of main bedroom	IDP1		✓							

The table illustrates that a significant number of carved components found in the selected timber houses were equipped with the floral motifs. This is suggestive indication that traditional craftsmen had strong preference for plant-based motifs. A possibility is that the motif of flora can be formed and composed in unrestricted fashion for various carved panels with unlimited types of pattern and carving layout according to the artistic and technical skill of craftsmen at their liberty. Apart from flora, motifs of calligraphy, geometry and combination of different elements are also apparent on different types of carved panels but in a smaller quantity of components. The carved components with different types of form and motifs were found on several architectural elements fixed to the interior and exterior fabrics and along the main facades of the houses.

#### 4.2 Physical Form and Basic Features of the Carved Components

As can be seen in Table 2.0, perforated ventilation panel fitted on wall was the predominant type of carving. The woodcarvings are positioned for specific purposes such as for natural ventilation, safety, screens and aesthetic (Zulkifli, 2000). Carvings on ventilation panels were mainly relief or non-relief manipulated on wooden panels and mostly in perforation. In woodcarving, perforation is a fully piercing technique done on a piece of wooden panel leaving a cut-through section (Norhaiza, 2008; Ismail, 2002). At a closer look one can appreciate the solids and voids in the panels. The solids and voids represent the perforated and non-perforated sections on the panels which could be achieved by the piercing techniques. The quality of openness and solidness is reflected by the size of perforation done on the wooden panels according to the shapes of motifs and pattern.

Perforated wall ventilation panel was found in two principle variants. The first type of panels was fabricated as a single perforated panel in rectangular layout as shown in Figure 5.0. Single panel means a carving done on a piece of wooden



board (Norhaiza, 2008). All elements of carving are crafted within the surface of the board with the specific size and shape. This type of panel was commonly seen on the external walls of rumah bujang berserambi, for example, Mohamad Dobah house. At the main façade of this house, repetition of several rectangular ventilation panels with various designs of motifs was apparent on the wall of *rumah ibu*. These carved components were placed within the thick wooden panels of convex wall panels. The shapes and dimensions of the carved ventilation panels blend in the plane surfaces of thick wooden panels with harmonious relationship. The juxtaposition of the horizontal carved panels with contrasting features on the upper part of the wall façade break the monotonous arrangement and verticality of the wooden frames. It appears that the carved panels were not only fabricated to facilitate in natural ventilation but also provide visual interest as apparent in the panel.



Figure 5.0: Single ventilation panel in rectangular layout at wall of Mohamad Dobah house

Various parts of plant including flower, leaves, flower buds and shoots were depicted as carving motifs for this panel. The floral motif possibly of daun sayap (a wing-like leaf) also known as *daun Melayu* or *daun Langkasuka* was composed in a complementary with the central motif of a flower possibly *bunga ketumbit* (a weed with bright yellow flowers). The carving motifs of plant elements are arranged within the geometrical frames in five different domains. The central motif is encircled with the frame in diamond lozenge shape which is embedded within the rectangular panel. This panel exhibits a successful combination of floral patterns with geometrical outlines.

On the other houses from Terengganu like Maryam, Kampung Losong and Tok Ku Paloh with the same type of dwelling architecture, there are also examples of single perforated panels which have different carving features. Tok Ku Paloh house, for example, which was built in early nineteenth century, exhibits a series of rectangular ventilation panels in vertical layouts that dominate the upper part of the wall façade of rumah ibu. The carved ventilation panels at this house were equipped with a vertical arrangement of floral motifs within the vertical rectangular shapes and layout. Figure 6.0 illustrates a single panel with a type of carving composed of plant motif possibly *bayam peraksi* (a weed). Several plant elements

including branches, leaves, leave shoots, buds and flowers flow in a rhythmic movement and intertwining characteristic encircled with vertical rectangular frame.



*Figure 6.0: Single ventilation panel in vertical rectangular layout found at Tok Ku Paloh house*

Continuous horizontal layout is the second type of perforated ventilation panels which was fitted on top of wall between the roof end and upper part of a door. It is apparent that carvings with perforation serve as fenestrations that allow ventilation and natural lighting into the houses. Fenestrations on walls are not only helpful for the ventilation but also useful in space beautification (Lim, 1987). The fine and intricate patterns on the wall fenestration, for instance, creates a sense of visual interest. Such prototype of carved component was also found in several houses in Kelantan including Hassan, Yaakub, Wan Aisyah, Wan Hussin and Wan Ahmad. For example, Hassan house was adorned with perforated wall ventilation panel in horizontal layout fitted on the upper part of side wall that separate rumah ibu from bedroom as shown in Figure 7.0.



*Figure 7.0: Carved ventilation panels fitted above the bedroom's door of Hassan Yusof house*

This panel allows the natural circulation of air into the building apart from serving as decorative element. This elongated piece of carved component with intricate motif of flora enhances the indoor setting, which concentrate at the main areas of the house while helping in cooling the interior spaces. The wall with beautiful carvings was positioned to separate between the public and private areas.

Perhaps, the placement of the carved panels on top of the bedroom's door was to indicate the point of entry to a private space. It is apparent that the size and position of the carved panels create a symmetrical silhouette within the wall of the bedroom, and the intricacy of the panel adds detail and variety as well as focal point to the spatial experience of the rumah ibu.

Carved panel in continuous horizontal layout was mostly found in houses with *bumbung perabung lima* type of dwelling architecture. Most of the panels were fixed on top of external wall and side walls that separate one space from the other. Many houses especially those located in Kelantan exhibit the continuous horizontal panels with floral or geometry motifs. For example, perforated wall ventilation panels fitted on the upper part of the front walls of *serambi lelaki* (male guest area) and *serambi perempuan* (female guest area) at Wan Aisyah house as shown in Figure 8.0. It appears that the panel found at the *serambi lelaki* was adorned with geometric motifs whereas the panel found at the *serambi perempuan* represents stylised floral motifs. Both panels were fabricated with non-relief motifs in repeated pattern and the distinction in the depiction of motifs between the two panels seems to reflect the designation of separate spaces for male and female visitors. Apart from that the panels with different carving motifs were produced in harmony with the distinctive forms of the two spaces.



Figure 8.0: Front elevation of Wan Aisyah house with the placement of carved panels

Most of the carved components found in Wan Aisyah house are wall ventilation panels expressed in perforated techniques without relief. The perforated section on the wall panel allows daylight into the building and at the same time directing a cluster of soft and beautiful light rays on the wall and floor surfaces creating a sense of visual interest. At night their silhouettes from indoor light add another beauty. This ambiance of beauty enhances the indoor setting of the house and the outline of the floral carving in horizontal band along the upper part of the external wall can also be viewed from the outside creates a sense of visual beauty. Apart from beauty, the wall fenestrations serves as screen for reduction of glare from excessive amount of day lighting while ventilate the indoor spaces including guest

areas for male and female visitors. Perhaps the embellishments were meant to enhance the wall components and beautify the front façade of the house. The placement of the perforated wall ventilation panels on the front façade suggests that it has specific reasons. The front façade of traditional Malay house is commonly positioned at facing the sun path (Raja Bahrin Shah, 1988).

Carved ventilation panel fitted on top of door is another form of carved component that dominate the Kelantan and Terengganu timber houses. This perforated panel which was normally fitted directly below the continuous horizontal panels was apparently the other predominant type of carvings found in abundance from the timber houses. There are a few houses which have the carved ventilation panels fixed above doors, for example, Biji Sura house from Pulau Duyong. This house which was more than eighty years of age possesses a wealth of carvings. Ventilation panels on top of doors and windows were the most dominant type of carved components found in the house. Figure 9.0 illustrates an example of door ventilation panel found in the area of rumah ibu. This panel exhibits a composition of various stylised plant elements probably of *kekacang* (leguminous creeper) in mixed pattern within a horizontal rectangular layout.



Figure 9.0: Ventilation panel in rectangular layout fitted on top of doors at Biji Sura house

The next type of carved component found at the external fabric of the Kelantan and Terengganu timber houses is in a form of double panels, for example, stringers at front and rear stairs from Yakub house (Figure 10.0). These carved stringers were fabricated as a set of two structural elements exactly alike with carvings of similar in nature. It is another type of building component placed at a point of ascending onto a house which is characterized by a clear contrast in carving form. There are three types of carved building components, namely, structural, elemental and ornamental (Ismail, 2001). Stringer of stairs is one example of structural carved components. The timber stairs that was marked as a point of entrance to this house is a straight bay with several treads supported by stringers and without any hand-rails. The stringers took form possibly an abstract representation and placed on both sides of the stairs. The top end of the stringer comprises perforated carving with different type of incision perhaps to represent the head of the stairs. It appears that the stairs with carved stringers were found at *pelantar hadapan* (front

verandah) linking to rumah ibu and *pelantar belakang* (rear verandah) linking to the kitchen of the house. The stairs with carved components suggest its degree of importance in relation to its main function as transitional element to facilitate the vertical movement. Similar decorative treatment was given to both front and rear stairs suggests that these circulation elements were equally important in terms of usage. Perhaps, the front stairs was reserved for male visitors and female visitors used the rear stairs for entrance to the house. As such, one important aspect of the placement of the carved stringers at the pelantar was meant to serve as welcoming features.

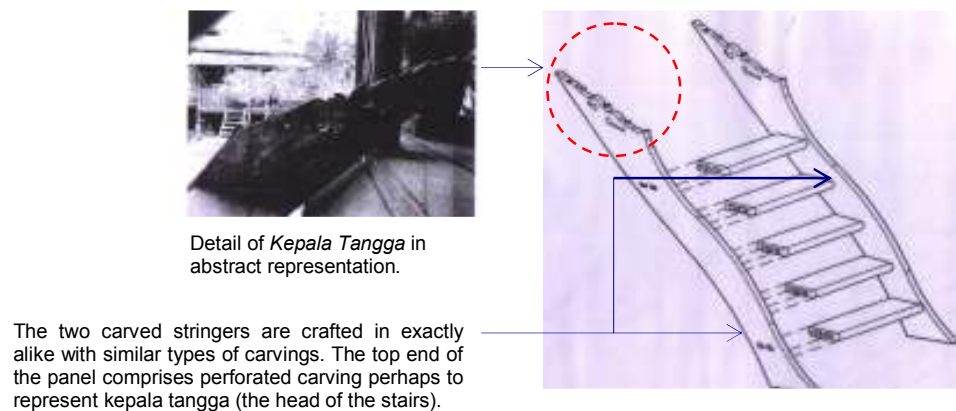


Figure 10.0: Carve stringers at the stairs of Yakub house

Different types of carving which are considered as the least dominant components including bracket, wall, door leaf, roof eave and gable end panels were also found at a few houses. For example, Wan Sulong house exhibits a set of two panels which were fitted at both front and rear gable ends of the house. These panels with floral carving motifs were positioned at the base of the gable ends as shown in Figure 11.0. The delicate carved panels were probably fitted to accentuate the central base of the gable ends from which the spreading of elements in ray pattern begins. Obviously, one can see that these two carved panels were almost similar in design forms which were located at different position. Both carved panels are the least noticeable features found at the roof ridge border and this type of ornament was only found at this house.



Figure 11.0: Carved panels at the gable ends of Rumah Wan Sulong

## 5. DISCUSSION

This study identifies woodcarving as one of key components that contributed to the exclusivity and distinctiveness of Malay traditional expression in its visual forms produced for the two types of prominent houses within the specified period. Carved components particularly in the form of ventilation panels, as this study has shown, reflected several considerations, including principal motifs, visual orders, regional identity and qualities of craftsmanship. This type of ornaments could be regarded as the legible manifestation of artistic tradition that was guided by those parameters determined by the craftsmen who produced the craft.

Flora is predominantly the most popular type of motif as appeared in the large amount of carved components. According to Norhaiza (2008), the Malay woodcarvers prefer to use creeping plants and flower producing plants because they were suitable for woodcarving. Various plant elements such as flower, leaves, tendrils, stems and branches were formed into delicate shapes according to the woodcarver's creativity based on natural inspiration. Besides, the floral motif was acceptable in the Malay art because, according to Othman (1995), Islam permits the use of non-figurative elements in the artistic work. As such the production of woodcarvings reflected greatly on the woodcarvers' cultural influences that shape their artistic expression. Likewise their intuitive sense is equally importance in shaping the woodcarvings. This is manifested through the choice of several types of plants such as *ketumbit*, *ketam guri*, *bayam peraksi* and *kekacang* as decorative elements utilised in the carved components. Perhaps the plant motif such as *ketam guri* was favored by the woodcarvers due to its flowers in vivid and striking colour. Full-bloomed flowers especially those in bright colours are eye-catching living things which have become central object in the carving composition.

Spiral was another part of a plant that was depicted as principal motif. The motif of spiral was found in many forms of carved panels with different types of pattern and carving layout. Spiral was depicted in distinctive feature that governs the compositional elements of the carved components as apparent in the panel shown in Figure 8.0. Spiral is a reflection of craftsmen observation of nature where spiral as a principle of growth in many plants such as found in many creepers. A careful study of the carved panels also reveals the composition of several types of plant motifs on a single piece of carve component as evident in the ventilation panel from Mohamad Dobah house as illustrated in Figure 5.0. This type of carving with combined motifs was probably based on the artistic preference, reflecting the creative expression by the woodcarvers. The fundamental characteristics of the floral motifs were retained and allowing certain modifications to ensure the carving



is a dynamic craft that demands ingenuity and creativity. This suggests why most carvings from the houses of Kelantan and Terengganu carried intricate floral patterns and has become typical Malay designs originated from this region.

Carving motif was not limited to the creation of the carved components with floral elements alone. It also includes other types of motifs such as geometry and calligraphy which were produced through artistic skills. Zulkifli (2000) posits that floral, geometry and calligraphy are the three major types of motifs used by Malay woodcarvers. The calligraphy motif possesses aesthetic values and conveys Islamic messages. Calligraphic elements depict the form of Arabic characters, verses from the Quran and local Arabic writing called *Jawi*. This motif was widely used in mosques, *madrasahs* and houses particularly in Kelantan and Terenggan (Abdul Halim Nasir, 1987). Reviewing the motifs used in the houses ornamentation, it is apparent that the woodcarvers from both states preferred non-figurative motifs such as floral and geometry as apparent in the wall ventilation panels at Wan Aisyah house. The figural designs were never depicted on any carved component from the houses either in isolation or in complementary with the other two kinds of motifs.

Compositions of the carving motifs on the specific panels were according to specific layouts and regulated by the specific ordering principles. It appears that most of the carved components were crafted in balance composition, suggesting an inherent visual order. The study has identified several ordering principles including symmetry, rhythm and repetition, variety, focality (visual emphasis), contrast, harmony and unity that governed the visual composition of the carved components. The visual ordering principles are used to construct the relationship among the visual elements of form, the compositional elements, and the intended meaning (Wallschlaeger and Busic-Snyder, 1992). Most of the carved panels found in the timber houses were carved in symmetrical composition. For example, the wall ventilation panel shown in Figure 5.0 demonstrates the harmonious and balance composition of carving elements with two axes of symmetry. Repetition of motif on left and right of the central axis suggests a sense of balance and symmetry. According to Ocvirk et al (2002) symmetry is achieved by the repetition of identical elements on either side of an imaginary central axis. Hence, symmetry means balance, and balance is a principle of beauty (Zakaria, 1989; Syed Zulflida, 2004). The ventilation panel exhibits a composition of various plant elements including flowers, leaves, flower buds and branches in complimentary relationships enhanced by the rhythmic lines, textures and shapes of motifs gives a sense of variety. Rhythm in the composition reflects on the recurrent repetition of the plant

elements with specific movements in harmonious pattern. The repetition of the same motif and pattern on both sides of the panel creates a sense of unity and harmony in composition. Apparently, the unique character of the carved component is in the intertwining movement of those visual elements that embrace the relief surface of the rectangular panel. The study reveals that the craftsmen also favoured the repetition of two identical components that strongly marked a symmetrical composition and arrangement as apparent in the stringers of stairs shown in Figure 10.0. The relationship between the compositional elements, ordering principles and the layout of the carving affects the overall visual form of the carved components.

Most of carved components were fabricated with its appropriate design for practical use in house setting. For example, as seen in many perforated wall ventilation panels which were found in almost all timber houses. It suggests that there were certain types of carved components commonly employed in the dwelling type of architecture from the Peninsula's east coast states. A possibility is that traditional woodcarvings were appreciated and valued for two reasons. First its visual form was blend with the dwelling architecture, beautifully and skillfully crafted to suit the distinctiveness of regional character. Wan Sulong house is one of the examples of the traditional house that exhibits the placement of carved panels as an integral part of the wall component. The carved panels were produced with distinct features thus making it easier to identify and describe their attributes that gave the front façade of the house its defining character. This character helps to define the important identifying feature for this particular type of a house which is rumah bujang berserambi.

It seems that the carvings were crafted mainly for appropriateness and blend harmoniously with the house form. The design of the house stands out clearly with the carved panels as complementary elements to the distinctive form. It is apparent that the form of house like the form of carvings was kept within certain dimensions and together they form the image of regional house architecture. Thus contributes to the foremost architectural identity that belongs to the states of Terengganu and Kelantan. The beautiful carvings were not only accessory to the houses but it explicated the form of the architectural elements in the most appropriate way resulting in unity. It is one of exemplary traditional ornament that arises through skillfulness and creativity of traditional craftsmen.

Another reason for the traditional woodcarvings to be much-admired and valued was due to the intricacy and complexity of carving on various panels with different shapes and sizes. Intricacy in woodcarving means the quality of having design

complexity in the arrangement of carving elements with highly elaborate and sophisticated workmanship. The intricacy and complexity of carving suggest a certain degree of skillfulness and creativity of the traditional craftsmen. It is these skills that could be associated with the techniques and qualities of the carvings that enhance their complexity and intricacy which is apparent in most of the perforated ventilation panels. A closer study of the carved components in the houses revealed a further variation of shapes and forms which are strongly reflected the craftsmanship identity that originated from the two states. In the art of woodcarving, craftsmanship refers to the aptitude, skill or quality workmanship in the use of tools and hardwood timber species especially chengal, red balau, merbau and sena (angsana) (Ismail, 2005). The proficiency of shaping woodcraft with the skilful use of the media offers the craftsman a means of artistic expression (Jackson and Day, 2005).

Most of the carved components with floral design found in the houses were perforated suggesting intricacy and complexity in fabricating them. For example, the carved panel as illustrated in Figure 6.0 exhibits complexity of carving with certain techniques of perforation and incision which creates an intricate overall design. The design qualities in the panel including depiction and composition of floral motifs in high relief and carved with perforation were contributory to visual intricacy and complexity. The carved component which has carving in overlaps character represents the intertwining of the plant motif gives almost a three-dimensional look. According to a craftsman from Temerloh, Pahang, Muhaimin Hasbollah, the complex carvings are usually with intertwining composition, where the most intricate carving has relief motifs in four overlaps. Carving in overlaps gives an expression of space with certain dimension of depth. The level of complexity in the intertwining composition is determined by the degree of overlaps. Visual intricacy in the carved panel was also achieved by the complex arrangement of floral pattern that consists of various plant elements. It appears that carved ventilation panels in single rectangular layout were the most commonly found in three-dimensional format. This accentuates the functional and beautiful aspects of the carved components of the houses thus conferring on design consciousness portrayed by the craftsmen. It is suggestive indication that the carved panels were purposeful products by the craftsmen which reflected their logical intuition based on creative inspiration and skillfulness that paves the way towards the distinctiveness of visual form.

## 6. CONCLUSION

Different types of carved components that adorned the timber houses of Kelantan and Terengganu display specific carving features which are distinctively different in character. Carvings were only evident on certain components of the house with significant uses either for interior or exterior settings. The most prevalent were perforated ventilation panels fitted on walls of rumah ibu which is the core area of the house. Visual composition, beauty and function of the carved components were fused to the architectural elements and in consonance with the house form. It suggests that carvings for house components were not objects crafted in a simple way but inextricably bound up with designated function, artistic qualities and skillfulness possessed by the traditional craftsmen. Functionality is one of the basic principles of Malay aesthetic which emphasises the practical function of an artifact. The analysis reveals that traditional Malay houses was designed and built with the conscious considerations on the proper layout of the carved components. Its visual forms was crafted and subscribed by the woodcarvers to be seen or used primarily in domestic setting thus creating pleasant ambiance.

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## SPONTANEOUS HOUSING IN SANA'A, YEMEN – CASE STUDIES

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**ABSTRACT:** The influx of rural population after the Yemen's revolution in the early sixties, the union between North and South Yemen in the early nineties, and the returning of the war veterans after the second Gulf war in 1991 have contributed to many spontaneous and unorganized housing settlement areas that are not equipped with basic necessities. These settlements have created a negative impact on the social, economical, and the environmental conditions of the urban areas. The spontaneous housing settlements are considered as the most deteriorating urban communities due to insufficient infrastructure services available to the people. This study attempts to focus on the spontaneous settlement of Madbah (City by Night) and Sawad Hizyaz housing (Union Street) in Yemen. They are good examples that represent the status of spontaneous housing in Sana'a and other cities in Yemen. The discussion will delve into the nature of the housing situation and uncovered the problems and potentials of the dwellers in these living environments. The study relies on the data which has been collected via questionnaires, interviews, field visits, personal observations and photographs. It is discovered that the areas under study was completely spontaneous in nature; lacking in basic necessities, infrastructure services and public utilities as required by the dwellers. Based on the conclusions, the study produced few suggestions and recommendations on how to improve the living environment of the areas under investigation, and these findings will be used to assist the spontaneous housing in other areas of Yemen.

**Keywords:** Spontaneous housing, housing environments, infrastructure and facilities, housing in Yemen

### 1. INTRODUCTION

Yemen is one of the developing countries; it suffers, as other developing countries, from the phenomenon of spontaneous construction in the cities. The Yemen's revolution in the early sixties, the union between both parts of Yemen (North and South) in the early nineties, and the flow of population after the second Gulf war in 1991 all have contributed to many spontaneous unorganised housing areas that are not equipped with basic necessities (Sultan and Kajewski 2003). Sana'a is the biggest city of Yemen from the point of view of the density of the population, with its population exceeding more than one million. Lately, it has witnessed a huge urban expansion which has led to the

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proliferation of spontaneous housing (Al-Waraqi 2001). As a result, spontaneous housing areas have appeared as cancerous areas inside as well as on the outskirts of Sana'a. Furthermore, continuous growth has been registered to the extent that spontaneous housing has reached the rate of 45% (Al-Abed 2003). The spontaneous housing areas are considered as the most deteriorated urban communities in the general environment because of the deterioration of infrastructure services in them (Haglan 1998). The locations of these spontaneous housing areas are normally situated in hilly areas, at the foot of hills, and along dangerous paths of waterways. The spontaneous housing areas are generally in need of the minimal infrastructure services (roads, drinking-water, sewerage system, electricity, and so on) and the social services (such as schools, clinics, social centres, and so forth) (Yemen 2003). This has contributed to the increase in the dangers faced by the inhabitants of these areas. Such deteriorating conditions have become the source of threat to their lives and properties (Al-Hazmi 2004).

This study will deal with this phenomenon of spontaneous construction in Sana'a, in general, and in the Madbah and Sawad Hizyaz housing areas, in particular as they are the largest spontaneous areas in the city. This study has two objectives; firstly, it aims to find out the general nature and reality of these two housing areas. Secondly, it aims to identify the specific problems related to the lack of services and public utilities. Therefore, field studies on specific areas chosen, have been conducted. The study concludes that the areas under study are completely spontaneous in nature; lacking in the most basic necessities of housing needs; infrastructure services and public utilities. Furthermore, the study has suggested and recommended on how to improve the living environment of the areas under investigation, and of all other spontaneous housing areas in Yemen.

## **1.2 THE SPONTANEOUS AREA IN SANA'A**

Over the last decade spontaneous settlements have been a very visible element in the urban landscape of Sana'a city (Ogaily 1994). In order to have a general understanding of the reality of Sana'a housing, the city can be divided into three zones. These are: the old city area before 1962, the transitional area 1962-1978, and the spontaneous area 1990 until now, Figure 1 illustrates the three housing zones of Sana'a city (Al-Abed 2003). The following will be an elaboration of the spontaneous area which will show the reality of Sana'a housing. This area is more important and more relevant than the other areas. In that the emergence of spontaneous housing began during these stages and continued in increasing trend until now.

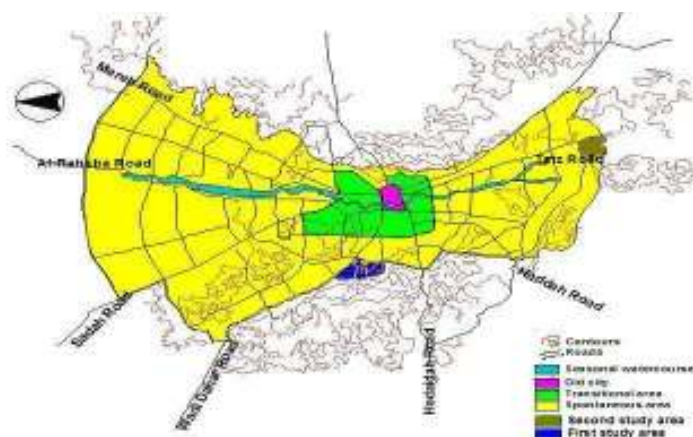


FIGURE 1 Three Housing Zones of Sana'a

Before 1990, there were several spontaneous housing pockets in the old city area, and transitional area. The rapid expansion of such settlements started since the Gulf War in 1990. There is a continuation of the expansion of the spontaneous settlements in all directions mainly at the mountain foothills surrounding the capital. Table 1 shows the percentages of housing types in the three zones.

TABLE 1 Percentage of Housing Types in the Three Zones

Source: Al-Abed 2003

Specific area	Building Types and Percentage %				
	Traditional Building	Modified Traditional	Apartment Building	Villa	Spontaneous
Old city area	50	20	22	3	5
Transitional area	5	15	40	30	10
Spontaneous area	3	5	2	5	85

From Table 1, it can be seen that there is a significant difference in the percentage of spontaneous houses in the spontaneous area (85%) from that of the transitional area which is 10% and the old city (indigenous) area which is 5%. The majority of building types in this area are spontaneous houses. The spontaneous settlements are unplanned areas and disorganised belts encircling the city. Spontaneous dwellings have no specific form. The dwellings in these areas are grouped randomly, leaving a narrow access around them. These accesses are irregular in layout and they do not have a regular width, nor are they built to a standard specification. The main elements of the spontaneous areas are the residential dwelling, the settlers' main aim being to make maximum use of land, with the land that is left over being used as a street. This has



resulted in narrow winding streets as well as difficulties in gaining access to some dwellings in these areas (Al-Abed 2003).

## 2. METHODOLOGY

This section shows the methods of data collection by means of the field trips conducted by the authors, on specific areas, namely the Madbah, and Sawad Hizzyaz areas in Sana'a, the capital city of Yemen. These two areas are good examples that represent the status of spontaneous housing in Sana'a and the other cities in Yemen.

The field trips can be divided into two main parts; first, interviews with 9 people in Madbah, and 7 people in Sawad Hizzyaz to discuss the reality and nature of these spontaneous housing areas. The housing characteristics, structural and building plans of the areas, have been recorded by the personal observations and taking photographs of the sites. Secondly, questionnaires were distributed to the residents of the areas studied. The survey was conducted on 80 sample families that live in the research areas; 40 families from the area of Madbah, where people has settled since the early eighties, and another 40 families were from the area of Sawad Hizzyaz, which was set up in the early nineties. The study tried to understand the differences between the two areas, since the settlements were established at two different time periods. The questionnaires were designed to assess the problems faced by the spontaneous housing areas, especially the lack of services and public utilities.

### 2.1 RESULTS AND DISCUSSIONS

From the interviews with the residents in Madbah and Sawad Hizzyaz areas, and personally observing and taking photographs of the sites, different points clearly became apparent.

#### ***a. Characteristics of Housing Area (Madbah & Sawad Hizzyaz)***

After visiting the two areas of study, it became clear that the first (Madbah) area suffers from land erosion, especially in the rainy seasons; as it lies on a hilly topography. Spontaneous houses are built everywhere throughout the area, as are narrow paths, alleys and steps on hill slopes especially at the south-eastern part. These houses are randomly placed and unorganised, without any separating roads in between them. There are no open spaces to cater for the social activities that the residents need. No data are available related to the number of housing units in this area.

On the other hand, the second (Sawad Hizzyaz) area of study is mainly low lying farmland, but has been neglected over time. Moreover, construction in this area was not concentrated in one area, but was in several, moderately separated areas that are linked

to each other via paved, dirt paths that are featureless in some parts. The area is a housing area, composed of about 500 housing units (Mahfoudh and Edrees 2003) linked to each other by paved roads that limit movement of pedestrians and traffic. It can be concluded that, the two areas do not follow proper architectural rules, and the houses do not follow traditional or modern engineering principles, and are limited in space (i.e. the houses are restricted in terms of area (80 to 100 square metres) when considering the number of people residing in them. Furthermore, each house has one to three rooms built from cement blocks and metal sheets, though some houses are made of zinc. These are illustrated in Photographs 1, 2, 3, and 4.



*PHOTOGRAPH 1 View of Land Erosion*



*PHOTOGRAPH 2 View of Unpaved Road*



*PHOTOGRAPH 3 House Built from Cement Blocks*



*PHOTOGRAPH 4 View of the Housing Area*

#### ***b. The Questionnaires Presentation and Tabulation Charts***

This part analysed the questionnaires that were distributed by the authors to the residents of the areas studied. The reality of these spontaneous housing areas were analysed, as well as the public services available in these areas and their infrastructures, as follows:

### 1) Reality of the Research Sites

From the location and characteristics of the housing areas, the relationship between the variables were compared and studied. The nature of the two areas were then analysed in the context of (1) the type of housing in these areas, whether the owners possess legal ownership documents, or building rights, or they do not, (2) the level of privacy available of the housing, and (3) lighting and ventilation in the housing units. The similarities and differences in the nature and environment of these areas will also be part of the study.

From Figure 2, it can be concluded that 67% and 25% of the residents were completely squatters in the Madbah and Sawad Hizyaz areas respectively. 33% and 75% were houses legal land owners possessing legal ownership documents in the former and latter areas respectively. None of the houses built in the two areas possessed buildings license from the authorities.

From Figure 3, in terms of the level of privacy, 13% claimed to have complete privacy within their houses in both the studied areas. 40% and 57% have partial privacy, whilst 47% and 30% felt that they are having no privacy at all for the Madbah and Sawad Hizyaz areas respectively.

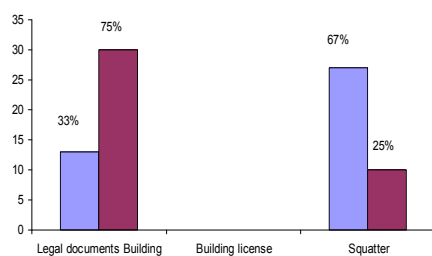


Figure 2 Survey Results on Legal Status

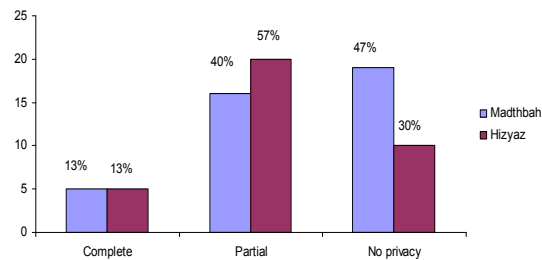


Figure 3 Survey Results on Level of Privacy

From Figure 4, 5% and 13% of the houses have lighting and ventilation everywhere; 25% and 20% have them in most places; 50% and 42% have them in some places; whilst 20% and 25% have no lighting and ventilation at all for the Madbah and Sawad Hizyaz areas respectively.

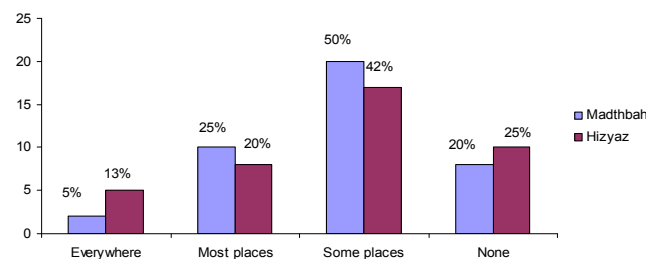


Figure 4 Survey Results on the Lighting and Ventilation

From the above, it can be seen that these areas are unplanned spontaneous housing areas, this study has thus contributed to the statistical analysis of the housing areas studied, where it was found that most of the land in the Madbah area had been illegally occupied (67%) and the area can be said to be spontaneous housing area. However, in the Sawad Hizyaz area, 75% of the residents legally owned the land, but none of them has their house built with proper permission from the authority; i.e. they do not possess legal license for the buildings; hence the area can be categorised as semi- spontaneous housing area. The reason for this is the fact that the houses are built spontaneously. This shows the unplanned nature and over-crowdedness of the houses, to the extent that most of the houses are side-by-side. It can be deduced that the majority of the residents do not follow the laws and regulations. The laws are only weakly implemented, which means that the grouping together of these people creates chaotic social structures.

## 2) Services

The study has focused on two types of services which include: (1) availability of drinking water, electricity, and sewage services, and (2) educational and health services.

### **Availability of Services (i.e. Drinking Water, Electricity and Sewage)**

From Figure 5, it can be concluded that 100% and 60% of the entire areas are completely devoid of available drinking water, in the Madbah and Sawad Hizyaz areas respectively. And that all the residents had to resort to drinking water that is brought in from nearby areas by special water transport trucks. However 40% of the resident claimed to have available drinking water within their houses in Sawad Hizyaz area.

From Figure 6, in terms of available electricity, 90% and 62% of the residents claimed to have electricity in their homes, but the connection was illegal and haphazard in both the studied areas. The rest of the residents 10% and 38% had no electricity at all for the Madbah and Sawad Hizyaz areas respectively.

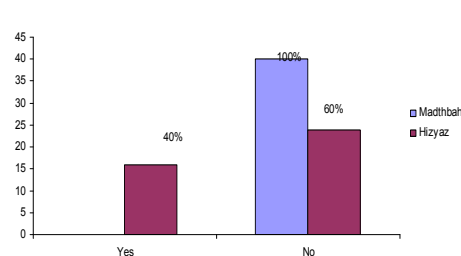


Figure 5 Survey Results on Availability of Drinking Water

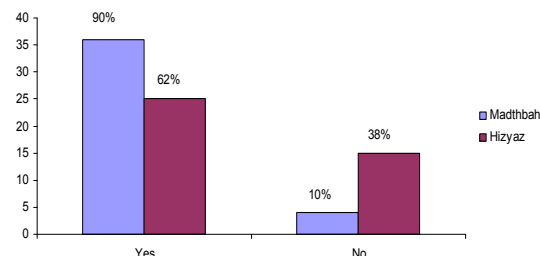
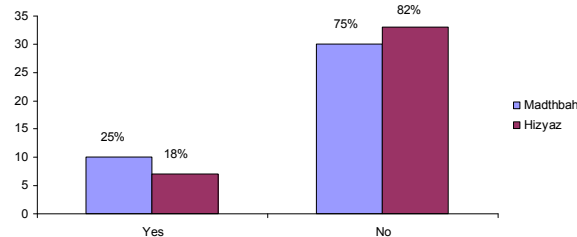


Figure 6 Survey Results on Availability of Electricity

From Figure 7, it can be concluded that 75% and 82% of the sample population of both areas studied said they had no proper sewage in their houses, and

had to dispose of light and heavy waste by digging holes in the ground in the Madbah and Sawad Hiziya areas respectively. 25% and 18% said they had proper sewage in their homes, but it was not well organised/connected, which caused many problems in the former and latter areas respectively.

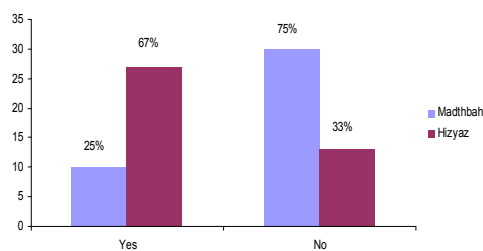


*FIGURE 7 Survey Results Availability of Sewage*

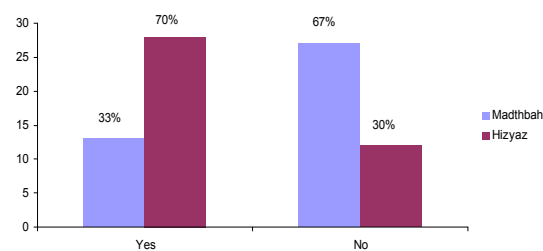
### **Availability of Educational and Health Services**

From Figure 8 it can be concluded that 75% and 33% of the sample population of both areas studied said that educational services are not available in the Madbah and Sawad Hiziya areas respectively. 25% and 67% of the sample had available educational services. These are the people who live near the only available school, which teaches primary, preparatory and secondary students in the former and latter areas respectively.

From Figure 9, in terms of available health services, 67% and 70% of the residents had no access to health services; only about 33% and 30% said that they could access health services in the Madbah and Sawad Hiziya areas respectively.



*Figure 8 Survey Results on Availability of Educational Services*



*Figure 9 Survey Results on Availability of Health Services*

Thus, it was found that the areas lack proper government water and electricity supplies and sewerage disposal system. These reflect how hard it is for the residents to live here when the areas lack the basic services that people cannot live without. The shortage of these services shows the reality, the spontaneous nature of these areas, and that they were not planned by the government. It also shows that the government has not given these areas any importance. The areas are also severely lacking in educational services and the available schools are not enough to educate the population here. Only a

very few are able to take advantage of schools that are near the areas. The areas under investigation have no health services, and there are no hospitals or medical centres. It can be deduced to the absence of proper housing and population policies, coupled with the bad living conditions which make these areas a source of growing hatred towards the society as a direct result of poverty. The areas thus may also become a breeding ground for organised crime.

### 3) Social Characteristics

These are characteristics that describe the cultural and social aspects of the families in the areas under study. The results were obtained via questionnaires, and represent the social status of the residents. The study will compare the two areas, studying the social aspects of: (1) Origin, (2) Reasons for Moving, and (3) Gender of family members.

Social Characteristics: (Origins, Reasons for Moving and Gender of Family Members)

From Figure 10, it can be concluded that 85% and 67% of the sample population in both the studied areas are from the countryside, while 15% and 33% were from the city in the Madbah and Sawad Hizyaz areas respectively. Thus, there is a difference between the two areas, yet in both cases the majority of the residents are from the countryside. These prove that these areas are a result of internal migration within the country.

From Figure 11, in terms of reasons for moving, 13% claimed that they were looking for better educational facilities in both the studied areas. 62% and 74% of the residents moved to find a job, whilst 25% and 13% said they moved to look for better health services in the Madbah and Sawad Hizyaz areas respectively.

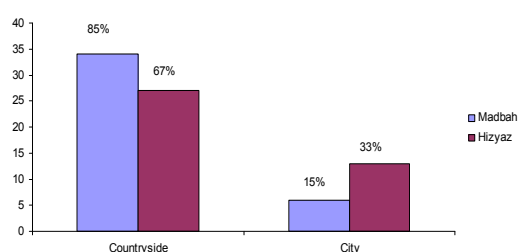


Figure 10 Survey Results on Social Characteristics (Origins)

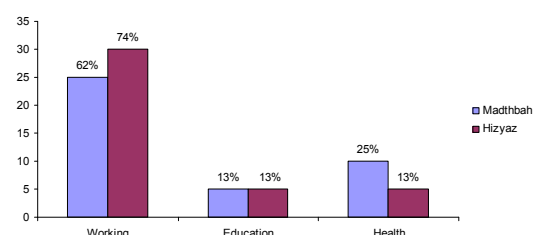


Figure 11 Survey Results on Reasons for Moving

Thus, it is clear that the majority of the residents are people from other towns, mainly from the countryside, looking for job opportunities to improve their financial status in both the areas studied. However, they have become poorer than they were. Most of the families have a low level of education. This shows that the level of education and awareness is low amongst the population. They are unaware of their rights or their duties towards their living area and environment. This is quite clear from the low number of

average members of the household that are in various levels of their education. It can be deduced that there is no development for these rural areas, small secondary cities and towns. The result is the increase in the migration from the countryside.

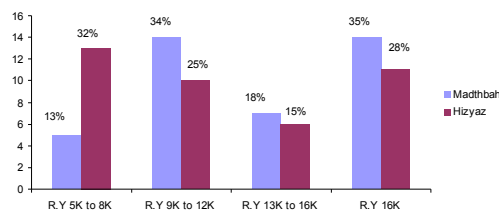
### 5) Economic Characteristics

This section deals with the economic characteristics of the families in the two areas in which the questionnaires were distributed. They describe the economic status of the residents. It can be analysed to found the relationship between area, location and economic characteristics such as: (1) family income, (2) and ability to build own house.

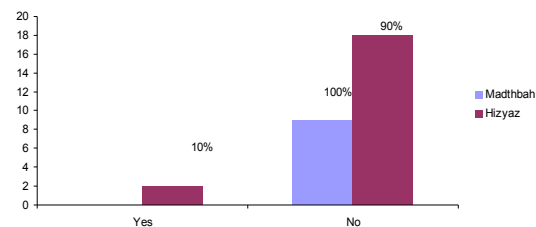
#### ***Economic Characteristics: (Family Income, Ability to Build Own House)***

From Figure 14, 35% and 28% of the sample had an income that was above 16,000 Riyals; 18% and 15% had an income “between” 13,000-16,000; 34%, 25% had an income of between 9,000-12,000 Riyals; whilst 13% and 32% had an income “between” 5,000-8,000 Riyals in the Madbah and Sawad Hizyaz areas respectively.

From Figure 15, in terms of ability to build own house, 100% claimed they were unable to build their own house in the Madbah area, while 90% said the same in the second area Sawad Hazyaz.



**Figure 14 Survey Results on Family Income**



**Figure 15 Survey Results on Ability to Build Own House**

The majority of the residents are from the low income group who suffer many difficulties in their everyday life. Only a few have an income of above 16,000 Riyals, and even that is not enough to satisfy all their basic needs when compared to the income that is available elsewhere. It can be deduced that this is because of the economic slump which Yemen is going through due to recent political events. Some are local, such as the 1994 civil war, and others occurred in the same region, such as the 1991 Gulf War. These situations affect the local economy, mostly due to the difficulty of finding jobs for those who returned from the Gulf, and whose number exceeds a million people. This caused a decrease in the average personal income, and an increase in the unemployment rate.

### 3. CONCLUSION AND RECOMMENDATIONS

Based on the results and findings from the data analysis in the previous parts in relation to the study's objectives the following points can be concluded. Firstly, the two areas studied are completely spontaneous in nature, as most of the houses do not follow proper architectural rules, and the houses do not follow traditional or modern engineering principles. Secondly, it can be seen that the Madbah area is an unplanned spontaneous housing areas (squatters), while the Hizyaz area is a semi-official housing area in which the land has been illegally occupied. The condition of the houses is bad, lacks privacy; lacks proper ventilation and lighting. Thirdly, the spontaneous housing areas (i.e. Madbah and Sawad Hizyaz) are lacking in the most basic of housing needs; infrastructure services such as roads, drinking-water supply, sewerage system, electricity, and public utilities such as schools, clinics, parks, and social centres. All these have contributed to the increase in the dangers faced by the residents of these areas. Such deteriorating conditions have become a source of threat to their lives and property. Based on the conclusion of the study the author makes some recommendations which can help in solving the current problems of spontaneous housing and to avoid the same problems in the future. Such recommendations are discussed as follows: Firstly, regarding the issue of the reality and nature of the spontaneous housing areas, they should be improved and upgraded so as not to negatively affect the living conditions there, and so as to provide a suitable, healthy living environment for their occupants. Efforts must be directed to the care of the urban aspects of the areas such as the buildings, the open spaces, and the facilities. Nevertheless, after improving and upgrading areas, if there are any new spontaneous housing areas appearing in the future, the authors suggest strict demolition policy to be implemented. Secondly, regarding the lack of infrastructure services and public utilities, it is recommended that the government should provide facilities and services to the currently existing spontaneous housing areas such as open spaces, paved roads, parks, mosques, electricity, drinking-water supply, sewerage systems, schools, clinics, cultural and trade centres by directing efforts and care on these areas and underling their importance.

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## Iran architecture in Sassanid era

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**ABSTRACT:** Considering science and technology developments and spread of communities and high speed of information transition, it's necessary to become hamonized with world developments. This will be along with transition of cultures, behaviours, different thoughts and life styles. Some of the culture exchanges cause improvement and completing our national culture, but others are incompatible with our regional culture.

In addition to this, architecture is mixed with human life and usually related with culture, nature, world vision and thoughts of each nation every time. So we can consider it one of the best appearances of civilization and culture of each nation in any era.

Iranian architecture has followed bases and criteria, coordinating with culture, life style, climate, economy and human necessities. It's a question in today's mixed architecture of Iran, especially in large cities, that why our multi thousand yaer culture and civilization can't solve the problem of updating the architecture with it's rich background and special ideas.

Our country is one of the oldest civilizations of the world and there is architecture and stonecutting works belong to more than 7000 years before in several places in Iran, but multi thousand year history of Iran architecture is not studied well. Iranian architecture is divided in two parts: pre-Islam and post-Islam. Pre-Islam architecture belongs to Media, Achaemenid, Parthia and Sasanid eras.

This document will be along with getting acquainted with culture and art, specially architecture of iran in *Sassanid era*, and history, theory bases and physical features. Of course this bases and criteria are hamonized with our today understanding of *Sasanid* buildings and studies done done in this field.

**Keywords:** sasanid era, architecture, specialities

## **INTRODUCTION**

The Achaemenidae history and quality of Arians' governing from the beginning up to creating their dynasty as the largest imperia of the world by Kourosh Achaemenidae in 550 B.C. in Pars land is been cleared by researches.

But we have a little information after Alexander attack in 331 B.C. and defeat of 3rd Dariush Achaemenidae and the overthrow of that dynasty and division of the conquered lands of Alexander between his successors in Asia (Soloukian and after them Parthian and killing the 5th Ardavan (the last Parthian king).

By coming the Sassanian, the Persians again were appeared and the Parthians were overthrown by Ardeshir-E-Babakan the son of Sassan. The Sassanid dynasty was created in 224 A.C. by Ardeshir. He created the large minaret of brazier of the Mazdisna rule like Achaemenidaes and showed that the Sassanid believes were following the Persian religion, ceremonies and art of Achaemenidaes.

Ardeshir was the founder of city of Ardeshir-Khoreh (Firooz-Abad) as his capital and when he occupied Tisfoon, created a new town beside Solookieh named Veh-Ardeshir. These 3 towns (Solookieh, Tisfoon and Veh-Ardeshir) were called Madaen.

The art and the artists in Sassanid society, with a high class distinction have been restricted to the aristocrats and the courtiers. In such a society there weren't any social and humanity art that related to people and their life anymore. In this era, artistic works were influenced by Achaemenidae, Parthian and Greek art.

They were Zoroastrian and in this religion, respecting to the fire as a sign of life, shows it is the largest manifestation of the nature beside other elements of the nature like water and soil.

### **▪ Art and architecture of Sassanian:**

By establishment of powerful central government of Sassanian, they developed in architecture and urbaning. The remains of the cities in those era and the stone works in the mountains shows the attend to extend of the cities and the ways specially the connections of the roads, bridges and industries.

Although the Sassanid art was continuing the Achaemenidaes and the parthians art, but it had preferences over the past eras in stone works, plaster works and architecture specially in construction of domes, vaults and wide halls without column.

Sassanian that were raised from the Pars land, were relating themselves to Achaemenidaes (Persians). They were bounded to their religion and restore the Zoroastrian rules with sanctifying the nature. The sun, as the first symbol and fire and water in next position were holy. Art and architecture were appearances of their believes. Most buildings in this era were in a huge scale with forms that were showing the power and greatness.



*Fig.1- Sassanid fabric*

The decorations after Achaemenidaes were developed and became luxurious. The plaster works were done separately from the architecture and natural forms were spread in architecture decorations of fabrics and other arts. (fig. 1)

### ▪ Sassanid urbaning

Ardeshir founded the city of Goor (Firooz-Abad or Ardeshir-Khoreh) like Parthian cities in a circular form. After becoming powerful, he constructed many cities such as Veh-Ardeshir and Tisfoon.

The form of cities in this era changed from concentric and radial into checkered little by little.

#### ✓ Firooz-Abad:

The remains of a circle form city by Parthian rules are founded in Firooz-Abad. This city, first was called Ardeshir-Khoreh. The radius of the city was about 450 meters and the governmental buildings were located in the center of the city.

The buildings were constructed by stone and plaster. The large minaret of Firooz-Abad (approximately in 30 meters height) which was the place of fire, created in center of city in order to show their believes. This minaret was one of the first towers which were made and later it was a model in whole Islamic architecture. It also was a rememoration of brazier of Naghsh-e-Rostam in Achaemenidaes era and the Persian religious ceremonies in a high and wide place. It's considerable that in Zoroastrian rules, contrary to Mazdisna's the fire should be under a shade and the sunlight shouldn't shine to it and the holy rain water shouldn't pour it too. This city had a circle wall around, four gates and a moat around the wall. This defensive method was seen in most cities at the beginning of sassanid dynasty.

### ✓ Bishapoor

An other important Sassanid city was Bishapoor which was 140 km far from Shiraz and 23 km far from Kazeroon. It was founded in 266 A.C. by shapoor (son of Ardeshir). This city was along with the road which connected Firooz-Abad to Tisfoon and had a strategic commercial and military position.

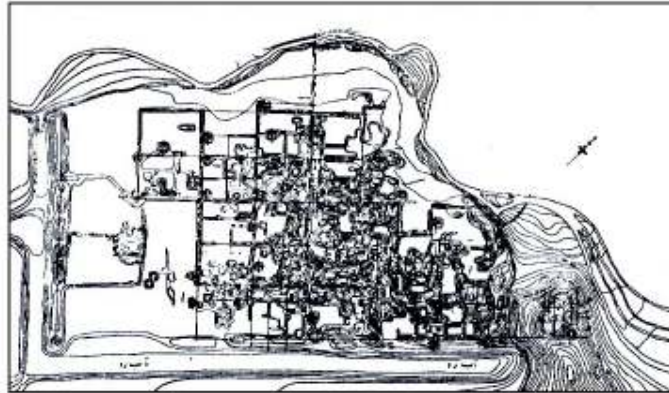
Before creating Bishapoor, the cities were in a circle form like Parthian cities. Bishapoor was the first model of Sassanid city which made in a rectangular form and checkered network. (fig. 2)

The city had a tall and thick wall around. Ghale-Dokhtar castle was overlooking to the city from the east. There was a moat around the wall which water flowed in it.

In middle of city two long northern-southern and eastern-western streets which were perpendicular to each other and intersect at the middle of the city. Important buildings and spaces, temples and mosaic-veranda were located there. One of the Anahita temples was in this city. In addition to the Sassanid works there were works from the beginning of Islam too.

The houses of the aristocrats were located in green areas. Private places and the residences of the courtiers were located in the north of city and most parts of establishments, administrations, public residential zone and working places were on the south.

Comparing between houses of public (which were made of plaster of clay and straw) and huge palaces shows the class distinctions in the society. The formal buildings were manifestation of power and splendour of the court when the Achaemenidae halls with columns and high Parthian verandas were changed into huge and splendid Sassanid domes and were symbol of politic goals. (fig. 3 & 4)



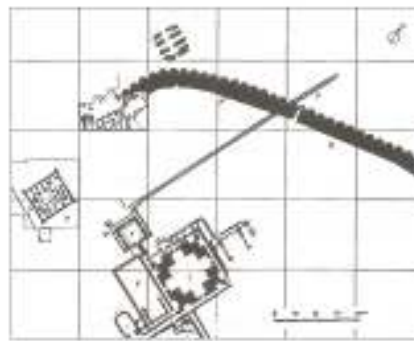
*Fig. 2- map of Bishapoor*



*Fig. 3- remains of Bishapoor*

*Fig. 4- founded places in Bishapoor*

- 1- hall
- 2-Anahita temple
- 3-Mosaic veranda
- 4-Mosque from Islamic era
- 5-towers
- 6-canal



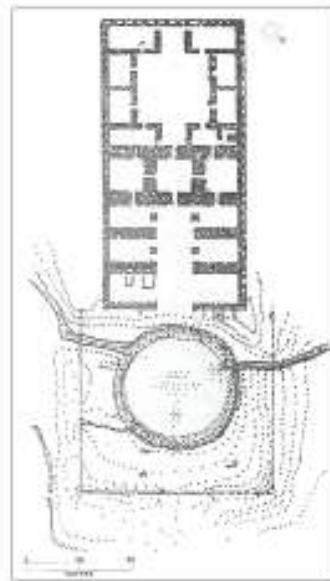
## ▪ Sassanid architecture

### ✓ Firooz-Abad Palace

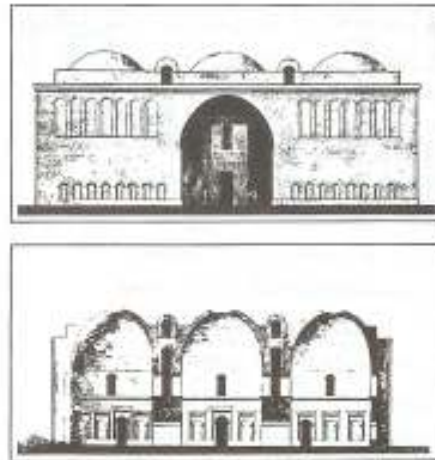
This building by 104×55 square meters area was made of stone and plaster mortar and the thickness of the walls was up to 4 meters somewhere. The external façade of the building had vaulted decorations which created in rectangular borders by semicircular arches. Ardeshir Palace in Firooz-Abad had a symmetrical plan. The entrance of the rooms was from the original veranda on the north.

This building was constructed on a cut surface and there were stairs on all four sides. There was a mineral water fountain in circle form at the lowest point. This palace is a sample of Sassanid palaces which was imitated in next centuries.

This building had specifications such as techniques for creating a spherical dome on a square plan for the first time in Sassanid architecture. In that time the dome was created just on the buildings by circle or octagonal plans in Rome. (fig. 5,6)



*Fig. 5- Firooz-Abad palace and fountain*



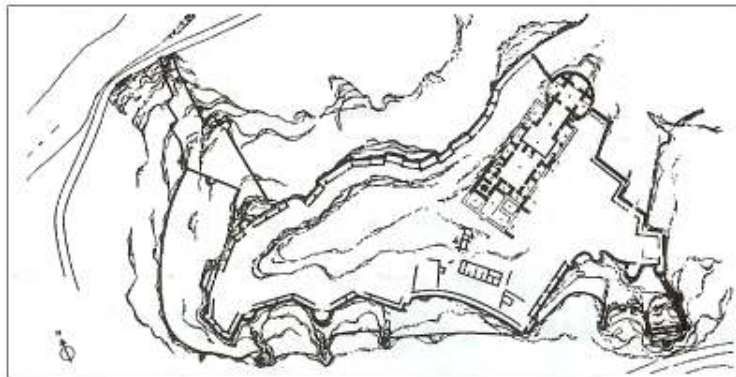
*Fig.6-elevation and section of Firooz-Abad palace*

## ✓ Ghaleh-Dokhtar in Firooz-Abad

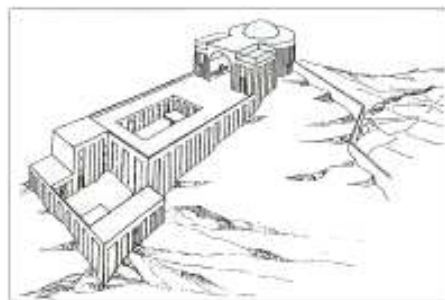
Ardeshir constructed ghale-Dokhtar like a castle as founding Firooz-Abad. This castle had a steep from 3 sides. At the pick of it on the highest point it had a veranda, a dome and two towers which had stairs that go up and terminated to large vaulted rooms created around court of the central veranda.

The original castle was located above these rooms had a large veranda with a curve roof, square rooms by a huge dome. The towers made variety in the monotone walls. This castle was made of large natural stones and plaster mortar the walls were thick specially around the dome.

It's clear that Ardeshir built it in a hurry, but the splendour was attended which was fulfilled. (fig. 7 & 8)



*Fig.7- Ghaleh-Dokhtar plan*



*Fig.8- drawn perspective of Ghaleh-Dokhtar*



### ✓ Tagh-e-Kasra

Tagh-e-Kasra is one of the best rememoriations of Sassanian in Tisfoon (today's Iraq). This great building might be constructed by 1st Shapoor. Its veranda was built by Iranian golden proportions by 25 meters width, 30 meters height and 50 meters depth. There are many vaults in a low depth just for decoration on the façade that emphasize greatness of the building and also stabilize the monotony and roughness of it.

This building was created for representing the greatness and power, and today, just one of four walls surrounding the central court is remained.

Its veranda wasn't only a great entrance, but had a heavy brocade curtain with different images. There was the famous carpet of "Baharestan" in the main hall which was made by silk and gold and had thousands of jewels on it that Arabs teared apart it. (fig.9)



Fig.9- entrance veranda of Tagh-e-Kasra

### ✓ Bishopoor Hall

This hall was in south east of Anahita temple in a 781 square meters space and had specialities for the first time in Sassanid architecture. The plan of this palace was cruciform by 16 sides and was a model for many fire temples. In Islamic era it was the source of four verandas buildings. (fig. 4) It had 4 symmetrical verandas and had a dome with 25 meters height. The hall was connected to the surrounding porches by 4 doorways. The hall had decorations by plaster and mosaic. The first signs of Moaragh-tiles were seen in this building. (fig.10)

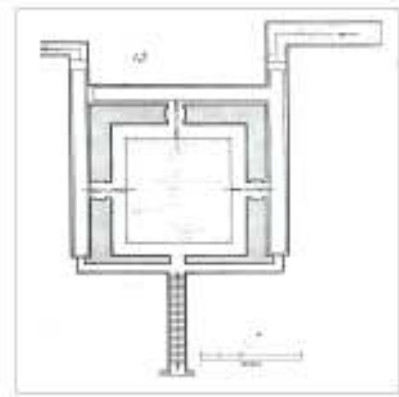


Fig.10- reconstructed mosaic veranda, Bishopoor

### ✓ Bishapoor Anahita Temple

In Zoroastrian rules, Anahita is the symbol of water. This building was a cube with sides in 14 meters length which made of different sized stone without mortar. It had an entrances in each side. On the northern façade there were 4 cow sculptures that were symbol of the temple beside decorating.

It was made 6 meters lower than beside ground, because they wanted the river water flowed into the temple. (fig. 11)



*Fig.11-Anahita temple-Bishapoor*

### ✓ Chahar-Ghapi

Fire temple is the place of protecting the fire and performing the religious ceremonies and blessing. Before Sassanian (in Achaemenidaes era) fire was created in open spaces on high platforms. After collection of Zoroastrian rules in 4 A.C. and because of their believes about preventing the sunshine from the fire, the fire temples were created under a shade in form of a building with 4 doors in direction of south, north, east and west. They were usually in form of Chahar-Taghi and the more important ones had a circumambulation corridor around.

Chahar-Ghapi fire temple was created in this era in Ghasr-e-Shirin and had a circumambulation corridor in 25×25 square meters with a dome by 16 meters height. (fig.12)



*Fig.12-remained of Chahar-Ghapi*

### ✓ Takht-e-Soleiman

Azar-Goshnasb fire temple was the most important one in Sasanid era, it's told that Zoroaster was born there. There was one of the most famous historical buildings, because of large costs of construction and equipments. (fig. 4) this

collection was lost its briskness up to Islamic era and in politic and economic actions started again in Ilkhanian era. The foundation of the building, platform and the walls were created by stone and later brick was used there. Plaster and tile-works were added to it in Ilkhanian era. (fig.13)

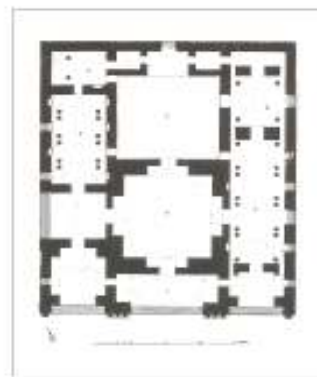


*Fig.13- Takht-e-Soleiman*

### ✓ Sarvestan Palace

Sarvestan Palace was located 9 km length from Jondi-Shapoor (near Shiraz). This building was in a large garden. Its plan was like Firooz-Abad Palace. The main hall was more sumptuous. Its construction time might be 2 centuries after Firooz-Abad Palace in 5 A.C. Its dome was made with baked brick but in Firooz-Abad just stone has been used.

The central hall had a dome and other spaces had barrel vault. (fig. 14 & 15)



In

*Fig.14- drawn perspective of Sarvestan Palace*      *Fig.15- plan of Sarvestan Palace*

Sassanid era stone works were developed as compared with last eras. Most of them were related to the kings' wars, hunting and entertainments of them.

In this era, gardens were as the Iranian models around or beside all important buildings.

## CONCLUSION

### **specialities of Sassanid architecture:**

Great researchers of Iran were presented continuance, stability, aesthetic, following the rules and believes as the most specialties of Iranian architecture. In each era, experiences of the last era's art and architecture were obtained and some elements were added to it in order to complete it.

Remained buildings of Sassanid era because of local and climatic specialties are different from each other, so single standards can't be expressed for all of them. Also during 4 centuries of Sassanian governing, there were many changes specially in construction techniques like domes and vaults.

In Mesopotamia, brick was used for creating dome and roof because of shortage of stone and wood.

The most usual specialties of Sassanid architecture are:

- Sassanian by relating themselves to Achaemenidaes and Persians and by intriguing the sense of nationalism and religiosity of the people tried to absorb their trust.
- The first model of urbaning in checkered network was innovated in this era.
- Like other arts, architecture was in service of kings and aristocrats, so any public art were rarely remained.
- The amount of large columns was decreased because of the new methods of domes and vaults construction.
- The vaults were made in semicircular or horseshoe form without a sharp point.
- Creating circle dome on the square plan was expanded.
- Most of the important buildings were huge and splendid, they wanted to show the power of the government in this way.
- Because of symmetricality of the buildings, usually there was a powerful axis.
- Most of the important buildings were created on sloped ground because of security and defensive matters.
- The most important part of the building was located in the highest point.
- Most of the times there was a lake or pool usually in a circle form in the lowest point of the building.
- Most of the Sassanid buildings were created on a platform.

- Most of the buildings were introvert and a central rectangular court was the communicator of different spaces.
- Water is represented in most places of the buildings because of its holiness.
- There was a garden around most of the Sassanid buildings with the primary specialties of Iranian garden.
- The connection of the spaces in Sassanid architecture was simple and clear

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## **Sustainability in Iranian Traditional architecture In the case of Isfahan-central Iran**

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### ***Abstract:***

Iranian architecture like the architecture of almost all other developing countries is in the middle of big transformation and change. Through last centuries, Iranian traditional and vernacular architecture demonstrated distinctive characteristics of sustainability. Today in Iranian contemporary architecture, however, such characteristics either completely demolished and forgot or misused frequently. During the recent years, Iran also has faced energy crisis. Then, sustainable buildings are demanded more than ever specially in Iranian large cities. Related statistics show most of spent energy is using by urbanized areas and residential buildings. Consequently, in order to find the proper way of adaptation with immediate environment, investigating traditional architecture and it's harmonize relationship with nature appear to be a useful way. On the other hand, Iran is a large country with diverse climatically conditions and as a result different vernacular and traditional architectures. In this variety, central part of Iran and its old capital city: *Isfahan* has had an essential role in Iranian culture and architecture. This city locates in the arid and semi arid part of Iran, however, the most important river of central Iran is divided the city in two parts. Therefore, the traditional architecture of this city contained the characteristics of both arid regions and riverside cities. The aim of present paper is to give an overview of vernacular/ traditional architecture in central part of Iran in the perspective of sustainability. Also investigating the unique architectural characteristics of *Isfahan* city is the other focus of study. In this inquiry, revision of this traditional architecture has been divided in two categories: urban layout in general and traditional housing in specific focus.

***Keywords:*** *sustainability, traditional architecture, central Iran, Isfahan,*

### **Introduction:**

The architecture style and building types at least in historical periods somewhat was depending on environment and climate condition. According to Reza Shabani <sup>5</sup>there is a relatively famous theory of Climate, which discuss about relationship between identity and natural environment. Based on this theory, some natural environmental elements like climate, geography, and geology are the main reasons for creating various identities of different nations and ethnics.

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<sup>5</sup> translation of : Shabani, Reza, *Iranians and national identity*, SAZEMANE ENTESHARAT, Tehran, 2006, P150

This matter at least about Iranian culture and architecture is more highlighted due to the historical respect for natural environment in this culture. For instance, Iranian New Year is in the first day of spring. Also, festival of fire at the last Wednesday before New Year, festival of Yalda at the first night of winter, or spending the 13<sup>th</sup> day of spring in the nature and many other examples are popular national celebrations, which are directly related to the nature.

Perhaps the first image of environmental character of Iran will remind everybody, hot and arid zone with architectural characteristics of such environments. However, Iran is a vast country with various climatic situations, different topography, and as a result diverse solutions in terms of environmental architecture. West and North West of Iran with long, very cold winters, north and south with very high humidity, center, and east of Iran with hot, arid and semi arid weather, through history forced the traditional architects to find a way for adaptation with such unfriendly conditions.

In contrary, in Iranian modern architecture seems such necessary combination of built and natural environment has been neglected. This ignorance has had various reasons which lack of enough information about traditional environmental architecture is one of them. It seems traditional architecture and its sustainable solutions to some degree, is unknown for even local architects. Then reviewing main environmental architectural characteristics might be useful for contemporary architecture too.

Among Iranian historical cities, Isfahan is one of the most important cities in terms of keeping main characteristics of its traditional environment. This city, which was the popular capital of Safavid rulers in the 17th and 18th centuries, lies in central Iran, with arid and semi-arid weather. Such environments generally do not have enough water. This city, however, is an exceptional case. A big river divides this city in two parts, which provide enough water not only for this city but also for the other peripheral regions.

Accordingly, environmental architecture characteristics of this city appear to be interesting due to such combination.

### **The local climate:**

Covering an area of 105,937 square kilometers, Isfahan province is located in the central part of Iran. According to the latest divisions of the country, Isfahan province includes 17 townships which Isfahan town is the capital of the province and the most populated city in the province. Due to its vastness, Isfahan province consists of several mountainous and plain areas. Regarding this natural and topographical situation, the climate of the province is changeable as well. Although the province usually enjoys a dry and temperate climate, but it can be classified as three climatic regions depending on the distance with western mountainous area and desert (Kavir) plain in the east and south-east. These climatic regions are<sup>6</sup>:

1. Arid weather: which is located in eastern part, near to central desert. The average annual rainfall stands at 70 millimeters.
2. Semi-arid weather: It covers the town of Isfahan.
3. Cold semi-humid weather: As we move on to the west and south-west, the height reduces, the rainfall rises and the temperature drops. Average annual rainfall of the region is 329 millimeters.

According to the reports of Meteorological Organization<sup>7</sup>, maximum temperature of Isfahan province is 40.6 centigrade, minimum temperature is 10.6 centigrade, and average annual temperature is 16.7 centigrade. The annual freezing days of thã province are 76 days ad average annual precipitation is 116.9mm. Isfahan is situated between two mountain ranges and has relatively regular seasons. Flowing through Isfahan city,

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<sup>6</sup> Zendehtdel, Hasan ,Persia other than history, IranGarden Publication, 2006

<sup>7</sup> Iran chamber of commerce, industrial& mines website, <http://www.iccim.org>



Zayandeh Rood River is the most important river of the province and one of important rivers in Iran.

### **Traditional architecture and environmental factors:**

The environmental architecture of this city can be studied in two category: urban layout and traditional houses:

- **Urban layout:**
  - Organic street's pattern
  - Bazaar
  - *Sabat*
  - *Chahar bagh*
  - open public spaces
  - *Madi*
  - Bridges
- **Traditional houses**
  - Compact buildings
  - Building materials
  - Winter-summer rooms
  - Openings
  - Courtyard

## Urban layout

### Organic streets' pattern:

Most of traditional streets in Isfahan had an organic organization. These narrow twisting streets, which were surrounded by high walls, could provide enough shadow. In fact, for arid and semi-arid weather, there is high temperature's difference between shade and sunny areas. Generally, shading area is cool enough during the hot seasons.

Such organic layout, which was supported by surrounding compact buildings, could protect buildings from occasionally summers' sand storms. Winters' cold dry winds also could not break in the buildings through such design. These narrow streets were also the best place for people, specially women and children to socialize. The width of streets was only allowed pedestrians and small load-carrying animals to pass. All these considerations could provide a sense of belonging in addition to enough safety feeling.

(The general view of streets in the old part of  
Isfahan, Photo: Mohammad Gharipor,  
<http://www.iranchamber.com>)



Bazaar:

Bazaar was the heart of such organic network. Bazaar was connected two main focal points: old Friday mosque and Naghshe-Jahan square with its new Friday mosque and palaces. Most of the Bazaar's passage had covered by vaulted brick roofs. In fact, the Bazaar of Isfahan is the longest roofed market in the world.<sup>8</sup> This long covered Bazaar not only acted as main movement network within the city, but also it was the heart of all social and business activities. There were many *madrasa*, mosques, *hammams*, water stores, warehouses, and stables in the Bazaar. Even nowadays, still bazaar has kept its central role in this city people's life. Bazaar because of its structure as covered passage usually was cool enough in summers and warm in winters. It had natural light and good ventilation through some small openings in the roof. All these factors were helped Bazaar to be the primary place for social interaction.



(Part of Isfahan bazaar, Photo: Mohammad Gharipour, <http://www.iranchamber.com>)

<sup>8</sup> Mohammad Gharipour, [http://www.iranchamber.com/architecture/bazaar\\_of\\_isfahan1.php](http://www.iranchamber.com/architecture/bazaar_of_isfahan1.php)

Sabat:

Traditional streets generally were covered in some parts to increase the shading zone of streets. This covered part, sometimes was a single arch and the other time it could be a room belonged to one of nearby houses. In addition to extra shading, which was provided by sabat the other advantage was better wind circulation. In arid and semi-arid weather, the temperature difference between shade and sunny area is high then this difference could provide a little breeze in the passage. The combination of this added shade area and breeze could provide relatively more comfortable environment.

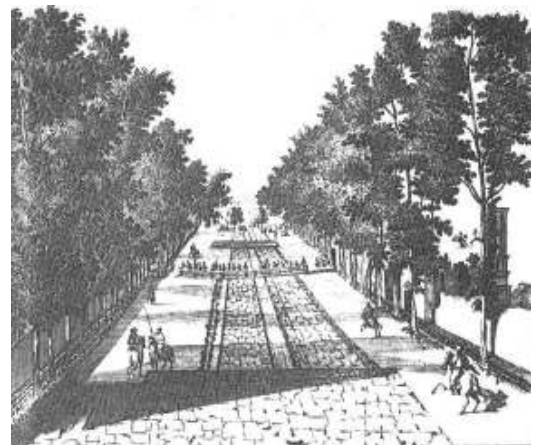
Sometimes, under this covered area (sabat), there were some small sitting places on two sides of the passage. Thus, people could stay for having chat and socialize in these more comfortable urban places. Sometimes the entrances of several houses were opened to this area. It was also another chance for socializing in a neighborhood.

(Sabat, Photo: <http://farm2.static.flickr.com>)



Chahar bagh:

Chahar bagh is the name of famous historical street of Isfahan. It is a long, straight street, which is in contrary with common organic layout of traditional streets in this city. In historical period this street connected Si-o-se Pol Bridge to the royal palaces. Here it seems traditional architects were giving another solution for environmental architecture of this city. For reducing the heat in such wide street, they divided this street in four parallel sections. Then by planting lush tall trees on two sides and putting a stream in the middle of street, enough shadow had been provided. Today, that tall tree has been replaced to the short ones, but still this street is cool in summer time. Subsequently, it shows traditional architects could find a solution for straight wide street which has many similarities with modern ones.



New and old view of Chahar bagh street in Isfahan (photo: [www.dejcam.com](http://www.dejcam.com))

### **Open public spaces:**

One of the most impressive environmental architecture factors of this city is its famous open public place: Naghsh-e-Jahan square. Designing such huge public open areas is somewhat rare in Islamic traditional cities. During Safavid period, however, king Abass the magnificent gave a new shape to the urban structure of Isfahan by making this rectangular square. Its length is 500m from North to South and has a width of approximately 165m. The square has been surrounded by two story arcades and historical buildings. This square had been used as a playground for polo games and horseracing, festivities, military parades and so on.

In arid and semi-arid weather, designing such enclosure is one of the best solutions for protecting the open area from hot dry winds during summer time and cold dry winds of winter. Later by adding a vast pool and planting trees all over the periphery of square, the comfort area of this place has been increased.

This new square through main Bazaar was connected to the old Friday mosque. In fact, during Safavid period, the old Friday mosque and its square were used mostly for religious purposes. However, this new square, and its mosque, were used more for official ceremony or playing and entertainment. These two important open public places were linked to each other through another public space: Bazaar. Therefore, possibly one can say that open public spaces were shaped the skeleton of this city.

(Nghshe-Jahan square,

Photo: Erich F.Schmidt,

FLIGHTS OVER ANCIENT  
CITIES OF IRAN)

**Madi:**



One of the especial characteristics of this city is some narrow streams that are called Madi. These streams are divided from the main river (Zayande-rood) and continue their way towards outside of the city, by running between some residential areas. Generally, streets were made on two sides of these streams, which with numerous trees and organic shape of passages, could provide cool, shadowy area, and increased the humidity of semi-arid weather.

### **Bridges:**

Isfahan is one of the rare cities, which in spite of its semi-arid weather, has many historical bridges over Zayandeh-rood River. Although these bridges were important parts of city movement network, they could provide livable open public spaces too. These bridges had (and still have) an essential role in people's social life. Most of these bridges have arched supporting walls, which can give enough shade area in daytime. Generally, in the afternoons, people are coming to spend time with their families or meet their friends around these bridges.

Khajo bridge, (Photo: Persia other than history)





## **Traditional houses**

### **Compact buildings:**

One of the major challenges for architects in hot regions is finding proper solution for decreasing the heat. One way of decreasing heat is protecting buildings from direct sun light effect by making them as compact complexes. In this approach, not only buildings but also the entire city had been made as a full mass. The only openings of such mass, was the courtyards and narrow twisting streets. Even these narrow streets from time to time were covered by “Sabat” or dome roofs. The common construction material of this region was brick and mud brick. That is why such compact layout in addition to using of a single material, has been given a unify image to the traditional part of this city.



General view from old  
Friday mosque and the surrounding  
houses

### **Building material:**

Finding construction materials is the other problem in the central part of Iran. In this broad region, which is surrounded by deserts, finding building material except soil is too difficult. Moreover, if even the few existing wood were applied in structure, termites after a while would have demolished it. Therefore, the common usable material was brick, mud, and mud-brick. These structures after the useful period age of building could



come back to their environment without any harm to it and they could be used repeatedly as construction material too.

The other advantage of using such building material, is laid in its' high potential for saving energy. Brick and mud can keep energy for a long time. In hot seasons, during the daytime, brick absorbs most of the sun heat without letting it to enter indoor spaces. While these gained heat exudes gradually during night time. In wintertime, the same procedure happens. The outside coldness absorbs by brick while the inside warmth would not waste too. This quality of brick is getting more effective by adding to the thickness of walls. Openings' frames had been made from wood. This natural material can keep energy in itself too. Usually thick canvas curtains were shaded windows. By this way, wooden windows were supported from direct sunlight, which could ruin them gradually. In addition, more shade was providing for indoor spaces.

A traditional house in Isfahan  
(photo: [www.Iranmiras.org](http://www.Iranmiras.org))



#### **Winter and summer rooms:**

Typically, traditional Iranian houses had two different sections for summer and winter. The northern face of houses, which had minimum sun light, was used in summers and southern face with maximum sun light was used in winters. Kitchen and service rooms were located in eastern or western faces, therefore in both season they were used

by reasonable distance of main spaces. Therefore, by dividing indoor spaces to winter and summer rooms, the need for heat and cold was being minimized.

### **Openings:**

Typical traditional Iranian house in central regions did not have any opening toward outside of house. All openings were just looking through inner courtyard. The high walls of courtyard, except mid-day which sun is raising perpendicular, could provide plenty amount of shade. Therefore, most of times there were not any direct sun light toward windows. In spite of this, the windows surfaces were divided in many small colorful pieces. That means, even if sunlight could enter inner spaces, these small colorful glasses would filtered the sun light to provide coolness and beauty in rooms.

A traditional window (Photo: Persia other than history)



### **Court yard:**

If we could look at the Isfahan from the top, the general view of old part of city is like a huge massive form with numerous holes. These holes, which are making the courtyards, are the only open areas in the most parts of city. In other words, most of times, courtyards were the only breeze points. These deep courtyards had an essential role in energy efficiency of buildings. All indoor spaces were opened to the courtyard. Because of surrounding tall walls of courtyard, most of times there was enough shadow in

it. This shade in combination to greenery and pool, which typically were existed in courtyards, could provide a pleasant cool weather in hot seasons.

Generally, the roof of basement was made upper than ground floor. Basement was colder and had more humid than other spaces. Therefore, by putting some openings for the basement, such cool weather could come to the courtyard. Then, this more or less pleasant breeze was accompanying by humid of pool and coolness of greenery. Finally, this weather conditions would transfer to the indoor spaces.

Although Isfahan has semi-arid weather and keeping buildings cool is the main problem, it is getting too cold, in winters as well. Therefore, as much as sun light is unpleasant in summers, in winters it is demanded. For this reason, trees, which were planting in the courtyard, were chosen from the types that were losing their leaves in winter. Therefore, sunlight could enter courtyard and bring heat to the indoor spaces.



## **Conclusion:**

To design buildings in harmony with the environment, it is better to have a look to the traditional architecture as a valuable source of learning and at the same time have another look toward the future. Investigating in traditional architecture of different

regions will be useful to find such proper considerations and perhaps re-apply them in the contemporary designs.

In this case study three types of solutions might be offered: In the first group, there are some qualities, which still can be efficient in terms of sustainability in the contemporary buildings even with the same format as traditional architecture, such as designing livable *open public spaces*, and designing *compact buildings*.

In second group, there are other characteristics, which by some changes and adaptation can be used again. For instance, use of *local building material* still can be a good solution for resource and energy efficiency. Especially in some regions, use of these local materials is easier and cheaper than concrete or other new materials. Or for instance although we cannot make courtyard houses with the same arrangement, the idea of *courtyard* can transform to the other related energy efficient ideas. Dividing a window surface to smaller pieces and use of *colorful glasses* is also can be used again easily in modern buildings.

In the last group, there are some traditional architectural characteristics, which are not applicable in modern architecture and societies anymore, like separating houses to *winter and summer rooms*.

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## ***Armenian Residents in the Heart of Isfahan***

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### **Abstract:**

Isfahan is one of the richest and most historical cities of Iran, and Jolfa is located in its southern part which is separated from other parts by the Zayandeh –Roud. Since Jolfa is home for Armenian residents in this region, therefore, it is different from cultural, social and economic viewpoint. Texture By taking into consideration its four-hundred years antiquity, it possesses a series of valuable historical buildings, which has locational – atmospherical-social and cultural advantages. But severity of packed damages on the shell of Jolfa region in recent decade has been so much because of dispersion of single remained buildings that has resulted in defacement of the concept “historical texture” and facing Jolfa region to “form and environmental identification crisis”, but inner values of Jolfa are still so impressive. In recent years different plans in order to renovate and rehabilitate this historical texture have been performed. This article concerns with introduction of Jolfa quarter and plans performed in order to rehabilitate and protect Jolfa region.

**Keywords:** Jolfa, Iran, rehabilitation, Isfahan, Armenian and Culture

### **Introduction**

Zayandeh –Roud River separates the northern Isfahan from its Southern part. The historical setting of Jolfa is an exclusive context which includes a valuable complex of historical structures that are granted with a variety of situational, spatial, social, and cultural merits especially from a touristic point of view. However, due to the dispersion of the remained historical single structures throughout this exotic area, doubt has been cast on the validity of its picture as a “historical setting”; and the area, accordingly, has been undergoing structural-spatial, social, and cultural identity crisis. However, notwithstanding this problematic situation, Jolfa is still an adequate context for the development of tourism industry in Isfahan and by implementing some modifications a balance can be reached between the historical structures on one hand and the modern urban structures on the other. The urban structure of Jolfa created based on the aesthetic standards of space and benefits from the employment of a variety of arts including architecture, tiling, plastering, and drawing, which are exhibited to the addressee. Standards like mixture, balance, conformity, symmetry, scale, polarity, opposition, priority, rhythm, variety, homogeneity, contrast, recurrence, and emphasis, have been employed in each and every one of the urban structures as well as the whole space of the town.

The new urban district of Jolfa alongside its old urban structure suggests, to a great extent, the feeling of spatial-unity. The major factor contributing to the pleasantness of Jolfa urban structure is its identity. The high velocity of changes in the city of Isfahan not only has not debilitated its identity, but also has added to it. This situation has also raised the area's status and has doubled the feeling of belonging to the space and place through creating symbolic and meaningful spaces. The existence of the well-structured streets, buildings, and squares that have been constructed based on the social and cultural beliefs and attitudes of the people is joyful and glorious to them and encourages the strength of identity.

Under what influences the spatial-physical structure of Jolfa has been constructed? Is the environmental quality and visual outlook of Jolfa open to investigation?



*Figure 1: view of isfahan*

### ***The Historical Development of Jolfa***

The early development of Jolfa dates back to 400 years ago during the reign of Shah Abbas I, when Shah Abbas Safavi transplanted the Armenian people to Isfahan in order to protect them against violation and attacks on the part of the Ottoman Empire. In 1603 AD, Shah Abbas arrived in Tabriz, then proceeded to Nakhjivan and conquered Jolfa and then Irvan; and passed all the Armenian across the Aras River into Iran where he settled them then. The Great Shah Abbas' period especially during Shah Abbas II's reign was the heyday of this territory, and this situation sustained into some periods afterward.



Figure2: map s of Jolfa

### ***Jolfa in the Modern Age***

At the beginning of the current century or generally at the contemporary age, the Zayandeh – Roud river territory was considered a suburban area of Isfahan, the only residential region of which was just Jolfa as well as a few dispersed villages located at the western part of the realm. Due to the decline of pressure on the Armenian during the Pahlavi age, its population strictly increased (e.g., to 6161 at 1345) and gradually came to be known as one of the most prestigious neighborhoods in Isfahan; with the increase in the urban public traffic (movement) space during the recent decades, the south sphere turned to be the main arena for the enhancement of building density, building height, and land and house price; faceless buildings began to pop up and a great majority of the invaluable gardens and buildings, which had survived up to that particular time, were destroyed. In fact, from the 70s onward is considered to be the second stage of wide-ranging destruction at the historical context of Jolfa, when the inattention and negligence of executive organizations as well as some internal factors resulted in this mishap.



from part of Isfahan



Figure5: maps of new urban district of Jolfa

maps



### ***The Structural Design of Jolfa***

Jolfa neighborhood is subdivided into New Jolfa and Old Jolfa. New Jolfa is widened along the Noabad town from Zayandehrood River to Chaharsoo (Sangtarashha); is running the length of Nazar street; and includes these sub-neighborhoods: The Big Square, The Small Square, Shirak-Khaneh alley, Chahar-Soogh-e Hakoopchan (Hasirbafab neighborhood), and Gharakel (Ghinan) which is placed at the center of the small square of St. George Church and wherein Vank Cathedral, and, Maryam, and Bethlehem churches are located. Chaharsoo is another neighborhood which is located among the other Armenian-inhabited neighborhoods, where Yoohana, Hwans, and Magrpich churches and Nuns convent are situated.

The historical Jolfa at the Safavis era had been located on the barren lands, fertile plains, and gardens in the south of Zayandehrood and its design had been based on that of Bagh-Shahr and Bagh-Rah. Nazar Street was the backbone of Jolfa; Shahmarimanian and Sarfarazian gates were surrounding the Big Square and the Small Square and up to Ghajars' reign over Jolfa were devoid of any rampart or wall. On two side of Nazar Street were the Big and the Small squares, the construction history of which with regard to the strength of the buildings around it dates back to the beginning of Pahlavi era. However, there is no doubt that the place had earlier been used as an open space or a meeting house with social functions at the seasonal square of Jolfa, and because of the connection between the neighborhoods at the river banks and Nazar Street, the north-south crossing known as Dahgane had been extended from the river side to this street.



*Figure 6: view of Vank Cathedral*



*Figure 7: Sangtarashha neighborhood square*

### ***The Current Plan of Jolfa after 1920m***

Jolfa district includes historical neighborhoods, has an area of 214 hectares and a population of 19000 including 6000 Armenians in the 70s. In the present situation, Jolfa is considered a residential setting almost without most tourist facilities. The major public service land-uses in this area include 16 historical churches, Armen kindergarten, coeducational junior high school and high schools, Jolfa historical bathhouse, a part of Tabriziha historical bathhouse, and some cultural-academic land-uses sited in the historical houses in Sangtarashha and Tabriziha neighbourhoods. On the other hand, the social functions of Jolfa square have strictly declined and there are just some traces left of Nayj and Shayj madi strips. The historical bathhouse of



Chaharsoo and all the neighborhoods gates and walls, several historical churches and most of the historical houses of Jolfa have been ruined. At the present time, the remaining historical buildings in Jolfa are most churches.

With the exception of some major cases, all the other passageways are either by definitions without commercial land-uses, or just have small shops found all along the western and eastern Nazar, Khaghani, Tohid, Hakim Nezami streets, and main passageways of the town. A series of minor passageways provide the internal connections of Jolfa anyway. However, the provision of internal connections, while some of the minor passageways are considered the main traffic axes of the town, is in many ways thorny.



*Figure 8: one of the historical house remaining*



*Figure 9: part of Shayj madi strip*



*Figure 10: interior court view of St. George Church*



*Figure 11: Chaharsoo square*

### ***The Environmental Quality and Visual Scenery of Jolfa***

The urban spaces of Jolfa do not correspond to the characteristics of urban architecture. Given the function of Hakim Nezami Street, for instance, as an interurban link of Isfahan, the establishment of a collection of automobile garages and service workstations is not congruent with this context. But, Jolfa is devoid of distinctive entries corresponding with its broad domain of functions. In addition, the destruction of the valuable historical houses has led to the decline of environmental quality and visual scenery of the district. At present, the historical passageways of Jolfa have developed into parking lots and car nests and are about to wreck. However, Jolfa squares and alleys have been constructed in a series of contrastive spaces which are enclosed by the body of residential units that jointly make a simple and consistent collection; a characteristic that suggests a sense of movement and dynamicity. The twisting nature of the alleys and their being roofless and roof-covered with their coherent inflowing into the big and small squares creates a sense of variety. The beautiful brooks along with rows of spruce and sycamore, especially those which flow through the gardens and flower beds among the residential buildings and are rarely found at the modern age are eye-catching.

Some of the alleys are covered by overarches the dark and light play of which both adds to the

taste of variety in the space and increases the enclosure sense of the environment. The entrance of each house slightly pulls back, and a bench-like resting space has been contrived beside it to provide the pre-space required for entering the house.



Figure 13: view of The Big Square



Figure 12: Sangtarashha historical passageway

### ***The Factors Influencing the Spatial Quality of Jolfa***

In this section, four factors influencing the spatial quality of Jolfa, i.e., tranquility, the sense of belonging, enclosure, and public sidewalks, are investigated. Tranquillity: Natural elements abound in all the alleys and impasses and due to the hierarchy of supervision provided by citizens, these set the ground for mental tranquility. Balance in bodies and avoiding the employment of a variety that attracts attention controls emotions in the structural space and while keeps you away from monotony, does not disturb your peace. At the same time, the exposure of the alleys to more public space is inhibited through forming windings.



Figure 14: Natural elements abound in alley

Another characteristic of these alleys is the use of natural elements in creating the feeling of tranquility and quietness in the passages. In the alleys, brooks flow and the presence of trees and greenbelts is noticeable.

***The sense of belonging:*** The alleys and impasses of the Iranians are the extension of their private life and the individual has a sense of belonging to it. The presence of a stage for sitting beside the house entrance is a joint space between some neighboring houses that makes the residents of the neighborhood socially closer. The existence of an open playground for kids between a few of houses is a good enough excuse for their mothers to crowd together.



*Figure15: The presence of stages for sitting beside the houses entrance*

**Enclosure:** In the alleys and impasses, the strangers are not well accepted since their entrances are built in a way that defines their own territory and reminds the passersby of more public passageways that they are encountering a more private space wherein they can not freely move about or have recreation. This characteristic is usually implied through narrowness, the lack of direct view to the alleys and/or the presence of ceiling or awning.



*Figure16: sabat the alley*



*Figure17: the lack of direct view to*

**Sidewalks:** Sidewalks are the location for the presence of all the citizens and their cooperation in their public life. Although flexibility is one of the important features of sidewalks, but what guarantees the presence of citizens therein is the security of such spaces.





*Figure 18: one of the Sidewalks in the jolfa district*

### ***The Comprehensive Plans Conducted***

In the first comprehensive program named Cox which was conducted in the historical area of Jolfa, the construction of these streets despite their impact in facilitating regional communications resulted in a rupture in the consistency of urban and historical development of the area. The revision program of cultural-historical axis of Isfahan in 1368 from the old square was initiated but the historical context of Jolfa was not accounted for as a part of this axis.

### ***The Programs Conducted by Isfahan City Reconstruction and Renovation Organization***

Isfahan City Reconstruction and Renovation Organization with the aim of restoring the historical context of Jolfa, the cultural-historical and touristic axis of Khaghani Street, the Vank Cathedral, Maryam church, Chahar Soogh, Jolfa, Sangtarashha, and Tabriziha alleys; regularization of Nayj and Shayj madis; regularization and restoration of Jolfa Square; and body construction and restoration of Sangtarashha-Tabriziha passageway which is currently in progress. Hitherto, intervention into the historical context of Jolfa has been sporadic and intermittent. It seems urgent that the related municipality as a first priority lay down the strategic plan of Jolfa as immediately as possible. The strategic plan of Jolfa studies the historical context of the area with reference to its current role and status in relation to the whole city. Investigating the capacities, potentials, limitations, problems, and the needs of the historical area, the structural strategic plan introduces a number of policies and strategies to be used for development in large scales, followed by a general pattern for the development and restoration of this historical context. This plan does not deal with the details and can be considered a basis for future plans.

***A proposed place-check of Jolfa using SWOT method***

<b><i>Opportunities, Facilities &amp; Vision</i></b>	<b><i>Threats, Limitations &amp; Difficulties</i></b>	<b><i>Principles &amp; Standards</i></b>
<ul style="list-style-type: none"> <li>-Presence of active local social centers with the potential to develop into dynamic regional centers.</li> <li>-The cultural variety widespread throughout the area.</li> <li>-High rate of literacy.</li> <li>-Adequate financial capabilities of the new residents of the context.</li> <li>-Relative security of Jolfa particularly for the development of tourism industry.</li> </ul>	<ul style="list-style-type: none"> <li>-The irregular increase of population due to irregular buildings.</li> <li>-High rate of the Armenians' emigration from Jolfa.</li> </ul>	<b><i>Society &amp; Population</i></b>
<ul style="list-style-type: none"> <li>-Relative high rate of investment in Jolfa in recent years.</li> <li>- The limited formation of the cultural and academic line along the Sangtarashha-Tabriziha passageway and the high capacity of the axis in increasing their acceptability of such land-uses and developing Jolfa into the cultural cannon of the south district.</li> <li>- The possibility of developing the churches into multifunctional settings.</li> <li>-The existence of a number of historical houses with the necessary capacity for the establishment of public service land-uses or shopping malls.</li> </ul>	<ul style="list-style-type: none"> <li>-The imbalance between the increasing rate of population and employment centers.</li> <li>-The establishment of unsuited and inhomogeneous urban activities.</li> <li>-The unsystematic establishment urban activities.</li> <li>-The lack of formulated and scheduled programs.</li> <li>-The displacement of incompatible and mismatched urban activities</li> </ul>	<b><i>Activity &amp; Function</i></b>
<ul style="list-style-type: none"> <li>-Providing the revision plan of the Detailed plan of district five.</li> <li>-Isfahan City Reconstruction and Renovation Organization and its steps toward drawing attention towards the historical contexts.</li> <li>-Expanding the budget of Cultural Heritage and Tourism Organization in order to purchase valuable historical houses</li> </ul>	<ul style="list-style-type: none"> <li>-The lack of union between the municipality and the Cultural Heritage Organization.</li> <li>- Failing to provide the strategic plan of Jolfa.</li> <li>-Insensitivity to the passed standards especially concerning altitude.</li> <li>-The shortage of financial and legal facilities for the possession of the various land-uses especially workshops and public service centers, and the lack of union between the municipality and the Cultural Heritage Organization.</li> <li>-Failing to drawing up the development budget for the preservation and restoration of Jolfa.</li> <li>-The absence of a particular organization in custody of the preservation and restoration of the historical area of Jolfa.</li> </ul>	<b><i>Legal</i></b>
<ul style="list-style-type: none"> <li>- Various facilities for the organization of the present space.</li> <li>- The presence of historical passages with the capacity to be converted into passageways with passerby priority of use.</li> <li>- The existence of the green outlooks of Shayj and Nayj, which can be effective in promoting the environmental quality of Jolfa.</li> <li>-The fast access to the natural axis of Zayandehrood, the historical axis of Jolfa, and the scenery of Soffeh Mountain, in conjunction with the presence of the historical context and cultural and social features of Jolfa, have capacitated Jolfa as the first priority in the tourism development of Isfahan.</li> <li>-The capacity for the limited formation of the new streets in the context.</li> <li>-The existence of a collection of important historical buildings.</li> <li>- The spatial potentials of Nazar Street from Tohid to Hakim Nezami.</li> </ul>	<ul style="list-style-type: none"> <li>-The limited width of passage networks, that makes the increase of population or service centers making up the high traffic mass less likely.</li> <li>-The dispersion of historical buildings along the passageways, which leaves little space for widening it without a high extent of destruction of historical buildings.</li> <li>-The dense context of the area, which makes any change recommendation or modification in the present structure without destroying a section of the context impossible.</li> <li>- Establishing incompatible land-uses in terms of type and function scale.</li> <li>- The contradiction between the present communication axis functions and the main functions of the street.</li> <li>-Failing to realize the axes of the Comprehensive Plan.</li> <li>- The strict cutback of the historical gardens of Jolfa.</li> <li>- The strict limitation of public green beds.</li> <li>- Sever shortage of public service centers.</li> <li>- Drying of brooks and madis</li> <li>-Sever lack of public parking lots.</li> </ul>	<b><i>Structural-Spatial</i></b>

<b><i>Executive Policies</i></b>	<b><i>Strategies</i></b>	<b><i>Objectives</i></b>	<b><i>Goals</i></b>	<b><i>Principles &amp; Standards</i></b>
<ul style="list-style-type: none"> <li>-Restricting the building height domain in the historical nucleus of Jolfa to one or two floors; and determining the height domain in the secondary territory of Jolfa.</li> <li>- Allocating the historical buildings to the touristic and accommodation services with the priority of employing the Armenian in their management</li> </ul>	<ul style="list-style-type: none"> <li>-Inhibiting the increase of irregular buildings beyond the capacity of Jolfa.</li> <li>- Establishing occupation and activity centers with the priority of employing the Armenian</li> </ul>	<ul style="list-style-type: none"> <li>-Determining the growth rate of population.</li> <li>-Hindering the cumulative trend of emigration from Jolfa.</li> <li>-Increasing cooperation of the people and executive organizations in the restoration of Jolfa.</li> </ul>	<ul style="list-style-type: none"> <li>-The stabilization and control of the population.</li> <li>-The preservation of identity and noble values of Jolfa.</li> </ul>	<b><i>Society &amp; Population</i></b>
<ul style="list-style-type: none"> <li>-Reinforcing and creating commercial and public service centers in Khaghani street, Chahar-Soogh, Boo-Ali, Vank Cathedral, and Jolfa alleys.</li> <li>-Establishing cultural and educational activities along the Sangtarashha-Tabriziha passageway.</li> <li>-Relocating Refah shopping mall.</li> <li>- Transferring workshops and service stations from Hakim Nezami street</li> </ul>	<ul style="list-style-type: none"> <li>-Combining land and building laws with those of urbanization.</li> <li>-Dynamic preservation of valuable historical buildings.</li> <li>- Preparing and enacting standards and regulations on the establishment method of various urban activities in Jolfa and requiring the municipality to practice those.</li> </ul>	<ul style="list-style-type: none"> <li>-Economical exploitation of the urban lands and the existing spaces.</li> <li>-Creating functional identity in the context.</li> <li>-Establishing activity centers with a limited traffic.</li> </ul>	<ul style="list-style-type: none"> <li>-Increasing the vocation centers and promoting the role of Jolfa in the economic design of Isfahan through functional refinement and establishing a diverse system of activities, compatible with the historical identity of Jolfa.</li> </ul>	<b><i>Activity &amp; Function</i></b>

-Preparing the Strategic Plan of Jolfa. - Preparing and enacting standards and regulations for establishing and locating the facility centers with prioritizing the provision of the Comprehensive Plan of Jolfa in the revision of the Comprehensive Plan of the area five. -Establishing the Development Organization of Jolfa.	- Custodianship of developmental affairs of Jolfa specifically. - Requiring the executive organizations to follow the standards and regulations, specially the Comprehensive Plan. -Providing the required finances in the cooperation of the people, municipality, and the Cultural Heritage Organization as well as other organizations. -Revising the existing standards. - Awarding economic and tax exemptions.	-Determining the legal boundaries of Jolfa. -Employing adequate strategies for the provision of required financial sources. -Preparing and formulating a collection of executive regulations and rules for intervention into the historical context of Jolfa.	-Legislative conduction. - Structural-spatial development of Jolfa.	<i>Legal</i>
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<i><b>Executive Policies</b></i>	<i><b>Strategies</b></i>	<i><b>Objectives</b></i>	<i><b>Goals</b></i>
-Rehabilitating, restoring, and modernizing all the historical churches. - Relocating Refah shopping mall. -Converting Boo-Ali passage into a public service line with the priority of supplying cultural products. - Establishing tourism and service complexes in the French school, Baghuskhanian hospital, and the neighboring historical buildings. -Converting Sangtarashha passage to a cultural-academic line with an urban-regional function. -Converting the passages leading to Khaghani, the end of eastern Nazar, and the likely passages of Sangtarashha-Tabriziha into impasses. - Stopping the traffic from	-Transferring the land-uses which are inhomogeneous in terms of type and function. -Establishing cultural, recreational, touristic land-uses. -Creating the internal connection among the historical structures aiming to making up multifunctional public service complexes. - Restoring the historical passages and lines. - Inhibiting or limiting the exploitation of passage network of Jolfa as a public passage network. - Constructing cycling and walking networks. - Constructing numerous small parking lots in areas	-Converting Jolfa into the historical-cultural-touristic axis of Isfahan. - Establishing adequate urban land-uses compatible with historical structure of Jolfa. -Developing mixed land-use pattern. - Reinforcing passerby axes and reducing the traffic mass. - Enhancing pedestrian security. - Creating visual legibility and clarity in the historical settings. - Improving visual features and urban scenery of Jolfa. - Increasing green beds and grounds. - Increasing public service centers and their per capita. -Reassessing and giving identity to the hierarchical	-Restoring the historical framework of Jolfa as the historical-cultural-touristic axis of Isfahan. - Modifying the existing structural-spatial space as a dynamic and lively context in satisfying the current needs in order for founding a favorable relationship between community and the environment.

<p>the end of eastern Nazar and Khaghani.</p> <ul style="list-style-type: none"> <li>- Changing Khaghani into a one-way street streaming from east to west.</li> <li>-Converting Tabriziha alley, Boo-Ali passageway and a section of Jolfa-Madi into impasses.</li> <li>- Building Safavi Street.</li> <li>- Situating parking lots at appropriate places at the entries of Khaghani, Nazar, Sangtarashha, and Jolfa -Madi streets.</li> <li>- Designing the centers of Shekarchian, Sangtarashha, Tabriziha and Khaghani neighborhoods.</li> <li>-Reconstructing the historical gates of Shahrmanian, Sarafrazian, and Jolfa Square gate.</li> <li>-Preparing a plan for landscaping of the major passageways, and paving of the minor passageways.</li> </ul>	<p>outside the common sight and away from the main streets.</p> <ul style="list-style-type: none"> <li>-Improving the formal and functional features of the historical neighborhoods of Jolfa.</li> <li>- Creating new urban spaces and improving the current ones.</li> <li>- -Improving the formal and functional features of the historical madis.</li> <li>- Reinforcing and emphasizing the symbolic elements and signs.</li> <li>- Making urban image plans, landscaping, designing sceneries, and paving in specific axes.</li> <li>-Formulating height standards and regulations.</li> </ul>	<p>subdivisions of Jolfa.</p> <ul style="list-style-type: none"> <li>-Reducing the spatial isolation of Jolfa.</li> <li>-Increasing the land-uses of public stations and parking lots.</li> </ul>	
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### **Conclusion**

On the whole, the historical area of Jolfa as a minority-inhabited sphere inherits a unique historical context the preservation and protection of which has its own particular subtleties. Jolfa area has two historical nucleuses, one with a primary and the other with a secondary boundary. These boundaries have not so far been recognized in the Cultural Heritage Organization plans and the height and building standards can not be considered identical in both the boundaries. If the irregular buildings keep progressing in this fashion, Jolfa will explode from the inside and will be left with spaces replete with a crowd of large buildings and passages the bottom of which due to the cumulative mass of automobiles may not be visible. At that point in time, we will not have anything remained of Jolfa but a few churches as symbols of the historical enclosed Jolfa. In order to take steps towards the preservation of Jolfa, following recommendations are proposed:

Introducing Jolfa via the public mass media and gaining the cooperation of the people, especially those who possess old houses, in order to preserve this historical context.

Determining the domain and boundaries of municipality's intervention right in the region.

Preparing the Strategic Plan of Jolfa.

Specifying the particular organizations and headquarters in custody of the developmental affairs of Jolfa.

Avoiding the irregular download of population and urban services.

Awarding tax-exemption and encouraging policies.

Preparing and conducting city image plans within the area borders as well as landscaping plans and scenery designs at the main passageways.



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## **STUDY ON THE VISUAL ASPECTS OF URBAN DESIGN IN THE VICINITY OF THE SHWEDAGON PAGODA**

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**ABSTRACT:** Yangon, the capital of Myanmar, is developing along with the changing aspects of socio-economic developments. The earliest accounts of Yangon are always associated with the Shwedagon Pagoda. The Shwedagon is the cultural lighthouse as well as a landmark of Myanmar. The ancient Myanmar planned this pagoda to attain visual supremacy and dominance over its environs. Conservation of such a historical heritage is to be regarded as our national concern. Some newly built buildings have become visual obstructions to the Shwedagon in the recent years. This situation calls for a scientific study and decisive actions in urban planning of Yangon. It is in need of strict regulations to preserve and protect visual axes of the Shwedagon. There has been a restriction for over six-storeyed buildings in the preservation area of the Shwedagon according to the 1996 Yangon municipal bylaw. However, these are not supposed to meet the actual requirements of present situation. Proper recommendations for newly built buildings in the environs of the Shwedagon need to be considered from visual aspects of urban design. The first portion of this paper is to review and study the traditional practices of urban planning in comparison with present conditions in the immediate vicinity of the Shwedagon. The critical analysis is made from visual aspects of urban design. Secondly, individual axes of the Shwedagon are found out and identified based on the present and past conditions. The last portion of this paper is providing specific guidelines to protect these visual axes of the Shwedagon with its setting. This may be a contribution to current and future efforts to conserve a landmark in the planning and development of a modern city.

**Keywords:** Visual axes, Conservation, Urban planning.

### **1. INTRODUCTION**

In the field of urban design, every built form, old or new, visually manifests the beauty of the whole city. The appearance of each new building should be considered from the actual vantage points from which they will be seen. Special care must be taken into account when a new building is to be built in the immediate vicinity of a historic heritage site. In the urban design history of Myanmar, such a heritage always got supremacy of site and structure over its environs. The ancient Myanmar knew well how to dominate an important structure in its whole urban scene and where the accessible axes should be placed. The main structures had these concepts of urban design and they perfected the utility of these concepts to suit the nature and cultural traditions of Myanmar. Throughout the history, Myanmar stands out proudly for her own culture from old days. Yangon, the capital of Myanmar, is famous for its cultural heritage, the Shwedagon Pagoda. During the 2500 years of its existence, the Shwedagon was endowed with her relics from the ancient history. The Shwedagon is also attractive for its architecture. Many visitors from various countries come to see the Shwedagon. Conservation of such a

heritage is a matter of great importance. In this case, the visual approaches to the Pagoda are to be studied and properly maintained. Because the first sight of a landmark leaves a lasting impression. As the city grows, many buildings are built along and near these visual axes of the Shwedagon Pagoda. Some of them cause obstruction to the Pagoda in the foreground. It is necessary to provide specific guidelines to protect the existing views towards the Pagoda.



*Figure 1. The greater Yangon, the capital of Myanmar*



*Figure 2. Shwedagon Pagoda, the unique landmark of Myanmar.*

## 2. METHODOLOGY

Eye-level studies were first made. All possible visitor's views towards the Shwedagon Pagoda were studied from literature, old photographs, records and then practically. The existing law of the Shwedagon Pagoda restriction zone was studied from the aspect of visual axes. This study was made from other architecture points of view such as visual supremacy, harmony, emphasis of nature, skyline and visual proportion. Topographical studies, analysis of approximate heights of standpoint an

each axis above sea level are made according to the satellite images. From all these attempts, each visual axis to the Pagoda is identified and method of conservation of these axes is to be found out.

### 3. URBAN DESIGN IN THE IMMEDIATE ENVIRONS OF THE SHWEDAGON PAGODA

#### 3.1 Review of the Urban Design History of Yangon

Yangon was founded by King Alaungphaya on the site of a small village called Dagon when he conquered lower Myanmar in 1755. In Alaungphaya's Yangon, as a religious heritage, the Sule Pagoda got the supremacy of site and structure. Before the colonial period, the Shwedagon Pagoda became the most dominant structure over the environs. After the time of Myanmar-English Second War (1852), a new settlement plan for Yangon was made. Yangon became the capital of Myanmar in 1885. It is obvious that the Shwedagon Pagoda Road was primarily planned as a visual axis to the Pagoda. Other roads were planned making reference to this road later. The urban design of Yangon at present needs to be studied compared with the past ideas and situation.



*Figure 3. Sule Pagoda and the old city of Yangon, after 1755.*

In visual proportion, the Shwedagon loses its supremacy which it got in the past. There has been a restriction for over six-storeyed buildings in the preservation area of the Shwedagon Pagoda according to the 1996 bylaw of Yangon City

Development Committee. It is the region within the radius about 0.7 mile from the pagoda, taking the main roads as boundary. Exactly, it covers 3367' (0.64 mile) to the north, 6227' (1.18 miles) to the south, 3812' (0.72 mile) to the west and 3321' (0.63 mile) to the east of the pagoda. However, these can partly meet the requirements of present situation. Some newly built building within this restricted area becomes visual obstruction to the pagoda while the others outside this area spoil the special vistas to the pagoda. It is essential to make an analysis and needed a careful zoning plan to protect and conserve this landmark visually.



Figure 4. Shwedagon Pagoda in the map of Yangon after the second Myanmar-English War, 1855.



Figure 5. Shwedagon Pagoda restricted zone by Yangon City Development Committee (Y.C.D.C), 1996.

### 3.2 Study from the Visual Points of View

#### a. Harmony between the Structures

On Singuttra Hill, all the structures are being in harmonious relationship with the main structure, the Shwedagon Pagoda. The Naungdawgyi Pagoda and the Mahavijaya pagoda have same function, form and colour with the Shwedagon Pagoda. Considering architecture in relation to its environment can create unity. The whole composition of the hill and the pagodas keeps unity.



*Figure 6. Shwedagon and its harmonious structure, Naundawgyi.*

**b. Deference between the Structures**

The Shwedagon Pagoda and its smaller harmonious structure, Naungdawgyi Pagoda, can be seen in above figure. Naungdawgyi Pagoda is respectfully situated on the lower level and giving deference to its main structure.

**c. Emphasis of Nature**

Shwedagon Pagoda was built on the summit of the 190-foot-hill call Singuttara. Natural landform is emphasized by complementary urban form to express the importance of the pagoda.

**d. Supremacy of Site and Structure**

The Shwedagon Pagoda can be seen through the grand urban space, the People's Square. It gets supremacy of site and structure over the environs.

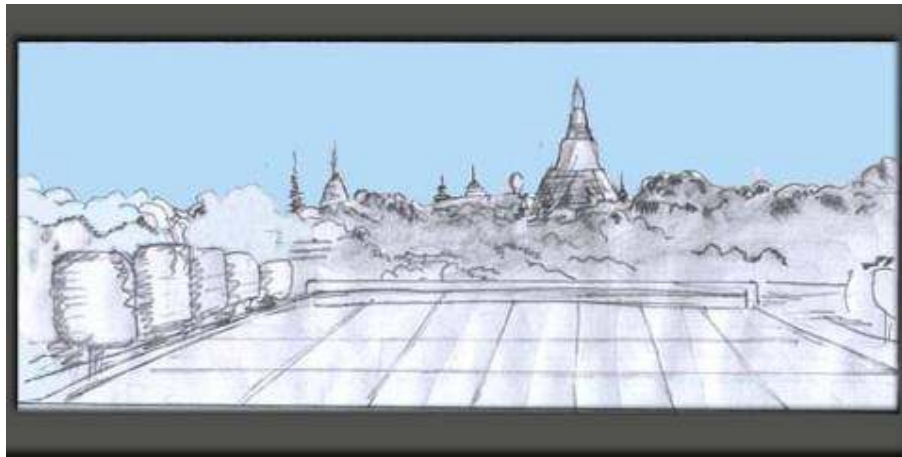
Height of the Singuttara Hill = 190'

Overall height of the pagoda = 326'

Total height = 516'

Distance through the Square to the Shwedagon = 3619'





*Figure 7. An urban scene of monumental scale is seen from Pyay Road.*

It is learnt that the degree of enclosure is directly proportional to the relationship between the viewing distance and the height of the structure which we view. This urban space and scene were intentionally designed. This view needs the formal recognition and protection essentially.

#### **e. The Skyline**

Viewing from the western bank of Hlaing River, the skyline of Yangon can be seen. In the past, it formed a harmonious relationship between the Shwedagon Pagoda as a dominant landmark and the rest of the city below it. The Shwedagon Pagoda was the most meaningful and powerful symbol of Yangon City. The city exploited its own topography. The resulting sky line was not the result of the placing of a single imposing landmark, but the result of a total built form in harmonious relation to the terrain. The vertical accent tied the heterogeneous elements of the periphery into a single visual unit. The isolated or visually independent hilltop was treated with the important building at the summit. The Shwedagon Pagoda, that stood out in the skyline derived emotional significance to the viewer. The Pagoda on the crown of the hill turned a lovely shape into a jagged skyline.

In the past, the highest roofline in the skyline was about 70 feet and when compared with the height of the Shwedagon Pagoda which was about 600 feet, the visual proportion was roughly (1):(9). At the present time, the environs of the Shwedagon were being overwhelmed by high rise buildings of about 700 feet height and more. The visual proportion previously mentioned became roughly (1.2):(1). This shows how they badly marred the skyline traditions of the ancestors.



*Figure 8. Skyline of Yangon in the past, view from the western bank of Hlaing River.*



*Figure 9. Present skyline of Yangon, view from the western bank of Hlaing River.*

It is not beyond the preventive phase. Certain regulations should control the form and location of high buildings when they affect the appearance of the skyline. Preserving fine old skyline with historic and symbolic accents near the Shwedagon Pagoda is especially vital. This must be done with care, for a continuous stretch of squat low buildings can be dull.



*Figure 10. Present urban skyline of Yangon, view from the southern bank of Yangon River.*



### **3.3 Identification and Analysis of the Visual Axes of the Shwedagon Pagoda**

This study can find out the possible visual axes to the Shwedagon Pagoda. These axes are;

#### ***a. Along the Shwedagon Pagoda Road (from Pantara Street to the Shwedagon)***

The Shwedagon Pagoda Road had been a main visual axis to the Shwedagon Pagoda before 1885. It is straight towards the pagoda in the part between Pantara Street and the Pagoda. This road is one of the most attractive entrances to the pagoda.



*Figure 11. Shwedagon Pagoda Road can be seen as the main visual axis from the past till the present.*

#### ***b. Along U Htaungbo Street ( from U Htaungbo Roundabout to the Shwedagon)***



*Figure 12. A view towards the Shwedagon from U Htaungbo Roundabout stimulates acute power of sight*

U Htaungbo Street is not in straight direction to the Shwedagon Pagoda. But, a view from it towards the Pagoda should be protected. The partial view of the

pagoda from U Htaungbo Roundabout heightens anticipation, alerts and sharpens the eye for the full observation of the things ahead.

***c. Along Kyartawya Street ( from the junction of Nutmauk Street and Bahan Road, to the Shwedagon).***

The view from the junction of Nutmauk Street and Bahan Road towards the pagoda, along Kyartawya Street is supposed to be artfully aligned to give monumental view of the pagoda as one approaches it.



*Figure 13. View from Kyartawya Street gives a monumental scene of the pagoda.*

***d. From the junction of Pyay Road and Ahlone Road towards the Shwedagon (area between the eastern side of Pyay Road and the Shwedagon)***

In this case, a wide horizontal angled view of about 90 from the junction of Pyay Road and Ahlone Road towards the Shwedagon should be kept open. This view through People's Square is the most amazing of all.



*Figure 14. Shwedagon Pagoda seen through the People's Square, well proportioned as a distinct object in silhouette against the sky.*

**e. Area within the north-eastern side of the Shwedagon Pagoda and the junction of Shwegontaing and Kabaraye Pagoda Roads**

This wide angled view of the area should be kept free. The view of the pagoda aids orientation within this region.



*Figure 15. View from the junction of Shwegondaing Road and Kabaraye Pagoda Road without visual obstruction.*



*Figure 16. Sight line to the Shwedagon is visually obstructed on Kabaraye Pagoda Road, near Home for the Aged.*

**f. Along the direction of Inya Road (from Panwar Street towards the Shwedagon).**



*Figure 17. A view from the Inya Road*

Inya road frames a view of the Shwedagon being in harmony with Naungdawgyi Pagoda at normal eye level.

**g. Along the U Wisara Road (from Hanthawaddy Roundabout to West Shwegontaing Road).**



Figure 18. A view towards the Shwedagon Pagoda from U Wisara Road, near Blazon Building.

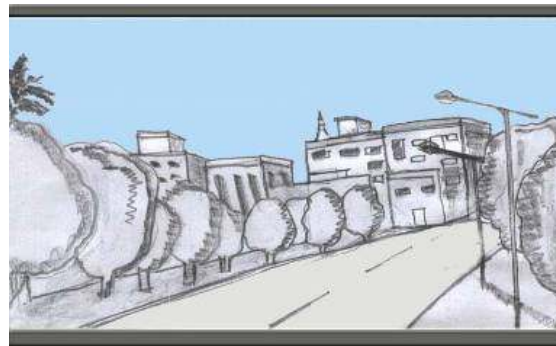


Figure 19. View to the Shwedagon Pagoda was obstructed by AWB building at the corner of U Wisara Road and Dhamazedi Road.

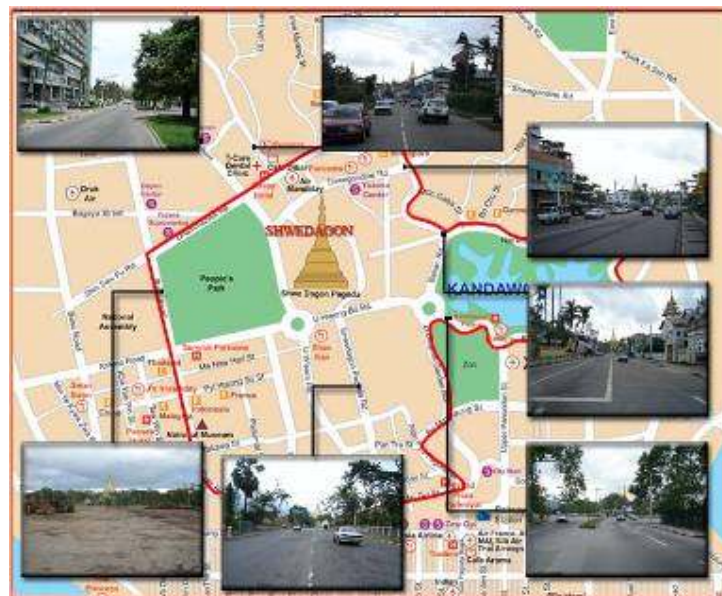


Figure 20. Views towards the Shwedagon Pagoda from each standpoint on each axis

The approximate numeric height and length of each axis are followings.

Axis	D	L	H	$\phi$
a	4535'	74'	442'	5.6°
b	2888'	74'	442'	8.7°
c	3016'	85'	431'	8.1°
d	3619'	85'	431'	6.8°
e	3352'	111'	405'	6.9°
f	3608'	103'	413	6.5°
g	4392'	80'	436	5.7°

Table 1. Basic data from the survey of endpoints of important visual axes.

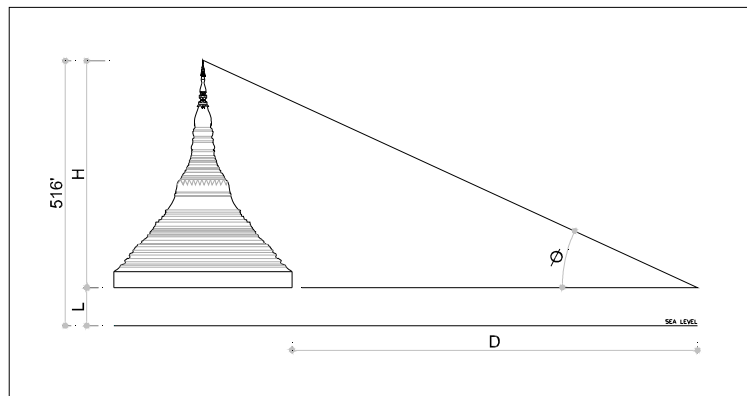


Figure 21. Figure showing the angle of view from the standpoint on each axis

D = distance from end point of axis to the Shwedagon Pagoda.

L = standpoint level above sea.

H = height of the sight line.

$\phi$  = angle of view from standpoint.

In this case, each axis is on its respective level and their distances from the Shwedagon Pagoda are quite different. Even on a certain axis, levels of standpoints can be different from one another. Therefore, it is impossible to determine the height of the buildings to be limited exactly for the whole. This problem should be dealt with on an ad hoc basis.

#### 4. CONCLUSION

It is needed to survey and evaluate all important views and vistas to the Shwedagon. Then it should draw up a map with the streets, buildings and angles of view to serve as a basic document against which every related construction can be



checked. Each newly built building should give deference to the existing heritage. Moreover, the visual impact of it to its environment and urban skyline should be considered. In some cities, laws have been passed to restrict building height as a means of protection of skyline. Visual axes to our historical buildings and other urban design traditions of Myanmar are to be lovingly maintained and protected. Without conservation, nothing can be left permanent behind. Our cultural heritage structures are in need of strict regulations to preserve and protect special vistas. It is found that any building which would cause visual blockage to a historical heritage should not built along and across its visual axes. The author think this is a matter of great urgency. Fine views from the visual axes should be kept open by stipulation. Special historic zoning ordinances are needed in the Shwedagon Pagoda zone. This can be done only by the coordination of people like city officials, architects, planners, private builders and developers. Such ideas must be transferred to the public's trust and consciousness to meet our goal to be a sustainable built environment.

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# **TOWARDS A TOURISM DEVELOPMENT ZONE FOR ANCIENT CITY OF MRAUK-U AND ITS ENVIRONS**

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## **Abstract**

The ancient city of Mrauk-U is one of the most attractive tourist destinations in Myanmar. Among the ancient city of Myanmar, the ancient city of Mrauk-U still retains its richness in art and architecture of religious monuments. Now, the inventory list of ancient monuments shows that there are 157 ancient monuments around Mrauk-U. Majority of ancient monuments except a few were built of stone. Many stupas and temples were ruined by heavy rain or by bombing during the Second World War. Similarly many stupas and temples were destroyed by treasure hunters who are in search of antiquities and valuable jewellery. On the other hand, the ancient city lacks proper tourist facilities as well as communication and transportation facilities. The aim of the paper is to revive the historic atmosphere of the ancient city of Mrauk-U by preserving and restoring ancient monuments and establishment of efficient tourist facilities to attract more tourists. Then, creation of further tourism facilities which fit into the tourism products, handicraft development and physical control with the development of human settlements and activities are necessary. The main objective of the paper is to develop tourism in the historic city of Mrauk-U area in a controlled manner. If unplanned, the ancient city could lead to uncontrolled development which would quickly degrade the religious monuments, the natural resources and the cultural fabric of the ancient city. To safeguard the sound future development of tourism in the historic area of Mrauk-U, it is essential that the local residents be integrated into all programmes and that their social and economic welfare improve alongside increasing tourist activity.

## **1. Introduction**

This paper outlines the Tourism Master Plan for ancient City of Mrauk-U and its environs, Rakhine, Myanmar. Mrauk-U was built as a defense city by King Min Saw Mon in the year AD 1430. Mrauk-U is a vast treasure house of the cultural legacy of Myanmar. A maze-like chain of lake and moats were also constructed both inside and outside the city walls. The palace walls, moats, ponds, palace gates, temples, stupas and monasteries of Mrauk-U are still standing in evidence. The total area of the city is approximately 21 sq-miles. The earth banks of Mrauk-U cover an area of more than 20 sq-kilometers (7.72 sq-miles). In an administrative definition, this area covers 6 quarters and existing municipal area is about 2.428 sq-miles. Tourism industry in Myanmar is organized and managed by the Hotel and Tourist Corporation

under the Ministry of Trade. It is also responsible for safeguarding against negative effects of tourism.

### 1.1. Location of Mrauk-U and Environs



Figure 1: Location of Mrauk-U and Environs

The ancient city of Mrauk-U is situated about 45 miles to the north-east of Sittwe the capital city of Rakhine State. Ancient cities like Dhanawaddy, Vesali, Launggret cities are situated in the environs of Mrauk-U. Dhanawaddy is lies 16 miles north of Vesali and 21 miles north of Mrauk-U. Another ancient city of Vesali is situated five miles north of Mrauk-U. Lemro dynasty ancient cities are 5 miles far from Mrauk-U. The ancient city of Mrauk-U is located at latitude 20 25' N and longitude 93 11' E striding alluvial plains of Kuladan and Lemro rivers. The city walls and moats were constructed, in part, with natural mountain ranges, creeks and drainages. Amidst the mountain ranges and valleys in and around Mrauk-U, there exist a large number of ancient pagodas images, temples, stupas, man-made caves, monasteries and other edifices of all descriptions. The ancient city of Mrauk-U was located inside the elongated mountain ranges. Apart from natural mountain ranges, massive stone fortification walls were built to defend from the danger of military campaign from their rival Kingdoms. The view of Mrauk-U historic city can be seen from above with the surrounding mountain



ranges and encircling canals and moats. The ancient city of Mrauk-U can be said as the strongest fortress city built in 15<sup>th</sup> century A.

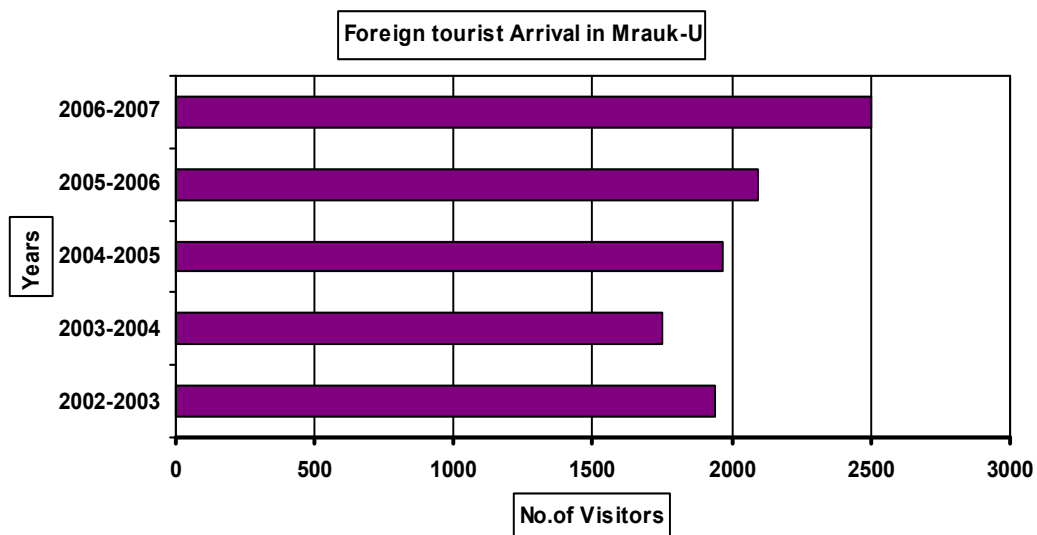
## 2. Present Tourism to Rakhine

### Attractions

Rakhine State is based on its cultural attractions. Such attracted towns are Sittwe, the capital city of Rakhine State, Ngapali beach in Thandwe, Kyaukphyu, Mrauk-U, Kyauktaw, Punnagyun, Myinbya, Taungup, Yanbye and Gwa. Mrauk-U is the most tourist attraction point in Rakhine and other tourist attraction near Mrauk-U environs are Dhanawaddy, Vesali, and Laungret which were old capital cities of Rakhine.

### 2.1 Foreign Tourist Arrival in Mrauk-U

Foreign tourist arrival in Mrauk-U is fairly small, at present, due to lack of transportation facilities and public facilities in Mrauk-U.



### 2.2 Tourist Arrivals by Mode of Transport in Mrauk-U

The number of arrivals in Mrauk-U is still fairly small (3000 in 2006-2007) and the increase in the arrivals is depend on transport and the physical capacity of the tourism

plant. Most of the package tourists and foreign independent tourist choice by plane from Yangon airport to Sittwe and another selection by car from Yangon to Sittwe which takes long one night two days. It takes about two hours by speed boat from Sittwe jetty along the Kaladan River and five hours by car from Sittwe to Mrauk-U.

### 2.3 Accommodation Facilities in Mrauk-U

Only one HTC hotel and eight private guests are in Mrauk-U at present condition. There are only 4 hotels and total capacity of 68 rooms.

#### Mrauk-U Accommodation, 2006-2007

HTC Hotels	Rooms	Beds
Mrauk-U Hotel	22	38
Private Hotels		
Nawarat Hotel	18	36
Prince Hotel	16	32
Vesali Resort Hotel	12	24

#### Private Guest Houses

Private Guest Houses	Rooms	Single	Double
Thazinpaingkhine	12	8	4
Nanmyotaw	20	16	4
Shwekhinkyi	8	5	3
Kyawsoe	8	5	3
Myanantheingyi	11	6	5
Gankawphoo	16	10	6
Thazin	5	3	2
Pleasant Island	7	4	3
Total guest houses	<b>87</b>	<b>57</b>	<b>30</b>

### 3. The Monuments as a Tourist Attraction

Mrauk-U is the single most attraction tourist destination in Rakhine but also in Myanmar. Like Pagan, the attraction of Mrauk-U is mainly the magnificent archaeological site with its numerous large and small pagodas. Almost all of the temple and pagodas are built of sand stones. Some temples continue to

be places of worship, while others are historic relics of the past from which a panoramic view of the whole archaeological site can be observed.

Hundreds of temples, stupas and other Buddhist monuments from the golden city of Mrauk-U are the main tourist attractions in Mrauk-U. First of all the beautiful cultural landscape in which pagodas and temples are set. Small hills and valleys are formed among numerous temples. The view over the hills is to be admired both in the full light of the morning and in sharp silhouette at sunset. Many stupas and temples lie at the foot of the hills and on the slopes and top of the hills. The ancient ponds which are scattered all around the archaeological site provided the main source of water supply, such as, Moreleikkan and Leksaykan etc. Furthermore, Rakhine traditional building style and village life of Rakhine is an attraction in itself which fascinates the tourists. The final attraction of ancient city of Mrauk-U is the rural and aspects of cultural and nature (including performing arts, food and drink) are not forgotten or overlooked.

The main attraction of Mrauk-U cannot be identified as one or a few main structures. The attraction is the vast number of monuments, the variation in their size and architectural style, the possibility of viewing a large number of monuments in a single visit, their historical background and the natural setting of the monuments. However, the tourists have a number of "must", of which the following can be pointed out; Shitethaung Temple, Htukkant Thein Temple, Anndaw Thein, Kothaug Temple. The most important destination competing with Mrauk-U in this respect are; Ayutthaya, living historic city of Thailand, Indonesia, with Borobudur and the temple island of Bali; and Kampuchea, with the gigantic temple complex of Angkor. Ancient city of Mrauk-U is situated in the dense jungle and offers a little possibility of enjoying an overall view of the archaeological area.

Types of structures	Nos.	In History
Temples and stupas	157(inventory)	6341(thazinpankhine)
Stone fortresses	11	11
Moats	15	28
Enclosure wall	18	18
City wall	13	13
Granaries	13	13
Gates	23	25
Libraries/ Pitakateik	6	48
Monasteries	-	-
Outpost	-	30

Table 1: List of Cultural Significant in Mrauk-U [Internal report from Department of Archaeology (Mrauk-U)]

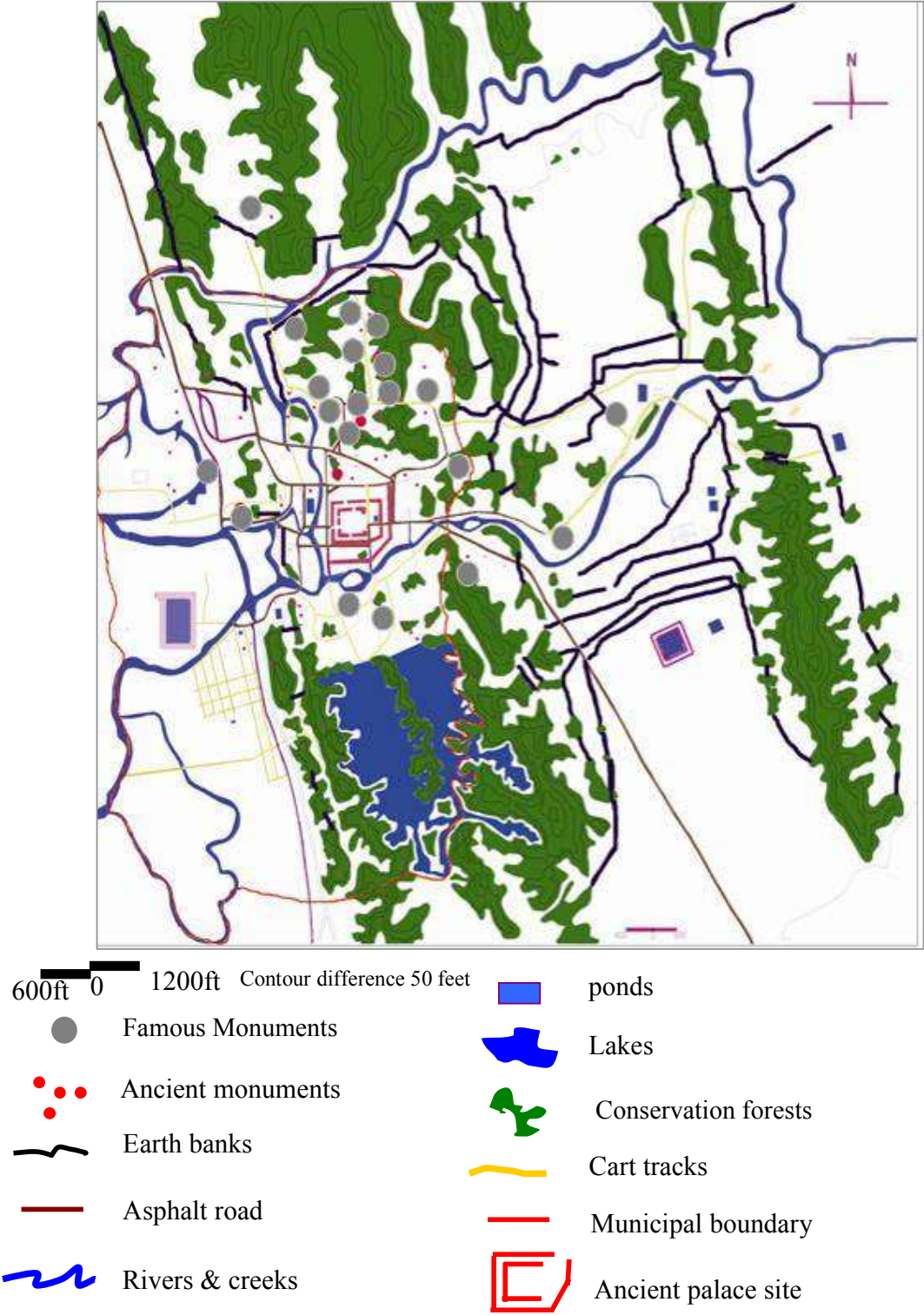


Figure 1: Location of the Most Well-Known Monuments of Mrauk-U

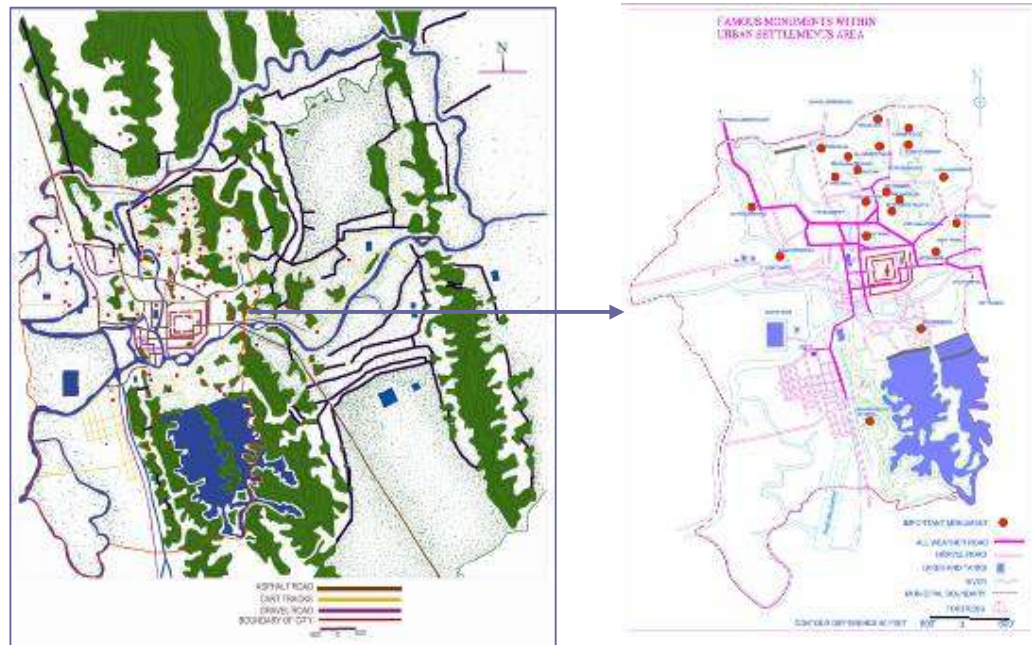


Figure 2: Location of Famous Monuments within Urban Settlement Area

Minkhaung  
Shwegu  
stupa



Ancient palace site



Laymyatnha  
temple



Lakamaung stupa



Htukkanthein  
temple



Koenawin



Shitthaung  
temple



Jinamanaung stupa



#### **4. Future Tourism Development**

At present, lack of tourist facilities and transportation difficulties related to tourist arrival. It is needed to repair Sittwe-Mrauk-U transportation system (by car or by boat) and then, domestic airline to Yangon-Sittwe for FITs and PKTs should be managed in the peak season. Moreover, the inner city of Mrauk-U drainage system, roads, electricity, and communication programmes are required to be upgraded for local visitors and international tourists.

##### **4.1. Outlined Tourism Policy and Strategy for Mrauk-U**

Ancient city of Mrauk-U has a very high potential for attractive tourists. At the same time the smallness of the population and socio-economic background make the area vulnerable towards a too strong tourism development. The historic city of Mrauk-U is the most important single attraction of Rakhine as well as Myanmar. The tourism development policy of Mrauk-U will have to be consistent with the overall policy.

The main objectives of the Tourism Master Plan are to develop tourism in the historic area of Mrauk-U in a controlled manner. The archaeological site of Mrauk-U is a very important factor in the marketing of tourism to Myanmar. Therefore, the protection and development of this site will be of major important for the future tourism to Mrauk-U.

The specific tourism development objectives for ancient city of Mrauk-U are as follows;

1. To protect the general physical and cultural environment of the archaeological site. The tourist amenities should not be permitted to destroy the character of ancient city scene which is the basis for successful tourism in Mrauk-U; neither should uncontrolled expansion of housing areas.
2. To develop the accessibility and attractiveness of the site to increase the number of tourists to Mrauk-U and to Myanmar.
3. To protect the rural, cultural landscape setting of the area.
4. To avoid major changes in building styles and the physical character of ancient city located close to the archaeological sites.
5. To further preserve and protect the cultural traditions (such as, performing arts, bamboo products, hand-woven handicrafts, etc).
6. To develop a tourism product and facilities which are in harmony with the previously mentioned objectives.

##### **4.2. Tourism Development Strategy for Mrauk-U**

The overall attractiveness of Mrauk-U will suffer and often discussed self-destruction of tourism might be a realistic case in Mrauk-U. The only solution to that would be to control the inflow and length of stay of the low -budget individual tourists. This control is suggested to be obtained by the following means;

1. Step-wise change of visa restrictions through this policy the overage length of stay of the standard FITs would not increased strongly.

2. Improvement of the standard of guest houses, whereby higher room rates can be required.
3. Control of the development of new guest houses.
4. Mrauk-U archaeological zone could be declared not only guests (tourists) would have to pay a fee according to the number of days stayed. The special fee for stays in the Mrauk-U archaeological area would reduce the length of stay of the low income tourists.

## **5. Details of the Outlined Master Plan for Ancient city of Mrauk-U**

The future tourism will be built on a number of key developments such as;

1. Development of the products, incl; development of programmes.
2. Protection of main attractions (the monuments and existing cultural setting)
3. Creation of further tourism facilities which fit into the tourism products and the environment.
4. Handicraft development (such as; weaving Rakhine traditional longyi (Rakhine longyi),
5. Physical control with the development of human settlements and activities;

### **5.1. Product Development**

The basis for the future tourism product of Mrauk-U will not change. It is the cultural heritage, the monuments, the handicraft and the rural setting. These key products will not need development but rather protection. There will however be a specific need for Rakhine traditional performances with a cultural stamp. It is recommended to limit such performances to what can be provided by Mrauk-U archaeological area, in order to safeguard the traditions of Rakhine culture.

### **5.2. Tour Programmes**

The present organized tourist circuits are extremely difficult by coaches and cars which from the private tourism sector. Such tour programmes cover most of the famous monuments of Mrauk-U, but, a large number of smallness monuments do not cover due to their location of the cultural landscape.

### **5.4. Protection and Development of Monuments**

The main attraction of Mrauk-U is the numerous monuments. There is no restoration and preservation work at the moment being carried out by international organization, such as Unesco/ UNDP project. At present tourists do not contribute to this effort. As however, the conservation of the monuments is a most for future tourism. It is suggested that Mrauk-U branch of Archaeology Department and HTC work closer together especially in the following areas;



1. Information to tourists about how to behave during visits to monuments.
2. Development of the archaeological area as a world heritage zone. At present, an entrance fee is equivalent to 5 US\$ per day.
3. HTC could also graduate the fee, including a smaller fee for package tourists in their package arrangements and a higher fee for FITs to be paid at the Archaeological Department of Mrauk-U. The collected fees from tourists are financially linked to the restoration of the historic monuments.

The closer co-operation between HTC and the Mrauk-U Archaeological Department would be formalized through a sub-committee. This sub-committee under the Regional Tourism Committee (Sittwe) could work on the following subjects;

1. Development of the Mrauk-U archeological zone including roads, drainage, electricity development and collection of entrance and stay fees;
2. Administration and budgets for funds created through the tourists' fees; details planning and implementation of restoration of historical monuments of special interest for tourists such as, Shittaung Temple, Htukkanthein Temple, Koethaung Temple, etc.
3. Production of informative materials for the tourist, such as maps, informative signs, etc.

## **5.5. Museums**

The new museum would be built to display programmes and to give more and higher standard information to the tourists. At present, the existing museum is very small for display for tourism purposes and its location is not quite worse for the old palace site. In order to undertake the above mentioned improvements and possibility to plan for the suggested new museum, possibility in north-west part of the ancient city.

## **6. Development of Tourist Facilities**

At present, HTC offers one two star hotel at Mrauk-U. Present tourist arrival of Mrauk-U will sufficient and more tourists arrival need a new five star hotel is planned for Mrauk-U. Mrauk-U HTC hotel is only partly fulfilled for package and individual travellers. The planned hotel will have a capacity of 100 rooms utilizing the site in full. It will be located close to the existing Vesali Resort Hotel forming a hotel zone outside municipal area of Mrauk-U. The zone for future tourism development will be located along Mrauk-U-Sittwe highway road. Hereby a new tourism development centre will be created and the pressure an inner city of Mrauk-U will be released. The new tourism zone should be development according to the tourist arrival of Mrauk-U.

All the above hotel developments should follow basic guidelines;

1. The hotel should be built in a traditional design using local construction materials of Rakhine, Mrauk-U,
2. The hotel should blend into the surrounding and should not be a landmark within the archaeological zone.



### **6.1. Private Guest Houses**

The existing eight guest houses will be sufficient to cover the demand for bed nights up to 2008-2010. It is recommended that the number of further guest houses at Mrauk-U archaeological area be restricted and that the total number of guest houses be not allowed above eight. These eight guest houses should cover the need for low-budget FITs bed nights up to 2010. Private guest houses for tourists should not be allowed near ancient palace site. The need for further beds for FITs, beyond 2010, should be covered through the establishment of a second tourism development zone along the Mrauk-U-Sittwe road (near Damaraza Quarter).

### **6.2. Revival of performing arts and traditional crafts**

The presentation of the Rakhine traditional dance performance should be made to develop in Mrauk-U for overseas visitors. At the historic temple of Htukkanthein Temple, outdoor performances could be organized during the peak season. Further opportunities to enhance the presentation of the Rakhine cultural heritage could include a well known “Kyin” a Rakhine wrestling ceremonies.

Rakhine region was well known for its production of good quality of cotton textiles weaving “Rakhine longyi”. The market for traditional crafts will increase with the development of cultural tourism in Mrauk-U. The efforts to revive traditional craft making involves two important elements.

The recommendation for improvements covers the following items;

1. Information for tourists about product quality and how it is recognized.
2. Encouragement of high-quality production.

## **7. Physical Aspects of the Development Plan**

The physical development plan of Mrauk-U area contains the following components;

1. the urban settlement
2. the archaeological area with villages and agricultural production
3. the tourism development zones

The population of Mrauk-U within municipal area is about 28142 nos. There are 49 groups of villages in Mrauk-U township and urban and rural population is about 244396, according to (2006-2007) urban registered population. Ancient city of Mrauk-U is a living city between living settlements. The boundary of Mrauk-U municipal area is about 2.428 sq-miles (1554 acres).

The population in the urban area is concentrated within the municipal of Mrauk-U, where population growth seems to be regaining some momentum due to trade and job opportunities created by the tourist trade. At the present condition, ancient palace site is located in the heart of the city and many living settlements are near the palace wall. It should be related them. The highway bus station is situated in the north of the ancient palace site and it impossible to see the whole wall structure of palace from a distance.

Small villages within archaeological area have sufficient room for expansion assuming low future growth rates. However, all of the villages is limited by archaeological sites and should not be allowed to expand its area.

As tourism is a significant factor in town growth, it is felt that future tourist hotels should not be placed within or nearby the archaeological area, but that a development zone should be established to the north-west of ancient city( along Mrauk-U- Sittwe Road) and south-east of ancient city (along Yangon-Sittwe highway road).

Many stupas and temples lies at the foot of the hills and on the slope and top of the hills. The visual obstruction in this ancient city consists of unsightly jungle growth, a number of poorly constructed houses at the foot of the hills. The ancient ponds which are scattered all around the ancient sites provided the main source of water supply at present. Not like the Pagan, many hills are found and Harritaung Hill in which Haritaung pagoda near the palace site, can view the whole of Mrauk-U city and another one is Shwetaung Hill.

The nature conservationists of Mrauk-U landscape are farmers and, when cultivated, the hills, the fields and trees are the best possible background for the monuments. Access to some monuments can be improved by maintaining footpaths, and trees can be planted along some roads as windbreaks and at selected sites for shade.

The potential threats to the natural environment of Mrauk-U can be counteracted through;

1. aiming marketing efforts at cultural and special interest tourists
2. banning hunting and collection activities that could threaten the environment;
3. controlling modernization in agricultural practices, and the expansion of forestry;
4. hindering the expansion of modern industry and the growth of residential areas within the important archaeological zones.

### **7.1. Zoning and land Use Planning**

The planning area is divided into the following zones;

1. Urban settlement of Mrauk-U
2. Archaeological zone with agricultural activities and villages
3. Tourism development zones

### **7.2. Urban Settlement**

In the anticipated development special attention should be given to the existing town of Mrauk-U within municipal area. The inner city of Mrauk-U was composed with palace and buildings for the royal court in ancient times. At present, there are many residential buildings near the royal palace site. The palace site was situated in the heart of the city. The moats had been made by damming the small streams. The inner city of the palace site was made up of three terraces. It would greatly add to the tourists' experience of

Mrauk-U, if the inner town could again be clearly distinguished from its surroundings which in historical times were the common people quarters and which today constitute a unique open landscape with numerous monuments.

Today there is a reasonable balance inside the town between historical monuments and residential buildings. Any uncontrolled development will have a detrimental effect. For the inner part of the town, a detailed town plan should be worked out. The inner town plan should respect the fields of archaeological interest (to be defined in cooperation with the Department of Archaeology). While these areas await excavation and archaeological research, they should be laid out as a national park. The land use and traffic proposals should be supplemented by a three-dimensional urban design to obtain the desired visual qualities. An important part of the town plan is the layout of surroundings of temples and pagodas. Careful planning of access roads and public spaces could result in new urban qualities where the temples and pagodas stand out as landmarks.

These monuments are seen and appreciated in relation to their surroundings and they take an added importance when they contrast with their background. This was most probably the situation in the great days of Mrauk-U, when ordinary houses and even palaces were built of wood and religious monuments of brick or stone.

The existing general character of Mrauk-U and its traditional building style should be preserved and the mixed character of tourism and the traditional Rakhine village should if possible, retain. Industrial development within the inner part of the city should not be allowed. Also street furniture must be part of the total design. This includes kiosks, signs, posts, display boards, litter bins, fencing, benches, etc. As a rule these facilities should complement and harmonize with their surroundings. For the anticipated future growth of population there is still land available within the existing municipal area boundary. An unbuilt area in the south-western part of the town could be developed for new housing construction.

### **7.3. Villages within the Archaeological Area**

These villages should impose restrictions on the type of buildings and construction materials used, and the developments should only be allowed the village limit.

The protected archaeological area outside the town and villages consists of monuments surrounded by cultivated fields with trees and shrubs lining the roads or free standing. Our recommendation is to change as little as possible in this area. Without land use regulations, there will be a danger of new building activities along the roads, blocking the view of the landscape and the historical buildings.

### **7.4. Tourism Zones**

Ancient city of Mrauk-U is a mixed zone of tourism and urban settlement. Existing tourism zone is north of the palace site and another zone is along on Yangon-Mrauk-U highway road. Tourism within the municipal area is planned

to have reached a suggested maximum with one HTC hotel and nine guest houses. Further tourism development should be avoided in order to preserve the character of ancient city. Tourism zones along on Mrauk-U-Yangon highway road with a capacity of only 20 rooms are the first priority for tourism development. Because of the location of the site near the Shwetaung Hill and close to the historic monuments, the hotel development at the site will have to comply with strict regulations as concerns construction materials and building heights. Nearby the ancient palace site of Mrauk-U, control and restrictions should be improved in order to avoid over- development. In brief, tourist promotion facilities and development programmes should be carried out as follows;

1. Providing basic tourist facilities such as cafeteria, recreation area, car park, etc.
2. Reviving annual festivals such as Lighting-Candles and Firework displays.
3. Building tourist information centers.
4. Promoting an open-air theatre for Rakhine traditional performing arts.
5. Enforcing security services
6. Promoting the private sector's interest in building first class hotels.
7. Upgrading of guest houses in tourism development area.
8. Formalization of a close co-operation between HTC and the Department of Archaeology. This co-operation could be established through a sub-committee for tourism development of the Regional Tourism Committee.
9. Strengthening of the handicraft sector through steps to improve the quality level and reintroduction of traditional skills.
10. Construction of the inner tourism routes system.

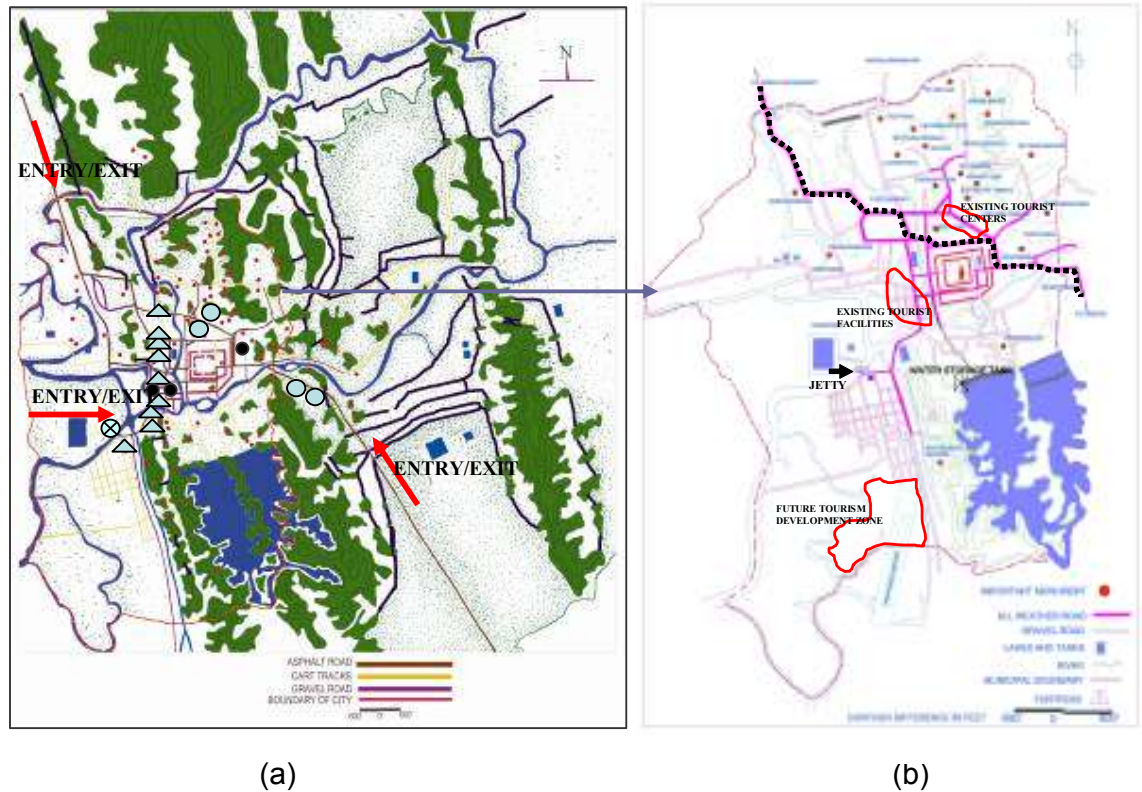


Figure 3: (a) Existing Tourist Entry or Exit Points, (b) Tourist Facilities Zones within Municipal boundary

## Conclusion

Ancient city of Mrauk-U has a very high potential for attractive tourists. At the same time the smallness of the population and socio-economic background make the area vulnerable towards a too strong tourism development. The historic city of Mrauk-U is the most important single attraction of Rakhine as well as Myanmar. The tourism development policy of Mrauk-U will have to be consistent with the overall policy. The main objectives of the Tourism Master Plan are to develop tourism in the historic area of Mrauk-U in a controlled manner. The archaeological site of Mrauk-U is a very important factor in the marketing of tourism to Myanmar. Therefore, the protection and development of this site will be of major important for the future tourism to Mrauk-U. The tourist amenities should not be permitted to destroy the character of ancient city scene which is the basis for successful tourism in Mrauk-U; neither should uncontrolled expansion of housing areas. The stone Buddhist monuments in ancient city of Mrauk-U are the most attractive tourist destination. However, if planned, it could lead to controlled development

which would quickly degrade the archaeological monuments, the natural resources and the cultural fabric of Mrauk-U. The monuments in Mrauk-U are the focal point of interest in developing the Rakhine State as well as Myanmar.

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## **PILOT SURVEY ON THE CONSERVATION OF HISTORICAL BUILDINGS IN MALAYSIA**

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**ABSTRACT:** Historic buildings basically represents the single most visible aspect of our past history and culture. Like most other countries in the world, Malaysia has a rich legacy of historic buildings with outstanding craftsmanship and architecture quality. They form an impressive historic features and heritage of the past work of man. It is important to conserve and preserve historic buildings because they provide a sense of identity and continuity in a fast changing world for future generations. However some of these buildings are at risk from defects and are not being well cared for due to lack of technical knowledge and high cost of repair and maintenance. The purpose of this paper intends to highlight the existing conditions of historical buildings in Malaysia with the main focus on the conditions of building defects and conservation approach to these buildings. To do so, a pilot survey has been conducted on several heritage towns and cities based on the existing heritage trail in Malaysia. The broad objective of this pilot survey is to examine the level of building defects and the location of building defects that normally occur at various types of historical buildings in Malaysia. At the same time, it will also look into the conservation approaches that has been done to these historical buildings either the method are acceptable according to the basic principles and philosophy of building conservation. It is expected that this paper could contribute some benefits to the owners, consultants, contractors, conservators, various government agencies, heritage body and by all those who concerned with the care and conservation of historic buildings in Malaysia.

**Keywords:** Pilot Survey, Heritage Trail, Historical Buildings, Building Defects, Building Conservation.

### **1. INTRODUCTION**

Malaysia's history is largely embedded in its architecture, social and cultural fabric, and of these the architectural fabric is probably the most enduring one. Recently, the historical building conservation and maintenance can be considered as a popular method use in Malaysia. In fact, historic building is an important element in town development which can be seen in some cities in the world. It plays an important role in defining the landmark within the urban area as well as generating income and boosting the tourism industry. Historic buildings according to Fielden (2000) is one that gives us a sense of wonder and makes us want to know more about people and culture that produced it. From the first act of its creation, through its long life to the present day, historic buildings have artistic and human messages, which will be revealed by a study of its history. A complexity of ideas and of cultures may be said to encircle historic buildings and be reflected in it. Malaysia has a rich legacy of historic buildings, they form an impressive heritage of the past works of man. As documents of the past, historic buildings are important as a source of historical materials as the paper and parchment used by historians. Therefore it is important

to conserve and preserve historic buildings because it provides a sense of identity and continuity in a fast changing world.

Since the building boom of the 1970s, many of Malaysia's historic buildings have been demolished. Recent large scale urban development continues to threaten pre-war buildings, while other historic buildings are simply deteriorating due to age, neglect and high cost of maintenance. Fee (1998) expressed that to lose these buildings, however is effectively to obliterate historical memories, and there is now increasing pressure from various segments of the community to conserve the nation's historical heritage. As we all know that conservation is the action taken to prevent decay, embracing all acts that prolong the life of cultural and natural heritage. Building conservation according to (Fielden, 2000; Insall, 1972) relates specifically to the process of repair, maintenance and restoration of historic buildings which aim to prolong a building's life and function. In Malaysia, the practice of building conservation is considered new. Laws for historic building conservation are established throughout legislation whereby a national inventory of historic buildings includes lists and schedules of old buildings for protection. Example of historic buildings in Malaysia according to Ahmad (1997) are mosque, churches, palaces, clock towers, prisons, government offices, institutional and commercials, residential, schools, railway stations, hotels, forts and monuments.

## **2. AIM AND OBJECTIVES OF THE RESEARCH**

The overall aim of this research is to have specific knowledge associated with defects in Malaysia historical buildings like; to determine the locations, types and causes of defect so that specific action can be carried out to overcome the problems as described before. Meanwhile the overall outcome of this research is to be able to recognize and diagnose defects at each building element in historic buildings. Previously much has been published about building defects, their causes and cures, but unfortunately the information is scattered over a wide range of publications and not easily accessible. There are also a number of excellent texts, studies and research conducted on building defects but these tends to be either highly technical and/or specific to certain type of defects or building materials and did not cover on the overall elements of the buildings. Moreover, the published advice on remedial work often assumes that the cause of the failure is already known; in practice, although the symptoms will be apparent, the under laying factors may be obscure. If a wrong diagnosis is made, the treatment is unlikely to be successful and money will be wasted. Actually there is a need for a guide to study about the defects and aid



the correct diagnosis of defects because prevention is better than cure, and something have to be done to reduce the frequency of defects especially to historic buildings by choosing appropriate approaches, methods, techniques and materials. Therefore it is worth to do this research. There are four primary objectives in this research that need to be fulfilled to ensure that the overall aim of this research is achieved. The objectives are as follows:

1. To determine the conditions of building defects at Malaysia historical buildings.
2. To determine whether the historical buildings in Malaysia has been conserved accordingly to the conservation guidelines.
3. To determine the locations of defects at historic buildings.
4. To identify whether the conservation approach has been carried out practically.

### **3. APPROACH AND RESEARCH METHODOLOGY**

The approach used in this research starts with the overview of historic buildings in Malaysia. The literature review is mainly acquired from published books, research papers, seminar papers and journals. The research is further reinforced by formulating a set of questionnaires and handed over to owners or occupants of selected historic buildings in Malaysia. The questionnaire will be tabulated, summarized and analyzed accordingly to the research objectives to obtain findings. The background information of this research is obtained by various methods and the collection of new data is necessary to get the accurate result. The data regarding defects in historic buildings is collected by two main methods as follows:

1. Observations through site survey/pilot survey where data is obtained from a visual inspection of defects at its exact location or based on building elements.
2. Questionnaires as mention before where data is collected by preparing a series of structured questions related to conservation approach at the historical buildings.

### **4. PILOT SURVEY ON THE HISTORICAL BUILDINGS IN MALAYSIA**

Building conservation has long been of concern, although its popular application is relatively recent in origin, particularly in Malaysia. In the past few years, many historic buildings have been preserved and conserved while others have been converted to become premises for a bank, restaurant, information centre or a printing office. Malaysia is one of the fortunate countries that have many historic

buildings which are of immense architectural and historical value. An inventory study undertaken in 1992 and 1993 by the Heritage Trust of Malaysia in conjunction with the National Museum, the Housing and Local Government Ministry and Faculty of Built Environment, University Technology Malaysia (UTM), reveals that there are near 39,000 historic buildings built between 1800 and 1948 throughout the country which are worthy for preservation and conservation. Buildings built within these periods are classified as 'pre-war buildings' due to their year of build, ranging from 1800 to 1948. Listed in Table 1 is the number of 'pre-war buildings' located in 247 cities and towns nationwide:

*Table 1. The Distribution of Pre-War Urban Buildings in Malaysia.*

No	States	No of Historical Buildings	Percentage of Historical Buildings
1	Penang	5,057	24.30%
2	Perak	3,351	16.10%
3	Johore	2,323	11.20%
4	Malacca	2,177	10.50%
5	Kuala Lumpur	1,763	8.40%
6	Kedah	1,282	6.12%
7	Selangor	1,166	5.60%
8	Sarawak	1,010	4.90%
9	Negeri Sembilan	999	4.80%
10	Pahang	831	4.00%
11	Terengganu	420	2.00%
12	Kelantan	373	1.80%
13	Perlis	25	0.10%
14	Sabah	10	0.05%
	<b>Total</b>	<b>20,787</b>	<b>100.0%</b>

Source: Iddid (1995).

To make sure that the objectives of this research can be achieved, a pilot survey has been conducted towards Malaysia historical buildings. Among the objectives of this pilot survey was to get a clear understandings related to a few aspects such as the research area, scope, needs and focus before the next stage of the research can be carried out. Therefore, there are 209 historical buildings has been choosen for this pilot survey at four main heritage towns and cities in Malaysia. The selection of the historical buildings and town/cities are refered to the list of historical buildings listed in Kuala Heritage Trails, Ipoh Heritage Trails, George Town Heritage Trails and Bandar Hilir Heritage Trails as prepared and provided by the experts from Badan Warisan Malaysia, Perak State Goverment, Penang Heritage Trust and Malacca Museum Corporation. The list of all the historical buildings that includes in the pilot survey are as listed in Table 2 on the next page:

*Table 2. List of Historical Buildings involved in the Pilot Survey.*

No	Name of Historical Buildings	Location	Year Built
1	Jamek Mosque	Kuala Lumpur	1909
2	Old Survey Department	Kuala Lumpur	1910
3	Old City Hall	Kuala Lumpur	1904
4	Old High Court	Kuala Lumpur	1915
5	Sultan Abdul Samad Building	Kuala Lumpur	1897
6	Old Post Office	Kuala Lumpur	1907
7	Industrial Court	Kuala Lumpur	1905
8	Textile Museum	Kuala Lumpur	1905
9	National History Museum	Kuala Lumpur	1888
10	Kuala Lumpur Memorial Library	Kuala Lumpur	1899
11	Royal Selangor Club	Kuala Lumpur	1890
12	St. Mary Church	Kuala Lumpur	1895
13	P.A.M. Building	Kuala Lumpur	1903
14	E.K.R.A.N. House	Kuala Lumpur	1937
15	Central Market	Kuala Lumpur	1936
16	32 Jln. Hang Kasturi	Kuala Lumpur	1909
17	34 Jln. Hang Kasturi	Kuala Lumpur	1909
18	36 Jln. Hang Kasturi	Kuala Lumpur	1909
19	38 Jln. Hang Kasturi	Kuala Lumpur	1909
20	40 Jln. Hang Kasturi	Kuala Lumpur	1909
21	42 Jln. Hang Kasturi	Kuala Lumpur	1909
22	44 Jln. Hang Kasturi	Kuala Lumpur	1909
23	46 Jln. Hang Kasturi	Kuala Lumpur	1909
24	48 Jln. Hang Kasturi	Kuala Lumpur	1909
25	50 Jln. Hang Kasturi	Kuala Lumpur	1909
26	52 Jln. Hang Kasturi	Kuala Lumpur	1909
27	O.C.B.C. Building	Kuala Lumpur	1938
28	Medan Pasar	Kuala Lumpur	1937
29	2 Medan Pasar	Kuala Lumpur	1906
30	4 Medan Pasar	Kuala Lumpur	1906
31	6 Medan Pasar	Kuala Lumpur	1906
32	Gian Singh Building	Kuala Lumpur	1909
33	Bumiputra Commerce Bank	Kuala Lumpur	1930
34	16 Lebu Ampang	Kuala Lumpur	1930
35	18 Lebu Ampang	Kuala Lumpur	1930
36	24 Lebu Ampang	Kuala Lumpur	1930
37	26 Lebu Ampang	Kuala Lumpur	1930
38	28 Lebu Ampang	Kuala Lumpur	1930
39	30 Lebu Ampang	Kuala Lumpur	1930
40	32 Lebu Ampang	Kuala Lumpur	1930
41	85 Lebu Ampang	Kuala Lumpur	1930
42	34 Jln. Tun H.S. Lee	Kuala Lumpur	1880
43	36 Jln. Tun H.S. Lee	Kuala Lumpur	1880
44	38 Jln. Tun H.S. Lee	Kuala Lumpur	1880
45	40 Jln. Tun H.S. Lee	Kuala Lumpur	1880
46	Old Federal Warehouse Building	Kuala Lumpur	1905
47	M.S. Ally Company	Kuala Lumpur	1907
48	Old Bank Simpanan	Kuala Lumpur	1914
49	Sze Ya Temple	Kuala Lumpur	1864
50	Lee Rubber Building	Kuala Lumpur	1930
51	Kwong Siew Association	Kuala Lumpur	1888
52	Sri Mahamariamman Temple	Kuala Lumpur	1920
53	Old Police Station Jln. Tun H.S. Lee	Kuala Lumpur	1895
54	Victoria Institution	Kuala Lumpur	1893
55	Old Post Office Jln. Panggung	Kuala Lumpur	1886
56	Old Chinese Café	Kuala Lumpur	1930
57	Chan See Shu Yuen Association	Kuala Lumpur	1906
58	Funeral Shop	Kuala Lumpur	1900
59	Colonial Hotel	Kuala Lumpur	1930
60	Yan Keng Drama Association	Kuala Lumpur	1920
61	Selangor Merchantile Shop Association	Kuala Lumpur	1920

62	Masjid India	Kuala Lumpur	1863
63	23 Jln. Melayu	Kuala Lumpur	1870
64	25 Jln. Melayu	Kuala Lumpur	1870
65	27 Jln. Melayu	Kuala Lumpur	1870
66	29 Jln. Melayu	Kuala Lumpur	1870
67	31 Jln. Melayu	Kuala Lumpur	1870
68	33 Jln. Melayu	Kuala Lumpur	1870
69	35 Jln. Melayu	Kuala Lumpur	1870
70	1 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
71	3 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
72	5 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
73	7 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
74	9 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
75	11 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
76	13 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
77	15 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
78	17 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
79	19 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1915
80	P.H. Hendry	Kuala Lumpur	1920
81	8 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1900
82	32 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1900
83	42 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1900
84	106 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1900
85	Coliseum Cinema	Kuala Lumpur	1921
86	Rex & Tivoli Hotel	Kuala Lumpur	1930
87	150 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
88	152 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
89	154 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
90	156 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
91	158 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
92	160 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
93	162 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
94	164 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
95	Odeon Cinema	Kuala Lumpur	1936
96	Lee Wong Kee	Kuala Lumpur	1926
97	233 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
98	235 Jln. Tuanku Abdul Rahman	Kuala Lumpur	1939
99	Globe Silk Store	Kuala Lumpur	1930
100	P. Lal Store	Kuala Lumpur	1930
101	Chotirmall	Kuala Lumpur	1930
102	City Hall Building	Ipoh	1916
103	Ipoh Railway Station	Ipoh	1917
104	Chung Thye Pin Building	Ipoh	1907
105	High Court	Ipoh	1928
106	Perdagangan Selat Building	Ipoh	1907
107	S.P.H. De Silva	Ipoh	1950
108	Leong Yew Firm	Ipoh	1913
109	State Medical Office	Ipoh	1920
110	M.B.I. Parking Building	Ipoh	1962
111	Perak Hydro Building	Ipoh	1930
112	Merchantile Bank	Ipoh	1931
113	Chartered Bank	Ipoh	1924
114	Central Police Station	Ipoh	1911
115	St. John Church	Ipoh	1912
116	Dramatis Hostel	Ipoh	1920
117	Hongkong & Shanghai Bank	Ipoh	1931
118	Perak Ku Kong Chow Kung Wu Association	Ipoh	1928
119	Kian Aik Chan	Ipoh	1930
120	Pakistan Mosque	Ipoh	1930
121	Seenivasagam Office and Residential	Ipoh	1900
122	Ali Pitchay Town House	Ipoh	1940
123	Kin Kwok Daily Newspaper	Ipoh	1930
124	Jan Sahib Office	Ipoh	1930
125	Villa Jaya	Ipoh	1930

126	Mikasa Photo Shop	Ipoh	1908
127	Ipoh Royal Club	Ipoh	1898
128	Panglima Lane	Ipoh	1890
129	Kinta Commerce School	Ipoh	1950
130	Yat Loo Club & Miners Association	Ipoh	1935
131	Kinta Aerated Water	Ipoh	1930
132	Star Publication	Ipoh	1930
133	Straits Commerce Warehouse	Ipoh	1930
134	Ambika Property Office	Ipoh	1930
135	St. Michael Institution	Ipoh	1923
136	Federal Malay States Bar & Restaurant	Ipoh	1923
137	Eu Tong Seng	Ipoh	1907
138	Padang Bandar Mosque	Ipoh	1908
139	Oversea Building	Ipoh	1930
140	Guan Yin Temple	Ipoh	1878
141	Foong Seong Villa	Ipoh	1931
142	Sinhalese Bar	Ipoh	1930
143	Kampung Jawa Malay House	Ipoh	1886
144	Han Chin Pet Soo	Ipoh	1929
145	Lam Looking Bazaar	Ipoh	1933
146	Kampung Paloh Mosque	Ipoh	1912
147	Old Kinta Fire Brigade	Ipoh	1913
148	Singapore Cold Storage	Ipoh	1930
149	King George the V Rotary Club House	Ipoh	1935
150	Chua Cheng Bok Building	Ipoh	1930
151	Pa Lo Ku Miao Temple	Ipoh	1872
152	Warta Kinta Office	Ipoh	1940
153	Information Centre	Ipoh	1940
154	Times of Malaya Building	Ipoh	1930
155	Oriental Hotel	Ipoh	1930
156	Mo Ching House	Ipoh	1930
157	Dato' Sri Adika Raja House	Ipoh	1910
158	Syabil Kathigasu House	Ipoh	1930
159	Dato' Panglima Kinta House	Ipoh	1898
160	Perak Chinese Dramatis Association	Ipoh	1939
161	Yau Tet Shin Bazaar	Ipoh	1961
162	St. Michael Church	Ipoh	1924
163	Convent School	Ipoh	1927
164	Malay Women School	Ipoh	1920
165	Lam Look Ing Villa	Ipoh	1930
166	Chinese Association Building	Ipoh	1930
167	Kampung Kuchai House	Ipoh	1903
168	Japanese Military Headquarters	Ipoh	1930
169	Fort Cornwallis	George Town	1808
170	State Hall	George Town	1874
171	City Hall	George Town	1906
172	Town Hall	George Town	1883
173	High Court Building	George Town	1905
174	Convent School	George Town	1852
175	State Museum	George Town	1821
176	St. George Church	George Town	1818
177	Peranakan Penang House	George Town	1890
178	Tua Pek Kong Temple	George Town	1900
179	Goddess of Mercy Temple	George Town	1800
180	Little India Shop House	George Town	1900
181	Mahamariamman Temple	George Town	1833
182	Teochew Temple	George Town	1870
183	Kapitan Kling Mosque	George Town	1801
184	Yap Kongsı Temple	George Town	1924
185	Dr Sun Yat Sen House	George Town	1880
186	Syed Alatas Mansion	George Town	1850
187	Lebuh Acheh Malay Mosque	George Town	1808
188	Khoo Kongsı	George Town	1906
189	Cheah Kongsı	George Town	1900

190	Assumption Church	George Town	1861
191	St. Xavier Institution	George Town	1954
192	Hainanese Association	George Town	1900
193	Carpenter Association	George Town	1850
194	Goldsmith Association	George Town	1903
195	Chan Kim Boon House	George Town	1900
196	King Wan Association	George Town	1900
197	Hainan Temple	George Town	1895
198	Benggali Mosque	George Town	1803
199	Cheong Fatt Tze Mansion	George Town	1890
200	Leong Fee Mansion	George Town	1907
201	Ku Din Ku Meh Mansion	George Town	1900
202	St. Francis Xavier Church	George Town	1867
203	Baba & Nyonya Heritage	Bandar Hilir	1896
204	Cheng Hoon Teng Temple	Bandar Hilir	1646
205	Kampung Kling Mosque	Bandar Hilir	1748
206	Sri Poyyatha Vinayagar Temple	Bandar Hilir	1781
207	Christ Church	Bandar Hilir	1753
208	St. Paul Church	Bandar Hilir	1553
209	Malay Independence Memorial	Bandar Hilir	1911
	<b>Total</b>	<b>209</b>	

## 5. THE PILOT SURVEY QUESTIONNAIRE

Basically there are ten (10) sets of questioned has been stated in the questionnaire form and the questions are as follow:

Question 1: Location of the survey?

Question 2: Year the building was built?

Question 3: Building category?

Question 4: Current uses of the building?

Question 5: Current conditions of the building?

Question 6: Does the building has been conserved properly?

Question 7: Are there any sign of defects occur at the building?

Question 8: If yes, at which element?

Question 9: Does the building needs any conservation approach?

Question 10: Does the current conservation approach suitable?

## 6. THE ANALYSIS RESULTS OF THE PILOT SURVEY

Based on the data that has been collected throughout the pilot survey, all the data has been analyses using SPSS and simply summarized in forms of pie charts as shown at the next page:

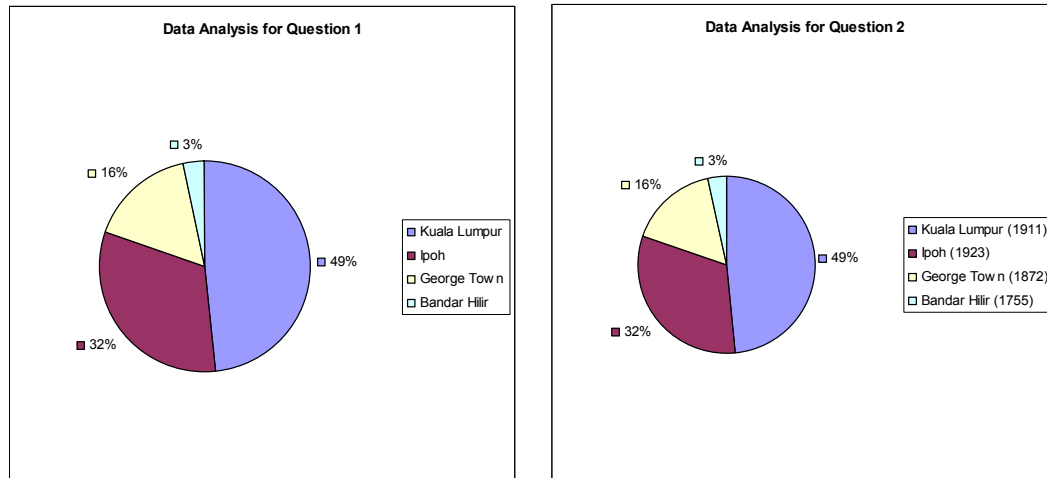


Figure 1. Data Analysis for Question 1: Location of the survey? (Top Left)  
 Figure 2. Data Analysis for Question 2: Year the building was built? (Top Right)

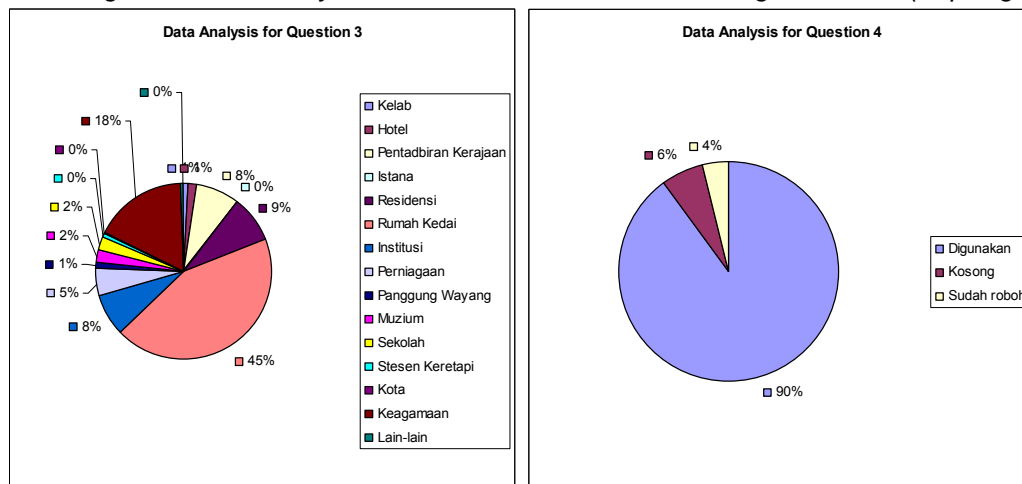


Figure 3. Data Analysis for Question 3: Building category? (Top Left)  
 Figure 4. Data Analysis for Question 4: Current uses of the building? (Top Right)

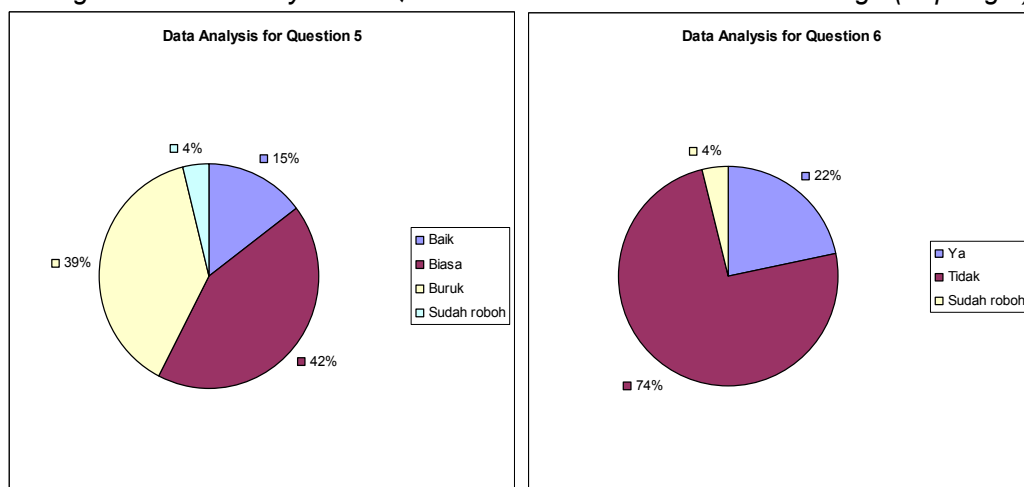


Figure 5. Data Analysis for Question 5: Current conditions of the building? (Top Left)  
 Figure 6. Data Analysis for Question 6: Does the building have been conserved properly? (Top Right)

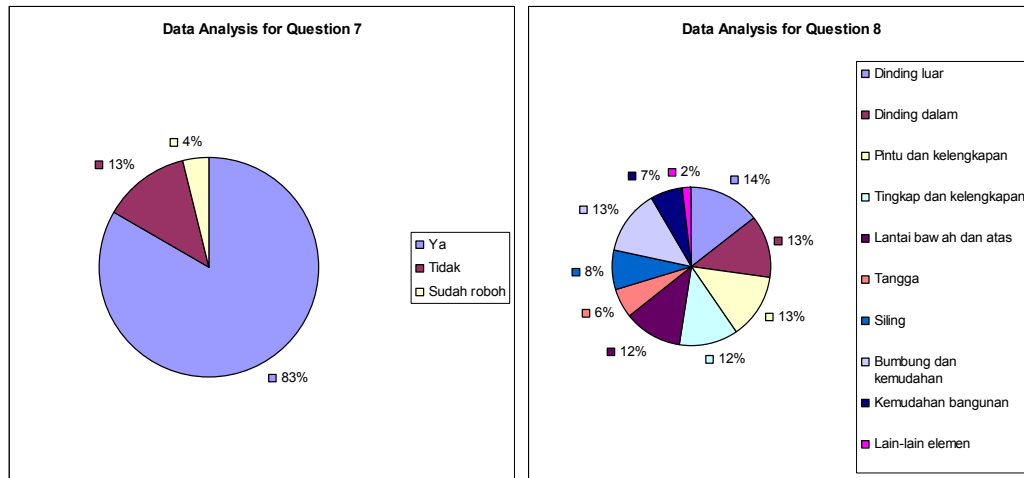


Figure 7. Data Analysis for Question 7: Are there any sign of defects occur at the building? (Top Left)

Figure 8. Data Analysis for Question 8: If yes, at which element? (Top Right)

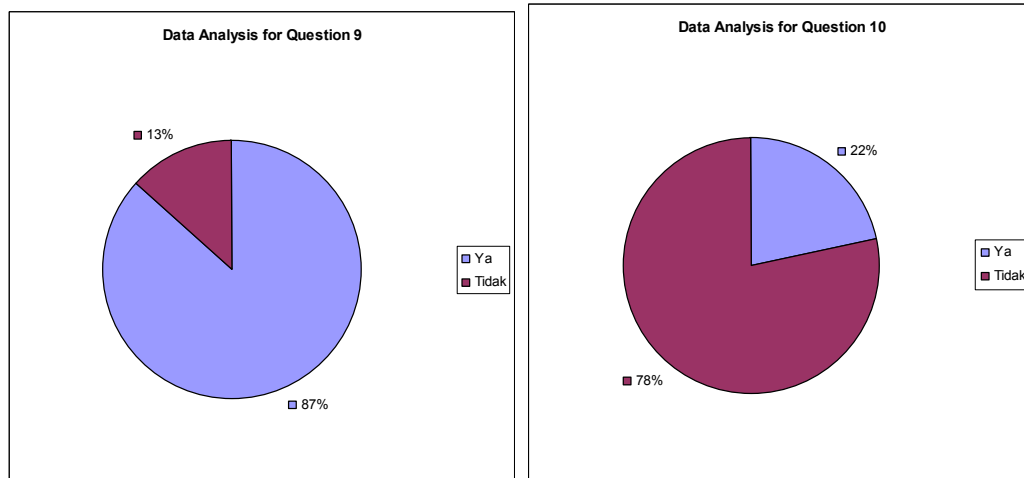


Figure 9. Data Analysis for Question 9: Does the building needs any conservation approach? (Top Left)

Figure 10. Data Analysis for Question 10: Does the current conservation approach suitable? (Top Right)

## 7. RESEARCH FINDINGS

Based on the total number of 209 historical buildings that has been surveyed in the pilot survey at four heritage towns and cities i.e Kuala Lumpur, Ipoh, George Town and Bandar Hilir, in order to identify the current conditions of the historical buildings and the level of building defects that occur at these historical buildings, it can be conculed that:

1. 49% of the historical buildings surveyed was located at Kuala Lumpur.
2. The average age of the historical buildings in Malaysia was built in 1903.
3. 45% of the historical buildings surveyed was categorised as shop houses.



4. 90% of the historical buildings surveyed was still occupied while the other 6% was abandon and 4% has been demolished.
5. 39% of the historical buildings surveyed was in poor conditions.
6. 74% of the historical buildings surveyed has not being conserved properly.
7. 83% of the historical buildings surveyed has the sign of building defects.
8. 14% of the building defects occur at external walls followed by 13% at internal walls and etc.
9. 87% of the historical buildings surveyed needs to be conserved.
10. 78% of the historical buildings surveyed showed that the buildings was not being conserved properly according to the basic principles and conservation guidelines.

## **8. CONCLUSION**

Like many other countries in which building conservation seem a fairly new practice, Malaysia faces several problems in dealing with the issues of historic buildings. First, the present legislation on historic buildings is not sufficient and suitable to protect such buildings from being renovated, refurbished or even demolished and destroyed. Secondly, there is lack of technical knowledge in repairing and maintaining historic buildings. This is a major problem because almost all conservation jobs involve both repair and maintenance stages requiring an understanding of and analysis of building defect diagnoses. It would be hard to imagine our towns and cities without historic buildings; so much they are a part of the everyday scene that we tend to take them for granted and overlooks their importance. Each one is an example of a combination of design and construction skills that provide us with a very visible history of buildings through the past 500 years. The aim of this research is basically to identify common problems related to defects likely to occur at historic buildings. It is hoped that by doing this pilot survey and throughout the findings of this research, we could now have a clear scenario about the current condition of Malaysia historical buildings and the percentage of building defects that occur at these historic buildings and therefore a series of preventive measures can be undertaken to prevent it from happening in the future. Based from the research findings, we can conclude that most of the defects that occur at historic buildings in Malaysia were at external walls followed by internal walls and etc. Therefore, building owners should take special care and considerations at these building elements in order to prevent defects from occur in the future.

Understanding the common building defects is simply a logical way of proceeding from the evidence to the cause of a defect, after which remedies can be prescribed. The more that can be found about why defects have occurred, the more can be fed back through the repair works by the professionals responsible for the conservation works. Good repair practice is central to good conservation in Malaysia. Repair would be the only action required to enable historic buildings to survive. The present reality, however is that other sorts of intervention may be necessary to accommodate change. Alteration of one sort or another, in addition to straightforward repair, must sometimes be inflicted on buildings if they are to continue to be useful and wanted. Conservation, therefore, may entail more than repair. Destruction is invariably wasteful and may be positively damaging, while the creation and conservation of good buildings is always worthwhile where repair and maintenance may seem a modest unglamorous activity that can be continuity of past, present and future, working closely with historic buildings, scan be sheer pleasure, and making them good in the Malaysian way, indeed be glorious.

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## THE IMPLEMENTATION OF MAINTENANCE WORKS FOR HISTORICAL BUILDINGS – A REVIEW ON THE CURRENT SCENARIO

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### ABSTRACT

*The conservation of historical buildings is a method on preserving structures which are historically and culturally important to the nation. Conservation involves works undertaken to preserve the condition of the building to its original state and this also includes the subsequent maintenance works. Maintenance is identified as a means on prolonging the lifespan of the historical structures. Without proper and systematic maintenance works, without doubt, the historical buildings will deteriorate and becoming dysfunctional as well as unfit to be used. This paper intends to highlight the establishment of maintenance management, the responses on the importance of maintenance works to be undertaken for historical buildings, factors governing the effectiveness of maintenance works on historical buildings and maintenance approaches, inclusive of maintenance programmed undertaken on the structural, non-structural elements as well as the services systems. The findings for this research are summarized from the responses obtained directly from the respondents employed for the management of the historical buildings. Case studies involving 20 numbers of historical buildings, of which some are already categorized under national heritage, were carried out. The methodology for this research is based on personal interviews and distribution of self-developed questionnaire which consists of 10 key topics, all developed relating to conservation of historical buildings and the current scenario on the implementation of maintenance works on these buildings.*

### Keywords

*Conservation, maintenance, historical buildings*

### 1.0 INTRODUCTION

All the key national and international documents, which provide guidelines for the protection of historic buildings, emphasize the pivotal role of regular systematic maintenance. For example, the Burra Charter, defines conservation as being "...All of the processes of looking after a place so as to retain its cultural significance" and goes on to state "...A principle of conservation is that the cultural significance of a place is embodied in its fabric, its setting and its contents...". Other international charters, for example the Venice Charter, the Amsterdam Charter, the New Zealand Charter and the Guidelines for the Management of World Cultural Heritage Sites, make similar points. During the formation of Society of Protected Ancient Buildings (SPAB), (Morris, 1877) had highlighted the importance of the maintenance plays in protecting historic buildings.

Given that the nature of historical buildings, which are in some avoidable degree of degradation and decay, maintenance is the single most significant approach that can ensure the prolongation of the building's lifespan. (Hamilton & Wan Salleh,

2001) stated that systematic management and continuous maintenance works are necessary for mitigating the decaying process that will lead to unsafe condition. Besides the benefit to the building's lifespan, the execution of the maintenance works on a building and its services system when continuously and progressively undertaken, in a long run will be profitable to the organization.

N O	NEGERI	BGN.	KOTA	BATU	GUA	PERIGI	MAKAM	LAIN- LAIN	JUMLAH
1	PERLIS	-	-	-	-	-	-	-	-
2	KEDAH	-	1	-	-	-	-	-	1
3	PULAU PINANG	7	1	1	-	-	1	-	10
4	PERAK	-	2	2	1	-	45	-	50
5	SELANGOR	7	3	-	-	-	2	1	13
6	W. PERSEKUTUAN	53	-	-	-	-	-	-	53
7	N. SEMBILAN	5	1	1	-	-	2	-	9
8	MELAKA	13	2	1	-	4	8	-	28
9	JOHOR	2	1	-	-	-	-	-	3
10	PAHANG	-	-	-	-	-	1	-	1
11	TERENGGANU	-	-	-	-	-	7	-	7
12	KELANTAN	5	-	-	-	-	-	1	6
13	W. P. LABUAN	-	-	-	-	-	-	-	-
JUMLAH		91	11	5	2	4	65	2	181

**Table 1: List of Heritage Sites to be Gazetted under National Heritage Act 2005 (Act 645)**

**Source: Malaysia Heritage Department.**

Based on the List of Heritage Sites to be Gazetted Under National Heritage Act 2005 (Act 645) as compiled by the (Jabatan Warisan Negara, 2007) (Refer Table 1); it was recorded that there were about 181 numbers of heritage sites in total, which consists of building, fort, stone, cave, well, cemetery and other pre-war structures sporadically located within 13 states in Malaysia. Out of this, only 91 are buildings. Undoubtedly, these buildings are important in portraying the historical past of the nation but given the age of the buildings at present, these structures will not be standing for too long unless proper maintenance works are carried out. The lack of proper maintenance works and identification of historical buildings may contribute to decaying of buildings thus resulting to decrement in the number of historical buildings. Rapid urbanization process is the main threat for historical buildings (e.g.) Bok House which was demolished in 14th December 2006 (Phang & Puah, 2006).

Acknowledging the need of a systematic maintenance for historical buildings, this research therefore is seen as the vital approach to highlight and to assist the improvement on the maintenance for historical buildings within the local context. This research intends to integrate two key elements, namely, the importance and the needs of the maintenance, with the main purpose of developing a framework for a systematic maintenance programme for historical buildings in Malaysia. The main

focus of this research will be concentrated on the historical buildings which have undergone the conservation works be it major or minor.

## **2.0 LITERATURE REVIEW**

(Fielden, 2003) stated that historical buildings are indeed valuable and should be appreciated for its cultural significance. The significance of these buildings presents in the forms of their aesthetical characteristics, historical value, social value, spiritual value and symbolical value. For their significances, these historical buildings should be preserved; purposely to be shared and cherished by all.

(Dunn, 2000), highlighted that maintenance is one of the primary principles for conservation of historical buildings. It is a method or an approach to preserve the existing fabric of the historical buildings. He also expressed that proper maintenance will upgrade the status and value of the historical buildings. In addition, systematic implementation of the maintenance works will raise the interests amongst the public and becomes political issue. Up to present date, there is a positive change in the public's perspectives on the issue of maintenance. Maintenance is now being largely accepted and recognized as the best approach in ensuring the prolongation of the buildings' lifespans, a strategy for slow renewal and decay prevention; and, maintaining utility and economic return (Dunn, 2000).

For some of the buildings, the main purpose of executing the maintenance works is to protect the function, the asset's value and the appearance (Hills & Worthing, 2006). The differences on the types of maintenance for historical buildings are due to the value of the buildings themselves which often have their own cultural importance value. (Hills & Worthing, 2006) also elaborated that historical buildings are invaluable artefacts of which the buildings' fabrics possessed their own archaeological value and definite functions.

(ICOMOS, 1987) stated that maintenance is defined as the continuous caring performed to prevent the structure, fabric and the positioning of the building, of which these differ from the concept of repair works which include the restoration works or reconstruction works and these require comprehensive planning.

(Fielden & Jokilehto, 1993) described that maintenance includes all practical and technical approaches which are deemed necessary to ensure that the condition of the building or the site of where it is located is maintained true to its original and that the works undertaken will not degrade the building's value and significance. This process should be progressive and continually undertaken to ensure that the lifespan of the building can be prolonged.

The differences in approaches and opinions on the aspect of maintenance for historical buildings are due to the continuous debate on the exacting nature and the value of these heritages. In general, the expression on the value of the historical buildings is clearly stated in Article 1 of the Burra Charter (ICOMOS, 1987). The content stated that the fabric of some historical buildings may contain the cultural importance of which the buildings itself should be viewed as valuable artefacts. Based on this statement, the main purpose of the conservation is to maximize the conservation of the cultural importance by performing one of its key principles, namely, the continual improvement. Article 1 of the Burra Charter (ICOMOS, 1987) also stated that if buildings are evidently found to possess the cultural importance, maintenance works therefore should be performed to retain the buildings.

(Kerr Semple, 1985) expressed his opinion that maintenance is part of the conservation process. He further elaborated that maintenance is an important conservation process, citing that prevention is better than cure. (Dann, Worthing, & Bond, 1999) highlighted in their research that somewhere along the line, there is a bond between conservation and maintenance works as the latter is an approach to prolong the lifespan of the building whilst at the same time if works undertaken are poorly performed, it may contribute to the loss of the original building fabric. This statement is strongly supported by (Brereton, 1991), stating that the replacement on the historical building's fabric, if not being properly detailed out or cared for will give a certain negative impact to the building's fabric and value.

## **2.1 HISTORIC BUILDING MAINTENANCE SCENARIO IN MALAYSIA**

Referring to Malaysia's Prime Minister, Datuk Seri Abdullah Ahmad Badawi during his speech in NAFAM Conference in Kuala Lumpur, billion of ringgit has been spent and wasted in repairing public buildings due to Malaysia's poor maintenance culture (Abdullah Ahmad Badawi, 2007). This is such a waste because if the defects were spotted earlier and rectified, it will not develop into big problems and cost more money.

In another event, the critical issues concerning the absence of systematic maintenance works became one of the key topics discussed by Datuk Seri Abdullah Haji Ahmad Badawi during his opening speech for Development of Maintenance Culture, a national seminar conducted on 23rd September 2003. He expressed his concern on the need to cultivate the culture of prioritizing and protecting the structural quality of a building amongst the Malaysian. In addition, the Prime Minister also highlighted that the understanding on the importance of maintaining the buildings should not be limited to new buildings only as the historical buildings also have their own significant value.

The absence of a proper and systematic maintenance which can be used as benchmark to carry out the maintenance works or as references has resulted to various issues. One of the recent examples on the failure to undertake proper maintenance involved the collapse of the ceilings at the Immigration Headquarters, main hall of the Ministry of Development, Entrepreneurship and Corporation in Putrajaya, and, the High Court Building in Jalan Duta, Kuala Lumpur. Another example is the leaking of the piping system at Parliament Building, as reported in the newspaper (Utusan Malaysia, 14 May 2007).

Up to present date, many historical buildings have been sacrificed just for the sake of letting way to new developments. Besides the demolition of these historical buildings, a large number of the historical buildings are also left in a bad state of decay, for instance, Kuala Lumpur Railway Station Building (KTMB) Kuala Lumpur and Majestic Hotel, both located in Kuala Lumpur (Utusan Malaysia, 22 August 2007, 25 August 2007). These two buildings are part of the national heritage and these are invaluable and the loss of the buildings should be avoided. Neglectance and unawareness are two main reasons on why these historical buildings are left decayed without any proper maintenance works and care undertaken to remedy the defects occurred on the buildings.

A survey carried out by (Berita Harian, 18 Februari 2005) on the condition of historical buildings located within the Federal Territory of Kuala Lumpur summarized that a large number of historical buildings were found to be in a very dirty condition, turned into rubbish dumpsites, victims of vandalism, not maintained by owners.

There is also the issue of which some buildings were maintained on their facades only while the backsides or alleys were totally neglected. Noted, without a proper conservation and maintenance works carried out on these buildings, in no time, these buildings will be the thing of the past, left to decay and demolished resulting to the loss of our historical evidences which can no longer be shared by the future generations.

One of the approaches to mitigate the issues as addressed by Datuk Seri Rais Yatim, the minister for the Ministry of Culture, Arts and Heritage (KEKKWA) in 2007 (Bernama, 24 August 2007), he expressed his concerns on the critical issues such as the demolition of historical buildings just to give way to new development and the badly decayed state of the historical buildings in Malaysia. In order to mitigate or to minimize the issues, he had addressed the plan to carry out periodic or scheduled inspections on all heritage buildings in Malaysia. The enforcement on compulsory maintenance works to be carried out on all inspected buildings will also be undertaken.

	Items	Maintenance Cost & Allocation (RM)				
		2004	2005	2006	2007	2008
	<b>Repair Works</b>					
a	Building	365,585,172.00	361,679,082.00	468,274,756.00	776,149,192.00	718,322,610.00
b	Services Systems	35,056,141.00	23,570,447.00	23,962,962.00	167,348,458.00	26,420,710.00
	<b>TOTAL</b>	<b>400,641,313.00</b>	<b>385,249,529.00</b>	<b>492,237,718.00</b>	<b>943,497,650.00</b>	<b>744,743,320.00</b>

**Table 2: Maintenance Cost and Allocation from Year 2004-2008.**  
(Source: Property Maintenance Budget Unit, Ministry of Finance, Malaysia; 2008)

Table 2 showing the maintenance cost and allocation from year 2004 until 2008. This allocation was provided by Ministry of Finance, Malaysia for repair works. Based on the table, it is shown that each year government has to increase the budget for maintenance. It is obviously shown in the table the amount that had been allocated for repair works to building structure is extensively high if compare to services systems. In principle, if maintenance works are continuously done, the budget allocation could be reduced each year, but the figure showing otherwise. In researcher opinion, this might happened due to the statement which earlier made by Pak Lah, who said that Malaysian have a very poor maintenance culture.

As stated in Clauses 38 and 39, Chapter 4 of the National Heritage Act 2005 (Act 645) (Jabatan Warisan Negara, 2005) supervision, management and inspections on heritage sites/buildings/monuments are required but somehow these are vaguely described. The non-existence of specific statement, guidelines and references therefore is the main reason on why immediate actions should be undertaken. Indeed, there is a need to highlight the needs and the importance of conducting maintenance works on heritage or historical buildings to ensure longer lifespan of these aged buildings.

### 3.0 RESEARCH METHODOLOGY

A total of 20 historical buildings located within the Kuala Lumpur area were selected from the list of historical buildings obtained from Malaysia Heritage Department , and also other buildings which can be considered as historical depending on their



historical, architectural and aesthetical value. The methodology comprises of the following stages and this can be referred to Figure 1.

### **3.1 Research Instrument**

The first method for this research involves compilation of data from published and unpublished information obtained from books, journals, articles, reports, thesis and websites. In addition, a set of self-developed structured questionnaire consisting of 10 sections of questions is prepared to assist for interview sessions with the maintenance management of historical buildings, authorities and other responsible parties which used as part of primary data sources. The purpose of this instrument is to obtain information from primary sources, directly from the respondents. Accuracy of information and findings is what expected from this instrument. Other than this, visual observation is also undertaken as secondary sources. Information such as external factors can be identified from visual observation.

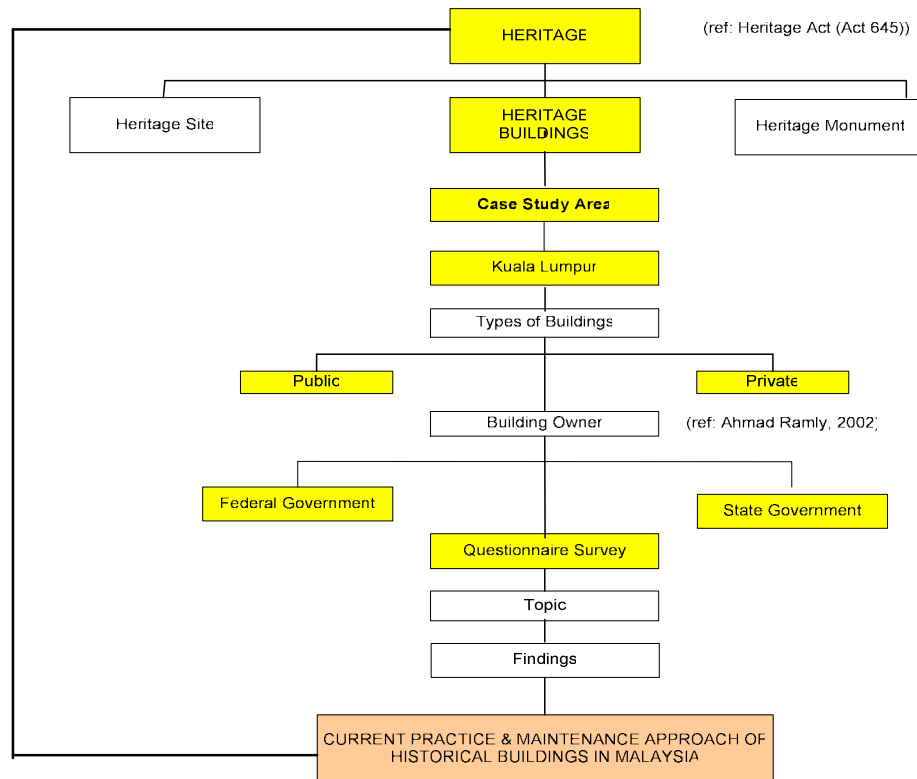
### **3.2 Research Samples**

The selection of the research samples is based on the information obtained from related organizations involving with the maintenance management of historical buildings in Malaysia. Each sample is selected based on the status of the building itself which is categorized as historical building and have undergone the conservation and preservation works.

### **3.3 Criteria for the selection of respondents**

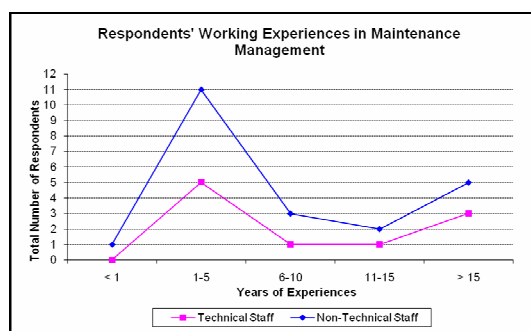
The main criteria for the selection of respondents are the respondents must be directly involved with the maintenance works or responsible for overseeing the execution of maintenance works. The respondents are classified into two categories, namely, the management level and the technical staffs.

**Figure 1: Research Framework for the study of Maintenance of Historical Buildings in Malaysia**  
**Source: Author's Research , 2008.**



## 4.0 Findings and Discussions

### 4.1 Demographic Profile of Respondents

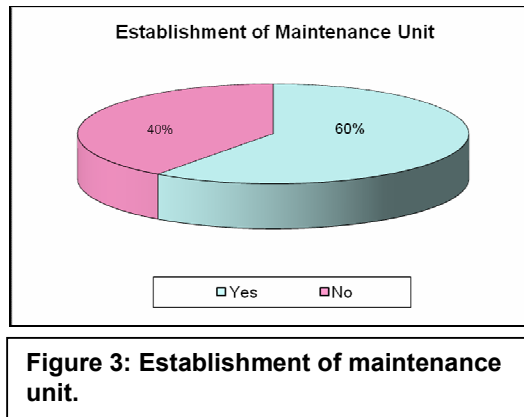


**Figure 2: Respondents' working experience in maintenance field.**

A total of 22 respondents were interviewed from 20 numbers of historical buildings selected. The respondents are consists of a personnel who involved in the maintenance of each particular buildings. This can be divided into two categories namely technical staff and non-technical or property management officer. Based on

the interview, it was found that most of them are still new and doesn't have much experience in terms of maintenance for historical buildings. This can be seen in the above figure which shows that majority of respondents have only 1 to 5 years working experience in the maintenance field.

#### 4.2 Organization Structure



In terms of establishment of maintenance unit within the selected historic buildings organization, 12 buildings (60%) confirmed that they do have proper set up of maintenance unit. Based on the researcher observation, even though 60% confirmed of the set up, most of them were focusing more on electrical and mechanical services rather than building structures. Most of them are still lacking of specialization for rectification of structure defects and diagnosis. Another 8 buildings (40%) which confirmed of their non-set up of maintenance unit prefer to outsource all the maintenance works or they just practice a very minor maintenance such as daily cleaning. Majority of the buildings were owned by the government, so if any damage occurred, they will directly refer to Public Work Department, Kuala Lumpur to get further advice and repair work done.

#### 4.3 The Importance of Historical Buildings

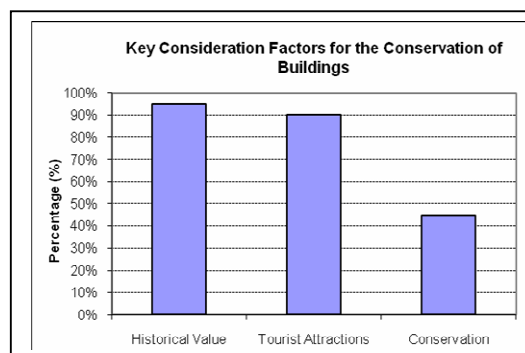
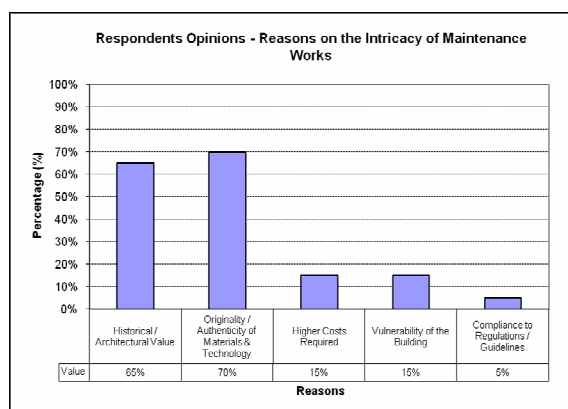


Figure 4: Key consideration factors for the conservation of

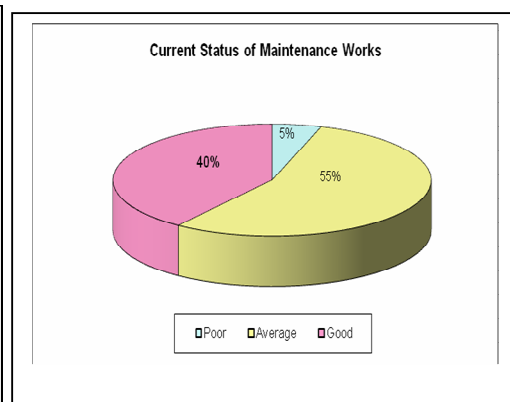
Based on the interview done, it is surprisingly found that all of respondents did aware on the historical value on their building and they are 100% agreed that it is such an important factor for historical buildings to be conserved and maintain. Other factors which also act as an important key consideration for the conservation and maintenance of historical buildings are historical value, tourist attractions and due to conservation guidelines imposed by government (refer figure 4). When asked whether they have informed all staffs on the different maintenance works requires in historic buildings compared to modern buildings, 65% confirmed that they did inform their staff. The rest (35%) said vice versa. Based on the findings and analysis, it is

shown that most of maintenance management staff in historic buildings do have some understanding on the important and significant of maintenance to the buildings. However, in some buildings they did not give so much attention to this matter making it less important to their staffs.

#### 4.4 Maintenance Approach – Current Practice



**Figure 5: Respondents opinion on reasons on the intricacy of maintenance works to historic building**



**Figure 6: Current status of maintenance works.**

50% of respondents claimed that they adopted Planned Maintenance Programme for their buildings, while another 50% confirmed that Unplanned Maintenance Programme is practiced by their organization compared to Planned Maintenance Programme. This confirmed that there is still lack of expertise in establishing a systematic and standardized maintenance programme.

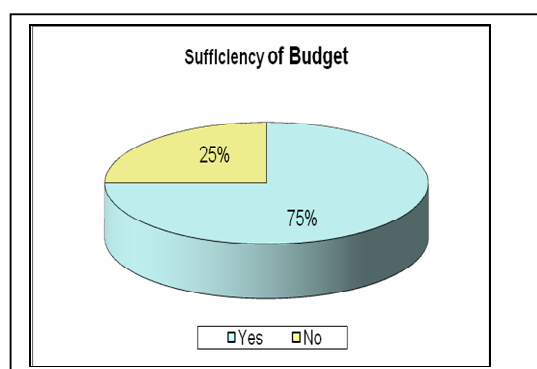
Generally, all of the respondents agreed that undertaking a maintenance programme for historical buildings are more complex compared to carrying out maintenance works for a new building. The subject of authenticity, the need to retain the architectural, historical, heritage and cultural values, the difference of the original built materials and technology, higher costs required are some of the intricacy that should be handled properly by the maintenance department and the technical skills appointed when undertaken the maintenance works (please refer figure 5 for detail). With reference to 3 scales marked as “poor”, “average” and “good”, purposely to symbolize the current status of the maintenance works implemented on the historical buildings, the overall results is shown on the figure 6 above. 55% of the respondents which is equivalent to 11 numbers of historical buildings claimed that they viewed the current status of maintenance works at an average and acceptable level. Respondents from 8 numbers of historical buildings claimed that the current maintenance works status are deemed as good enough. Their basis for this status level achievement is based on the current condition of the buildings of which the buildings are functional and not much defects occurred on the buildings and the services systems. 5% of the respondents which is equivalent to 1 number of historical buildings viewed that the current maintenance works implemented are considered as poor. Based on researcher observation, this may due to lack of maintenance personnel within the building.

#### 4.5 Regulations and Guidelines

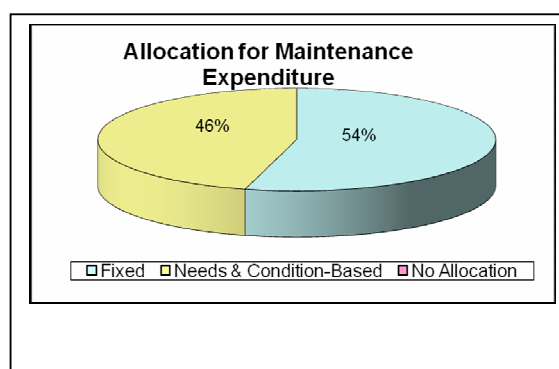
Findings regarding regulations and guidelines had confirmed that only 45% or 9 buildings did refer to some guidelines in doing their maintenance works, somehow another 55% or 11 buildings said they did not refer to any guidelines provided that they did not aware of the existence of the guidelines for historical buildings. Those 45% refers to guidelines provided by national heritage trust, public work department, museum department and KEKKWA. However, when asking the specific name of the guidelines, they cannot give the answer which showing their unsureness. The respondents were also asked in terms of their awareness on international guidelines for historic buildings. Surprisingly, all respondents confirmed that they just refer to local guidelines only. None of them aware of the international guidelines such as burra charter or venice charter.

95% of respondents then said they need a proper guidelines to assist them in carrying out maintenance works in their buildings. Reasons to the needs are standardization will be achieved for maintenance works, the guidelines can act as a quality benchmarking to all maintenance work done, it can be a basis for preparing the maintenance programme for specific buildings and also as a reference for external contractors appointed for maintenance works in historic buildings.

#### 4.6 Financial Factor



**Figure 7: Sufficiency of budget**



**Figure 8: Allocation for maintenance expenditure**

In terms of financial factors, 75% or 15 buildings had confirmed that they have sufficient budget for carrying out all maintenance works, while another 25% or 5 buildings did not have adequate budget (refer figure 7). Most of the budget are allocated annually depends on the needs and condition of the building. Some of it were given fixed budget in annually basis (refer figure 8). Usually the allocation provided will be based on the previous year expenses. In terms of budget resources, most of the buildings were much depends on their own organization. They hardly get the budget from the government. When asking whether they know if there are incentives given by the government, 55% said they are not sure and 15% said there is no allocation provided. However, another 30% answered yes showing that they know that there are allocation provided by the government.

As to researcher knowledge, Malaysia Heritage Department under KEKKWA, do have some allocation for maintenance of historic buildings, but the allocation must be applied for and will only be given to certain criteria of buildings decided by KEKKWA. This happened to put a lot of restriction to historic building owner as they

have to achieve certain criteria in order to get the allocation. And for some of them, they feel it is very hard so they decided not to apply at all.

#### **4.7 External Factors Affecting the Implementation of Maintenance Works**

During the interview and questionnaire fill-up session, respondents were also asked to give their opinion on the external factors that might contributing to an efficient maintenance works for historic buildings. Amongst the factors given are the needs for funding allocation, best management practice, efficient supervision works, the needs for establishment of specific regulations and guidelines, appointment of qualified technical skills, provision of incentives from the government and establishment of standardized maintenance programme.

In researcher observation, much of the problems associated with maintenance management of historic buildings is mainly due to lack of systematic maintenance programme to assist the historic building owner. It is confirmed that the proper programme is crucially needed in order to remain what we still have today. Without doubt, if no systematic maintenance works being implemented, we will lost our evidence of history sooner or later.

#### **5.0 Conclusions and Recommendations**

As a summary, this paper summarizes the findings on the current implementation of maintenance works undertaken for historical buildings in Kuala Lumpur. The case study result indicated that maintenance undertaken for historical building in Malaysia is still on a loose based. It can be summarized that major issues contributing to the lagging of a proper maintenance programme are as follow:

- a) The absence of the enforcement of a scheduled or periodic inspection by the authorities on historical buildings is the main issue associated with the decaying condition of the historical buildings. It was found that the main maintenance works carried out on these buildings are mainly repair or replacement works. In fact, the works normally concerns the services systems, not the building fabric or the structural or non-structural elements.
- b) Some of the organizations of historical buildings do not include a proper set-up of maintenance department or unit to carry out this specific work. Most of the organizations preferred to outsource the maintenance works to external contractors. This results to another issue on the quality level of the maintenance works, whether the works undertaken are true to their originality or not. As earlier explained, conservation is a new industry and not all contractors are knowledgeable and skillfull enough in understanding the intricacy of the maintenance works to be carried out on the historical buildings. The lack of understanding may result to loss of building value.
- c) Financial factor or in other name the cost to be allocated to carry out the maintenance works is one of the major issues. Based on preliminary study conducted, it was found that incentives given to the owners of historical buildings are not compelling enough and very limited. In addition, the financial allocation for conservation and maintenance works provided by the government is only provided for selected buildings only.
- d) The lack of technical skills and expertise to carry out the maintenance works is another issue faced in Malaysia. Undoubtedly, the numbers of competent technical staffs in Malaysia contribute to the questionable level of

maintenance works carried out. Maintenance is a new industry in Malaysia and majority of those involved in the maintenance management organization of historical buildings are lacking in technical knowledge and skills. It is noted that historical buildings are more intricate and delicate compared to contemporary, modern buildings and therefore there is a need to understand the importance of preserving the significance of the buildings with regards to its architectural, cultural, heritage and aesthetical values as well as to fully understand the conventional or traditional materials and technologies used for the construction of the buildings. In short, the execution of the maintenance works on the historical buildings should not be taken lightly and indeed the works require involvement of experts in order to ensure that certain quality standard is achieved and to prevent the loss of heritage value.

- f) The non-existence of specific guidelines and an example of an established maintenance programme as a standard guideline that can assist the maintenance department or unit is another issue that is overlooked in Malaysia.

The majority of the bodies charged with the conservation of historic buildings follow the logic and common sense of prioritizing maintenance over repair. Yet this research finding suggests that even some of these organizations are confused and relatively ill prepared to implement a coherent maintenance strategy. This is not so much an issue of negligence, but one of a failure to give maintenance the requisite priority. There is another more profound problem relating to the issue of maintenance; whilst most people would agree that a regime of regular maintenance is the ideal, providing good value for money and a better investment performance, the fact is that maintenance is perceived as money and effort spent on nothing new. It does not make the owner money, and although it can save them money in the medium and long term, they never see the return in an accountable way. Despite the best efforts of those championing regular maintenance, and its undoubted importance as the optimum conservation strategy, it has never been seen as either an attractive or a lucrative option. Maintenance is always wrongly perceived as a low status professional activity.

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## **Sustainability in Small Urban Complexes**

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### **Abstract:**

After the second war and re-habitation of destroyed places, the cooperation of modern environmental designer and architects glorified urban construction and urban issue as an important urban construction and architectural one. Building new cities by prepared design of neighborhood units and determination of parishes have been carried out by an individual or a special group for thousands of people.

Stability of cities and their re-habitation are important matters for architects and designers of 21<sup>th</sup> century. The main view of designers about environmental psychology for finding dynamic trend and stability of public spaces in quarter scale are investigated attention to requirements in daily communication with neighbors, passengers and other users in good environment, parish centers, markets and public space is considered in small urban complex.

These issues are proposed by psychologist and architects of 60<sup>th</sup> and 70<sup>th</sup> decades in late 20<sup>th</sup> century in environmental psychology frame. John Lang, Christian Norberg Schultz, Christopher Alexander, etc... are successful architects in this field. Their works are comprehensive references.

**Key words:** Environmental psychology, sustainability, neighborhood unit, sustainable human environment

### **Introduction**

After rehabilitation in early 20<sup>th</sup> century and propagation of modernism in building industry, urban large complexes were built in Europe and then in South America, South Africa and some European colonies in Asia. These complexes involved residential complexes, urban centers, governmental and public spaces.

By passing time and meeting primary requirement, problems related to designing were clarified. Of course, it was accompanied by basic conversion in scientific and philosophical issues the absoluteness was denied in Europe. Entire's scientific theories

were entered in philosophy. In this period, pluralism and other different theories were accepted, and philosophy as a effective scientific branch could affect on urban building and architecture by imposing relativity theory. This theory denied the harmony of parishes and cities; as a result, the shape of cities was changed. Architecture scientists studied other kind of science and they investigated architecture and building surrounding by combination of structure science, and they created spaces.

Psychologists Psychologist-architects studied the effect of human beings behavior on human environment other than post-modernism aspect in studying these spaces.

### **Architecture psychology**

According to analytic limitation and investigation about individuals and interactive effects on spaces, this issue in not consider large enough in relative private and public spaces. In studying pre-modernism architecture, we encounter with small public spaces in residential texture that they are main part of neighborhood units.

Psychological studies showed that dependency, feeling tranquility, safety and unity are behaviors that an individual communicates in public space. By these behaviors these spaces could be an open space for special ceremonies in a parish or it may be a small shopping center, and even a cultural and religious center. People could feel spatial ownership, feel unity and more interaction relative to other parts of city.

Designing, building, rehabilitation and preservation of these space expand continues attendance and as we know, an architectural design or landscape is complete when the human beings attend in it, whenever the human beings attend in these environments, we can hope revival of our design and his/her life.

This theory was proposed by psychologists in order to meeting exalted needs than human needs. This theory has been considered by architects in post-modernism architectural period. Demolition of some parishes and complexes in modernism period or changing functionality of some spaces, because of lacking determined goals criterion, strengthened this theory.

In this research, the authors try to recognize the strength and level of preservation of parish identity and personal identity and, as a result the stability of residential texture.

*The result of field research in historical and cultural cities showed that:*

- The residential parishes that shaped around strong and identical center, have been change a little relative to others.

- The residents of valuable center and parishes have belonging feeling and dependency to total civic complex.
- The residents of religious and cultural limited parishes resist on preservation of old texture and interaction with past trend relative to other s and show less intent to behavioral-Skelton renovation.
- Whenever the value of parish or neighborhood unit is increase, people will participate in strengthening of its value and situation.

### **Conclusions**

The results show that the mentioned theory is real, by detailed investigation as a behavioral-psychological research, we can prove this theory according to scientific limitation of author, it is not possible in this case.

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## **Role of Public Spaces in Old Urban Texture**

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### **Abstract**

In the world, every object requires preserver and reinforcement in order to survive. Every article which stops movement is condemned to die. So, one of the best and simple ways of survival is sustaining to movement. The best solution for survival of an object is the preservation of its movement.

The main solution for survival of an urban texture is continuity of important urban public and comprehensive places. In this article, public spaces such as cultural, religious, governmental, and scientific centers are introduced as important urban centers and their roles in stability and survival of the city are expressed. For an instance, it will be referred to some religious and cultural spaces in Islamic countries. In simple words, the hypothesis of the research is defined as follows.

*Public spaces are hearts of cities. A way of their stability is the preservation of continuity and updating the survival of them.*

**Key words:** Sustainability, Public Spaces, Urban Design, Architecture

### **Introduction**

The beginning and end of the life cycle of a plant involve a core and its central part that indicate the name and identity of total plant.

It is possible to forget previous name of a plant, when it is dried, but its seed preserves it and it can revival the plant's identity after passing special phases.

If there are proper seeds developing in proportionate condition, the result will be a defect plant the fact is that incorrect selection of seed lead to unusable plant in spite of correct planting stages. The name and identity of a person is determined by his/her ancestor's identity, when he/she obtains new personality; it is dominated, so the firm and strong part of a person's identity is his/her family's eternal part.

A residential texture is a complete of adjacent units; these residential units are gathering together in order to develop a texture. The identity of a place, a village or a city is the name that it is known from early days and it is fixed section of a texture which indicates current history. It is impossible to extract the identity from the appearance but the importance of a result urban complete is observable.

The aim of authors to introduce public and governmental places as main parts of an

urban texture and its identity in order is propose new solutions.

Surely, we have asked about our identity and the relationship between our tasks with our personalities the best answer to these questions in scientific, religious and philosophical texts is that our behavior, environment and persons who I have Relationship with them create my personality then I am distinguished accordingly even my appurtenance is firm. So an alive creature is recognized by his/her surrounding.

We want to consider this creature larger than a human, an animal or a plant. We propose the author's opinions about investigation about old and traditional residential texture in old cities of Iran.

### **The parish as an alive creature**

A parish is a complete of neighborhood units, residential, public, and commercial and service units, their residents can meet their daily requirement in this limitation so these units can act as a group and participate in some activities as a co-group. The formation of cultural and sport groups is different from other daily behavior with neighbors by passing the time and more relationship with people. So, the parish and its physical limitation change to parish behavioral meeting place and related activities lead to active and stable place.

### **Place-parish Behavior**

The main subject of the article is place-parish behavior that is the main reason for importance of parish special places and as a consequences parish identity and behavior.

The public place that can service the special individuals of a society in small scale lead to attendance of population in these places. They related to vacant space but in this case they are affected by natural and unnatural surrounding.

So, a humanistic environment creates place for group activities. A behavior is shaped gradually and then it is established by residents, space is a new identity proportionate with individual's performance in space. The good or bad value of place-behavior relate to behavior value, but this issue is not One-way-for example, anti-behavior is not shaped around religious place of teenagers do not gather around adult service offering places. In order to establish such a meeting place it should create required place for majority of population. The experience showed that the changes in places lead to changes in environmental behavior and as a result changes in identity of parish even it have symbolic aspect it can resist against new activities.

The studies in Tabriz indicated that small changes in behavior of old parish cause to

demolition of identity and create parish with new identity. Sensible changes do not lead to renewal of parish structure with strong center.

In 70 to and 80 decades the urban designer did not care about the identity of cities in demolition of valuable parishes. In explanation of results, it can be referred to followings:

- The parishes with valuable mosques with centrality around mosque have been recognized as parishes with Islamic and religious believes in daily activities and behavior.
- If the mosque and its surrounding preserve its old shape, similar behaviors are observable and the identity of parish does not change.
- In parish that its main place-behavior was a Bazar or square, the attendance of population shaped its fundamental identity.
- Unfortunately this identity has been loosed because of demolition of majority of these places or changes in identity. Poets and authors have been growth in these places.

In some parishes, there is no special monument and place-behavior because of lack of unity in complexes and diversity of culture and personalities.

In large scale, it can be said that these places create a city depend on strength and level of different activities in important urban centers with strong characteristics, the city have had identity.

Some of these identical centers and symbols are observable because of public and social value.

They are recognized as civic elements. So a city with more parish centers has high architectural and social value in case of admission this theory, it can be used in three sections as a recognition tool:

a) Past: they are categorized as identical cities with historical and cultural precedence that main activities are conducted there.

b) Present: by recognition of important centers, it can be programmed in order to strengthening of parish and residential textures identity and eternal value.

It should be noted that these activities do not weaken these centers and reduce place-behavior.

c) Future: the investigation in Gheshm Island showed that new parishes have been built around mosques and houses of the great persons it means that the special places with proper behavior should be constructed according to design.

### **Conclusions**

The total results and the manner of their application have been explained in text.

Shaping of parishes identity and their revival have been carried out in four stages.

*First stage:* building and organization of required place for proper behavior.

*Second stage:* shaping defined behaviors special for places.

*Third stage:* giving place-behavioral identity to surrounding monuments and complexes.

*Fourth stage:* changing place to district index -depend on plan scale and identity of texture.

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## ACHIEVEMENT TO URBAN SUSTAINABLE FORM

(A Case Study: Yazd)

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**ABSTRACT:** City and urban form is sustainable when a city is accessible in its total aspect for its residents. In other words, a sustainable city necessitates circumstances which are changing after passing time. This paper is aimed by answering the following questions:

What is urban sustainable form? How is the level of city sustainability related to its form, size, density and structure?

The especial structure of historical city of Yazd as in central Iran is originated from its location at the desert margin. Also, Zagros heights prevent the city from sea humidity and many other factors which cause weather dryness and lack of step in Yazd city. But in the past the creative designers of the city utilized from modular concept in the form and the size of building, compatible with climate, the maximum use of potential and local materials. Also they had avoided their designs from unnecessary decoration by using ornaments including aesthetic and function aspect.

They considered human scale in proper form based on resolving human need during time to create an urban sustainable form too.

This paper is attempting to recognize urban sustainable model by identifying the principles and concepts of sustainable design in Yazd old fabric. So, the urban structure and its component elements are categorized in three level of macro, medium and micro. After classification its obvious specification in different level from the whole to detail and vice versa, it can be analyzed to present the hidden model in Yazd city in which urban sustainable form follows them. The obtained pattern can developed during a creative process and utilize it in future city design.

**Key words:** Sustainable form, Pattern recognition, Sustainable principle, Yazd.

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## **1. INTRODUCTION**

This paper analyses the sustainable design principles and methods of traditional architecture and design system in historical Yazd city in the central part of Iran. This analysis will result in the development of a suitable framework for sustainable planning of cities as present and future settlements.

Originally the aim of this study was to prove that erosion or depreciation of historic urban fabric was not only the result of building material's erosion, but also of a wide range of cultural, economic, social and political factors.

It also aims to prove that along with the physical rehabilitation and conservation of the urban fabric, action should be taken toward the cultural and social improvement of a city.

For a historic city like Yazd, probably the most important aspect is its history. Because structural and socio-cultural heritage is intimately linked, it is possible to learn from our ancestors experience when sustainable design and planning for the future.

Therefore it was our duty to consider the history of the city as an important part of the study.

To reach this aim, living in the study area with a close relationship to resident was the first and basic step to be taken. The second step understood the importance that in historic fabric as Yazd, the structure of the city was a collection of different systems of which each one had its own special characteristics.

Apart from collecting the necessary information from different sources, it was necessary to investigate every single building.

## **2. GENERAL SITUATION OF THE CITY**

Yazd City is located to the east of Isfahan and to the south of Kavir-e-Loot, in the longitude of 54°, 24' and the latitude of 31°, 25' and 1200m above sea level in the central part of Iran. The city is surrounded by Kharayegh and Taft mountain chains from northeastern and southeastern sides respectively. A regional main road along the southeastern to southwestern direction and its interference with several byways towards the south brought about an appropriate situation from the access viewpoint for the city. The direction of the gradient for the conduction of water by the Qanats from the southern mountains has developed the residence possibility.(1980,Bonine)

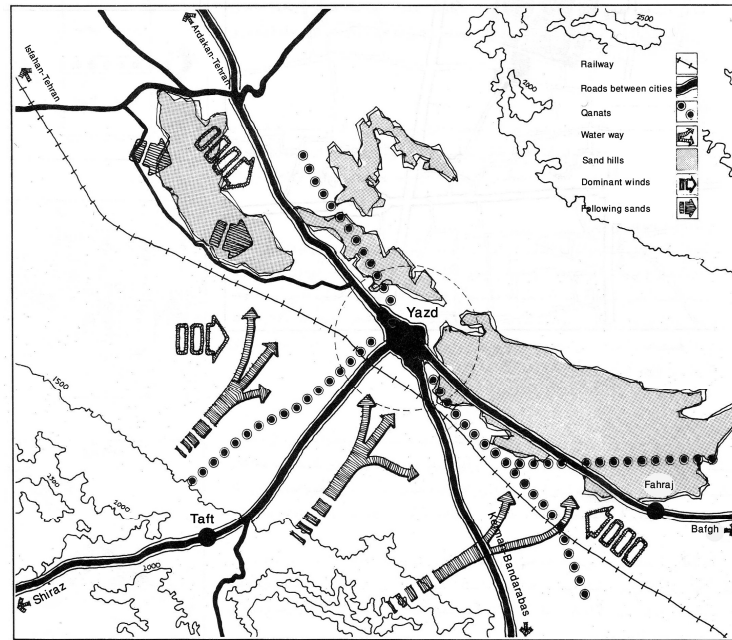


Figure 1. Situation of the city

Source: Author

The location of the city at the desert margin and the existence of Zagros heights preventing the permeation of sea humidity as well as several factors have caused the dry weather of Yazd. But in the past the creative designers of the city utilized from the "Qanats system" (underground water channel), which brings water to ground level land through a simple traditional technology, transfers it to gardens, dwellings and public services. In these areas water is stored separately for each neighborhood.(1983,Kamiar)

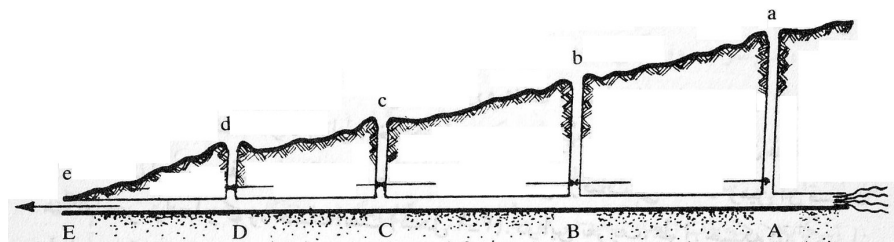


Figure 2. Diagram of a typical Qanat

Source: Author

## **1. URBAN SUSTAINABLE MODEL IN THE HISTORIC SITE OF YAZD CITY**

### **3.1 urban structure and urban fabric (Macro level)**

#### **a. *First Stage: Formation of primary core***

According to history on the formation of the primary core of the city, before Islam and during the Haecamanid era (330 to 550 bc) a city called Isatis was located in the present location of Yazd. However there is no reliable document in this regard, the primary core of Yazd was in the form of a castle due to its location and the defensive necessities the city was taken control of by Muslims in the 7 century and continued its life in the form of a collection of cities including Aghda, Meibod, Fahraj and Haftadar until the late 10 century.(1996,Ebrahimi)

#### **b. *Second Stage***

Maybe one dare say that the substantial transformation and change of Yazd into a reliable and integrative city dates back to 11 century when the gates were developed all around the city and the new existence thereof was introduced. The first wall for the city along with the main four gates was formed in such era within which the development of the city was towards the south and the city center was formed around the great mosque. In this stage, the main axis of the city is the main passages. Such passages led to the city gates and the main places in the city were connected therewith. Traditionally, the city market had to be easily accessed by each and every part of the city. The market was regarded as the performance heart of the city. The arrangement around the market proves such issue. The users of the market accessed to it by the least change in direction. In the 4<sup>th</sup> century the city was developed towards the south and southwestern and new walls as well as seven gates were built.(1988,flamaky)

The reasons of the development of the city towards the south and southwestern were expressed in different historical documents among them are the course of the sandy winds in the north, appropriate lands for building construction in the south and southwest and the underground course for the movement of waters from the south and southwest towards the city.

**c. Third Stage**

In the 15 century, the city heart was transferred into Mirchaqmag collection including the mosque, market, cistern around a large square in the southeastern part and the city center was transferred into such collection. The market which was at first developed in the "Jameh" mosque appeared in the proximity of the south gates and even at the back of the city enclosure and joined to Amirchaqmag Square. As a result, the market grew so fast and changed into an active trade center in the region.

**d. Fourth Stage**

During the 16<sup>th</sup> and 17<sup>th</sup> century, Yazd city was not developed compared to other cities of Iran like Isfahan Shiraz and Kerman.[4] In the late 17<sup>th</sup> century and the early 18<sup>th</sup> century another collection called Shaah Tahmaseb was developed including the service spaces and located in the southwest. These two square were connected by a local trade axis. The city center remained in the pervious place.

**e. Fifth Stage**

In the 19<sup>th</sup> century, a new collection called Khan including square, school, bath, market was developed and also in 1815, the construction of a wall to surround all around the city just began. Such wall did not act as an appropriate border for the city and the development of the city towards the south and southwest went on.(1988,Delamy)

**f. Sixth Stage**

In the 20<sup>th</sup> Century the construction of streets during Pahlavi Dynasty on the old fabric was conducted and new users on the margin of the streets formed. Yet the traditional city went on notwithstanding the internal changes.

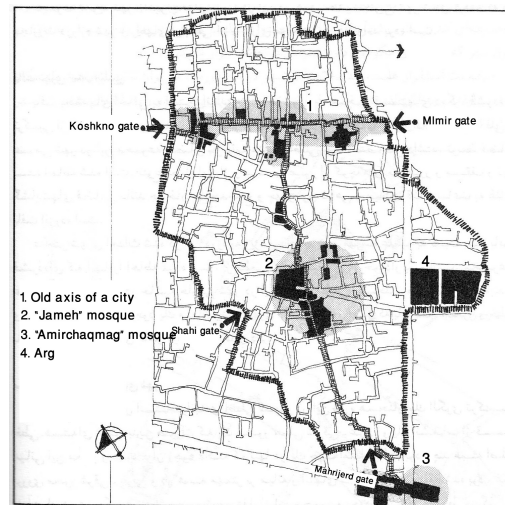
The physical structural pattern of a city is linear-core. Its development follows a pattern of parallel axes perpendicular to the main initial axis, and stretched toward south of the

city. Several cores of the urban elements formed across each of the axes crossing the main axis. This growth trend gradually turns into a structure with a grid pattern made up of several axes and cores.

Sets of the urban elements and function that are established in each era occupy the suburban areas; locate adjacent to the city gate and along the main city and region connecting path. This array results from and influences the city growth.

Due to their potential in redirecting the city growth orientation towards themselves, the newly constructed edifices in each historical era located at the city suburbs tend to turn into core locations increasingly. (1997, Hamidy)

The general fabric of the collection of the city main structure spaces is compact and organic and there is a harmony all over the city fabric. Partitioning of the performance elements belonging to the city structure has a broader surface compared to that of the other elements.



*Figure 3. Historical development of Yazd city in six stages*

*Source: Author*

The urban fabric pattern in the collections and traditional performance elements has been introspective and the open spaces of each urban element have been enclosed in the built spaces.

### 3.2. Urban Space and Urban Elements (Medium Level)

The urban open spaces in the city main structure are in the form of the large squares and enclosed by the public buildings. The designed squares are the main factors organizing some of the buildings and are in turn among the main elements in the structure. The main performance of the elements in the city structure includes religious performance like Tekiyehs, Hoseiniehs, Mosques, Altars, and Shrines. Cultural performance stands for schools and service performance is like baths, cisterns, inns and trade performance is like market, mini market and trade places.

Governmental and administrative applications have their own special scope and are far from the public ones. The applications joining the special performance collections in each historical era are the market places. (1993, kheirabadi)



*Figure 4. "Mirchaqmag" square in Yazd city*

Source: [www.silkroadandbeyond.co.uk](http://www.silkroadandbeyond.co.uk)



*Figure 5. "Jameh" mosque in Yazd city*

Source : [www.travel-earth.com](http://www.travel-earth.com)

### 3.3 Skyline and image of Yazd city (Micro Level)

The image of traditional Iranian cities has been formed mainly along two factors, the cultural and climatic.

The unique sky line of an old city expose its activity, power, decline and the other characteristics and it is the first image which establishes the identity of a city in the sight of an observer.

Roof type, building material and even the color of traditional is subject to climate, but the form, structure, building order are cultural aspects.

The visual characteristics of traditional cities are very important in giving them a special identity from outside and inside. Any observable element on the skyline of a Yazd city, apart from being a functional factor at the neighborhood level, water reservoir, mosque and Hoseinieh and at the urban level as minaret of "Jameh" mosque, "Amirchaqmag" square or wind tower, were and still are the main basis for urban characteristics and orientation subjects for visitors and residents. Apart from such urban elements, the spatial arrangements of urban spaces were also important in influencing the image of a living environment. (1986.Soltanzadeh)

The minaret and dome of the mosque are probably the only urban elements, which still play the main role in the image of an Iranian-Islamic city.

In spite of all this ignorance, still are the wind towers on the roof of the building of the Yazd which built the historic image of this city.

The old form and elements of traditional cities have a strong effect on the mentality of their inhabitants. For example the minaret along with its religious aspect has always been an important orientation abject in the city.

New areas of cities develop broken from old structure and attention to special quality of traditional city is not to be seen.



*Figure 6. Skyline of Yazd city*

Source: [www.fahadaneyazd.blogfa.com](http://www.fahadaneyazd.blogfa.com)

#### **4. CONCLUSION**

The historic site of Yazd city has a special identity through its form and structure, which developed on a long period of time. Yazd city is representative for all historic cities in central part of Iran. The traditional urban design principles and methods of Yazd city are:

##### **A. Sustainable Form and Structure:**

- Historic citadel has developed based on the needs for progress and communication.
- Historic citadel contributed service centers.
- The historic centre includes closed neighborhoods and a comprehensive pedestrian network within whole city.
- This urban fabric tackled the climatic problems, providing a suitable ecosystem by using the existing natural and man-made potentials.

##### **B. The development principles of Yazd city are based on natural and cultural factors:**

- Neighborhood typology.
- Neighborhood centre.
- Relation and balance between empty, half full and full space.
- Urban symbols as the most important cultural elements within the urban fabric.

##### **C. Design principles:**

- Climatic balance by the help of underground water channel system.
- Encountering the desert sandy winds and air circulation with the help of green belts around the city.
- Planning covered alleys, which provide shadow.
- Deep courtyards inside the residential buildings.
- Green spaces full of shadows.
- Verandas.
- High ceilings and arches walls.
- Light color building material with low thermal capacity.
- Irregular design of alleys to prevent circulation of inconvenient winds within the city.



This paper was simply a review of what we know as sustainable urban design and architecture in central part of Iran. Now the situation of the cities such as Yazd raises the question: are the traditional characteristics of these cities, which have their roots in the culture of this country so strong and functional that we appreciate their real value and give them a respectful place in our modern cities; or, so we simply put them aside and replace them by new and modern approaches ignoring climatic and cultural differentiation?

Architects, urban designer and planners and transport engineers should accept more responsibility toward these cities.

To show the ability and value of sustainable traditional way of life in providing desirable living environment, in this part the special urban design principles and methods of Yazd city will be demonstrated.

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## **URBAN MICRO CLIMATE PERFORMANCE IN DEFERENT URBAN FABRIC IN MOSUL, IRAQ**

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### **ABSTRACT**

City of Mosul has a traditional urban core called *old city*, side by side with a modern fabric adopted by municipal authority since the rapid urbanization which the city had witnessed in the fifties of the last century, the traditional one characterizes with a compact and organic tissue, Introverted courtyard buildings built with a heavy thick masonry structure, while the modern is open geometric one with a wide streets and extraverted buildings build with concrete. City of Mosul has a hot dry climate summers and cool rainy winter, this research aims to make a comparative study for the urban micro climate performance (air temperature and relative humidity) in the two deferent urban fabrics (traditional and modern), during both the hottest and the coldest period of the year, using the meteorological data as a reference for evaluating the performance. The way cities are planned and built is therefore important for the global energy use environmental comfort. So it's important to study the relationship between urban form and outdoor climate. The preliminary results confirm that the climatic conditions are much more stable in the traditional city than in the modern part of the city, regarding both air temperature and relative humidity.

### **INTRODUCTION**

It is well known that the built environment Modify the climate. It has found that the geometry of buildings and properties of building materials have a strong influence on the urban climate. Parameters such as building density, height to width ratio of street canyon thermal admittance and color have a direct influence on the climate around buildings. This climate affects the comfort of humans at street level. It also influences the thermal stress on buildings and thus affects indoor comfort as well as energy use for heating and cooling [1].

It is possible to create a good urban climate through conscious urban planning and design. However, in most cases the climate is not sufficiently considered in the planning and design processes and as a consequence, many urban areas are uncomfortable. Whereas comfort and energy use on single buildings have been studied extensively, outdoor comfort and energy use in urban areas have had little attention [2]. Climatic aspects are seldom considered in urban planning codes. The problem is especially great in developing countries with rapid urbanization, where cities grow with

little control. Today's urban design and planning is often inspired by western movements and trends developed for a totally different climate.

City of Mosul has a traditional urban core called *old city*, side by side with a modern fabric adopted by municipal authority since the rapid urbanization which the city had witnessed in the fifties of the last century, the traditional one characterizes with a compact and organic tissue, Introverted courtyard buildings built with a heavy thick masonry structure, while the modern is open geometric one with a wide streets and extraverted buildings build with concrete. City of Mosul has a hot dry climate summers and cool rainy winter, this research aims to make a comparative study for the urban micro climate performance (air temperature and relative humidity) in the two deferent urban fabrics (traditional and modern), during both the hottest and the coldest period of the year, using the meteorological data as a reference for evaluating the performance. The final results confirm that the climatic conditions are much more stable and a better performance in the traditional city than those at the modern part of the city, regarding both air temperature and relative humidity.

## BACKGROUND

Mosul, with almost two million inhabitants, is the third largest city in Iraq. Mosul is situated **36.19 N, 43.09 E**, at **230 m** above sea level in a hilly area between the Mountains in the North and the *Al-jazeera* plane in the South and the West, Tigris River divides the city into two parts. The climate of Mosul is characterized by hot and dry summers and cold winters with rare snow, [3]. Annual mean temperature is **19.5° C** and rainfall is **383 mm**, [4]. Monthly climate data is shown in figures (1, 2).

Mosul consists of two contrasting parts: the traditional Arabic-Islamic, organic urban pattern, the *old city*, and the modern city with its gridiron urban pattern. One housing district in each part of the city was studied.

*Almakkaoui* in the *old city* is one of the most densely developed areas. Introverted courtyard buildings in two to three stories surround the narrow streets, which cut deep ravines through the city. The street network is irregular, which means that the buildings shade each other, there is a great variation of traditional building elements and a large number of building details provide shade at street level.

*Almalia* is a modern, two story housing area in the new part of Mosul, planned and built as a suburb with extroverted detached and semi detached houses. The area has a

regular pattern wide street planned for car ownership. This low density means both buildings and the ground are exposed to a great amount of solar radiation. Only a few trees provide shade for some facades and footways.

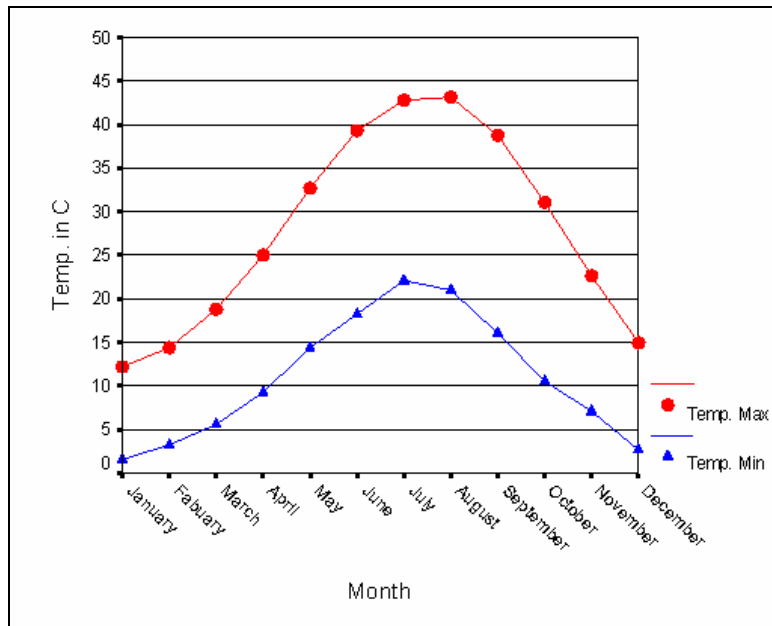


Figure 1. Max. & Min air temperature in Mosul City

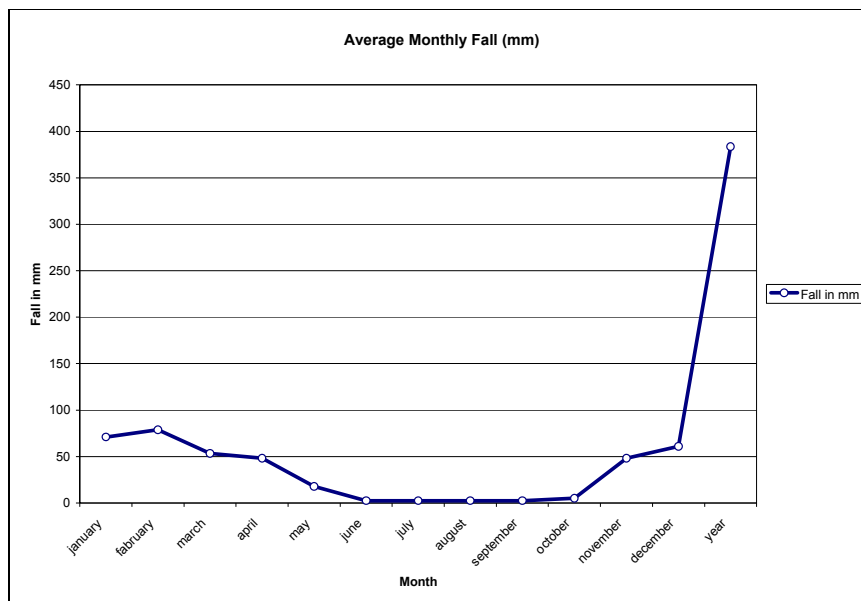


Figure 2. Monthly and Annual Rain Fall in Mosul City

## PROBLEM

Different urban shapes result in different urban microclimates. This study seeks to define relevant parameters in traditional and modern living areas. The aim is to find combinations of qualities from both environments, to be used in guidelines for future housing development in Iraq.

## METHODOLOGY

**Measuring Points:** In each neighbourhood several measuring points were studied. Measurements were made in two different street orientations, fig (3). In *Almakkaoui* the height to width (H/W) ratio of the street canyons varied between 4.25 and 3.64, whereas in *Almalia* the (H/L) ratios were 0.17-0.2. While the sky view factor (SVF) in *Almakkaoui* was between 0.056-0.061, whereas in *Almalia* the (SVF) was between 0.74-0.8.

For each measuring point, air temperature and relative humidity were measured in the middle of the street canyon, 2 m above street level. The instrument was protected from sunlight during the measurements. The measurements took place each hour per day from the sun rise to sun set, in summer (from 20<sup>th</sup> of July to 5<sup>th</sup> of August 2006) and winter (from the 20<sup>th</sup> of January to 5<sup>th</sup> of February in 2007). The measurements were made in one district at a time: seven days in one district followed by seven days in the other district.

All measurements were made with the testo-179-H2 instrument. The accuracy of the air temperature is  $\pm 0.5^{\circ}\text{C}$  and 3% for the relative humidity

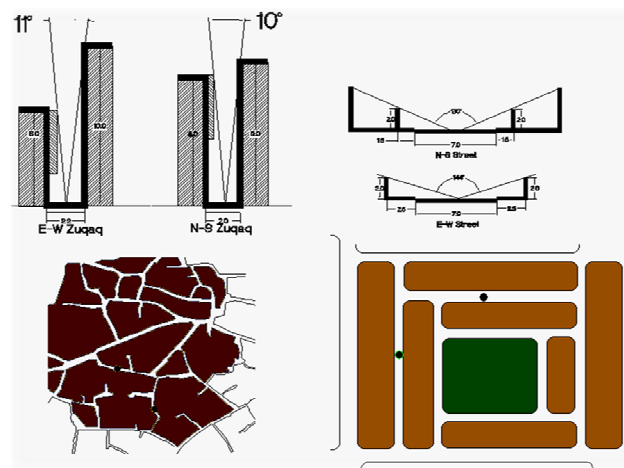


Figure 3. Plans and sections of measuring points in the traditional and modern urban fabric in Mosul city.

**Climate Measurements:** The measurements were made during summer, 20 July-5 august 2006, and winter 20 January-5 February in 2007. The "official" climate for Mosul (non urban climate) for the actual periods, measured at the Meteorological station situated on the outskirts of the city.

## RESULTS

The measurements can be divided in two category; air temperature and relative humidity.

### *Air Temperatures*

(1) - Summer:

The air temperatures measured in the *Almakkaoui* district (in the old city) varied very slightly and steadily in different hours of the day, with a Standard deviation 2.08-2.74 less than that one at Meteorological station 6.67. The minimum temperatures were 3.1-2.8°C higher than the "Meteorological station" for all measurement points all the days of measuring. The maximum temperatures were 8.9-8.3°C lower than the Meteorological station ones. The daily mean of air temperature was 4.9-4.5°C lower than the Meteorological station ones. Table (1, 2). No significant difference could be observed between streets of different orientation.

.The air temperatures measured in the district *Almalia* varied roughly during the hours of the day with a standard deviation 6.62 which is almost the same one at the Meteorological station 6.69-6.83. The minimum temperatures were 0.4-0.5°C higher than the ones measured at the Meteorological station. The maximum air temperatures were 2.3-2.6°C higher than the Meteorological station. The daily mean of air temperature was 1.59-1.63°C higher than the Meteorological station ones. Table (3, 4) As in Almakkaoui, no significant difference could be observed between streets of different orientation.

*Table 1. Summer daily cycle of air temperatures in (N-S) Traditional street canyon compared with meteorological station records.*

Time	Air temp. in the Traditional Path	Air temp. at meteo. station	Deference in air temperature
6:00 AM	31.1	28.0	3.1
7:00 AM	31.0	29.6	1.4
8:00 AM	31.5	32.9	-1.4

9:00 AM	33.3	35.6	-2.3
10:00 AM	34.3	38.7	-4.3
11:00 AM	35.6	41.5	-5.9
12:00 AM	35.9	42.3	-6.4
1:00 PM	36.2	44.0	-7.8
2:00 PM	36.3	45.2	-8.9
3:00 PM	36.9	45.4	-8.5
4:00 PM	36.9	45.1	-8.2
5:00 PM	36.3	44.6	-8.3
6:00 PM	36.0	43.1	-7.2
7:00 PM	35.3	39.5	-4.2
Mean	34.8	39.7	-4.9
Daily variance	5.6	17.4	
Standard deviation	2.08	6.67	

*Table2. Summer daily cycle of air temperatures in (E-W) Traditional street canyon compared with meteorological station records.*

Time	Air temp. in the Traditional Path	Air temp. at meteo. station	Deference in air temperature
6:00 AM	30.8	28.0	2.8
7:00 AM	31.0	29.6	1.4
8:00 AM	31.7	32.9	-1.2
9:00 AM	33.6	35.6	-2.0
10:00 AM	34.9	38.7	-3.7
11:00 AM	35.9	41.5	-5.5
12:00 AM	36.7	42.3	-5.6
1:00 PM	36.9	44.0	-7.2
2:00 PM	36.9	45.2	-8.3
3:00 PM	37.6	45.4	-7.8
4:00 PM	37.6	45.1	-7.5
5:00 PM	36.8	44.6	-7.8
6:00 PM	36.2	43.1	-6.9
7:00 PM	35.7	39.5	-3.8

Mean	35.2	39.7	-4.5
Daily variance	7.4	17.4	
Standard deviation	2.74	6.67	

*Table 3. Summer daily cycle of air temperatures in (N-S) Modern street canyon compared with meteorological station records.*

Time	Air temp. in the Modern Path	Air temp. at meteo. station	Deference in air temperature
6:00 AM	31	30.5	0.5
7:00 AM	31.5	29.9	1.6
8:00 AM	33.2	29.6	3.6
9:00 AM	34	31.8	2.2
10:00 AM	35.5	34.8	0.7
11:00 AM	38.2	37.4	0.8
12:00 AM	44.9	42	2.9
1:00 PM	45.1	43.6	1.5
2:00 PM	46.7	44.8	1.9
3:00 PM	48.3	46	2.3
4:00 PM	47.3	46.2	1.1
5:00 PM	45.7	44.8	0.9
6:00 PM	44.6	44	0.6
Mean	40.46	38.87	1.59
Daily variance	17.3	16.7	
Standard deviation	6.62	6.69	



*Table 4. Summer daily cycle of air temperatures in (E-W) Modern street canyon compared with meteorological station records.*

Time	Air temp. in the Modern Path	Air temp. at meteo. station	Deference in air temperature
6:00 AM	30.9	28.3	0.4
7:00 AM	31.5	28.0	1.6
8:00 AM	33.1	29.6	3.5
9:00 AM	34.3	32.9	2.5
10:00 AM	35.8	35.6	1
11:00 AM	38.3	38.7	0.9
12:00 AM	44.5	41.5	2.5
1:00 PM	45.9	42.3	2.3
2:00 PM	46.8	44.0	2
3:00 PM	48.6	45.2	2.6
4:00 PM	47.4	45.4	1.2
5:00 PM	45.3	45.1	0.5
6:00 PM	44.2	44.6	0.2
Mean	40.51	39.7	1.63
Daily variance	17.7	17.4	
Standard deviation	6.63	6.83	

(2) - winter:

The air temperatures measured in the *Almakkaoui* district (in the old city) varied slightly and steadily between different hours of the day, with a very small Standard deviation 1.74 less than that one at Meteorological station 4.18. The minimum temperatures were 4.93-4.6°C higher than that recorded at the "Meteorological station" 1.5°C. The maximum temperatures were 10.23°C slightly lower than the Meteorological station ones. But the daily mean of air temperatures were 8.68-8.83°C higher than the Meteorological station ones by 1.83-1.98°C. Table (5, 6). No significant difference could be observed between streets of different orientation.

Tables (7, 8) shows air temperatures measured in *Almalia* in winter. The air temperatures measured in this district varied slightly during the hours of the day with a standard deviation 2.17-2.57 but higher than that one at the Meteorological station 1.5. The minimum temperatures were 0.67- 1.07°C higher than the ones measured at the Meteorological station. The maximum air temperatures were 1.2-1.7°C higher than the Meteorological station. The daily mean of air temperature was 0.67-1.07°C higher than the Meteorological station ones. No significant difference could be observed between streets of different orientation for both types of districts.

*Table 5. Winter daily cycle of air temperatures in (N-S) Traditional street canyon compared with meteorological station records.*

Time	Air temp. in the Traditional Path	Air temp. at meteo. station	Deference in air temperature
7:00 AM	6.43	1.50	4.93
9:00 AM	7.17	3.27	3.9
12:00 AM	9.83	9.27	0.56
3:00 PM	10.23	10.97	-0.74
5:00 PM	9.73	9.23	0.5
Mean	8.68	6.85	1.83
Daily variance	3.8	9.47	
Standard deviation	1.74	4.18	

*Table 6. Winter daily cycle of air temperatures in (E-W) Traditional street canyon compared with meteorological station records.*

Time	Air temp. in the Traditional Path	Air temp. at meteo. station	Deference in air temperature
7:00 AM	6.10	1.50	4.6
9:00 AM	7.13	3.27	3.86

12:00 AM	9.53	9.27	0.26
3:00 PM	10.30	10.97	-0.67
5:00 PM	11.07	9.23	1.84
Mean	8.83	6.85	1.98
Daily variance	3.8	9.47	
Standard deviation	1.74	4.18	

*Table 7. Winter daily cycle of air temperatures in (N-S) Modern street canyon compared with meteorological station records.*

Time	Air temp. in the Modern Path	Air temp. at meteo. station	Deference in air temperature
6:00 AM	2.17	1.50	0.67
7:00 AM	3.53	2.03	1.50
8:00 AM	4.80	3.03	1.77
9:00 AM	5.67	4.00	1.67
10:00 AM	6.37	5.13	1.23
11:00 AM	7.80	6.27	1.53
12:00 AM	9.70	7.53	2.17
1:00 PM	9.53	8.40	1.13
2:00 PM	9.60	8.40	1.20
3:00 PM	8.30	7.90	0.40
4:00 PM	7.80	7.73	0.07
5:00 PM	7.53	6.57	0.97
6:00 PM	6.90	5.43	1.47
Mean	7.53	7.9	0.67
Daily variance	2.45	2.51	
Standard deviation	2.17	1.50	

**Table 8. Winter daily cycle of air temperatures in (E-W) Modern street canyon compared with meteorological station records.**

Time	Air temp. in the Modern Path	Air temp. at meteo. station	Deference in air temperature
6:00 AM	2.57	1.50	1.07
7:00 AM	3.70	2.03	1.67
8:00 AM	4.90	3.03	1.87
9:00 AM	6.07	4.00	2.07
10:00 AM	6.83	5.13	1.70
11:00 AM	8.23	6.27	1.97
12:00 AM	9.87	7.53	2.33
1:00 PM	9.50	8.40	1.10
2:00 PM	9.13	8.40	0.73
3:00 PM	8.43	7.90	0.53
4:00 PM	7.50	7.73	-0.23
5:00 PM	9.55	6.57	2.98
6:00 PM	6.98	5.43	1.56
Mean	7.3	6.9	1.07
Daily variance	2.43	2.51	
Standard deviation	2.57	1.50	

### ***Relative Humidity***

(1) - Summer:

*Almakkaoui* district has a higher and more stable relative humidity (Standard deviation 7) than *Almalia* (Standard deviation 11), the daily means of the RH at *Almakkaoui* were 35%-31% whereas at *Almalia* was 24% for both deferent orientation streets, and the traditional district had recorded a higher mean RH than the Meteorological station by 7% in contrast to the modern district which recorded lower than the Meteorological station by 2%. There was a small difference could be observed between streets of different orientation for the traditional district only. Tables (9, 10, 11, 12).

*Table 9. Summer daily cycle of Relative humidity in (N-S) Traditional street canyon compared with meteorological station records.*

Time	Relative humidity in the Traditional Path	Relative humidity at meteo. station	Deference in Relative humidity
6:00 AM	41.7	42.3	-0.7
7:00 AM	38.3	44.7	-6.3
8:00 AM	45.4	42.7	2.7
9:00 AM	41.0	35.0	6.0
10:00 AM	38.3	27.7	10.6
11:00 AM	31.5	22.3	9.2
12:00 AM	27.2	20.7	6.5
1:00 PM	25.8	18.7	7.1
2:00 PM	29.5	15.3	14.1
3:00 PM	31.1	15.0	16.1
4:00 PM	22.1	15.3	6.8
5:00 PM	27.2	15.0	12.2
6:00 PM	29.2	18.0	11.2
7:00 PM	32.3	26.4	6.9
Mean	35.2	39.7	7.31428571
Daily variance	53.2	129.8	
Standard deviation	7.3	11.4	

*Table 10. Summer daily cycle of Relative humidity in (E-W) Traditional street canyon compared with meteorological station records.*

Time	Relative humidity in the Traditional Path	Relative humidity at meteo. station	Deference in Relative humidity
6:00 AM	39.3	42.3	-3.1
7:00 AM	43.2	44.7	-1.4
8:00 AM	43.2	42.7	0.6
9:00 AM	39.2	35.0	4.2
10:00 AM	36.9	27.7	9.2
11:00 AM	33.1	22.3	10.8
12:00 AM	29.7	20.7	9.0

1:00 PM	26.8	18.7	8.1
2:00 PM	24.6	15.3	9.3
3:00 PM	20.2	15.0	5.2
4:00 PM	24.1	15.3	8.8
5:00 PM	26.6	15.0	11.6
6:00 PM	27.1	18.0	9.1
7:00 PM	25.2	23.3	1.9
Mean	31.37	25.43	5.95
Daily variance	58.75	123.92	
Standard deviation	7.66	11.13	

*Table 11. Summer daily cycle of Relative humidity in (N-S) Modern street canyon compared with meteorological station records.*

Time	Relative humidity in the Modern Path	Relative humidity at meteo. station	Deference in Relative humidity
6:00 AM	36.1	42	-5.9
7:00 AM	38.2	44	-5.8
8:00 AM	36.1	47	-10.9
9:00 AM	36.2	40	-3.8
10:00 AM	35.9	38	-2.1
11:00 AM	30.9	22	8.9
12:00 AM	13.3	21	-7.7
1:00 PM	14.3	19	-4.7
2:00 PM	14	16	-2
3:00 PM	14.5	13	1.5
4:00 PM	10.1	12	-1.9
5:00 PM	12.4	13	-0.6
6:00 PM	22.6	15	7.6
Mean	24.2	26.30769	-2.10769
Daily variance	130.046667	183.73	
Standard deviation	11.4038005	13.555	

*Table 12. Summer daily cycle of Relative humidity in (E-W) Modern street canyon compared with meteorological station records.*

Time	Relative humidity in the Modern Path	Relative humidity at meteo. station	Deference in Relative humidity
6:00 AM	36.5	42	-5.5
7:00 AM	39	44	-5
8:00 AM	36.2	47	-10.8
9:00 AM	35.7	40	-4.3
10:00 AM	34.8	38	-3.2
11:00 AM	29	22	7
12:00 AM	11.7	21	-9.3
1:00 PM	16.8	19	-2.2
2:00 PM	13.2	16	-2.8
3:00 PM	8.8	13	-4.2
4:00 PM	13.4	12	1.4
5:00 PM	16.8	13	3.8
6:00 PM	27	15	12
Mean	24.53077	26.30769	-1.77692
Daily variance	127.413974	183.73	
Standard deviation	11.2877799	13.555	

(2) - winter:

In comparison with the Meteorological station the traditional district (*Almakkaoui*) relatively has a higher and more stable RH (Standard deviation 4.4-4.9 ) than *Almalia* (Standard deviation 9), the daily means of the RH at *Almakkaoui* were 58%-57% lower than the Meteorological station by 7%, whereas at *Almalia* was 65% lower than the Meteorological station by 8-9%. No significant difference could be observed between streets of different orientation for both types of districts. Tables (13, 14, 15, 16).

*Table 13. Winter daily cycle of Relative humidity in (N-S) Traditional street canyon compared with meteorological station records.*

Time	Relative humidity in the Traditional Path	Relative humidity at meteo. station	Deference in Relative humidity
7:00 AM	62.43	83.00	-20.57
9:00 AM	62.93	78.00	-15.07
12:00 AM	54.80	57.67	-2.87
3:00 PM	53.20	46.00	7.2
5:00 PM	58.17	60.67	-2.5
Mean	58.31	65.07	-6.762
Daily variance	19.19263	231.61	
Standard deviation	4.3809394	15.219	

*Table 14. Winter daily cycle of Relative humidity in (E-W) Traditional street canyon compared with meteorological station records.*

Time	Relative humidity in the Traditional Path	Relative humidity at meteo. station	Deference in Relative humidity
7:00 AM	62.77	83.00	-20.23
9:00 AM	62.20	78.00	-15.8
12:00 AM	54.47	57.67	-3.2
3:00 PM	51.70	46.00	5.7
5:00 PM	56.00	60.67	-4.67
Mean	57.43	65.07	-7.64
Daily variance	23.72697	231.61	
Standard deviation	4.87103377	15.219	



**Table 15. Winter daily cycle of Relative humidity in (N-S) Modern street canyon compared with meteorological station records.**

Time	Relative humidity in the Modern Path	Relative humidity at meteo. station	Deference in Relative humidity
7:00 AM	81.30	92.33	-11.03
8:00 AM	77.53	85.33	-7.80
9:00 AM	71.93	79.33	-7.40
10:00 AM	70.27	76.00	-5.73
11:00 AM	65.40	74.33	-8.93
12:00 AM	60.57	69.67	-9.10
1:00 PM	56.70	63.33	-6.63
2:00 PM	52.83	58.67	-5.83
3:00 PM	53.37	60.00	-6.63
4:00 PM	59.60	66.33	-6.73
5:00 PM	63.37	66.67	-3.30
6:00 PM	72.03	73.67	-1.63
Mean	65.41	73.49	-8.08
Daily variance	86.34239697	102.8690333	
Standard deviation	9.292060965	10.14243725	

**Table 16. Winter daily cycle of Relative humidity in (E-W) Modern street canyon compared with meteorological station records.**

Time	Relative humidity in the Modern Path	Relative humidity at meteo. station	Deference in Relative humidity
7:00 AM	80.10	92.33	-12.23
8:00 AM	74.83	85.33	-10.50
9:00 AM	72.17	79.33	-7.17
10:00 AM	69.40	76.00	-6.60
11:00 AM	65.47	74.33	-8.87
12:00 AM	60.13	69.67	-9.53
1:00 PM	53.70	63.33	-9.63

2:00 PM	51.10	58.67	-7.57
3:00 PM	54.90	60.00	-5.10
4:00 PM	59.83	66.33	-6.50
5:00 PM	62.03	66.67	-4.63
6:00 PM	61.15	73.67	-12.52
Mean	64.40	73.49	-9.09
Daily variance	79.39999015	102.8690333	
Standard deviation	8.910667211	10.14243725	

## CONCLUSIONS

- As measurements did not take place at the same time in both neighbourhoods, the results by no means give a complete picture of the climate. However, the measurements indicate great differences in climate between the extremely dense old city and the very open urban tissue of the modern one.
- In the modern district the heat island phenomenon is clear with higher temperatures than reported from the Meteorological station outside the city.
- During daytime, however, the two neighbourhoods show totally different behaviour. In the densest part, of the old city the air temperature is normally *lower* than the Meteorological station temperature whereas it is *higher* in modern district. One explanation to this is that the sun does not penetrate down into the narrow street canyons; and most of the sunshine is reflected by the light coloured roofs. Furthermore the dense and heavy structure of the Medina reacts very slowly to temperature differences.
- In general, the climatic conditions are much more stable in the old city than in modern part of the city regarding both air temperature and relative humidity, which is play an important role in the physical comfort of the pedestrians. The stable climate in the traditional canyon is partly attributed to the large mass of the traditional area. The ratio between the total surface of walls and street and the air volume in the canyon is considerably higher in the old city. Hence, a large part of the increased air temperature during daytime will be absorbed by the canyon surfaces and not released until the night, which reduces diurnal swings due to its high thermal inertia, the old city withstands sudden climatic changes better than modern area.

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## **A STUDY ON COMPUTER PROGRAMMES APPLIED FOR SOLAR SIMULATION IN ARCHITECTURE AND URBAN DESIGN**

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**ABSTRACT:** This paper conducts a study on the computer programmes which are applied to simulate solar radiation in research area of urban development and architecture. These programmes are useful to simulate thermal behaviour of a building or its envelope when they are exposed to the sun. The other benefit in application of these programmes is to understand influence of solar irradiation on energy efficiency for buildings as well as identifying comfort level for pedestrians walking in cities. Since these programmes are released in an immense range, hence this paper attempts to introduce several of well-known programmes that are available in the market and widely used by those involved in related research with this study. In addition, the paper's effort is not only introducing the simulator, but also to clarify the strong and weak points of the programmes. Subsequently, limitation in terms of availability of either programme is shown and rate of required expertise is discussed in its relevant section of this paper. At the end their capabilities are compared together and comprehensiveness of alliances within programmes is pointed out.

**Keywords:** software programmes, solar simulation, building and its envelopes, architecture and urban development.

### **1. INTRODUCTION**

Simulation programmes are burgeoning in almost all areas of knowledge. They are capable to prognosticate which is considered the main reason of their every day thriving. These programmes facilitate and shorten long procedures in both terms of time and calculation. Even in cases that research or computation confronts difficulties; for instance pecuniary issues; simulation is the only solution. The other motivation of their popularity is the daily base advancement in those programmes per se. Computer literacy associated with all mentioned reasons result in ongoing exploitation of simulation programmes in different fields of knowledge in which architecture and urban design are not exceptions.

The objective of this paper is to introduce several well-known and reliable simulation programmes in architecture and urban design. This objective is accompanied with highlighting necessity of simulation approach especially in developing countries in both level of practice and education.

### **2. SIMULATION PROGRAMMES IN ARCHITECTURE AND URBAN DESIGN**

In architecture and urban design simulation programmes are widely used. Designers and engineers apply simulators to understand behaviour of studying

objects. In relevance with ability of software, simulators in this area can be classified in two major categories: qualitative and quantitative.

### **2.1. Qualitative simulation programmes**

These types of programmes are useful to study qualitative behaviour of users in a space, so-called qualitative simulation programmes. Studying the behaviour of visitors gathered in an arena in case of fire is exemplifying of these simulators' usage. Utilising traditional approaches are rough assumptions that sometimes are not even close to reality. Since these programmes are not of this paper discourse, we do not debate anymore and start introducing the other type which is quantitative programmes.

### **2.2. Quantitative simulation programmes**

These are programmes that deal with physical aspects such as structure, temperature and so on. In spite of being applied in architecture and urban design, these aspects are derived from physics and hence they have physical definitions and units. It is the extent that engineers are more familiar with them. In order to solve this problem, recent programmes are integrated with user interface capabilities that enable architects and designers to utilise them. It brings another imperative advantage that significantly augments efficacy of project to be designed. Dealing with design stage, these software programmes address efficacy of project from the preliminary stage that usually designers are involved in.

One may find energy and subsequently thermal concern among those which attracts designers and engineers from city scale to single room. Due to recent increment in fuels price, this issue is also attractive to clients. In the other hand, governments and ecology activists concern about it because world threatening catastrophes such as global warming and climate change are explicitly addressable throughout energy. Therefore, thermal simulators that encompass focus of this paper are selected and introduced in following with particular spotlight on solar thermal simulation programmes.

## **3. METHODOLOGY**

Selection of simulation programmes are based on reliability of their output and results. In this regard points delivered by US Department of Energy, unit of Energy Efficiency and Renewable Energy (EERE) has been deemed. In integration with

recommendation of this department as one of the most harbingers in thermal simulation, delineation of the releasing company of each software is pointed out. In addition published papers in association with the programmes are cited as well. It has been attempted to avoid personal views of authors in detail data except of comparison part of this paper. Only very general information from personal viewpoints of authors has been mentioned wherever necessary.

The effort of this paper is also to introduce the latest version of programmes with additional information about the availability of software and market issues.

#### **4. THERMAL SIMULATION PROGRAMMES**

The most recognised thermal simulation programmes particularly integrated with solar irradiation simulation are pointed out below as follows:

##### **3.1. Ecotect**

It is one of the most popular simulators among its own types, however its daylighting evaluation can be considered as the most consistent application (Khaled, 2007). The publisher describes the ECOTECT as a complete building design and environmental analysis tool that covers the full range of simulation and analysis functions required to truly understand how a building design will operate and perform (*Ecotect*, 2008). US department of energy accentuates that it provides essential analysis feedback from even the simplest sketch model (US Department of Energy, 2008). ECOTECT progressively guides the user as more detailed design information becomes available. It is available through its website: <http://www.squ1.com>.

##### **3.2. Energy plus:**

*Energyplus* has released by US Department of Energy based on *BLAST* and *DOE-2.1E* programmes (Crawley, et.al., 2005). Regarding its strength points US department of energy has mentioned that it has accurate, detailed simulation capabilities through complex modelling capabilities (US Department of Energy, 2008). One of the most advantages of applying this simulator is that Weather data for more than 1250 locations worldwide available on its web site. The software has won different awards namely R&D 100 awards, Awards for Excellence in Technology Transfer (2times) and IT Quality Award for Technical Excellence (*EnergyPlus*, 2008). The URL <http://www.energyplus.gov> is its website.

##### **3.3. IES**

IES is a wide-ranging tool for simulating and cost calculating for thermal management and illuminating as well (*IES*, 2008). It is an integrated collection of application which is linked by a single Integrated Data Model and Common User Interface (Muhaisen and Gadi, 2006). Having another name as VE (Virtual Environment), it consists of different simulators, each for different purposes. It is one of the most comprehensive programmes for understanding the thermal loads (US Department of Energy, 2008). Entire the programme is available via its website: <http://www.iesve.com>.

#### **3.4. *LESO-SHADE***

It calculates shading factor on any facade or surface of a building caused by any obstacles. According to US department of energy, the scenes are easy to define and the user can get very easily and in a short time both a 3-dimensional view of the scene and the shading factors that can be taken into account as its advantages whereas disadvantages are: there is no possible connexion to a standard CAD package, the number of possible geometric shapes is rather limited and the geometric elements cannot be rotated of an arbitrary angle which makes this software not fitted into this (US Department of Energy, 2008). Its website <http://lesowww.epfl.ch/> provides more information.

#### **3.5. *ParaSol***

Suitable for designing sun shading devices, Parasol accepts input data in 3 separate segments: room, window and sunshade (*ParaSol*, 2008). According to US department of energy it is a design tool to study the potential of solar protection for different types of sunshades and glazing systems and their influence on the building energy performance at an early design stage (US Department of Energy, 2008). Having more inquiries, <http://www.parasol.se> should be visited.

#### **3.6. *RadTherm***

It is a tool for heat management. US department of energy explains that *RadTherm* has powerful capabilities to solve transient solutions for 2D or 3D models in a natural environment, including the effects of direct, diffuse, and reflected solar radiation, thermal radiation, natural or forced convection, and conduction, but as a points of weakness it needs high level of knowledge, an engineering background which makes it difficult for those who are novice but interested (US Department of Energy, 2008). It is a professional thermal modelling to predict the full temperature distribution of a product or system, e.g. active and passive cooling can be tested for the cost-benefit analysis

(RadTherm, 2008). *RadTherm* is obtainable through <http://www.thermoanalytics.com>.

### 3.7. **Shadow FX**

*Shadow FX* is a useful software for architects and town planners for shading calculations, sun modelling and solar shading. US department of energy accentuates that the program is user-friendly and highly graphic where shadow profiles are output in the form of AutoCAD DWG and DXF files (US Department of Energy, 2008). The software can be reached via <http://www.shadowfx.co.uk>. It is designed to deal with small scaled 2D shadow analysis since the overhang and fin diagrams provide fast, simple sun-screening design solutions (*ShadowFX*, 2008).

### 3.8. **Sombrero 3.01**

*Sombrero 3.01* is a design tool to calculate shading on any arbitrary surfaces surrounded by shading elements as a function of time and location (Niewianda and Heidt, 1996). It provides quantitative results for shading of collectors or windows by buildings, overhangs, trees or the horizon (US Department of Energy, 2008). It adds: these results can be used either directly for visualization or as input for other thermal simulation programmes. Either for active use of solar energy (domestic hot water, photovoltaics) or for passive solar architecture (shading or lighting of planes), *Sombrero 3.01* can provide quantitative results (*Sombrero*, 2008). It is obtainable via <http://nesa1.uni-siegen.de/>.

### 3.9. **SUNDI**

A simple analysis can be done with sun orbit diagrams. The results can be presented graphically. The *SUNDI* simulation programme can be used for calculating the irradiance losses due to shading (*SUNDI*, 2008). The irradiance losses can be also calculation for long periods of time US department of energy (US Department of Energy, 2008). Programme is user friendly and calculations are very quick. To access for more information, <http://emsolar.ee.tu-berlin.de/simulation/sundi.html> is useful.

### 3.10. **TownScope II**

*TownScope II* is among those few simulators which supports urban designers and decision makers as well (Teller and Azar, 2001). It supports urban design decision-making in a "responsive environment" perspective (*TownScope II*, 2008). According to US department of energy it combines a user-friendly graphical interface with powerful analysis tools (US Department of Energy, 2008). Thermal comfort, critical wind discomfort risk and perceptive qualities of



urban open spaces can be assessed very quickly via *TownScope II*. Additionally, the software provides an integrated multi-criteria decision module to rank various alternative proposals. Regretfully dimensioning, optimisation or detailed simulations are not afforded by the software. It is obtainable via <http://www.ulg.ac.be/lema/> . Recently its website address has moved to <http://www.lema.ulg.ac.be/tools/townscope/> .

### 3.11. **TRNSYS**

Transient simulation programme links the components of the grid connected PV system together (Abdullah, et.al., 2002). It is also useful for energy savings calculation by daylighting (Schweizer, et.al., 1998) as well as thermal simulation (Flor, et.al., 2005). Recently the programme has been developed in terms of external shading and internal insulation calculation of building which called *TRNSHD* (Hiller, et.al., 2000). It also benefits of a graphical interface (*TRNSYS*, 2008). The input data must be in very detailed information because the programme is not provided any assumption (US Department of Energy, 2008). It is available from: <http://www.trnsys.com> .

## 5. SIMULATORS JAXTAPOSITION

A juxtaposition is provided in table 1 containing all introduced programmes. Glossary of abbreviation as follows:

### **Glossary:**

- : available
- \_: not available
- D: Day
- Dcp: descriptive manner
- F: Free
- H: Hour
- L: limited
- M: Min
- MI: Manual Input
- Mth: monthly
- N/A: Not Applicable
- TMY: Typical Meteorological Year data set
- TS: Technical Support

Table 1: simulation programmes and their capabilities.

	Released	Open source		Climatic data			Modelling capability		Sun path	Shadow cast	Thermal calculation		Other capabilities			Expertise requirement				
	Date	Trial version	Full version	Particular area	Data bank	World climate	Model maker	Compatibility to other programme	Certain periods	Accuracy	Outside	Inside	Heat gain	Temperature	ventilation	Luminance	others	Low	High	Training course
Ecotect 5.50	Jun 2006	L	100\$	•	•	–	•	•	•	M	•	•	•	•	•	•	•	•	–	–
EnergyPlus	Apr 2008	–	F	–	1250	–	Des	–	•	N / A	–	–	•	•	•	•	•	–	•	–
IES 5.8.2	Apr 2008	L	8000\$	•	L	–	•	•	•	M	•	•	•	•	•	•	•	•	•	•
LESO-SHADE	1999	–	CHF 2000	L	–	–	L	–	•	H	•	–	–	•	–	–	–	•	–	–
RadTherm9	Jan 2008	L	\$1000	L	–	–	•	L	–	–	•	–	•	•	•	•	•	–	•	•
Shadow FX 1.08b	Jul 2000	L	\$99	L	–	–	L	•	L	H	•	–	•	–	–	–	–	•	–	–
Sombrero 3.01	N/A	L	€22000	2000	–	–	L	–	•	H	•	–	•	–	–	–	•	•	–	–
SUNDI	N/A	–	F	•	–	–	N/A	N/A	•	D	N / A	N / A	•	•	–	–	–	•	–	–
TownScaper II 3.0.1	Nov 2007	L	€450	L	Mt h	–	L	L	•	H	•	–	–	•	•	•	•	•	–	•
TRNSYS 16	Oct 2004	•	4200\$	–	–	TMY	DCP	–	•	N / A	•	•	•	•	•	•	A	•	–	T S

## 6. OUTCOME

In this paper, the top 11 most recognised thermal simulation programmes are introduced. They are useful in architecture and urban design particularly in solar irradiation simulation. They effectively can underpin strength points of design even in very early stage of design when project is not more than a concept. Nonetheless in developing countries utilisations of simulators are still in process, undoubtedly next decade will be dominated by them and in all schools of design; architecture or urban design; they will be applied widely. It is the process that leading universities have already commenced within last ten years.

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## **TWO CITIES: BETWEEN REPRESENTATIONS AND PRODUCED IMAGES**

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### **ABSTRACT**

There is a tendency within literature and scientists thoughts related to urban researches that says there is no crisis of the reality of the city, but there is a crisis of the representation of this reality. Could the image of a city cancel the city itself? Despite the fact that it is hard to figure out something while it is still taking form; this paper explains, to some extent, the close tie between the image of a city and its representation. The two cities we speak about are Constantine city and the new town of Ali Mendjeli. They are in opposition, a bit paradoxical, as well in the remarks that represent the inhabitants' feelings as in the specialists' thoughts: "the ancient city and the new city".

A frequent mobility from one city to another constitutes an actual parameter associated to a field of possibilities which makes it likely to socially institute an individual capacity of selection and comparison, even evaluation, and social criticism. To understand inhabitants reaction as well as his mode of adaptation, while his mobility between the two different environments, as sense producing urban entities, we will give insights in points that are relevant to the identity of a city, with a focus on the impact of a rapid urbanization beside an age-old one on citizen mental images.

Keywords: Age-old city, Rapid urbanization, Built landscape features, Mental representations, Identity, Visual culture, Space appropriation.

### **1. INTRODUCTION**

It is true that the concept of "city" is a fuzzy one, a very broad term, difficult to define. In spite of this fact, the most general and concrete definition is that one which identifies the city as "a mode of space appropriation by a human group of certain importance"; the place giving the feeling of belonging to it. Therefore, the stress is on mental inhabitants representations in connection with the lived city. The representation of this materiality in its absence that is connected with the significances for each one, lived, collective and individual experiment, and closely related to the urban experiment and the urban culture which results from it.

A broadly known fact is that there is a great variety of mental representations of a city. The ones of the urban residents, the representations of artists as a form of sublimation, representations of the urban planners and the policies translating the desired city, finally those of the researchers who want to rebuild the city logically. However, the significant connection that establishes between a human being and the place where he lives consists of the act of identification, in other words the recognition of belonging to this place. The appropriation of the place is carried out at the same time as the self-definition in this same place by the act of identification.

N.Schulz calls this "existential spatiality" (Schulz Ch N, 1988); thing which does not require at all the orientation's functions, so of organization and of fitting in the city, because one can find his bearing among the built forms organized in a space, without being completely identified with them.

The particular character of a place is the indispensable condition of the interiorization and the highlighting of a space as being a representation of the identity, and this particular character is closely related to the values in connection with the semantic system managing the architectural forms in a place, in fact, the city.

## **2. CONSTANTINE CITY**



***Figure1: Constantine overhead photo***

The town of Constantine is the third most important town located at the North East of Algeria. It has always been and remains represented, imagined and described through its picturesque and particular site and landscape. Through this external sight of the city, the inhabitants imagine it and represent it in its absence; with more consistency, for them, it exists in relation and by this sight from the others on it. Grafted to the site, there is the inherited built patrimony that makes the figure of this city inseparable from its history specificities and its development process. The landscape sight of the city seems to constitute, since always, the principal means to

make the city a high place. And no one can be unaware of the characteristic of this Turkish Arab city, mainly metamorphosed by the Haussmann gesture, of which it reflects images of modernity at the end of the 19th century, architecture intended to enrich the city visual culture by monuments charged to educate the sight.



**Figure2 : Plan of Constantine localisation**  
**Source : <http://www.djazair2003.org/decouvrir.php?rub=1&page=1>**

The Medina of Constantine is a testimony of diverse civilisations: numide, Greco-roman, arabo-islamic Turkish and French. It is an age-old city, which site has been occupied since very long time. That is why Constantine is perceived as a huge monument regarding to its urban and architectural appearance. A population around 538 000 inhabitants occupies "Le Rocher", the rock supporting the centre of Constantine.



**Figure3 : Bridges in Constantine-photoAdhamKirdani**

Constantine is a strong city because of its characteristics and its very marked and specific figure from both its site and history. This typical natural and urban environment worked, since more than one century, the aesthetic conscience of the majority of its inhabitants, so much so that in their opinion it is the CITY, where they lived and which they know since always. Constantine is one of the cities having marked more the social history and representations. The famous "Rock" of Constantine is the fundamental space of representation as a historical centre remaining for always the real centre town; that towards which the Constantine's inhabitants always go for a stroll, do their shopping... even when they live at the new city of Ali Mendjelli.

The problematic medina has been a huge question to deal with, that appears several times in diverse ways of thinking about. Nevertheless, the only action that has been undertaken is the project of rehabilitation that did not emerge from patrimonial concern, but rather in logic of enhancement and embellishment of the general appearance. Since less than three years ago, the local Authorities target Constantine for some actions planned within a whole program of "urban renewing". The main aim is to raise the city to a metropolitan rate; taking the necessary steps and using the tools for a sustainable development thought process. For this sort of strategy, the immediate step was the enhancement of urban image of Constantine, especially the structuring axis and main thoroughfares; beside that, tackling the issue of the traffic system.

On the other hand, from 1962 until now, Constantine city experienced a rapid growth in population and in demand, especially for housing and services. This imposed new infrastructure demands, particularly for dwellings, jobs, services and transportation systems. The authorities planned a new city to fulfill several goals at once: providing larger spaces for housing and else. The fact is that the new city is facing a great rejection from both the inhabitants and Constantine citizen. There is no more expressive of this impression than the sentence of Marc Cote: *"Which type of kid has grown in the shade of the old city?"*. The author who brings back the inhabitants of Constantine opinion on this urban fact: *"the inhabitants of Constantine find all the arguments to condemn this creation, "which does not have anything of a new city". They condemn the municipal officials, the promoters, the inhabitants, the architects, the practices"* (Cote M.2006).



### 3-THE NEW TOWN OF ALI MENDJELLI



*Figure 3: some views inside Ali Mendjelli city*

In year 2000, whereas hardly this new city of Ali Mendjelli starts by taking form, the municipality of Constantine celebrates the 2500ème birthday of its city. A new city planned for 300 000 inhabitants, 1500ha was retained for the creation ex nihilo of a whole city. This city has never been part of a lay out scheme; it has been decided in relation to the arrival of new urban planning tools. So, is it worthy of the destiny of Constantine2? Is the size sufficient to counterbalance the weight of the secular city? What makes its rejection in the spirit of the Constantine's inhabitants?



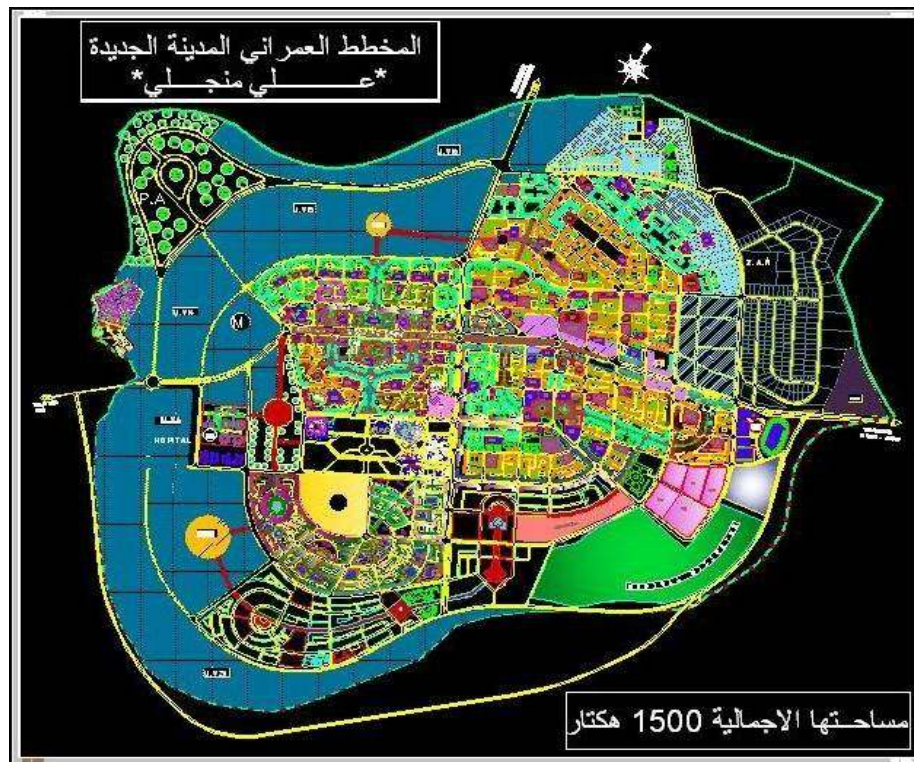


Figure 4: Plan.1 Urban plan of the new town of Ali Mendjelli

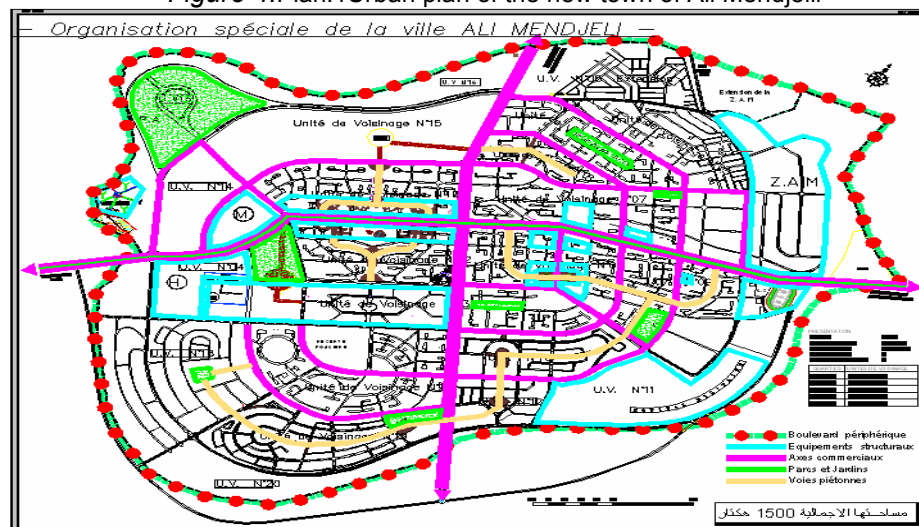


Figure 5: Plan.2 Spatial organization of the new town of Ali Mendjelli

The new town of Ali Mendjelli, constitutes not only a space receiving the demographic overflow of Constantine, but it is the occasion and the un hoped-for chance for the authorities to be able to carry out their project of metropolization and modernization according to their conception of modernity. Lastly, it is a virgin site, without any constraint. Then several criteria are targeted and carried out imposing themselves as being the major signs of the image of the city; among them is the verticality of architecture.

In the official presentations of this new city project, they obliterate the past of Constantine, only the project of city constitutes the basement and the presented action form. A project illustrated by the achievements from five to six years of town planning, aiming to assert the town of Ali Mendjelli as a high place of contemporary architecture.

The higher limit of the town of Ali Mendjelli size depends on a regional or national planning matter. In the master plan, it was established a proposal of a town for 300.000 inhabitants, with possibility of increasing this long-term figure, a surface of 1.500 ha, a capacity of 50.000 residences.

Officially and theoretically *"this structure should allow the development of a whole range of centres with various importance, while the city realization and beyond its first section, this system makes it possible to give birth to these qualities of character and identity which are often apparent in the historical development of the cities..."*.

It is true that since the starting point, the watchword concerning the type of construction or architecture selection and choices has been clearly announced. It was generally expressed in a language which stressed terms such as: the street, the trade on street, the pedestrian passages, the frontages on street, the urban density, the arcades bordering the streets, constructions in height...etc. it was, in fact, the principal instructions on the schedules of conditions addressed to the operators and to promoters.

The new dimension integrated by this city is the towers one, between 14 and 17 levels, set along the central axis constituting the linear centre of the city. These towers that are detached from the basic gauge: the usual building from 5 to 6 levels in Algerian cities, adopted for the remainder of the city. A «vertical city» decision from the «Ministry », the objective was: to give "a style to this city".

A linear centrality materialized along a 80 meters broad monumental axis over a length of 1500metres, a broad ground full supposed to be pedestrian in the centre, alleys of cars on both sides and spaces of greenery " *the watchword retained in the schedule of conditions was ' the city effect'.* To find the city left in Constantine, understanding by there not the medina (non-renewable) nor the ZHUN (not very liveable), but the colonial ,so finding the street, the trade, the pedestrian ways, animation, the urban density "( COTE M, 2006).

It is a strange monumentality on a 'No man's land'. Architecture being one of the forms of our comprehension of reality, it is the method through which a cultural interaction between inhabitants is built. The architecture of this new city is unrecognizable; the masses are unusual and detached from urban space. There is no rhythm of walk. All this makes communication with space and its perception so

difficult within such a framework which takes in account only quantity in height and width. In addition, there is the forced settlement in the city; 56% of city programmes of habitat consist of social one, 20% the socio participative habitat, 18% for the formula hiring-sell, only 1% for real promotion and 6% of private individual houses program.

Because of its mode, the settlement in Ali Mendjelli city constitutes the major fact in the representation of this city by the inhabitants of Constantine.

Three categories of populations were concerned with re-housing towards the new city: the Medina disaster victims, the landslides disaster victims and the shantytowns occupants. In 2005, based on six people on average per family, approximately 72000 people were transferred to the town of Ali Mendjelli and Massinissa at Khroub city. The settlement was supposed to be done in a voluntary and progressive way according to the populations' choices. However, the force of an administered transfer of quite precise populations has done it.

The drawbacks of this kind of settlement were of major importance: to give to the new city of Ali Mendjelli an indication of re-housing, city of the poor. An image without a nuance of urbanity *"a too homogeneous and too poor settlement for a real urban life ...re housing dealing obliterated the populations diversity, essential to any life and any city"* (COTE M, 2006)

Moreover, the re-housed people continue to exist only by their categories: old city disaster victims, slips disaster victims, the shantytowns community, social cases. They are still identified by their original places. Various labels with pejorative connotations stuck to the inhabitants who only renew these districts of origin by giving same names to the new occupied places, transporting in the same time, social space practices. (PELLEGRINO P, 1994)

#### **4-FROM CONSTANTINE CITY TO THE NEW CITY OF ALI MENDJELLI, A MATER OF IDENTITY**

The main stake for any city is to constitute itself in a place of memory and to assert itself as place of power, through some urban signs and images.

In fact, by its built forms and its organized space, the city is a place. CH N Schulz asserts that each place does have a particular interpretation, a characteristic image, individuality. By syllogism, we deduce that each city has its own character, so individuality. Many cities testify this fact. However, even so obvious is this reality, it remains difficult to understand how a city preserves its identity and its character, and especially the role which it can play in the reinforcement of its inhabitants identities,

in other words, in keeping the feeling of belonging and being anchored to this place, perennial. It is also hard to figure out how, in the contrary case, we end up to territories without places, face to the loss of the selection criteria for the appropriation of space and the belonging to it (SASSI S, 1996).

Any city emerges in the Co-constitution of space and the society; a common space where the individual and collective identities confront themselves and complement one another. The researchers recognized the primacy of the mental images in the transmission of the models related to the culture, and their role in the safeguarding of the collective memory by the cultural tradition. This is, according to P. V. MEISS, the base itself of the idea of the place. The tradition being born obligatorily from acts and conventional behaviors related to conceptual diagrams, space situations as well as forms and memorable textures (MEISS P V, 1986).

In fact, the reaction that we have in front of any built landscape, either architectural (SIVADON P, 1969) or urban one brings back our cultural bottom. Any brutal transformation is felt like an aggression with the culturally interiorized code governing the comprehension and the perception of space. This is why, in any city, architecture must be "the good measurement" of the identity. Because at the time it tries to transform the traditionally transmitted connection that the inhabitants maintain with the understood and accepted visibility of space they belong to, by the forms and the scale, architecture is regarded as a rupture of the traditional order of the aesthetic and perceptive inhabitants vocabulary (MARTINON JP, 1991) .

Everybody makes a mental image of his city. These representations of the city space also vary from a group of actors to another. They even can be sometimes unmatched; which is a major reason for each new produced space rejection, because it breaks the balance of the representations. For that, the stakes of space and representations merge. Muriel Rosenberg expresses it in other words: *"the way in which a society thinks its space is thus a factor of construction of space"* (ROSEMBERG M, 2000).

Admittedly, we share PIERRE SANSOT opinion concerning the fact that each city, whatever its size has the right to assert its difference and that it is not necessary to compare the incomparable (SANSOT P.1994). However, we share still more the same author's idea concerning permanence of some signs that trace a markdown line between an urban entity and another. Nevertheless, we extend this idea to the character that the same author speaks about, preferring the use of the term 'charm' to that of 'quality of life'. This charm related to the super saturation of sense in a place

where each part has a history, is carrying life stories...etc. such is the problem of the great variation made by the spirits of Constantine's inhabitants on the representations of the two cities.

### **5-The urban project**

Constantine "a regional capital, a metropolis" constitutes the ambitious urban project of this town public authority. It is prestigious project, but at the same time a double-edged weapon. With the emergence of this project, a new conception of the city and its image is induced, making re-appear on the surface the new urban modernity models, with all the speech which supports it and the indicators which materialize it; And there is people reaction. A new attitude towards the current city of Constantine as towards the new town of Ali Mendjelli emerges.

Two urban centers have to be managed according to this perspective of metropolization; however, each one belongs to a different urban register, obeys logic different from the other' one:

- A new urban centre, the new town of Ali Mendjelli, located at approximately 17 km far from the town of Constantine;
- An old urban centre named the town of Constantine.

The city is set on scene with all the enquiries surrounding it, and this reveals the social imaginary of all those who take part in this speech about the city.

Each social actor in the city does have a representation of it. This representation, which according to Muriel Rosemberg constitutes a filter of the knowledge about the reality and influences, in this case, the action, is conveyed by the speech produced on the space of this city (ROSEMBERG M, 2000).

We have tried to distinguish the various representations related to the various actors in connection with the town of Constantine, through the produced speech, trying to get the significances of their actions. More especially, such as the same author confirms it, any action on space is motivated by the symbolic values one attributes to space, in a way that the symbolic values system which sticks to space is in itself a component of the space representations. Therefore, the stakes on space are also stakes of representation (ROSEMBERG M, 2000).

The official speech reveals the intention to equip the town of certain attributes of urbanity and modernity, which, at the same time, contribute to its economic performance. The urban development of Constantine project requires an improvement of the city image. This calls actions that relate primarily to the assertion of the city by specific projects, spectacular, however nevertheless with an

ecological action according to the topical environmental policy (ROSEMBERG M, 2000).

The immediate objective is in particular to improve the urban image of the structuring axes and thoroughfares of the city center, the thing that goes hand in hand with the necessary improvement of the traffic inside it. Projects are tunnels and car subways, the exchangers, the tram, the trans-Rhumel viaduct, the highway, the cable car, the bridge...it is a kind of city mobilization, which passes by the resort to urban signs.

However, introducing a system of action mobilizing the various actors around this project seems to be difficult, as expressed by the local authorities, whereas the innovation that the urban project brings should find favorable receiving environment, persons to take charge of things at all the intervention levels and a collective engagement.

On the civil society side, there is a mobilization of the social actors organized in associations fighting for the old city. In speeches, it is a matter of "*...war of the patrimony in Algeria, which is lost or gained here in Constantine*". Local inhabitants and associations consider the authorities technical works and interventions as a threat for their city in terms of not respecting the patrimony and introducing many changes into its fabric.

Voluntary partnerships founded on an attachment for this city are concretized by an engagement, a will of action, conception of what is their city and the convictions about their vision on this city future.

Inhabitants, in and outside the city, natives of this city, try to mobilize themselves around releasing events such as projects in favor of the patrimony safeguarding suggested and carried by the community of the university researchers.

## 5-Conclusion

It seems obvious that while working on the metropolization project, there was no concerted effort to find out the right way to produce a new space and to rehabilitate an old one, being within the same urban project. Moreover, no regards to the historical background in terms of released images and social representations. The local authorities were not thinking of combining local vision and global one, in terms of local and universal morphologies, and the relevant choices. The consequence of this inadequate strategy is the fact that the two cities, Constantine city and the new town of Ali Mendjelli are put in opposition; a little paradoxical image. In addition, the not expected result is the rejection of the new town in spite of the entire huge budget allocated to it.

The problem of this new city adoption lies in its total perception as non-identifiable urban entity, thus non-appropriable. What is problematic, in fact, is the loss of the reference marks. In the new town of Ali Mendjelli, the architecture is the one of gigantism which is aimed and carried out; great masses of construction to which correspond large uniform frontages, generating a trouble. In his sets of dwelling, the inhabitant face to the repetitively thus, the uniformity, cannot have the impression that his house is identifiable, even less in pushing back districts devalued by their mode of settlement.

The Constantine's inhabitant identified himself rather to his city, which characterize the identifiable and locatable forms. Among those, there are the old city architecture, or traditional architecture rich in architectural details, locatable and familiar characteristic architectonic elements; base, noble stage, crowning, superposition of orders, pediment columns pilasters... details on the man scale which make mentally possible the varied cuttings comprising of the characteristic elements being used as land marks.

This typical natural and urban environment worked, since more than one century, the aesthetic conscience of the majority of its inhabitants, so much so that in their opinion it is the CITY, where they lived and which they know since always.

A frequent mobility from one city to another constitutes an actual parameter which makes it possible to socially institute an individual capacity of selection and comparison, even evaluation, and social criticism. As the all of the inhabitants of the new city come from Constantine, and regularly move to it, this constitutes a worsening factor.

In fact, the colonial settling in Constantine was harmful in some extend for the secular city; because of the violence of interventions on the old fabric...but the French authorities during the colonial period of Algeria did have a visionary leader. This space conceiver allowed the city of Constantine to remain all this long time a high place. The reason is that, even if there were very precise aesthetic recommendations, the architectural production constituted, mainly, an answer to a cultural policy founded upon the resort to tradition and regional repertoire of details and forms (OULEBSIR N, 2000). The architectural landscape definition required some mental dealing such as observation, selection and description. There was a will to build a common space of representation throughout this architectural landscape definition. (OULEBSIR N, 2000)

In the urban landscape of a city architecture must preserve the traditional order of the aesthetic and perceptive vocabulary of the inhabitants. This is the most important element in building representations, especially in case of a rapid



urbanization beside an age old one. There is no way to consider one city representation by fragmenting the urban experience but by considering its full complexity

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up at the conclusion that the external walls and facades of houses express clearly and significantly the styles and way of living origins. The facades are a cultural memory tool, which inscribe themselves in the city as distinctive elements: « ...repérer l'articulation des types et des modèles d'expressivité relatifs à l'habitat. Archétypiques, représentatives d'une continuité culturelle les faces externes de l'habitat sont l'objet de préférences qui rapportent de manière significative l'origine des styles et des façons d'habiter, à des types de pratiques habitantes conditionnées par les types spécifiques de logements qui en sont l'instrument. Les faces externes de l'habitat sont un instrument de mémoire culturelle ; cependant elles s'inscrivent dans la ville non pas comme dans un milieu qui serait unifié par une mémoire habitante, mais comme des éléments distinctifs, emblèmes de rapports de classes dépassant le lieu de leur effectuation, la ville habitée. », In Figures architecturales formes urbaines, p.247.

## **IMAGINARY AXIS AS A BASIC MORPHOLOGY IN THE CITY OF YOGYAKARTA - INDONESIA**

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**ABSTRACT:** The life and characteristic of the cities in Indonesia cannot be separated by the influence of city's development in Java Island. The influenced of Javanese cultures not only in the cultural system, governmental mechanism or political behavior of the administration, but also on the dimensions of the established institutions; it starts from the beginning of the *Mataram Hindu* Empire, the *Majapahit* Empire as well as the *Mataram Islamic* influence of the recent time. In this paper the term "axis" as a basis of morphology for creating city's order in a traditional city of Indonesia especially in Java is analyzed. Here it is applied in the order of ancient city of *Trowulan Majapahit*. This axis was influenced by the growth of religions as a cosmology orientation. Certain imaginary axis which acts as a joint connects the various cosmic forces of the universe. Besides in the city development plan, this imaginary axis is applied as a "road system". An axis of the sun orbit is the easiest cosmic force we can feel in everyday life. Thus, the shapes of the traditional cities in Java and on the island of Bali tend to incline on the order East - West axis or North-South axis. Orientation of the buildings has been developed according to such orientation too. Meanwhile giving honor to the universal objects as the cosmic forces such as mountains, rivers, lakes and sea, have been applied in the city planning. This paper also delves into the concept of imaginary axis influenced by the shaping of elements of the traditional city in Indonesia, especially the placement of *alun-alun*, *keraton* and the mosque. Philosophically, Yogyakarta has been shaped by cosmology axis which cannot be inseparable from those elements such as *Merapi* Mountain, *Keraton* and Southern Sea (Indian Ocean). This order referred to *Trowulan Majapahit* space and order which is known as a concept of space according to Hinduism.

**Keywords:** imaginary axis, cosmology, basic element of the city, *keraton*, *alun-alun*, Yogyakarta.

### **1. INTRODUCTION**

The city's development through history in Indonesia cannot be separated by the growth of civilizations in South East Asia. The center point of these civilizations is located at the area which now has known as Indochina. The civilizations in South East Asia presume has started develop at about 4000 - 5000 years ago.

The growth of civilizations in Indonesia was influenced by migrations of some people from Indochina to the archipelago in Indonesia. Process of those migrations has occurred in two periods and it happened because of the civil war and hunger. The first migrations executed by the Proto-Malay people who brought several competencies such as: the expertise for doing earthenware vessels, built boat, taming animals, planted rice and also brought a basic Malay language. The second migrations executed by the Deutro-Malay people, they have a good skill to processed metal become agricultural tools. The unifications of both cultures have known as Dong-son civilization.

Cultural feature which developed after the migration known as a megalithic culture, this culture become a feature of Neolithic civilization. Hence, it clarified why in Indonesia discovered so many artifacts such as: a big statute, obelisk, stair graves

of ancestors (*punden berundak*) and tomb stone. Planting rice in wet land and taming the animals have developed during the Neolithic culture; both activities have been an early process of developing agricultural culture which influencing the growth of new socio-cultural process in the rural community.

The existences of traditional cities in Indonesia are influenced by proselytization of Hinduism and Buddhism in the early century. *Negara* which emerged from Hindu-Buddha in South India has known as a structure to establish an urban settlement. According to an ancient inscription from Kutai (Borneo), *negara* established as a center of political power in Indonesia since 5<sup>th</sup> century. In *negara*, the organizing of social, politic and economic settlement has been applied in the several villages as territories of *negara*.

Many of ancient inscriptions explained that some *negara* which exist before Kertanegara Kingdom (1268-1292) did not establish sovereignties of a kingdom. In other words, they scattered as small several *negara* who always competed, civil war to each other and never become dominant absolute like Majapahit Kingdom succeeded in 14<sup>th</sup> century. However, the first city in Nusantara that may have urban structure has been established during the Majapahit Kingdom, known as Trowulan city.

## 2. COSMOLOGY AND IMAGINARY AXIS

In the early of agricultural settlement, people have high dependence to the nature. Various natural phenomenon are believed as a blessing or a fury from tremendous forces in the universe. The tremendous forces are believed can be change according to the people behavior which always trying to be adapted and synchronized with nature. These comprehensions become a basic thinking for the growth of animism and dynamism religion. Various ceremonies are arranged periodically for tributes to the forces in the universe. Related to those ceremonies, it is begun forming a being bound between people to the cosmic in the universe, human being positioned as a part of the natural system such as micro-cosmos and macro-cosmos. The human well being and harmony of life are established from the effort of human being positioning himself in the universe as well, as a part of micro-cosmos and macro-cosmos.

Human understanding about his cosmic environment is interpreted to the sense of space. Space is regarded as a place for entire cosmic environment. Human being is regarded as a micro-cosmos meanwhile house is considered as a macro-cosmos. In the next level, house is considered as micro-cosmos meanwhile city is regarded as macro-cosmos. To maintain the harmony between micro and macro cosmos it is necessary to make several arrangements in space orders. Hence, the orientation in the space becomes necessary. Space orientation determine linkage pattern between entire cosmos power. Every road in the city is ordered by giving honor to the cosmic; so that the harmony and balance between entire cosmic forces can be appear as well. The positive cosmic-relationship had to be ordered in a direct pattern meanwhile the negative one is ordered in indirect pattern, this arrangement is believed can reduce negative forces from the nature.

It indicates some imaginary axis appeared as a connection between entire cosmic powers. In the city development plan, the imaginary axis is applied as a road system. An axis of the sun orbit is the easiest cosmic force we can feel in everyday life. Thus, the shapes of the traditional cities in Java and on the island of Bali tend to incline on the order East-West axis or North-South axis. Orientation of the buildings has been developed according to such orientation too. Meanwhile giving honor to

the universal objects as the cosmic forces such as mountains, rivers, lakes and sea, have been applied in the city planning.

The junction between two axis of cosmic forces is believed as a critical point which can give a spiritual power. But on the other hand, this point is believed can be a disaster source if the cosmic forces inside it is not maintain well. Only some people who have higher spiritual power can take benefit on that junction. As a consequence, the traditional people have a special attention on the road junctions. Road junction is considered as a sacred place which has a big cosmic force and it necessary to maintain the balance and stability. Road lane is arranged according to it hierarchy in the grid pattern. The wider road has higher cosmic forces than narrow ones. Another cosmic force is controlled by the presence of open spaces with certain trees inside them. This cosmic opinion is not changed although under domination different religions such as: Hindu, Buddha, even Islam.

The axis is a basic morphology on the shaping of urban pattern in the traditional city in Indonesia, especially in Java, which influenced by the proselytization of religions as a cosmology's orientation. The developments are begun at the glory of Majapahit and Ancient Mataram Kingdom, and then the influences were spread out to several regions in Java. Several cities in Java such as: Yogyakarta and Surakarta posses those urban pattern and structure and become precedents for another cities before the Europe influence entering to Indonesia. The axis concept influences on the development other cities in Java, especially on the placement of *alun-alun*, *keraton* and mosque as a basic element of the city. The orientation of axis incline on the order North-South, meanwhile the alun-alun is located in front of keraton and mosque is located at front-left of the keraton.

### 3. BASIC PHYSICAL ELEMENTS IN TRADITIONAL CITY

Discussion about traditional cities in Indonesia therefore can be look from the shape of some physical elements which give the image about the city development process and other influences factor. The process of city development can divisible into two big influences such as: Hindu-Buddha and Islam.

The physical elements are as follows:

- a. *Tugu*  
*Tugu* is a stone monument (commemorative post) and become an important element in Hindu civilization. According to some ancient inscriptions from 14<sup>th</sup> century have been known that the *Tugu* is almost always connected to the birth of family who hold the power. *Tugu* has been built to indicate the human settlement, where the power is established by ritual process according to the religion such as: animism, dinamism or Hindu. Meanwhile, *Tugu* is also indicate the believe of people that the cosmic forces presented into the earth to unifying the great cosmic and rules of the earth upon the human being.
- b. *Candi*  
*Candi* is ancient Hindu or Buddhist temple or shrine. Especially Hindu's candi indicate a transformation from *Tugu* to building design and construction, where the people were settle and stay in a concentrated place in urban context.
- c. *Keraton*  
*Keraton* is a center of power and the urban settlement had been developed. According to archeologist, the urban settlement in Java had been developed after the Trowulan city during the Majapahit Kingdom. *Keraton* is function as a center of power and has a landmark which establised the orientation and shapping the city. This situation were supported by open space and market right in front of *keraton*.

- d. Mosque  
Mosque is an indication of entering Islam influences at the city in Indonesia. Islam influences is side by side with who hold the power, this can be proved on the placement of the mosque in the city is so close to the keraton.
- e. Graveyard or *Sarean*  
Graveyard for the family kingdom has a unique character in the city civilization in Indonesia. Graveyard is built side by side with the mosque, it showed in the Islamic Kingdom in Java such as: Demak, Jepara, Kudus, Yogyakarta and Surakarta.
- f. Market  
Market is people's place for daily activity in economic transaction. Market in traditional Javanese urban daily life is function as a place for people to change the agriculture commodity one to another and even the handicraft. Otherwise it also function as a social interaction place for people within the city. Market usually has taken place in the open space in front of keraton, named *alun-alun*.

According to the discussion above, concluded that the traditional settlement in Indonesia, especially in Java has been shaped by the repeatedly urban structures such as: *keraton* as the center of government, mosque as a center of worship, and market as a center of economic transaction.

### 3.1. Majapahit's Ancient City



Fig.1:  
Reconstruction  
Majapahit City by  
Henry Maclaine  
Pont

Majapahit is a greatest kingdom in Java and has important influences as pioneer in the development of city system and order in Java. The Majapahit's ancient city was located in Trowulan, East Java. According to the book of *Negarakertagama*, Majapahit is a city without fortress and shaped from the combination of separated building compounds which linkage by the road. Open space is used for market and social interaction for the people within the city. The buildings are built around the compound and every compound is separated but has same orientation to on order North-South.

According to the typology we discussion above, so Majapahit is not a compact city like fortress city in Europe, otherwise it is stretched city. With the result that image of urban in the city is not appeared yet. The space perception appeared in multi-focal

and centri-focal. This concept is the symbol of centralistic politic in the kingdoms in Java. Henry Maclaine Pont, the Dutch architect who exists during colonial period in Indonesia, assumed that Majapahit is a big city, surrounding by multi layer brick wall, the ditch around the outer of the region and has rectangular pattern.

### 3.2. The Concepts of *Keraton* and *Alun-alun*

The concepts of *keraton* and *alun-alun* are developed from the centralistic concept which is characteristic of traditional city in Java. *Keraton* mean King's or Sultan's palace or the *bupati's* palace at the lower level on government system. *Alun-alun* is an open space which usually located right in front of *keraton*. Several cities like Yogyakarta and Surakarta have 2 (two) *alun-alun* in the front and back of *keraton*.

*Keraton* and *alun-alun* is basic form as an embryo for generating city form in Java trough the cosmology orientation as basic principles for structuring the city. *Keraton* and *alun-alun* are placed at one line to the North-South axis, hence this pattern introducing the axis concepts in the city development plan, then it trigger the rectangular concepts and finally develop as grid pattern. Otherwise, even the *keraton* and *alun-alun* concept based upon cosmology factor or not, the axis is still contribute as a main axis for shaping the city's structure and contributes as a basic form to shaping typology and morphology in the urban space. However, the neighborhood gate is other physical element which is function as a supplement to the axis. This supplement appears to establish the visual aesthetic and contribute to enhancing the axis.

### 3.3. The Basic Concept of City Form

The city form begun with the typology of single or group building which are uses orientation axis. In Hindu's period, the usage of orientation axis become the main factor in the shaping a building or other built environment. The orientation axis is a physical form which is appears from the people's religion. The concept of North-South axis and East-West axis become a basic pattern in their cities. These axis have 2 (two) phenomenon:

1. As an imaginary axis base upon the religion and cosmology, and also base upon a sacred things which they are believed on it.
2. As an aesthetic value trough the orientation to something.

The development of orientation axis is parallel with the natural reality in the *kampong* development system which is based upon the natural grid pattern. The natural grid pattern is emerged from rice field and garden pattern that have the North-South orientation. Islamic influence contributes positive things for the better axis concept within the city. The different philosophy did not trigger a contradiction. Islamic influences entering with gently and flexibly within the existing culture and religion. Islam at that time is side by side with the kingdom, hence Islam significantly contribute a positive thing in the shaping of urban space within the city.

The Europe styles from the Dutch influences more significant than Islam, especially in the local axis concept. Dutch made the different interruption, they did not accommodate the existing pattern otherwise they are applied style and pattern they brought from the West. Their concept also has an axis concept but base upon on the effort to get the visual and physical aesthetic to shaping the definite linear space and sequence, as well as the renaissance period. Orientation can enter to various directions without the grid pattern. Hence, in this period bloom new axis base upon the linkage between building compounds/cluster and finally shaping new axis especially in the road junctions. This condition is enriched with the physical element

such as building series which shape a gate and become a visual axis (visual space axis).

#### 4. CASE STUDY: YOGYAKARTA

The city of Yogyakarta is shaped before the Dutch came to Indonesia. Planning aspect such as: geographic and economic were not dominant, otherwise the spiritual aspect more dominant which politically assessed under Sultan direct order. This is because all the lands in Yogyakarta belong to Sultan and people only borrow it. Hence, Yogyakarta is planned base upon a strong imaginary axis between Merapi Mountain in the north and South Ocean in the south, however Yogyakarta located in the center of them.

##### 4.1. The Development of Yogyakarta

The birth of Yogyakarta related with the dissension between the family members in Mataram Kingdom because of Dutch political tactic named *de vide et empera* (opposing someone against the other), this was happen under the King/Sultan Sri Susuhunan Pakubuwono III. Finally Giyanti agreement at 13<sup>th</sup> February 1755 become the climax of the dissension, Mataram become divided into 2 (two) region. First region (known as Surakarta) is under Sri Susuhunan Pakubuwono III and the second region (known as Yogyakarta) is under Sri Sultan Hamengkubuwono I.

Philosophically, Yogyakarta shaped by cosmology axis which cannot be separated one to another such as: Merapi Mountain, Keraton and South Ocean. Mountain symbolizes heaven and ancestors; otherwise ocean symbolizes the world. This order refers to Majapahit space and orders which posses the concept of space in Hindu religion. One year after Giyanti agreement, the axis strengthened with the built of *Tugu Golong Gilig*, which symbolize *manunggaling kawula gusti*. This tugu called in Dutch as *witte paal* (white post) because it is shape like post and painted white. At 10<sup>th</sup> June 1867 the Tugu has been broken because of a big earthquake. At 1889 Dutch re-built the the Tugu and exist until recent time.

Yogyakarta as capital city of Sultanate *Ngayogyakartaadiningrat* is begins with the *Gamping* resthouse, function as center of government and the house for sultan and his family member. In 1755 the keraton is under construction and at 7<sup>th</sup> October 1756 the center of government has been moved to keraton. Hence, the government orientation moved out from resthouse in Gamping to *siti hinggil* and *pagelaran* in keraton.

*Siti hinggil*, *pagelaran* and *keraton* all at onces giving positive daily life for the people who live in *jeron beteng*. Basically *jeron beteng* is the restricted area and only *abdi dalem* (sultanate staff) live inside it. In 1765 people in *jeron beteng* has been divided into several kampong, which has a name according to the their duty, such as:

- *Siliran*, kampong for *abdi dalem silir*, who have duty to maintain the lamp.
- *Gamelan*, kampong for *abdi dalem gamel*, who have a duty to maintain kingdom's horses.
- *Langenastran*, kampong for *abdi dalem langenastran* as sultanate bodyguard.
- *Patehan*, kampong for *abdi dalem* who prepare tea for keraton.

Outside the *jeron beteng*, sultanate military camp was arranged in horseshoe formation. There are 8 companies (1 battalion), every company live in 1 kampong which has special name, such as:



- *Wirobrajan*, kampong for wirobrajan soldier as a company I.
- *Daengan*, kampong for daeng soldier as a company II.
- *Patangpuluhan*, kampong for patangpuluh soldier as company III.
- *Prawirotaman*, *Nyutran*, *Ketanggunan*, *Manti jeron* and so on.

*Kampong* settlement is located outside the jeron beteng which supports a daily life for the people who live inside the jeron beteng. Clothing are prepared by *kampong Karangajen*, foods are produced in the *kampong Utara Beteng*. Thereupon in kampong *Utara Beteng* built *Beringharjo* Market. Other goods are supplied by shop houses in *Malioboro* Street. Beringharjo market built as consequences of Hindu space and order named Catur Tunggal, such as: *keraton*, *alun-alun* and market. This market functioned as social-interaction space for all class of people in Yogyakarta.

In 1765, Dutch asked sultan to build a fort in the downtown to protect and secure Yogyakarta from the revolt. The fort named as *Fort Rustenburg* which mean fort for the vacation. Fort around keraton is built in 1784 base upon the wish of Sri Sultan Hamengkubuwono I after he looked at the *Fort Rustenburg*. However, after Diponegoro war in 1830, Dutch changed the name become *Fort Vredenburg* which mean fort for peace. People in Yogyakarta named the fort as Loji Besar, meanwhile the housing in front of fort named as Loji Kebon and Dutch military camp behind the fort named Loji Kecil.

Once again in 1813, Dutch turn on his *de vide et empera* to opposing keraton's family members against the other. Finally *Kadipaten Pakualaman* is separated from keraton and forming their own government. In 1870, Dutch make a land regulation named *Agrarische wet*, as a consequences the Dutch investors began build sugar factories and steel factory named Purosani. This situation is strengthened by the increasing of transportation development such as: the built of *Lempuyangan* train station in 1872 and *Tugu* train station in 1887. Thereafter, Yogyakarta became wider to the north with *Malioboro* area and *Mangkubumi* area as the main axis. In the beginning of 1900s, the north of Yogyakarta had been developed well with specific space order and Europe style buildings. The Dutch civil housing began built in Bintaran, Jetis and Kota Baru in 1918.

#### 4.2. The Philosophic of Space Order

The main axis which shaping Yogyakarta has a sense of philosophic for the human being. It means the journey of human life from beginning until the end of life. Along the main axis can found several elements which related one to another, such as: *Panggung Krapyak*, *Alun-alun Kidul* with 2 banyan trees, *Alun-alun Lor* with banyan tree and mosque, *Beringharjo* Market, *Kepatihan* complex and *Tugu*.

- *Panggung Krapyak*, explained the human condition in the world of spirit/soul. Kampong Mijen/wiji (mean: germ) is located in the north side of panggung krapyak which mean the human being must be pass trough the 'germ' process.
- *Alun-alun Kidul*, explained the marital process between 2 human being which is symbolize by 2 (two) side by side banyan trees. Trough to the north direction, a narrow road which is named as *Pamengkangan* is located, it explained the birth of a baby. Trough to the north direction, *Kampong Magangan* is located, this is a place for baby to learn about life until he/she grow up and mature.

- *Keraton*, is the world for human being to stay and life. Here is the place for the king and princess, this explained that the human must be can to be a king/princess, to make a decision, regulate, and enter to the life.
- *Alun-alun Lor*, explained the social intercourse place in the world. To the west direction, grand mosque is located which is symbolized as a reminder for human being about their responsibilities as khalifatullah (chalip).
- Before reach out the *Tugu*, there will be found many junctions. This is symbolized as the temptations which will be turned the human being from his/her destination.
- *Beringharjo Market* is symbolized as temptations to human being about goods.
- *Kepatihan* is symbolized as temptations to human being about duty and position.
- After pass all of them, all human will be arrive to the *Tugu*. *Tugu* explained *manunggaling Kawula Gusti*, the unity between human being and God.

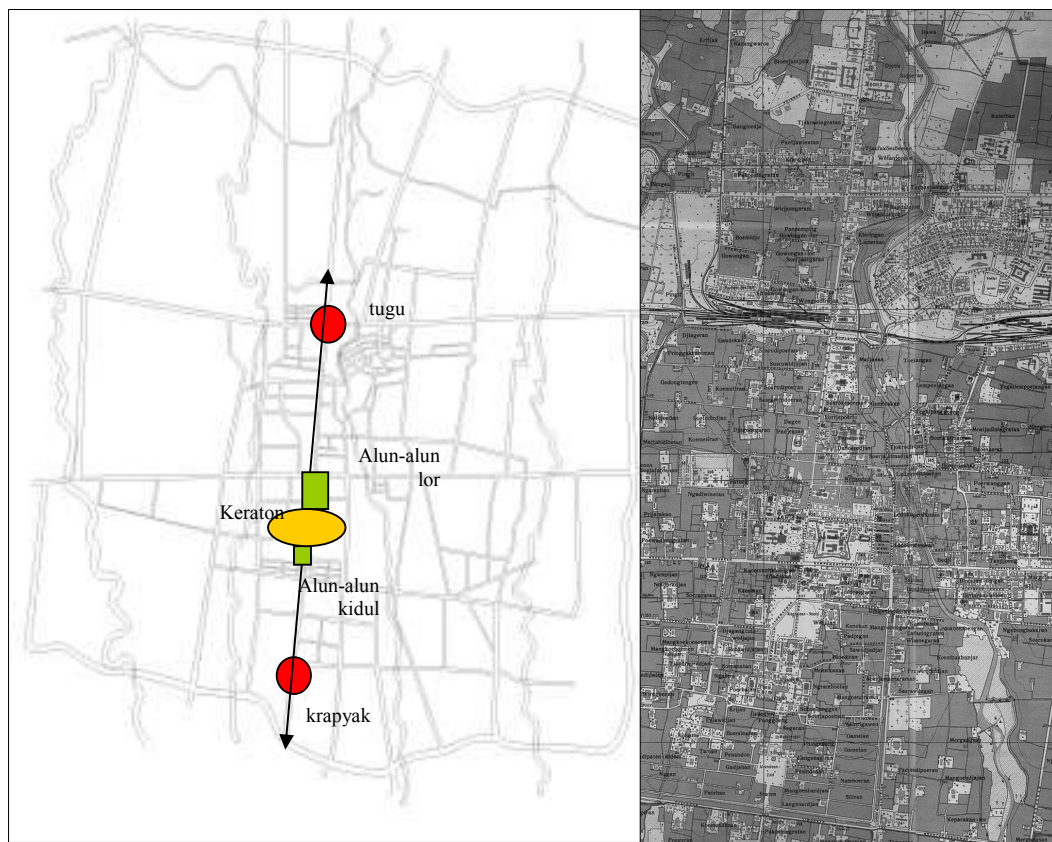


Fig.2: Structures and Order in Yogyakarta

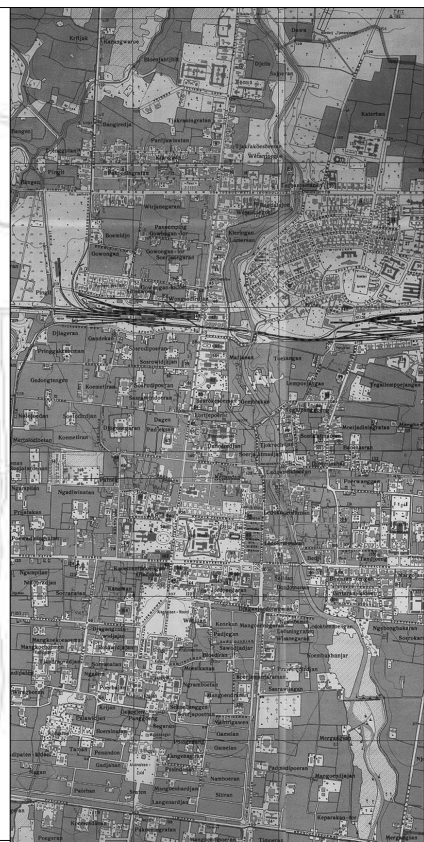


Fig.3: Yogyakarta in 1925

## 5. CONCLUSION

Generally Yogyakarta has a concentric pattern, all the activity centering to the keraton. This pattern separated by main axis which functions as main road; however keraton is located around the main axis. The concentric pattern began change to be multiple nuclei, since Yogyakarta became administrative region in 1947.

Yogyakarta is planned base upon a strong imaginary axis between Merapi Mountain and South Ocean; however Yogyakarta located in the center of them. Main axis

which had been shaped has a sense of philosophic about the journey of human life from beginning until the end of life. Along the main axis can found several elements which related one to another, such as: *Panggung Krapyak*, *Alun-alun Kidul* with 2 banyan trees, *Alun-alun Lor* with banyan tree and mosque, *Beringharjo Market*, *Kepatihan* complex and *Tugu*. Alun-alun Kidul has a smaller dimension than Alun-alun Lor and located inside the fort; however only half of the Alun-alun Lor located inside the fort.

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## **DENSITY, DESIGN AND THEIR IMPACT ON URBAN FABRIC**

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### **Abstract**

Urban consolidation has become one of the prime objectives of metropolitan planning across the world. It is based on the desire to increase population densities within existing built-up areas in cities through relaxation of regulations controlling building heights and bulk. There is a need to evaluate density and design and its impact on urban fabric to create good and feasible development.

It is often assumed that high densities are inherently evil and that low densities are good. It is quite likely that living conditions in high-density residential developments is better than in the low-density areas. In the older areas of cities in many countries, despite high densities, living environment is often quite good. However, effects of high density could be negative that can give rise to unpleasant interferences but it can also be very positive leading to social cohesion.

Planning can influence urban development through layout of services and other practices followed in design and subdivision. The economy in the planning of housing development considerably depends on judicious choices of these variables. High densities bring down total cost as well as cost of land per unit. However, design parameters such plot coverage, height, proportion of area under roads, open spaces etc also affect cost and the environment of residential development, over and above the density effects.

This study discusses mutual relationships of density and design and their impact on urban fabric. It provides some guidelines for the planning of residential areas. It attempts to identify the relationships between density and design as well as density, design and urban fabric. No attempt has been made to suggest specific standards for density or other aspects of design.

### **1. Introduction**

Density is relevant to 'environmental quality, transportation system, physical infrastructure and urban form, social factors and economic factors' (Churchman 1999, 398). Growth of the urban areas in the last few decades has led to a number of physical problems. Many factors are responsible for this unprecedented growth of urban centres all over the world, which has contributed to acute shortage of building space and increase in the price of land. The cost of land and infrastructure is increasing continuously. In spite of this, planners are generally concerned with low density with implicit assumptions about its effect on the living environment. It is often assumed that high densities are inherently evil and low densities are inherently good. Often density is confused with building type planners often assume, for example, that detached housing has lower density than attached housing types. While this is normally true it is not always the case. A high-rise tower with large number of units set on a park-like site may have lower density than a set of detached houses on small plots (Forsyth 2003). Finally, some people associate

higher densities with some social and economic characteristics such as renter, low-income households, and high crime neighborhoods. Peoples' perception towards high density is linked with the notion that they are not good places to live. High density urban development is not necessarily undesirable if it is properly planned and managed. It is quite likely that in spite of high densities living conditions can be better than in the low density areas. In the older areas of Indian cities, despite high densities, living environment is often quite good. Effect of high density can be negative and give rise to unpleasant interferences but it also can be very positive and give rise to social cohesion. However, the problems typically associated with density are not necessarily caused by high densities but by poorly designed development.

Spiralling land prices in urban areas in many countries have tipped the balance in favour of intensive multi-storey developments. To regulate the nature of such high density developments planning authorities formulate design parameters such as density standards, coverage, floor space indices and the controls that influence design and cost of housing.

Cost and environment of urban land development is greatly influenced by the nature of planning, layout of services and practices followed in the design and subdivisions. Economy in planning of housing developments considerably depend on judicious choices of these variables. High densities bring down the total cost as well as land cost per unit. However, other design parameters such as plot coverage, height, proportion of area under roads, open spaces etc also affect the cost and environment of residential developments over and above the density effects.

With ever increasing demands for housing in urban centres, effective utilisation of land is assuming greater importance. Due to growing pressure on land, optimisation of residential densities has become necessary. Although dwelling size, its shape and the nature of grouping are fairly crucial in determination of densities, choice of layout also deserves prime consideration. A proper choice of dwelling size, nature of their grouping and number of storeys and due regard to design and construction practices can help to achieve quality built environments.

This study discuss the mutual relationships between density and design parameters and their impact on urban fabric. First part of the paper gives an overview of density, design and relationship between density and design. Second part of the paper outlines what is urban fabric and impact of design and density on urban fabric. Final section concludes with how density, design and urban fabric are complementary to each other.

## 2. Density and Design

Design plays a crucial role in the successful development of a specific density. The arrangement, location, views and sequences of well designed medium density housing can function better than a poorly designed low density development.

Both density and design plays very critical role in creating built environment. However, density itself cannot create good or bad environment because density is only a measurement, not an independent factor, that could create good or bad urban fabric/built environment (Alexander 1993, Forsyth 2003). Indeed it is design that is responsible for creating good or bad urban fabric. Density is only one of the elements or parameters of design out of many design parameters such as floor space index, plot coverage, mass, volume etc. Therefore density could not guide the form of built development. First part of the section gives overview of density, second parts explains urban fabric and last part describes the role of density and design in creating sustainable urban fabric.

### 1. Density

Concept of the urban density is very old it has been applied ever since the Garden City movement in England and the early modernists in Germany (Pont and Haupt 2007). Density has different implications to professionals in different disciplines such as planners, economists, community organisations, psychologists and ecologists. For example, a psychologist or a sociologist may concentrate on the effects of perceived density on mental well-being. Density is a term that represents the relationship between a given physical area and the number of people who inhabit or use the area. It is expressed as a ratio of population or number of dwelling units to area (Forsyth et al, 2007; Forsyth, 2003, Holden & Norland 2005, Montgomery et al 2003, Churchman 1999, Cuthbert 2006, Magri 1994). Population density is not a practical measurement because it will be lower with small households such as empty nesters than with large families with several children (Forsyth et al 2003). The most widely used method to determine the density is dwelling unit per hectare (Pont and Haupt 2007). Another area of confusion is the issue of crowding, a perception that there are too many people (Churchman 1999, p390). Churchman says that 'density is an objective, quantitative, and neutral term'. It is neutral in the sense that one cannot know immediately whether a given level of density is positive or negative. In housing studies, however, crowding is generally measured as number of people per room, per bedroom, or square foot. Obviously density and crowding are not the same and are not even always related. It is possible to achieve very high

densities with spacious apartments with no crowding, and conversely it is possible a detached farm house is crowded in terms of having many people per room.

Much of the literature on density by professions outside of planning focus less on the actual quantitative measure and more on the perception of density by the people who encounter it. This builds on the notion of perceived density as examined by Rapoport (1982) which looked at how different environmental, cultural and social factors could influence in both positive and negative sense, the perception of different densities by different people. Jensen (1966) argues that same housing density could be accepted differently in different parts of the world based on cultural and societal norms of the particular countries or place.

Unfortunately, planners and researchers often refer to density in relative terms such as high or medium density without specific numbers. Notion of high and medium density is relative and it varies from place to place. Same density can be perceived and evaluated in very different ways by different people under different circumstances in different cultures and countries. For example, density of 40 dwelling units per hectare is considered to be high density in Australia whereas the same density in India is considered as very low density. While people often talk about low, medium and high densities there is no agreed standard of what constitutes high, medium and low densities. High density in Minneapolis in the U.S. might be considered as medium or even low density in Paris and Singapore.

There is no one conventional measure of density between or within countries or even within a region. Different countries have different approaches to measure density: it varies from density measured as population per hectare to dwelling units (DU) per hectare. DU sounds much better because it is constant whereas population is variable and it is based on household size. Gross and net residential density is typically expressed as dwelling units per hectare. Floor area ratio is a more precise way of measuring commercial or mixed-use density.

Net residential density includes the area occupied by the housing itself, any services and facilities for its immediate benefit, private gardens, communal gardens, children play areas and incidental open spaces. It includes parking spaces, access roads within the site and half the width of surrounding roads. Small scale facilities such as a local shopping or a community centre may also be included (Forsyth et al 2006; 2003, Montgomery et al 2003, Burton 2000, Cuthbert 2006, Jensen 1966, Magri 1994).

Gross residential density (neighbourhood density) includes, in addition to the above, open spaces serving a wider area and other landscaped areas, primary schools, local health centres, distributor roads and transport networks, small scale

employment, services and mixed use. It does not normally include large industrial and commercial areas or major roads and transport interchanges (Forsyth et al 2007; Forsyth 2003, Montgomery et al 2003, Burton 2000, Cuthbert 2006, Jensen 1966, Magri 1994).

The difference between net density and gross density plays an important role in projecting future land needs. Net density refers to the actual lots used for development after road allowance, parkland and other non-development lands are excluded from calculation. Typically, at least 33% of land is devoted to these uses. A gross residential density of 25 du/ha would be roughly equivalent to a net density of 37.5 du/ha as the following example illustrates.

## 2. Design

Design could be viewed as an activity that translates an idea into a blueprint and vision for any urban, rural and regional areas or for different land uses. The important part is the translation of the idea through design's ability. Design does not have to be new, different or impressive to be successful, as long as it is fulfilling a need and is a functional, as stated by Wright 'form follows function'. Indeed design methods do lead to innovative and interesting places.

Design not only look at the aesthetic aspects of the built environment but it is a problem-solving activity. Indeed design is a 'functionalism' or 'form follow function' approach. Jones (2001) argues that design is a functionalist approach: "the functionalist approach suggests that if we analyse the problems that the design sets out to address in sufficient details and in scientific manner, a spatial solution will emerge from this analysis or 'programme". It suggests that design is a linear process, which if carried out with sufficient rigour, will lead to a single, optimum solution" (Jones 2001, 51). Both design elements and functions have impact on built environment. Design have many elements such as plot coverage, floor space index, set backs, mass, height etc which helps to create various urban fabric with same density. Functions of the design also play a crucial role in creating a urban fabric such as how the streets are laid out, land is subdivided, buildings are arranged and detailed, where trees are planted, where the sidewalks lead.

## 3. Relationship between density and design

There is a strong relationship between density and design. Density is a measurement but design is a tool, which creates urban fabric. Therefore both density and design play an important role to create desirable urban fabric in various cultural contexts. This section is divided into three parts. A first part argues effect on



variations in design and density, second part explains the Impact of design parameters and last part describes impact of layout pattern.

Campoli and MacLean (2007) argue that for many people density is associated with ugliness, congestion and crowding, even if it can be shown to people that well designed higher density can achieve good built environment and could save land, energy, infrastructure cost and the overall cost of the housing development. They argue that many people have problem of visualizing density or distinguishing quantitative and qualitative character of density. Forsyth et al (2007) argues that higher density has many advantages in terms of efficient use of infrastructure, housing affordability, energy efficiency, vibrant street life that improves social interaction. However she says that density alone is not sufficient to create a good urban environment and it requires appropriate design. Montgomery, Saunders and Chortis (2003, p1) say that 'issues relating to urban form and density continue to fuel worldwide debate'.

#### *1. The effect on variations in design and density*

The effects of variation in the basic relationship between different factors like total living rate, floor space rate, floor space index, plot coverage, communal services index and number of storeys determine the total land requirements for housing. These variables in total determine housing density and plot size.

Dutta and Garg (1967) and Sinha (1982) argue that increases in density can only result from substantial decreases in the total living space. Even at low floor space rate, high densities cannot be obtained until total living space rate falls. This study also showed that variation in the communal services index can have a substantial effect on densities, particularly where total living space rates and floor space rates are low and number of floor increase. However at low floor space rates (such as 20 sq ft per person) the effect of building height on density is negligible. At medium floor space rates (e.g. 80 sq ft per person) the effect of building height becomes more marked but it is still not significant until the total living space rates fall below 350 sq ft. At higher floor space rate (e.g. 200 sq ft per person) the effect of building height on density becomes dominant when the total living space rate falls below 750 sq ft.

The point that clearly emerges from the Dutta and Garg's (1971) study is the importance of the total living space rate and it is perhaps the most significant aspect of housing density.

## *2. Impact of design parameter*

Dutta and Garg (1971) in their study refer to the mutual impact of land use, coverage, floor space index, open space per dwelling on density. These allocations influence the net and gross residential densities. Increase in residential densities bring down the plot area of dwellings and mainly result in high rise development. At a particular density, the extent of land coverage and the type of open spaces greatly influence the quality of environment.

Nature of grouping of buildings and number of storeys also influence residential densities. These values increase with increasing number of storeys in continuous row of dwelling or where no additional side open space is allowed. In the case of high rise apartment they tend to fall after recording small increase. However, the number of storeys giving maximum density varies with the nature and size of the dwelling units. Floor space index values behave similar to that of density. In a continuous row of dwellings it shows constant increase with the number of storeys. Irrespective of grouping in a row the land coverage reduces at a diminishing rate with increasing number of storeys. Number of dwellings placed in a row influences only the rate at which land coverage diminishes. Overall high rise development does not become economical, after certain height if a small number of dwellings are grouped in row.

Open space per dwelling remains constant for a particular dwelling size and location even with varying number of storeys for a continuous row of dwellings. With other grouping it uniformly increases and greater rates are achieved in shorter row than the longer row. In row type housing open space per dwelling can be determined by multiplying the area of dwelling with the factor for the required for open space. The study concludes that apart from dwelling size, its shape, orientation, and grouping the layout deserves prime consideration in determining densities.

## *3. Impact of layout pattern*

Other studies by Datta and Garg (1971) and Sinha (1982) analyse the impact of different layout patterns on housing densities. Size, shape, and nature of grouping give diverse configurations of buildings and directly influence the choice of layout and resulting densities.

Squares and rectangular blocks are relatively efficient whereas layouts with irregular and spread out blocks consume relatively more land. Densities vary with the size and number of dwellings in a block, number of blocks forming the pattern, and the spacing between the blocks. A comparative study of 'T', and 'U' pattern formed with three blocks demonstrate that the density of 'T' pattern progressively increases with

the number of dwelling in cluster. 'H' pattern gives highest density values in medium range cluster, but density reduce with the increasing size of the cluster with large number of units. 'U' pattern makes relatively highest density and 'T' pattern usually low. Four blocks of 'U' pattern can achieve higher density in large cluster, and falls appreciably with 'X' pattern. 'H' pattern formed with five blocks obtains highest values for a clustering large number of dwellings. Finally this study concludes that net area density rise with the increase of number of units in cluster. This study throws some light on the behaviour of certain parameters that influence the nature of housing development.

Quite often, in residential area planning, blocks consisting of single row of dwellings is provided. However, in low income group housing doubly loaded blocks are also adopted. Relatively higher densities can be achieved with such blocks than blocks with single rows. Higher densities between 68% and 87% of net area densities are possible with doubly loaded blocks as compared to 52% to 78% obtained from single block. Relative increase in density varies between 13% and 57%. However, in most cases about 20% to 25% more densities can be achieved with doubly loaded blocks. If higher floor area ratio is allowed doubly loaded blocks can result in higher densities. This section demonstrates that it is design rather than density matters in creating better built environments.

Even though high-rise buildings are generally associated with high residential density there is no basic relationship between the two. For example the two neighbourhoods depicted in Figure 1 have exactly the same density but they look very different at night and day. Although they both have the same density they are not necessarily perceived to be equally dense. What really matters is how the layout is laid out. Layout plays very important role in creating urban fabric and living environment.



Figure 1. Impact of design on built environment Source: Lincoln Land Policy Institute

### **3. Density design and urban fabric**

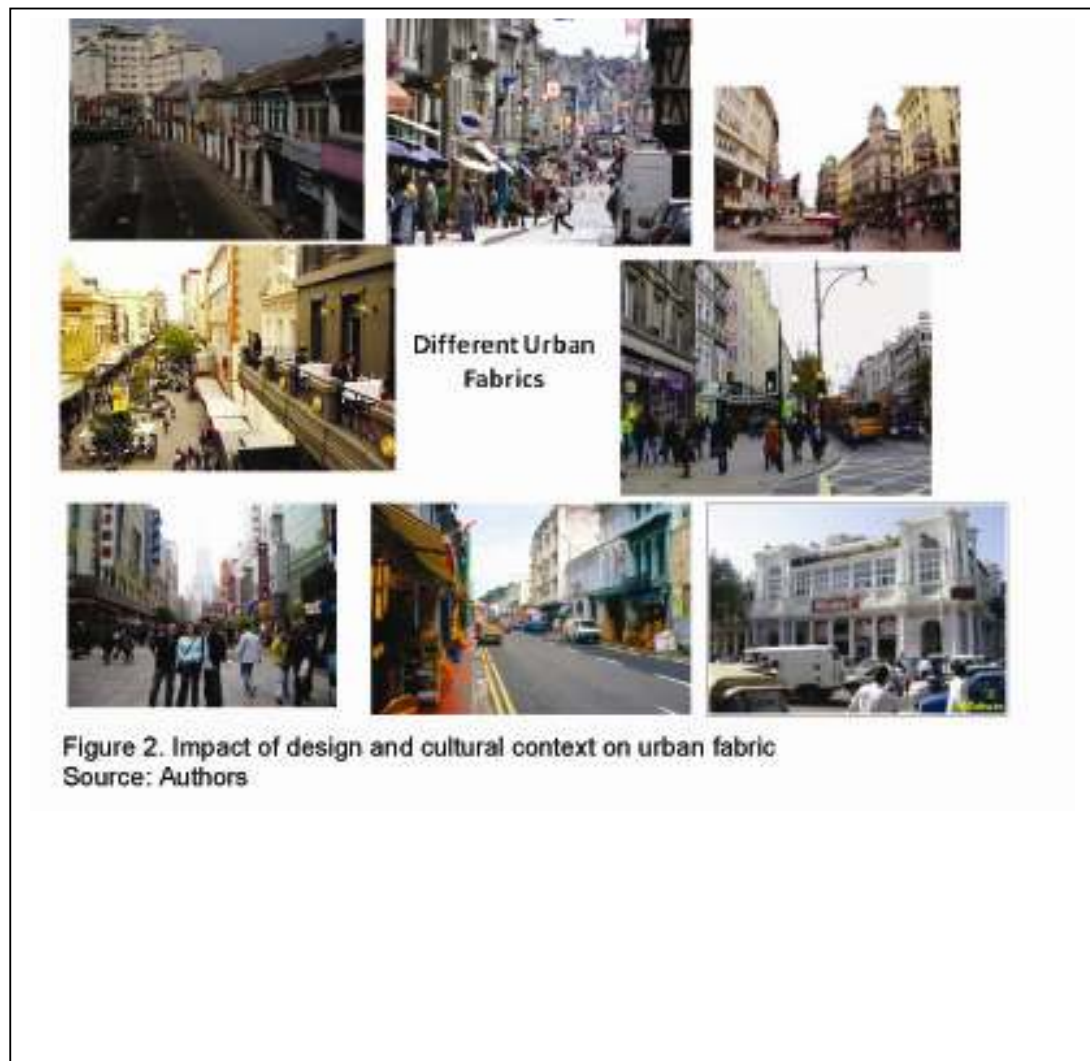
Both density and design play important role in creating urban fabric. First part of the section explains what urban fabric is and second discuss the impact of density and design on urban fabric.

#### **1. Urban fabric**

It is generally assumed that urban fabric is nothing more than the physical arrangement of various activities, architectural forms to suit land use regulation (Greene 1992). There are various schools of thought: some authors discuss design of urban fabric in physical and environmental terms (Cullen 1961, Levy 1998, Lynch 1960, Trancik 1986), whereas others argue that creation of urban fabric is the linkage between psychological, sociological and philosophical aspects (Rapoport 1982, Alexander 1987). Some consider it as an interplay between environment and social factors (Barnett 1982, Lawson 1980). In spite of great concerns for creating sustainable and lively neighbourhoods (urban fabric) there is not enough comprehensible and consistent terminology in a framework both planners and public can use to communicate ideas about neighbourhood design (Greene 1992).

For most researchers in urban morphology urban form means the form of urban fabric. Paradoxically, the concept urban fabric has never been clearly defined. This is despite the fact that in most research on urban form the same elements are identified and analysed, either separately or in relation to each other (Levy 1999). In this paper the urban fabric is defined as the physical form of towns and cities.

Figure 2 illustrates how design plays an important role to create various urban fabrics for the same activity or use. Forms of commercial streets from various cities reflect various urban fabrics even though the activity is same. However this difference is also due to use of different design parameters and the context and culture of places.



the classification of lots, the typology of constructed spaces or the identification of types of urban spaces and squares, typology of open spaces or the identification of types of urban spaces and squares and provision of public realm and density.

Modern cities has undergone radical changes in physical form, not only due to their expansion but also through internal physical transformations. These have created entirely new kinds of fabric. A shift has occurred from a closed fabric, including central business districts and outlying suburbs in which the link between the different elements (plots, street, constructed space and open space) formed a system (system of urban architecture), to a peri-urban fabric which is open and fragmented with autonomous and atomized elements which do not relate to each other. The shift has been accompanied by significant changes in scale with the appearance of imposing mega structures and relationships between buildings that are now only functional. The aerial photograph of Pittsburgh in Figure 3 depicts design elements that impact on the urban fabric.





Figure 3: Old Neighbourhood in Pittsburgh, Pennsylvania  
Source: <http://www.airphotona.com>

This aerial photograph of a neighbourhood in Pittsburgh shows most of the buildings are three-story row houses, a building type which lends it medium to high densities. Variety of land uses exist here including houses, apartments, churches and shops. All streets are interconnected and have sidewalks, and parking is limited to curb side spaces. Whereas the aerial photograph of a housing development near Denver in Figure 4 shows many of the characteristics of automobile-oriented development. There is only one land use present here: single family houses. Shops, workplaces, and schools can only be accessed by a lengthy drive. Houses are placed at the centre of large lots, and large areas are taken by roads and driveways resulting in a low density. the creation of the urban fabric.



Figure 4: Denver, Colorado, United States  
Source: <http://www.airphotona.com>

Another example show how the urban fabric varies from one example to another and how living environments is different for different types of layout pattern. Figure 5 depicts that even though density for all four lay outs is 25 dwelling unit per hectare yet urban form varies drastically from one place to another due to design parameters as it results in different types of built environments.

These examples show how the image of urban fabric varies from one plot to another and how the living environment is different for different types of layout. Another example from Singapore and Delhi (Figure 6) also demonstrate that even though density in both examples is more or less the same the urban environment is very different because of different design approaches followed in Singapore and Delhi.



Figure 5. Examples of different built environment with same density: (1) A mix of single and multi-family homes on small lots, Newport Beach, CA, (2) Side-yard houses on long and narrow lots, Charleston, SC (3) Town houses and large single-family homes converted to apartments, Sandusky, OH (4) Multi-family development, Tampa, FL.  
Source: Lincoln Land Policy Institute



Figure 6. Impact of design parameters on urban fabric  
Source: [http://www.db.com/careers/en/images/India\\_\(Delhi\)\\_iStock\\_000001307820Small\\_rdx\\_500x335.jpg](http://www.db.com/careers/en/images/India_(Delhi)_iStock_000001307820Small_rdx_500x335.jpg)



Another example shown in Figure 7 depicts that even though the design approach is same for the two developments density varies significantly. These two examples have similar urban form but density is very different: 45 du/ha in Grachtengordel in Amsterdam (left), where as it is 85 du/ha in De Pijp in Amsterdam (right). However this difference in density is due to number of amenities and workplaces and size of dwelling units. Thus there is no direct relationship between density and urban fabric.



Figure 7. Density design and urban fabric Source: <http://www.europeanbeerguide.net> and <http://www.amsterdamimage.com>

Pont and Haupt argue that density alone merely reflects the intensity not the urban form. However when density is seen with other design elements such as floor space index, open space ratio, and network density it will impact on urban form and will be able to differentiate urban for more efficiently (Pont and Haupt 2007). . Therefore high density urban development is not necessarily undesirable if it is properly designed, planned and managed.

#### 4. Conclusions

To achieve high density, placing houses closer together is important, and building vertically is also important. A two-story house provides the same living space with half the footprint. Given our desire for large homes arranging single-story houses in a compact layout pattern does not provided a good deal of density. Even at modest densities it consumes unreasonable amount of open space. Building up rather than building out not only allows higher densities but also offers opportunities to create significant green spaces and public realm.

What determines whether a place seems too dense? One important characteristic is the overall settlement pattern. If there is little variation - an even wash of development from one corner of town to the other, or the same shape blocks or building type repeated relentlessly will feel crowded even if it has a low density.



Contrast and diversity at the neighbourhood as well as the regional level are vital components of successful density.

There is a clearly a need for a better understanding of the role of these elements, particularly in the context sustainability. In this regard, there is a need to establish how urban form and density may be managed to successfully address both ecological and liveability criteria and the result could then be used in an assessment of the degree to which cities meet environmental performance and liveability standards.

Perceived density and crowding are based on the principle that the same density can be perceived and evaluated in many different ways by different people under different circumstances in different cultures, context and countries. However, a high density urban fabric could be more sustainable and lively than low density developments because of different design approach. Therefore we need not be afraid of higher-density developments because if designed well, it can provide great economic, social and environmental benefits.

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## ISLAMIC LAW FOR WATER AND LAND MANAGEMENT AND ITS IMPACT ON URBAN MORPHOLOGY

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**ABSTRACT** Urban morphology and territorial landscape of Islamic cities were deeply affected by the Islamic law that regulated the ownership, distribution and use of water and land. Due to the climatic exigencies and the economy of subsistence that was mostly based on agriculture, water was a precious liquid that was treated with special care. A sophisticated system of subdivision of shares was developed by jurists from the succession law and right of ownership over a long history of daily practices and cumulated body of legal opinions.

Consequently, the analysis of urban forms in Muslim cities cannot bypass the study of these mechanisms that are found in books of jurisprudence, archives and courts records and the people's practices that are rooted in the local traditions and that are still standing in some parts of the Muslim world.

The present study aims at presenting these mechanisms and shed light on their physical impact in the Muslim cities. The complex geometry of land subdivision in both urban and rural areas, and water irrigation system are analyzed through the available maps and aerial views. Cities such as Blida, Kolea and Tamentit, Algeria, provide sufficient documents for the study of this relationships between the Islamic law and the urban form and thus, serve as case studies. The study aims at presenting a good example of the interaction between human needs, faith and spirituality, and laws of nature, and thus add a new dimension to the concept of sustainability.

**Key Words:** Islamic law, Land, Water, Rights, Urban Morphology, Muslim Cities.

### 1. INTRODUCTION

Muslim cities were often dictated by the hot climate and sun, and thus were characterized by their "solar architecture". However, it is often ignored that the same cities have also developed a sophisticated "water architecture" that stemmed from the scarcity of this element and the special care drawn to it. It has been a major factor that shaped and sometimes dictated the morphology of some traditional Muslim cities.

Landscape of the territory of cities was for instance marked by major elements that brought water from remote sources. Aqueducts as suspended canals crossing mountains and dunes created a territorial architecture that marked the physical environment of Cordoba<sup>1</sup>, Algiers and many other cities).

In desert cities this same element was inverted. Water was drained in an underground gallery in order to protect water from sand storms and evaporation. Desert cities in Iran, Afghanistan and North Africa present a characterized territorial image of successive wells, often covered with domes that penetrate the city urban fabric. So, looking from the air, sets of wells look like a line of small craters (Figure 1). Some of these wells are consequently covered with parapet walls giving them

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<sup>1</sup> Benhamada S. *Al-maa'wa al-insan fi al andalus* Dar al-Taleea, Beirut 2007, p 115. Cordoba used to have an aqueduct that has a unique bridge that had 19 arches, each measuring around 50 palms.

cylindrical shapes, and others have domes creating a very characterizing urban furniture.

Water brought from many canals is gathered in common pool that have very characterized architecture that is shaped by water movement and topography. Pools and collectors have different forms and sizes from which diverge many smaller channels.

Land was subdivided into parcels in a linear form that goes in parallel to the canals. Parcels had a modular pattern that defined the territorial landscape, defined by the system of cultivation, the trees sizes such as palm trees, and oranges. Rights for irrigation however the locations and forms of these plots were, stressed this modulation.

At the urban level, the city was also shaped by water. The urban space was framed with a grid of fountains, *sabeel*, that provided water to passersby<sup>2</sup> as well as residents. Rain water was stored in wells and pools, and drained to streets through extended elements from the roofs called *Meezab*.

Drainage of rain water were also present in this natural design process. The urban pattern of Algiers old city, was developed on the versant of a dune facing the sea that helped discharging used water efficiently.

In desert, the underground irrigation system was combined with wind-catcher techniques to provide freshness. Where water tunnels run beneath houses, special rooms were constructed beside the underground stream with tall shafts reaching upward to wind-towers above roof level. Air caught by the wind-towers, was forced down the shaft, circulates at water level, and provides a cool refuge from the afternoon heat of summer<sup>3</sup>.

The following sections will highlight the tripartite relationships between the urban morphology, human needs for water (and land), and the Islamic law. At a higher level, it gives a new sense to the concept of sustainability that relates urban development to the laws of nature on one side, and the metaphysical mind that constitutes the way the Muslim mind perceives the environment.

## 2. THE MORPHOGENESIS OF CITIES

Opposite to the well known model of Muslim cities that are mostly irregular and organic, the present work presents cases of cities that have a relatively orthogonal network that has been dictated by the by the water channels and irrigation system. A similar study was made by Bonine M. (1979) on the Iranian cities that have the same irrigation system<sup>4</sup>.

It is not the intent of the author to establish an exhaustive list of these cities but rather to present some examples and highlight the relationships between the urban morphology and water<sup>5</sup>.

### 2.1. Blida And Kolea

The urban structure of the city of Blida was highly shaped by the irrigation system. Its location was first determined by the availability of water and the fertile land that characterizes the Mitidja plain<sup>6</sup>. Its road pattern was marked by the canals of water that infiltrated the city towards the agricultural land (Figure2). The river called *sidi*

<sup>2</sup> In Algiers there were around 100 fountains forming the water grid of the city and insuring the provision of water to all the residential quarters.

<sup>3</sup> Qanats p5 available online [www.waterhisotry.org](http://www.waterhisotry.org)

<sup>4</sup> Bonine, M. E., (1979). The Morphogenesis of Iranian Cities. Annals of the Association of American Geographers. 69 (2), 208-224.

<sup>5</sup> Cities presented here are selected on the basis of a personal interest and field studies that made documentation and urban history available.

<sup>6</sup> It occupies the coastal central part of North Algeria.

Ahmed Al-Kebir was first diverted from its initial path, initially directing from north to south, in order to protect the agricultural space from floods and permit control of the descending water (Saidi 2002: 389). The diverting point served thus as a delta from which many canals departed in the form of an open hand with 8 fingers towards north and thus replacing the large river flow. Agricultural plots developed accordingly in a linear form parallel to the waterways. Channels and small dams were built with clay and stones conducted water to all parts of the city in response to the local population needs for irrigation and potable water. Many fountains were also built near the main gates of the old city (Saidi M. 2002).

Channels were further subdivided into smaller streamlines to reach the smaller plots that resulted from the subdivision of land according to the succession law. In fact the continuous subdivision of land entailed the redefinition of the irrigation system in order to insure the share of water for each new parcel.

The initial irrigation system helped Saidi M. (2000) to redraw the morphology of the city through the reconstruction of both the agricultural parcels and the building parcels. Due to the periodic maintenance and the right of passage known in the Islamic law that gives access to the channel, paths seems to have developed along these channels and turned into streets and roads. The hierarchy of the irrigation system thus should have shaped the present roads network and circulation system. In the absence of major topographic constraints and a homogenous slope directing north-south the channels and consequently the roads were straight and diverged from the old city core to its periphery.

This could be also said about the city of kolea that was also founded in response the same Andalusian population as in Blida, that fled Muslim Spain to North Africa (Saidi M. and Librato P. 2004)<sup>7</sup>. Being on the slope, roads were parallel to each other and would have been running along the channels that were traced by the water of springs that originated from the summit of the city, among which Ain Hlalef, Ain Lalla Ruba and Ain Sidi Ali<sup>8</sup>. As an agricultural settlement, the urban fabric of the city would have developed from the agricultural parcels into a row of back-to-back houses<sup>9</sup>.



Figure 1: Foggara wells along streets in Adrar (Algeria)

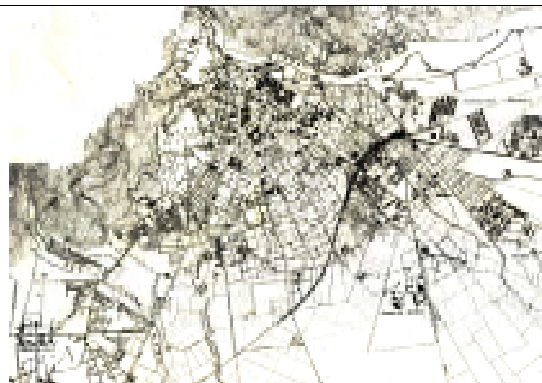


Figure2: Blida and its periphery showing the traces of water canals

<sup>7</sup> Saidi M. and Librato P. (2004) From the grid to the labyrinth. The Medina with a Roman Substratum in the cases of Miliana and Koléa, Algeria. International Seminar "The Mediterranean Medina" June 17-19, 2004 Pescara, Facoltà di Architettura Francavilla a Mare, Museo Michetti.

<sup>8</sup> The information was provided by an old lady (around 70 years old) who lives since here childhood in this city.

<sup>9</sup> This deduction is in contrast with that of Saidi M. and Librato P. (2004) who consider that the morphology of the city was shaped by the Roman grid. In fact their article provide no evidence of such an influence. It seems thus to be a mere glorification of the Roman model and belittling of local know-how that is reflected in the title of the article.

## 2.2. Tamentit

The city is located in the region of Touat that is in the heart of the Algerian south-west part of the Sahara.. The city that goes back to 570 AD, was the crossroad of many desert and commercial roads among which the Sudan road that relates north Africa with Black Africa. It was thus an important pole of cultural and commercial exchange (Martin M.G. 1906)(De Colomb L.1860).

The city is formed of many compounds that represents autonomous neighborhoods known as ksour, and that are separated by streets (Suter K 1952). Each ksar is squarish in form and is enclosed within a surrounding wall that comprises watching towers and a unique gate. Echallier (1972:51-60) described the chronology of their development in detail despite the scarcity of information.

The geologic structure of Touat seems to have dictated the orientation of the settlement. Foggara, that are the underground canals providing the settlement and the oasis with water, are directed East-West in consequence to the presence of Tademait plateau. Three of these Foggara, after reaching the palm-tree gardens, pass through the ksar and irrigate the oasis of the other side. The city is thus surrounded by oases that form a microclimate within the town<sup>10</sup>.

In the absence of a major topographic constraint and the presence of a small slope, the city shows an orthogonal pattern that corresponds to the development of streets in parallel to the water channels (Figure 3). Its oasis is also ordered according to these channels and are structured in accordance with the palm tree that became the territorial module. A better understanding of this morphology requests an insight in the hydraulic system that is known as *Foggara*.



Figure 3: Tamentit; an aerial view showing the oasis, the city and the canals

### 2.2.1. The system of Foggara

The system of Foggara consists of conducting water through an underground gallery from a remote location to a human settlement and an oasis. Its utility is to

<sup>10</sup> One of these fougara known as Hennou is the oldest one and pass under ground of the settlements and thus seems to be older that the settlement that was founded around 517 AD.



minimize the community's efforts and time of the daily search for water, to prevent evaporation and dust due to the harsh climate, and to keep water fresh and cool. Initially, the wells are established to provide air and light, and enable the workers to dig horizontally and create the gallery (Figure 4). But they are also maintained in order to enable the community to carry out the annual maintenance and repair the gallery in case of obstructions that are caused by the sand storms.

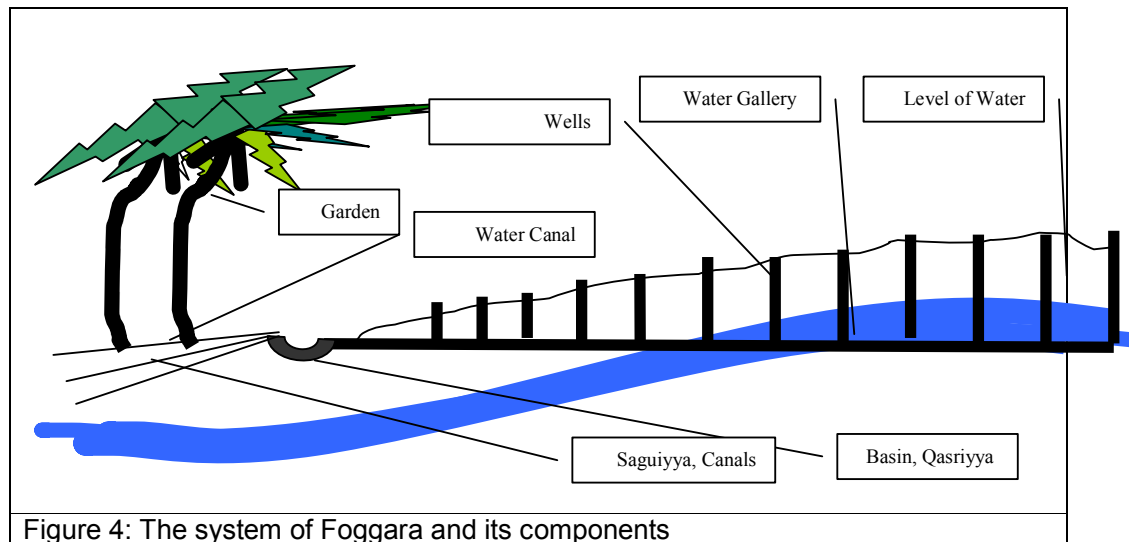


Figure 4: The system of Foggara and its components

The system, is also known in other Muslim countries such as Iran<sup>11</sup>, Oman, Emirates, Yemen and Morocco. It is believed to have been developed along time ago in the Middle-East pre-Islamic period<sup>12</sup>.

In Algeria, the region of Touat within which Tamentit is located has a network of underground canals that has in total around 2000 km in length<sup>13</sup>. The system although defeated by the modern system is still in use in most of the old settlements<sup>14</sup>.

Regarding the process of construction, once the location of the first well is defined that is always in the highest altitude, a series of other wells that will have lesser depth, distant 5 to 10 m from each other, are established. The total length of a foggara might reach 8 km, 10 and even 15 km. An old foggara is an outcome of an incremental work of generations that is undertaken in consequence to the decrease of water level or a communal project of improvement. A horizontal gallery that is located in 10m to 12 m depth in the ground links between these wells. Water drainage is insured through a light slope that is in the range of some millimeters per meter. Its width has a diameter of 1 to 1.20 m that is sufficient for a person to pass through for repair and further digging. Once this gallery reaches the oasis and/or the settlements it appears on the ground surface as a canal and flows towards a large basin, called Kasriya, from which water is distributed to farms and gardens. Water doesn't come only from the first well but also from the walls of the other secondary wells through infiltration (figure 5).

The subdivision of water is done by a public agent known as Kiyyal al-Maa (measurer of water)<sup>15</sup>. A special technique that relies on mathematics and geometry of circles was developed to measure shares and distribute water. A table, made of

<sup>11</sup> Among Iranian cities that rely on this system we can state: Hamedan, Qazvin, Neyshabur, Kerman and Yazd. See [http://www.destinationiran.com/Kariz\\_\(Qanat\).htm](http://www.destinationiran.com/Kariz_(Qanat).htm) accessed on July 15, 2008.

<sup>12</sup> The system is was known under different names such as Qanat(s) and Kariz in Iran, and Aflaj (pl. of falaj) in Oman and Emirates, and khittara in Morocco. See Qanats available online [www.waterhisoty.org](http://www.waterhisoty.org)

<sup>13</sup> [zoumine.free.fr/tt/sahara/donnees\\_geo\\_clim\\_bota/foggaras.htm](http://zoumine.free.fr/tt/sahara/donnees_geo_clim_bota/foggaras.htm)

<sup>14</sup> The last fougara seems to have been dug in 1984.

<sup>15</sup> De Colomb Les Oasis du Sahara p 35

copper, that has many holes of different sizes, reflecting the fractions of Islamic law of heritage, is used to create orifices within the outer wall of the main basin in the direction of the gardens. A comb-like form called shebka (network) through which water is channelled into smaller canals and streamlines called seguiyya, is then formed (De Champeaux G. p22-24)(Figures 6 & 7).

At present, many of these Foggara have lost their water due to the continuous hydraulic and drilling works in the 1970's and 1980's that extracted large quantity of water. Urban sprawl also covered areas through which Foggara passed and thus led to their destruction and pollution with sewage and other used water<sup>16</sup>.

### 3. ELEMENTS OF THE ISLAMIC LAW FOR WATER AND LAND

Islamic law should be first placed within the metaphysical framework that governs the Muslim mind and vision to the cosmos and that constitutes the general beliefs. Within this universal order, the human is believed to fulfill a mission on Earth that is known as *khilafa* and/or *istikhlaf*. Land and water are thus perceived as parts of this general ecosystem.

On the other hand, Islamic law also relies on endogenous norms that govern the ideas and actions of the Muslim individual. Legal rules and moral reasoning are thus interwoven and dictate human actions regardless of external authorities. These latter intervene only in case of deviations in order to correct misconducts, misuse and abuse of rights.

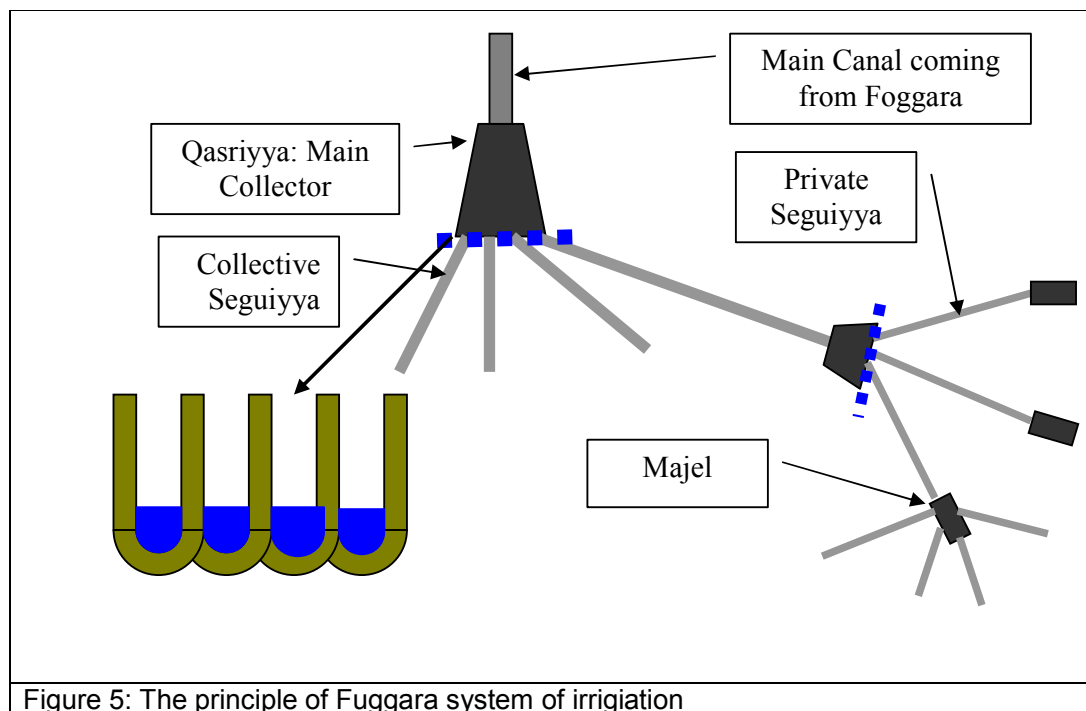


Figure 5: The principle of Foggara system of irrigation

These two features give a special meaning to the concept of sustainability that render it an integral part of Muslim environmental culture. It is within this framework that Islam urges humans to rationalize utilisation of natural resources and fight any spoiling, harmful and destructive actions as it considers that in contradiction with the supreme mission. It considers basic human needs as vital and recommends

<sup>16</sup> A regulation was established in 1996 in the wilaya of Adrar to protect the Foggara system (Wilaya Decret no 426, dated 23 june 1996). until recently, qanats still supplied 75 percent of the water used in Iran, for both irrigation and household purposes.



equitable use of these resources. Protecting the public realm and establishing the general legal framework is thus coupled with the insurance and promotion of individuals rights.

In legal terms, there is no fragmental field of 'Islamic water and land law' but rather a set of overlapping themes or domains of *fiqh* that deal with these two issues. Water and Land rights in Islam do not exist in isolation from other parts of Islamic law (UN-HABITAT 2005).

Water and land were specifically mentioned in many occasions in the Quran for they paramount importance<sup>17</sup>. In reference books of legislation they are sometimes classified in special rubrics, and in others are treated jointly. Among the major rubrics of *fiqh* in which water and land issues could be found we can state; public interest, right of ownership, succession law, easement law, right of passage, right of preemption, right of precedence, customs law and servitude zone "hareem" of trees, wells and rivers (Garbrecht G. 1983).

### 3.1. Ownership and Possession <sup>18</sup>

According the Muslim jurists, water legally ranges between two statuses with regards its origins and the degree of human needs. It is either public or private. Large rivers and lacks, rain water and springs with abundant water are considered of the first category, and are thus shared equally<sup>19</sup>. Sources that emerge in private properties, and wells and canals built by individuals is of the second one. As a private property, it could be subjected to regular forms of usufruct and transactions such as selling, endowing, donating etc (Benhamada S. 2007b).

A foggara for instance might be private or collective depending on the way it was constructed, by an individual, or by a social group. However it is in practice constructed and maintained by the whole society. In some cases a wealthy person could create a Foggara and join it to the common one adding its water to the general flow. Its outcome water is then added to the whole. However he gets half of the added quantity from the out-coming debit, in counter part of benefiting from the main gallery.

Ownership is sometimes conditioned by public interests. In case of scarcity and extreme need, and/or excess of water beyond the individuals needs, public authorities are called for intervention. Possession of flowing water from a spring in one's property or a river passing through that property does not give the right of preventing the others from benefiting or using it improperly. It is thus an imperfect property, or a form of possession, called in legal terms *Hiyaza*, that gives the right of use only. This form has an implication in case of scarcity of water where water rights are allocated according to priorities (the closer to the spring), merit (efforts made to bring water), and degree of need (thirst, basic needs).

### 3.2. Revivification of Dead Land

This mechanism is based on the principle of the freedom of action that is granted by the Islamic law to individuals within the general concept of vicegerancy, *khilafa*. A dead land *mawat* is by definition any piece of land that is not used, not owned and that shows no sign of prior appropriation. The act of reviving consists of bringing water to a dry land or drying a swampy area so that it suits agriculture and other aspects of development. Jurists agree that revivification is the first step of appropriation *Hiyaza*, by which land could be owned (Kami E. died in 1723, 2000: 426-438). However, they disagree regarding the permission of the ruler.

<sup>17</sup> Surat "Tell them that water is shared among them, and each one should have his own share", Quran 54:28. In the Sunna for instance "People share three things: water, grass and fire" Kami E. died in 1723 (2000): 478.

<sup>18</sup> The present section is limited to water. Land has been treated in many other studies.

<sup>19</sup> The first category is supported by the sayings of the prophet stating that "People share three elements: water, fire and grass" and that "extra water should not be prevented" Al-Bukhari vol 3-p200, Muslim vol5, p34-35.

There is a symbiosis between water and land. Revivification is often made by the establishment of an irrigation system such as digging springs and wells, and laying canals from existing sources of water.

In the case of Tamentit for instance, the area of revived land depended on the quantity of water. The decrease of level of water also led to the gradual shift of green land. Parcels located in higher level were abandoned while new land which water reaches was revived. The city thus witnessed a successive shift of its oasis to lower level. In extreme cases settlements were abandoned when water ground vanished, while new ones were born when a new source of water was discovered.

On comparing foggaras in two different dates, 1670 and 1906, Martin AG (1906, p254-255) found that in 1670 there were 36 fouggaras in Tamentit having a total debit of around 70 habbas (210 liters per minute). In 1906 it has increased to 2083 habbas and thus led to the extension of the farming area and the population growth. Revivification process depended on the availability of water, its ground level and location of new sources<sup>20</sup>.

### 3.3. Servitudes Zone Hareem

Opposite to the previous principle, the Hareem concept consists of defining a buffer space around trees, wells and springs or along rivers and canals that preserve their use and prevent any other activity. A well for instance should have a servitude zone around it between that has a radius between 40 and 60 cubits as it is used sometimes for animals, while a spring might have a servitude zone of 500 cubits (Kami E. died in 1723, 2000: 442). Any other well or septic fossils as well as a building should therefore not be permitted to be built within this zone.

Also a tree has a servitude zone that insures its roots to develop and its leaves and branches to extend. It is estimated to be 5 cubits. A similar unit of space was developed in Bahrain to measure land though the number of palm tress that is known as *Maghras*. A garden could thus be measured through the number of trees that have each this module of land. This module also served jurists to investigate in case of conflict between contiguous properties regarding boundaries and harvesting. Land in the vicinity of cities and villages is regarded as buffer zones, *hima*, that serves residents for wooding and grassing and thus is excluded from revivification. However, other jurists consider that unused land within the city is a residual space left behind the act of revivification (Al-Qarafi S. E. (lived between 626A.H. and 684A.H.). It could thus be developed in continuity to the early action. This in fact what happens in the Muslim cities where a continuous appropriation of unused spaces takes place over centuries and leads to a complex geometry of cumulated solutions.

Within the urban space, adjacent outdoor spaces along houses walls were considered as a servitude zone for houses that are called *fina*. Umar Ibnul-khattab, the third caliph, judged that fina(s) belong to the owners of houses for their utility. However, they were not allowed to build it.

Canals had also a linear *hareem* zone that permitted repair and periodical cleaning. Rivers have also their own linear zone that prevent people from building along it. In most of cases, this zone turned into a path along the canals.

### 3.4. Subdivision of Succession law

Islamic law of succession is one of the areas of jurisdiction that had the most impact on physical environment and urban geometry of cities. It departs from the principle of distribution of wealth and resources among individuals for social justice. It thus

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<sup>20</sup> Echallier J. C. Village desertes et structures agraires anciennes du Touat-Gourara Arts et Metiers Graphiques, Paris 1972.

combats monopole and class segregation. However, it leads sometimes to the fragmentation of the properties that sometimes hinder their use and usufruct.

Jurists developed tools and techniques for the subdivision of wealth such as land and water. Books of jurisprudence abound with examples and real cases of subdivision (Al-Rami XV Century, Al-Wansharissi died in 914 AH, Kami died in 1723). Water was considered as part of things that could be owned, inherited and thus subdivided. Qanat and fougara system gives a sophisticated system of subdivision and fractioning<sup>21</sup>. A table of copper that reflected the shares according to Islamic law was manufactured<sup>22</sup>. This fractioning is reflected in the shape and size of the canals and streamlines that are built hand-free using clay as a material (Martin A.G.P. 1908) (Figure 6).

An example of a fuqara subdivision of water would be for instance among 36 people that built it. If the resulting water is for instance 86 habbas the quantity of water will be subdivided on 36. that will give  $86/36 = 2\text{habbas}$  and  $14/36$  for each. The denominator of the latter fraction need to be changed from habba to qirat in order to be subdivided and thus is multiplied by 24. So  $14/36\text{ habba} \times 24 = 336/36$  that is  $28/3$ . Each member will thus have in addition to the previous 2 habbas, 9 qirat, and  $1/3$  qirat will remain. The latter will further be subdivided into fils and will be multiplied by 24. The final result will thus be that each members will have 2habbas, 9 qirat and 8 fils.

Besides the subdivision of the debit into fractions, water was also subdivide according to a time schedule that is based on the moon and stars positions. Once the water is collected in the general collector, called *Majjel*, *Qasriyya* and *sahreej*, a continuous opening and closing actions of water channels took place within the oasis.

### 3.5. The Customs Law Urf Role of Custom and Istis-hab (urf)

Islamic law gave importance to local traditions and customs of each region and considered it as a source of legislation as far as they don't clash with the principles and ethics of Islam. Local and pre-Islamic practices have therefore persisted in the Muslim world and gave variety within the general framework of Islam (Hakim)<sup>23</sup>. Measurement techniques, tools and instruments, and management systems of water and land were therefore preserved in each region. On the other hand, the open borders within the large territory of Islam permitted the exchange of practices through the migration and travels of Muslim individuals and social groups.

For instance, Andalusian community that fled to North Africa in 1535, brought new ways of irrigation and farming that shaped the new cities such as Kolea, Blida, Algiers and Cherchell (Saidi M. 2003). It is most probable also that other migrations took place from Oman, Persia and Yemen to the Maghreb and introduced the system of Foggara that is strikingly similar to Aflaj of Oman and Emirates, and Qanat of Iran.

Public agent known as Kiyay al-maa and the technique used to measure the debit and subdivide water according to inheritors share would also be part of the customs.

<sup>21</sup> The measurement is based on a unit this equivalent to the width of a finger, that it is approximately 9mm in some areas and 27mm in others. The unit of measure called 'the habba or sebaa' أصبع, is the quantity of water passing in a night and day in a hole that has a width of a small finger pierced in a table of copper. It is equivalent to 3.50 litres per minute. This unit is further subdivided into other units. It is equivalent to 24 kirats or 96 dirhem (4 per kirat) or 144 kharrouba (6 per kirat) or 576 mouzouna (6 au dirhem or 4 a la kharrouba, or 2304 farfouria (4 per mouzounia)

<sup>22</sup> The table is designed to give the fractions that are known in Islamic law of succession. The first row at the bottom there is a series of equal holes that have the size of a small finger called habba. In the second row the holes are larger but of equal sizes that is 7 habbas. In the last upper row the holes are of different sizes and reflect the fractions  $2/3$ ,  $1/2$ ,  $1/3$ ,  $1/4$ ,  $1/6$ ,  $1/8$ ,  $1/12$ ,  $1/24$ . this latter is called the fils or qirat. The qirat is itself subdivided into other fractions that goes in smallness to the needle of the palm tree.

<sup>23</sup> Hakim, B S (1994) The "Urf" and its role in diversifying the architecture of traditional Islamic cities. *Journal of Architectural and Planning Research* 11(2), 108–127.

Both time-based and debit-based categories of Foggaras were thus either imported or adopted from the other communities within the legal framework of Urf.

### 3.6. Easement and elimination of Harm

On granting the right of property and freedom of usufruct, the Islamic law permitted also the transaction and exchanges of services and benefits among neighbours and partners. It however set rules that prevent damage and protect neighbours and public. Intervention of public authorities was mostly limited to the authentication of agreements and accords, solving conflicts that brought to courts, and defending public realm from private violations.

Passing through another's property or draining water through neighbours assets was a common practice that is known in the rural as well as urban areas due to the continuous subdivision of properties and transactions. The passage of water and person on others property was done either on the basis of the ownership; a footpath or canal a being owned or bought, or through the acquisition of the right of passage *Haq al murur*, and the right of drainage *haq al masseeel* that is granted due to a previous subdivision or a precedence, or through charitable donation.

According to Ibnu al-Rami (XV century, 1995:587), a person might own a palm tree within another's property. The land owner has thus no right to prevent the owner of the tree to reach it, maintain it and harvest it. However, if the land is planted the owner of the tree should find the optimum path that doesn't cause any damage to the plantations. A similar legal opinion was stated in the case of a person who owns a piece of land within many other properties whose owners want to prevent him from passing through. Ibnu al-Rami (1995: 594) states that they should reach an agreement among themselves to provide access to him and could not prevent him. This also applies in case he wants to develop his property into a house or any other building. Similarly, if they decide to develop their properties into constructions they should decide about the location of the path that lead to the central property.

In most of the cases agreements are reached among neighbours and partners after long discussions and in the presence of other members of the community as witnesses and mediators. Most often the concerned parties are motivated by their religious convictions and moral values that urge for good deeds. A right of passage and/or drainage on another's property could also be shifted from a location to another as far as the owners of the concerned land agrees.

Such a flexibility permitted a dynamic birth and extinction of rights and servitudes that was reflected in the geometry of plots and engineering solutions away from the direct intervention of the authorities. Figure 6 Shows for instance how two crossing were designed in the form of two flyovers.



Figure 6: a small water distributor



Figure 7: a fly-over channel

#### 4. Conclusion

The urban morphology of the old Muslim cities that are located in desert has been highly shaped by the movement of water and the early form of land parcels that were initially set for agricultural purposes.

One of the most important lessons of these case studies is the new dimensions added to sustainability concept in accordance with the Muslim mind and the long practice acquired through city making experience. Endogenous norms that stemmed from the Islamic metaphysics turned into an Islamic legal framework that highly shaped the actions of people on the built environment. The example of the Foggara system shows how these actions go in line with the laws of Nature that kept balance between natural resources and human needs, and reflected the Islamic beliefs and rules of conduct.

Such a symbiosis between the environment, the human needs and religion gives an image of a sustainable development that used to govern our human settlements before the advent of industry and powerful technology<sup>24</sup>.

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<sup>24</sup> Some private Foggara become a favorable site for fish breeding and provide a large quantity of fish.

## OPENS TYPOLOGY ARCHITECTURE OF ISLAM (Case Study : BAYT AL QUR'AN and MUSEUM ISTIQLAL)

Julaihi Wahid<sup>25</sup> and Bhakti Alamsyah<sup>26</sup>

### Abstract

Progress of technology that is increasingly fast more enabling man to innovate in finding a new findings, do not aside from in architecture area. From civilization of man who nomad, formerly lived in tree house, caves until finally permanent and makes shacks and then rounds into traditional houses which there are still up to now. Requirement would a protection of nature for all man activities increasingly grows along with development of man activity, causing emerges a new notchings in designing building. Besides house, building that is in general as place of man activity also experiences development that is enough significant.

But appearance of building having new notchings itself always generates pro and counter where, especially in state which tropical climate. Borns it the new notchings always also followed by bases and methods realized also in conceptioning has just in architecture which can accompany bearing it a form of new building. Bolts from the thing, Ir. Achmad Noe'man, which is an architect in Indonesia trying to make a new breakthrough in designing building and always bears a new concept in finding new notchings which in basing to understanding of architecture having nuance Islamic. Bayt Al Qur'an and Museum Istiqlal is some of masterpiece Ir. Achmad Noe'man will be applied as case which will represent in business to find has present a new type in developing architecture concept is having nuance Islamic as well as as an impregnation of form or building types in architecture in general

**Keyword:** *Islamic Architecture, Type and Typology*

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## UNDERSTANDING ABOUT TYPE

Type comes from Greek word '*tipos*' widely has showing meaning coverage and can be application into many nuances and various from the same ideas like a model, matrik, impressi, printing; mould and also relief. To be more knows farther about understanding of type hence hereinafter is under this will elaborate understanding about definition from type triggered by the architects between it.

### **a. Guido Francescato**

Express that the type shows some meanings, in a the synonym type with class and category, and in architecture side and designs seen like a classification. And in a the type professional discourse has a coverage from having the character of things explains up to things having the character of ambiguous and abstraction.

Type concept got based on architecture concept idea is an idea relating to making of a masterpiece / presentation of architecture (*praxis*), idea to an architecture masterpiece (*theory*), and knowledge in architecture area (*research*). Difference of type and typology here is explained, where typology is be a study about type, and in a few literature it is found that typology is equal to type.

While categorizing if utilized in construction related to a structural classification to a function, related to building types expression like hospital, library, shopping centre. If in implication with technology, classifies a system like: *passive solar*, *concrete precast* etcetera identical with a certain building type.

Differentiated it is also between typologies and form, where typology is functioning to categorize a building seen from function, technological and structural and not from form. While form is having essential from type but having different spectrum, where type haves the character of more abstraction.

Type is classified again into two concept class, that is:

- Type is a presentation of geometry from a form, in understanding here type is an a real equipment good for a geometry typology, and this classification based on to configuraton and characteristic form of *Ecludean* (Passanti 1963, Zevi1948). But typology geometry is not a unique in architecture, because doesn't express natural, which more compatible application in form of other arts picturesquely and statue (Eco 1968).
- Relational typology is a type that is is too not explains, and has ideas symbolising form of architecture and all the equipment.

In proposing a new type as a whole, an architect must make a sign or characteristic in the profession causing can guarantee the location in a history, and must concerning things including about structure in public, and applies a criticism to the future to a new type is peeped out the causing can see the continuation in front.

Hereinafter in making a new type better also is depicted past type / history / the origin, so that visible deviation done to appearance of a new type. Measuring instrument utilized to test is an elementary type / past, what has a form yielded from certain norms which has been tested the function and ability in a process designs in the operation to yield an certain object, so that in this case type can assist finds / defines authenticity / natural an object.

### **b. Quatremere de Quincy**

According to Quatremere de Quincy understanding of a the visible type in a few elementary understanding that is:

- There is difference between a types with model
- Be a recognition of a relation between object with historical the presedent.
- An emphasis between a forms with the usefulness.

A type is sinomim also with a model though is between it there are two differences that is enough easy to be understood. Because type word presents slimmer of image to copy or dummy fullyly from an idea and also element like the one ought to be done to a model. And

model understood as practically as a art, an object which must be imitated like how existence, where type is on the contrary, an object yielded from an actor will tend to not to have resemblance with other. All thing relating to accuracy term given to a model, while a type altogether more or less as thing vague. And in architecture science expressed that altogether has predecessor or history, for absense of a generation also coming from thing not exist.

In this case Quincy assumes that the type:

1. Interferes in / unlike a model
2. Type in empathy is result from a journey of long tradition (everything must have antecedent).
3. A type is alterable from the original. And this thing is addition of a variation formally can be done, so that itself type basically can be modified and developed fartherly, also covers development from various from form of at an object / building.

## USEFULNESS FROM TYPE

### 1. *Purpose of studying type is:*

- a. Desire to be able to analyse and discuss existing from a production.
- b. Interest in designing

Both the things is upper is related to form and between both correlating tightly.

### 2. *Relation between an concept idea, type and designs:*

The three has a different level series and scale, where a concept is thing still having the character of abstraction, then towards at skematic designed with focus from things which the abstraction becomes a type, then is continued into a form which more concrete that is a designing, and enables for existence of change which is a variation from a type by virtue of choice, limitation owned, choice form and characteristic from face / feature. A level from typology can be seen as a planning scale in a decision designs depicting an unity of choice from system

### 3. *Some differentiations from type*

In a few case there is differentiation of five levels from type is:

1. As a configuraton from komplek and town space / urban space.
2. Building apartement is including is including road, the relationship with building units and housing.
3. A level from itself housing
4. As a element of main construction
5. As a element of frieze like panel cladding.

### 4. *Type in a design process according to the experts*

#### a. *According To Francescato:*

In type usage, cannot be avoided by architect to depend on to ideologys owned by it, opinion widely, memory, personality and individual creativity owned, and processed is creative in the field of architecture is not different far from other esthetics area, because also is a hop which can depict an expression a finite quality of his specific storey an object, and the on unique lays in authenticity of esthetics communications and workmanship of his own tur architect / usefulness of an the object differentiating it from other art, where architect has freedom in doing a deviation from specific types which there have been before all.

An architecture masterpiece fiddles around with hopes from consumer causing peeps out a difference / various forming of things which have been assumed as according to what which have been applied till now, but must be avoided applies a type as a model which can submit common things because this things is a ancient have been way.



Not like other art area, an architecture masterpiece proposes an wide opinion, that is proposing a new road to live in an area, and joined in takes a hand in one of aspect that is is not only classifies it as a art but tending to as a mass communications.

**b. According To *Quatremere de Quincy***

In a process designs he to express that typology explains process to design is good as creativity hop that is supported by intuition and or as sekuen orthogonal transformation and reduction of functional peripheral, or even as interplay between forming processes image and problem finishing process practically.

Type is a knowledge wheel of architecture because type forms unity formation, function and meaning transmission by history and orthogonal transformation by through history by filters dialektikal between architectures and public. Type is a thing that is separate between a forming of history and condition of culture.

**ROLE OF TYPE IN CONCEPTIONING PLANNING**

Concept is developed with reduction of complexity experience of becoming logical form with abstraction process. Concept can become frame of reference for design. Bounces Image to enrich architect in making concept so that architect can involve subjectively. Accomodates logical form empirically actual is processing interpretation that is seeking of correct form for conceptioning is certain.

Type or typology used to arrange complexity memory so that serve the purpose of activity base to know possibility that design hereinafter. Type or typology is a compilation providing framework to identify some different places and event in experience remembered, to identify way how the experience applied in design and makes innovation notching to become on unique. Innovation happened is result from idea of analogis and metaforik during execution of design.

Manipulation image because of way of our approach to the experience we pack into a different light. Image in mind formed by experience of indera : eyesight, hearing, kisser, groping and taste. The experience has versions as according to interes desainer. Versions experience of forming a reality of mind and separate emotional. Ability of desainer to choose the experience version place design applicable to that is then.

On the contrary ability forms experience through imaginasi mental also required by architect. Like in imagining which has not there is based on past experience. Aldo Rossi express that past experience haves a nest in *memory* and bes awaiting to be used as basis activity for design need. Observation becomes *memory* and lapped over in catalogue that is is neutral not but arising as objects experiencing deformation or evolution. In short memory kept in types compiled in mind catalogues. And this can become making base of concept in design.

**ARCHITECTURE CONCEPT ISLAM**

Based on explanation to hence which will be developed in this handing out is to see concepts developed in Islam architecture typology. Then usable as reference to develop Islam architecture is typology inspired from form of religious service houses ( mosque).

Islamic Religion comes from Mid-East Asia, so that what is coming from Mid-East Asia impressing must be followed equal to the original area, however if seen from Islam teaching truthfully only direct religious service problem relating to *akidah* must be same, however problem relating to nature or earthly freed by religion.

Mosque architecture, not identical by discussing architecture arab. Mosque architecture is universal architecture. Every nation which been governed and or successfully influenced by Islam will render and enrichs architecture repertoire. Architecture which Islamic grows by exploiting architecture before all is a state. Way of building, architecture style, element of architecture, detail-detail which full of correctness in design and embodied to to become buildings having separate marking, full of diversity as according to condition and situation of nation or state influenced by Islam.

Islam hardly esteems modernization, this seen from prohibition *taqlid*, follows habit / tradition without knowledge. And so do in architecture, prohibited *taqlid*, so that an architect *must do ijtihad*, *ijtihad* in architecture, arranges thinking in form language which islamic, be challenge for architect. This thing also told by A. Noe'man in magazine *Perspektip*. No 02 the year 1981 referring letter Al Baqarah sentence 170 having meaning as follows :

*"Dan apabila dikatakan kepada mereka : "Ikutilah apa yang telah diturunkan Allah", mereka menjawab : "tidak, tetapi kami hanya mengikuti apa yang telah kami dapati dari nenek moyang kami ", apakah mereka akan mengikuti juga, walaupun nenek moyang mereka itu tidak mengetahui suatu apapun, dan tidak mendapat petunjuk. Penjelarasannya : Yang melarang manusia untuk tidak mengikuti tradisi yang tidak bermanfaat, bahkan menyesatkan. Peralnya bila "arsitek" tidak berinovasi dalam berkreas, segera akan tiba siksa "neraka" dunia, akibat ikut-ikutan tanpa dasar dan mengabaikan sunnahullah. Ia mengutip surat 3 (Ali Imran) 190-191 mengenai keharusan berfikir tentang alam semesta yang dilanjutkan doa mohon dijauhkan dari siksa neraka.*

This plurality also becomes strength and Islam properties. Therefore architecture which Islamic shall give also possibility that to adaptation of creation of culture from the moslem is it doesn't matter he to stay, any tribe and tradition of the culture. Opinion Adhi Moersid, jury Aga Khan Award for Architecture in article *Tantangan Bagi Arsitek Muslim* in magazine *Konstruksi* April 1992, express:

*Architecture which islami ought to give stimulation to every moslem occupying to be man who pious cloth. While Dr. Nurcholis Madjid arises, every religious expression, at the most result of universal Islam dialogue with situation culturalized in certain space context and time.*

While A. Noe'man in the same magazine expressed:

*Architecture which Islami and the follower is not found. On the contrary might possibly happened in area where Islam grows fertility, exactly barrens of architecture which Islamic. This opinion might be don't make happy however this is logical consequence from universal of itself Islam, often is called as with rahmatan lil'alam, blessing for nature universe. Possibly we are not able to build with Islam architecture criterion. Goods times which non moslem exactly can do it, estimable of Noe'man. Noe'man exemplizes Bauhaus. Moderation, idea equity of Bauhaus, which is anti ornamen and anti the eclecticism perhaps instead hardly Islami. There's nothing pretended mengukapkan, sincerity of material as it is, possibly like the one is conceived by Islam without mubadzir.*

In Islam there are two guide types as Allah power sign evidence :

**Firstly** sentences written that is Holy Book Al Qur'an/ *Qualiyah* giving picture about existence which is absolute, beside contains laws and deed suggested and prohibited.

**Second** is sentences Qauniyah, in the form of Sunnatullah or frequently is conceived of nature laws. Allah hardly suggests to dig and exploits this for safety and man kindness. Thereby, explains that very open Islam and suggests cooperation of attainment of science and technological to all people. Because, concerning importance of all people, not merely the muslimin only, a real held high by height in Islam.

In scheme of an architecture masterpiece, an architect after paying attention to clauses given by the science discipline, must also pay attention to social factors, economic and ecosystem. If checked to be more third circumstantially of the factor, in fact is man problem, space and time. Man, space and time, will show difference phenomenon to the amount aspect, when her horizon is narrowed to to become sectoral problem, regional and last, this area in the eyes of Islam conceived of sentences Qauniyah. So, is there any thing more assertively given Islam for this matter, what can differentiate from other ?.

Achmad Noe'man express in *Konstruksi* magazine January 1991:

Conference about mosque, not quit of of discussion to Islam as a *Dien*, what arranges attitude to life, way of thinking and behaviour pattern Muslim. An architect in building mosque shall be descending at Taqwa, in the process and program doesn't secede from rule of source of Islam ( Al Qur'an, Al Kaun/ the universe and Al

Hadist) and aim to from *ridha Allah*. This quality measure becomes hold of universal knowledge. While amount measure will only arise if knowledge is narrowed to to become sectoral, area. This amount measure always shifts according to progress of science and technology, appreciation of art, regional and epoch.

Various form of mosques which spread over in all Indonesia, at least shows one things. That the very flexible Islam, not rigid. And flexible of the Islam exactly in Indonesia this. No wonder, if (when the expert of architect marvels and cans understand at condition of believing in it mosque expression in Indonesia. They can understand why life tolerance between believers believes in after height and only just is met in other public.

Other statement that is from Darrundono in Konstruksi magazine Januari 1991 having a notion:

Not all mosque architectures must distinguish Arab-sentris. " Important, reference must from '*ruh*' itself Islam". Because in fact itself Islam have been contemporary, *diridhai* as recent religion by *Allah SWT*. Example, " Is the Islam architecture correctness the marking there must be ?" He hardly disagree if only the visualisation is just which Islami, but also the soul Islam must. About localism characteristic, he answers to, " May just of visual expression follows what is growing in the area, so long as the activity and consumer soul Islam has". Because, from which the name '*ruh*' Islam, can be interpreted into all kinds of form. Clever the architects in designing. But with a note doesn't run from frame of reference of *Al Qur'an* and *Hadist*. Inter alia, there is democracy characteristic in it.

### **MEMORY CONCEPT ISLAM IN BUILDING *BAYT AL QUR'AN* AND *MUSEUM ISTIQLAL***

Based on description to hence under this will be elaborated some case studies to see the application of mosque architecture kedalam other building of which is not mosque but architect wish to present Islam architecture concept maximumly into the building. This thing is reachable because of architect (Achmad Noe'man) what designs the building has owned memory which is viscid to itself Islam architecture. But unique building designed by it still have element Islamic which enough perfect.

*Bayt Al Qur'an* and *Museum Istiqlal*, be two building in one unities. Of course in planning and scheme of the architecture, not quit of of august Islam teaching values, which none other than is guided by *Al Qur'an*, *Sunnah Nabi Muhammad SAW*, and interpretation of the moslem scholars. All the things becomes starting point from pattern behavior of Indonesia public mirror in culture, morale teaching, mores, including architecture. According to Achmad Noe'man:

*"In Islam there is no dichotomy between religions and muamalat. We knew that the Islam concept not only ritual only. Besides belief in God problem, Islam also care to ideology problem, intellectual or social. Perhaps Islam concept that is, which able to be packed into architecture scheme concepts".*

Between *Bayt Al Qur'an* and *Museum Istiqlal*, be one inseparable braids, as according to function of the building. While *Bayt Al Qur'an* itself, is not museum, because *Al Qur'an* cannot in packing into museum. This because of existence of a real guide values height in *Al Qur'an*, so that believe people who can up to level of muttaqien. The guides in *Bayt Al Qur'an*, be guides which must be application in life. And in the end, comes up with one personifications in Islam culture in life facets. This can seen in *Museum Istiqlal*. For example all thing relating to *sunatan* chlid, *hatam* *Al Qur'an*, nuptials and others. It all is application from the *Allah* comands in *Al Qur'an*. Thereby we can say, that *Bayt Al Qur'an* be the source, while *Museum Istiqlal* is the personification in Islam culture.

*Bayt Al Qur'an* is not solely place to keep *Al Qur'an*, but he is a place of study about *Al Qur'an*, how *Al Qur'an* becomes guidance of life for Islam believer in world. What *Al Qur'an* claims people welcomes life every epoch. Therefore, study *Al Qur'an* now we can say study tekstual and study kontekstual. Tekstual, in the form of translation, interpretation and application from sentences *Al Qur'an*. Kontekstual, be contexts *Al Qur'an* which then in analogy into everyday life. Therefore, development principle of *Bayt Al Qur'an* is how *Al*

Qur'an becomes guidance, impeller, life determinant. Also goal, taste and karsa man who coloured seriously.



**Picture 1. Building exterior Bayt Al Qur'an, obviates excessive impression**

Evaluated from the angle of architecture, clearly both this buildings refers to exaltus values which implied in Islam teaching. One of them is that in architecture science discipline according to Islam, we may not make thing excessive, however having to justified to beauty, security and safety, and the function, although from the angle of aesthetic still must be thought of.

For example in appearance of exterior *Bayt Al Qur'an* and this *Museum Istiqlal*, architect still must major what presented. Like calligraphy article "*Innaa nahnu nazzalnadz dzikraa wa innaa lahuu lahaafizhuur*" at one of side fasade building, with the meaning "In fact we reduce this *Al Qur'an*, and in fact we looking after this *Al Qur'an*".

This sentence hardly as according to mission brought by *Bayt Al Qur'an* and the *Museum Istiqlal*. That is existence of an effort to look after *Al Qur'an* and propagates information widely to public, starts from *Al Qur'an* which has hundreds of year the age, contemporary finite. So coalescence of this sentence not solely for the shake of beauty of mere, but meaning a real burdens. In Islam, all something that *mubazir* may not, becomes to anticipate this *kemubaziran*, architect Noe'man emphasizes, we must master the science. "If the architecture unmatched to the science discipline, we can say that it non architecture islami". This mirror at appearance *Bayt Al Qur'an* and *Museum Istiqlal* which is enough simpel and functional and comes up simple.

Other example is roof is in the form of pyramid. This is not solely as symbol only. However of course under the roof there is room closed to be required light from the top of. As according to fomentation of the moslem scholars by then, hence to it is written by a prayer which able to be read from plane.

Orthogonal transformation form of roof Masjid Demak at one part of the building, also based on at function which wish to be reached. Under the roof there is multipurpose room / conference. This requires ceilling which is enough is height. Because the construction is steel frame, and requires a room that is is not is in the form of box, with quality of good acoustic. Hence form of roof Masjid Demak, be one applicable alternatives here. As we know, with roof model like this, voice bound will be broken, so that doesn't generate purr. "Of course coincidently form which we use is form of roof Masjid Demak. This election based on technical requirement. This of course aliance from science and technology. So not only orthogonal transformation of form, but based on functional reason".

In line with than both the buildings, hence the facility also enough having immeasurable, starts from space to exhibit, library, seminar space, office, finite of garden plays at children. We thirst for *Bayt Al Qur'an* and this *Museum Istiqlal* life. So also with children, that be chummy with area of hereabouts. We expect education at this children finds beautiful without we must speak. And they can differentiate good which and ugly which.

Discuss Islam architecture, better discuss direct applicable Islam concepts direct to architecture concepts, said expression Noe'man. This to avoid elaborate discussion and long draw out. This thing clarifies if Islam concepts is applied into architecture concepts, by itself becomes Islam architecture. On the contrary, man who is having architecture science discipline, but doesn't know Islam concepts for architecture, hence he will not become Islam architecture. Islam Architecture is ideas and architecture masterpieces matching with Islam opinion about architecture. For the reason, architecture masterpieces matching with this Islam opinion, shortly can be called as Islam architecture. This can born and grows where only

Possibly Islam architecture can born and grows in place of where the Islams and follower is not found. Or on the contrary, might possibly happened in an area where the Islam grows fertility, but there barrens of and grows the Islam architecture. This thing can be felt enough bewildering, however this is in fact a psychological concept from universal of itself Islam. And marginally Islam architecture is not merely mosque building but rather from that is applicable Islam architecture at all of element of building which can accomodate life activity



**Picture 2.**  
**One of side fasade building**  
***Bayt Al Qur'an***

All something from development which is result of Islam culture from human life, based on guide *Al Qur'an*, placed in a museum, that is *Museum Istiqlal*. Here many met by artifact, culture objects, man products, past ommissions, good in the form of goods, article, accessories or weapon, what influenced by Islam nuance.

*Museum Istiqlal*, in general has space program that is we can say equal to museum-museum in general. For example sunshine may not too much admission in room. " On that account, natural light need to be anticipated with irradiating or illumination with other artifiisal". Artificial light itself may not bother object to exhibit the in room. So light characters must be paid attention doesn't fade / changes colour than objects exhibits



**Picture 3.**  
**Landscape and garden plays at child one**  
**of Fasilitas is concerning facet beauty of**  
**and education**

Something else that need to be paid attention seriously is climate happened in Indonesia, that is tropical climate. This climate, besides having dampness that is enough is height, also has high temperature also. " That must be obviated by can destroy various material from objects exhibits".

Museum communicates non one way only, but having to be able to communicate in two way traffic. Museum differs from showroom. Steps into museum of course needs contemplations and we to know that museum is cirri a state which has had culture.

Important meaning from museum, can become source of idea from cultural expansion now. Can also becomes data source to interpret how Islam influences public at a period of certain.

In the end *Bayt Al Qur'an* and this *Museum Istiqlal*, be masterpiece and Indonesian nation effort to push that Indonesia moslem public involves meaning *Al Qur'an* and at the same time as kontribusi Indonesia Islam to world Islam, that the Indonesia Islam is Islam having individuality. cold Islam, peaceful Islam, Islam that is full is tolerance. So Islam here presented in Indonesia face, be Islam which during.

## **CONCLUSION**

Like the one explained by Francescato that in type usage, cannot be avoided that architect depends on to ideologys owned by it, opinion widely, memory, personality and individual creativity owned. And so it is with opinion Quatremere de Quincy that as sekuen orthogonal transformation and reduction of functional peripheral, or even as interplay between forming processes image and problem finishing process practically. From two the opinions becoming cynosure in delivering birth a new type in a planning of building is existence of **memory** staying in idea of architect and supported by architect **individual creativity**, in short memory kept in types compiled in mind catalogues.

Based on experience of Achmad Noe'man is upper clearly depicts that if an architect have never handled project given by client, hence he tries looks for soybean cake by discussing and is each other divide mental shadow with client and other desainer. Result of discussion and is each other divide and itself architect shadow is transferred in the form of picture or media expresi other physical. Shadow explained upper depicting that memory from experience of in making planning concept would continuously overshadow in plannings hereinafter. Mental shadow can present various theme - intellectual, emotional, or experience - where the essensial meaning comprehended by all sides but perceivable in differs in by every participant. requirement of Understanding would be the same become

base from usage of mental shadow and ideas coming from mental shadow as result of experience.

Comes to light that concept developed with reduction of complexity experience of becoming logical form with abstraction process. Concept can become frame of reference for design. Bounces Image to enrich desainer in making concept so that desainer can involve subjectively. Accomodates logical form empirically actual is processing interpretation that is seeking of correct form for conceptioning certain. At least the thing have been proved by experience of Achmad Noe'man in the plannings which the application of Islam architecture into presentation of building.

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## APARTMENT LAYOUT AND PRIVACY SATISFACTION

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Housing design has always been a crucial subject of architect's concern. Architecture in general and housing design in particular has often been criticized by some architects and also in academic literature for not fulfilling people's needs and requirements. The alleged failure of modern housing over the last fifty years has often been attributed and related to a perceived break in the continuity of tradition in the design and layout of the new dwellings as provided by developers. In particular the housing types introduced by the western architecture are not conformed to the traditional nor to the apparently desired new ways of life of the majority of Muslims families in Iran. It has been admitted that the physical layout of the traditional houses is in consonance with the cultural norms and fulfilled the level of privacy in residential design, contrarily, in the middle of the twentieth century there was a break in cultural continuity with the introduction of new housing typology. These housing types were responded to a new set of needs but privacy needs in particular disappear in these transitions. The aim of this article is to investigate the apartment layout in the contemporary apartments of Tehran from privacy perspectives. In this paper the authors also attempt to focus on the potentials of achieving privacy according to the Muslim perspectives. To achieve this goal, the information was gathered from 200 questionnaires on how the occupants react towards the element of privacy in different apartment layouts. The results were used to provide a guideline for apartment layouts design in order to achieve the highest level of privacy. Finally the findings were used for analyzing the level of privacy in the housing plan. This study believes that this approach can be applied for analyzing different layouts of residential environments regardless of cultural background.

### **Key words:**

Apartment layout, privacy, housing in Tehran, structural permeability index, design analysis

### **• Introduction:**

The modern housing of Islamic societies has been criticized by many researchers for not in accordance with people needs and ignorance of socio-cultural parameters in design of houses (ABU-GAZZEH 1995, Al-Kodmany 1999, Bokhari 1983). The alleged failure of modern residential buildings of these societies has often been related to the discontinuity in tradition and imitation of modern western architecture without utilization for Islamic culture (Radi 2004). Although the impact of modern architecture on Islamic community is not the same in many areas likewise many houses built were not giving attention to the occupants consideration and more research on cultural needs is needed especially in the Middle East. Concomitantly, the rush to satisfy intense demand for rapid growth and modernization, Western



principles of architecture were used without modification. Tehran, the capital of Iran, is also essentially a modern city, developed in the last 50 years. The city is design with modern infrastructure with an extensive network of narrow, twisted streets ran through the city (Whalen 2008). As commented by Madanipour (1999) ...” *The urban transformation from the nineteenth century has radically changed the image of the city from a traditional, Middle Eastern city into a modern one, a transformation which can be observed through patterns of land use, street pattern and building form.*” Although the process of the restructuring of the street occurred in a series of stages but it originally started by the “Act concerning Building and Widening of Streets and Alleys” in 1933. This act implemented a grid iron street system for allowing easy traversal of automobiles. Besides, in the old city, street system was a hierarchical distribution pattern of narrow, winding streets leading to cul-de-sacs. Today an orthogonal network of roads is imposed and so as the building form, it changed from introverted, low rise courtyards to extroverted medium and high rise buildings.

In the past decades Tehran is experiencing the highest rates population explosion and the demand for new apartments and residential units are also escalating. To satisfy such a demand one of the issues that is neglected is systematic study on cultural needs and real requirements of the residents. One of the essential issues that is not giving minute attention in housing design is privacy. The element of privacy in the Iranian society cannot be taken lightly in every day life especially in housing design. The Muslim society tend to ignore the importance of privacy and taking the western civilization as a model of modernism. Some researchers believed that the transformation in life also demand a new requirements in designing of the house so that the residents can adapt with these new conditions especially in the city centre. Needless to compare with the tradition of the past, the rule of women has changed in the society and the traditional houses can not survive the present requirements. However, the idea of privacy can not be replaced with efficiency and physical aspects of a comfortable place alone. In this condition, there is a need to examine the potential of analyzing the contemporary needs and requirements with Islamic aspects of privacy elements.

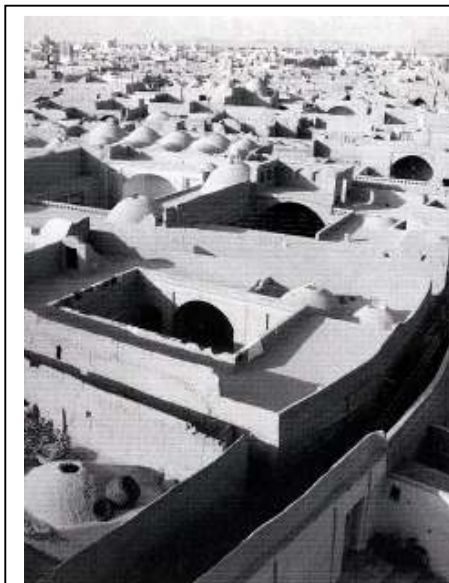
- ***Privacy in Iranian traditional houses***

Studies on Western forms of privacy, revealed differences in practices and conceptualizations arising from age, gender, social class and other factors that may influence the perspective of privacy. Better understanding of privacy need to explore the cross-cultural, and interdisciplinary inquiry of the said society (Alshech, 2004). It is well documented that, in Muslim societies the Holy Quran and the tradition of the Prophet (sunnah) are the basic sources to be followed. With regards to the architectural design, neither the Quran nor the *Sunnah* can provide a detailed codes of house design and construction, as long as the house designs do not conflict with *sharah* (Mortada, 2003). With respect to the concept of privacy in Islamic perspective it seems that individual freedom is circumscribed so as nobody is permitted to harm other members of the community, it means that community do protect and empowers the individual. Generally, Islamic law categorizes gender relationship within the two categories of lawful and unlawfull “*mahram*”. The word “*mahram*” defines the legal relationship between the male and the female either by marriage or close blood ties. Any person outside this lawful area of “*mahram*” is stranger. Sex separation is part of the Islamic system and Islam disapproves of free mixing between unrelated members of opposite sexes. By this categorization also, Islam confines the privacy boundaries of individuals.

In particular this emphasis (on separation and category of relationship between men and women) is the most concerns of Islamic scholars in order to show the effect of privacy in housing design. For example, the stranger is prohibited to enter other's houses unless he is permitted by the owner.

The family is the main concern in privacy particularly the protection of female members from the eyes of male strangers. The consideration of The Holy Quran shows that, separation and shield of the domicile from public domain is emphasized and boundaries between the open public sphere and protected privacy is defined and required in Islam. On the other hand, privacy according to the Islamic principle is an affiliation of principle upon a Muslim to separate his or her secluded private life from public intercourse.

With respect to Islamic rules, the traditional architecture was the product of Islamic beliefs and values of the inhabitants. The Iranian traditional architecture like other Islamic domains was responsible to the residents culture and the privacy of individual and his family as maintained in both houses and neighborhoods. Seyfian and Mahmudi 2007 believes that privacy in Iranian architecture comprises of two concept of security and respect to others right. Hence, this concept and the climatic reasons became the basis of the organization of the spatial layout of the neighborhood and houses in Iran.



*Figure 1: A bird view from compact and inwardly oriented*



*Figure 2: the courtyard of a traditional houses in hot arid region of Iran*

Hierarchy is one of the most important characteristics of Iranian traditional architecture that provides privacy. It deals with separation of the different domains from public to private. In fact there are three main recognizable transition zones in traditional cities i.e public, semi-public, and semi-private domains. The movement patterns and their diminished size from public to private stressed on changing character and function of domains. In addition, the neighborhood gateways were stressing the penetration of successive level of public or private life. This hierarchal

movement pattern provided the separation between the most private zone of city “the house” and public domains like bazaar and other public spaces.

This hierarchy is also recognizable in traditional court yard houses that provides the highest level of privacy for residents. A courtyard house is a type of house where the main part of the building and all living areas are disposed around a central courtyard. Besides the climatic reasons, this inward looking houses were organized to provide a private and personalized space for the house habitants (Figure 1.0). In these inward looking houses residents felt free from the outsiders and the family activities took place without encroachment of strangers (Figure 2.0). The visitors could not see the inside of a house from the alley when the door was open. It was provided by the hierarchal movement pattern of the entrance elements. In this system, the gradual movement from the entrance into the centre of the house (from the semi public space, the alley, to the most private part of house) is recognizable. In order to access the house spaces, it was necessary to pass from pre - entrance, entrance, vestibule, and corridor in order to get into the court yard. Thus the visitor do not have any view into the courtyard as he passed through the corridor. This indirect and hierarchal movement pattern satisfied the highest level of privacy for residents.

The study of Iranian traditional houses reveals that these houses were built in accordance to the religious and cultural requirements of their residents. They satisfied the highest level of privacy and regardless of the size of house or the social position of the owner when similar architecture principles were applied to achieve the acceptable and comfortable habitats. But as mentioned above some cultural values were lost during the modernization of Iranian cities and in the rush for modernization such issues as efficiency and affordability were substituted with other simple criteria deemed to suit the Islamic culture of Iran.

In spite of the importance consideration of people requirements in design of housing the related research shows that the focus on user characteristics and their spatial requirements in housing design is essentials. There is also a lack in consideration of match or mismatch between apartment layouts and users spatial requirements in the contemporary architecture of Iran. This paper specifically focuses on privacy requirements and needs in modern housing of Tehran by analyzing the modern apartment layout in Iran with privacy perspective. Vaziritabar (1999) poits out that there are five kinds of privacy is considered in housing study: i.e. **Personal privacy** - that deals with privacy of every individual from the other family members. **Family privacy** - which is a kind of privacy deals with privacy of family members from non family members and its relationship between private life of family and friends, guests and etc. and it also concerns with separation of the private life of family members from the others. **Intra family privacy** - that deals with the privacy of activities of family members inside the house. **Visual privacy** - this kind of privacy deals with the visibility of the family members from the outsiders. **Neighbor privacy** - this kind of privacy deals with privacy of family members from their neighbors. **Urban privacy** - this deals with the privacy of family members in the neighborhood. It also deals with the desire for living in crowd or more private types of thoroughfares. **Auditory privacy** - concerns with privacy of residents from noise of surrounding environment of home.

Hence by considering the different kinds of privacy this study deals with personal privacy, family privacy, intra family privacy and visual privacy. Regarding to the goal of this study especially in visual privacy the windows and other apartment elements that are not related to the apartment layout are not considered.

- **Objective:**

The main goal of this study is to provide an approach for analysing the apartment designs as a basis of privacy. The study sets the following objectives:

- To identify the design layout preferred by those households who desire a high level of privacy
- To examine the effect of houses layout on privacy achievement

- **Methodology:**

This research is qualitative in nature. The methodology of the research is focusing on the people believes and attention in the apartment layout. Questionnaire was used in the inquiry in order to get the user's reactions. The questionnaire was distributed by random technique among 200 respondents. In order to clarify the results, the combination of both closed-ended and open-ended questionnaires was used in this paper. The information was gathered from respondents on how they think about privacy in different layouts of houses.

### ***Sampling procedure***

To reduce the scope of empirical investigation into a manageable size attention were confined to Tehran city and focused on small sample of subjects from defined population. The participants of the study were selected according to the following criteria:

**(1) Gender.** The households where both men and women were participated in questionnaire. But related to the age of the respondents such as teenagers and elderly person who may have different needs to privacy, thus the respondents selected among the ages group of 20 to 60 years were also asked.

**(2) Social class.** As the desire for privacy is different among social classes, it is necessary to compare populations of similar status. Kheir Al-Kodmany (1999) argues that in the low-income groups, for instance, the crowded living conditions force a lack of privacy, so privacy norms are much less stringent than for high-income groups. But the situation is different in Tehran. Studies show that the residents in southern parts of Tehran that considerably the most crowded and low income residents are desiring a high level of privacy. In this study the sample was drawn from household respondents of the medium income people in Tehran.

**(3) neighborhoods.** The apartment selected randomly from western part of Tehran which the plenty of new apartments is apparent.

- **Results:**

Questionnaires were divided into four categories: i) Personal privacy, ii) Intra family privacy, iii) Family privacy, iv) Visual privacy. Participants were asked on how they feel about privacy in different apartment layouts.

**Personal privacy:** Respondents were asked on how often they wished to be alone when they are at home in order to find out their personal desirable privacy. 67% of the respondents wanted a high level of personal privacy especially when they feel too tired. For 23% it was less important. Respondents were also asked on how they achieve the highest level of personal privacy at home. 64% of respondents stated

that when there is enough personal rooms. 10% of respondent did not answer the question and 26% believed they can feel enough privacy in a shared room.

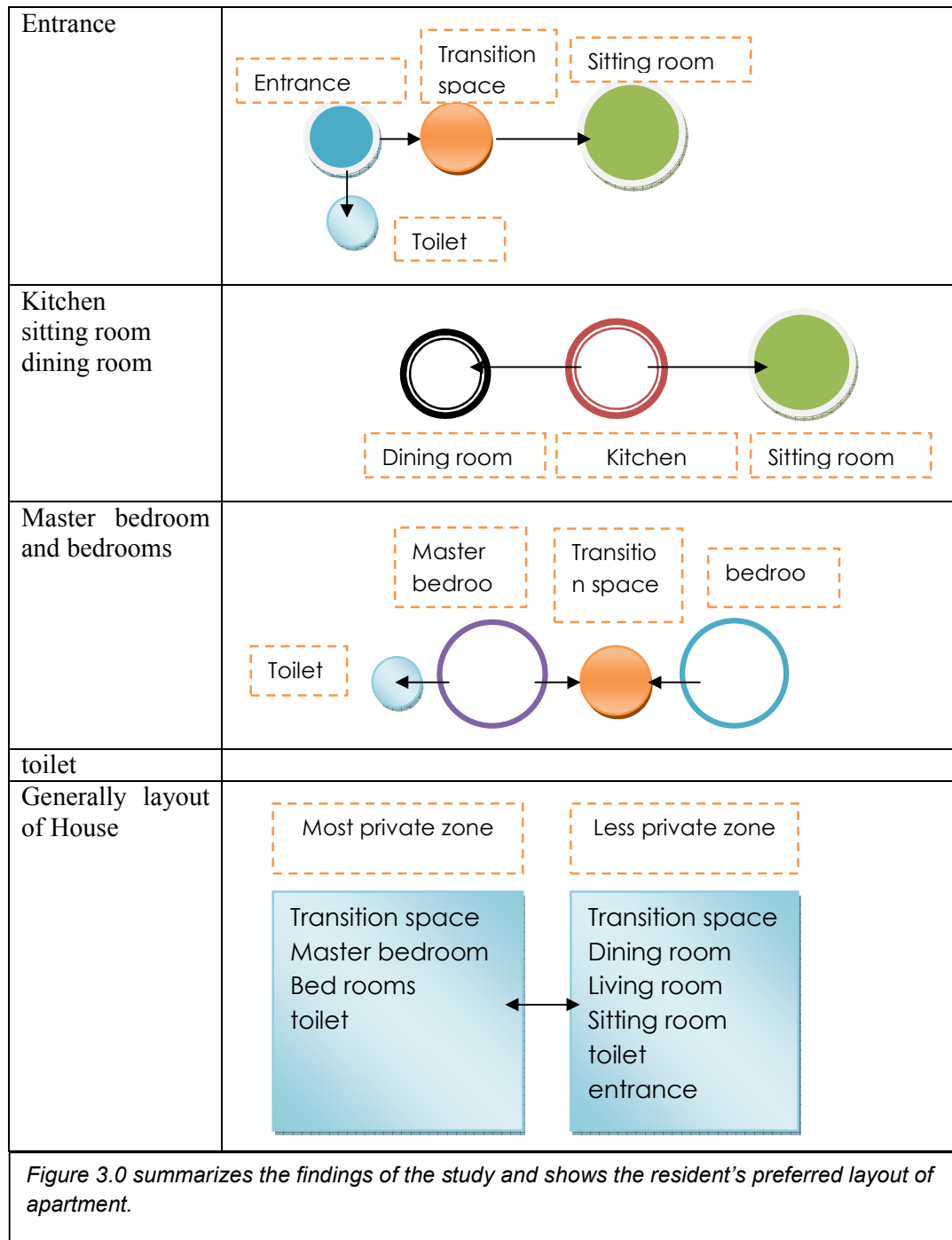
**Family privacy:** The respondents were asked on how they think about the privacy achievement when the kitchen is open and not demarcated by walls. 55% of respondents answered that it decreases the level of privacy while 40% believed that they find such a design is comfortable and modest. 5% of the respondents did not answer the question. In relation to the kitchen they were asked on how they feel when the guests can see inside the kitchen while the owner is cooking. 48% of the respondents answered that they feel uncomfortable while 38% found it comfortable and 14% did not answer the question. About the position of the toilet they were asked on how they feel if the only toilet is located in the master bedroom. 74% of the respondents answered that it decreases the level of family privacy. Only 15% believed that most of the time their guests are their relatives and it does not matter if the toilet is in the master bedroom, and only 11% did not responded to question. The other question about the separation of the toilet for guests and the owner were asked, 65% of respondents found it comfortable while 35% of respondents found it impossible in the limited space of their apartments. The other question asked were on how they think if their apartment were designed into two separate zones with less private areas for living room, sitting room, and kitchen and more private zone for bedrooms. 71% of respondents believed that it provides a high level of privacy while 23% asserted that they do not find it necessary and 6% didn't answer the question. Questioners were also asked for having a separate room for guests. 78% of respondents believed it is not necessary and only 22% believes it would be more comfortable.

### *Visual privacy*

With regards to the entrance door, the respondents were asked on how they feel if the entrance door were opened to a transition space apart from a sitting room. 78% thought it help to increase the level of visual privacy. 22% believed that the entrance space is not necessary and stated that it could be used for another reasons specially for a very small apartments. The questionnaire were asked on how they feel when the apartment entrance doors are opposite to each other. 75% for the respondents asserted they feel uncomfortable and 15% did not answer to the question. In relation to the location of elevator door, 84% of the respondents found it uncomfortable if it opens right in front of their entrance door, while 16% of the respondents did not answer the question.

### *Summary:*

The consideration of the results shows in the family privacy zone, the majority of respondents prefer a two main zones of less private and more private in their apartment layouts. They also prefer to find a transition space joining a different parts of house to in order to provide a hierarchy in design. The findings also show that although the life style is changing, nevertheless, the residents prefer the highest level of privacy as much as possible. Figure 3.0 summarizes the findings of the study in a graphical diagram. According to the people's requirement the relation of different space of apartments is recognized in this table.



### Analyze of a sample apartment

This part deals with the analyzing of a sample layout of an apartment with a view of privacy factor as a basis as discussed in the above findings. Figure 4.0 shows the plan of an apartment in western part of Tehran. This house is built 3 years ago. In

considering the relationship between the different spaces of the apartment according to the structural permeability model is illustrate in Figure 5.0. Structural Permeability is a model that is used to visualize the explanation and evolution of the results with a proper graphical representation” (Wahid 1998). This technique is one way to conduct the analysis of space by standard method of graphs. In the light of this technique it is possible to show the hierarchy and spatial arrangement of domestic spaces.



Figure 4.0 apartment plan and spaces

As Figure 6.0 shows that this apartment is divided into spatial compartments. The first level consists of the dining room, the living room and the kitchen. Whilst the bedrooms are gathered around a transition space. It shows that the zoning of more private and less private in this apartment is according to the residents point of view in order to achieve the level of privacy. Consideration of structural permeability model of this apartment shows that the transition space of (1) is located beside the entrance door that this also increases the level of privacy. Generally two transition spaces of (1) and (5) provide a hierarchy in apartment layout that is acceptable is privacy achievement. Such organization may cause the bedroom doors do not open to the sitting room area which not desirable for most of the respondents. According to the respondents requirement the location of toilet is not acceptable. Both of the toilets are located in the more private zone and it means that the guests and strangers must enter to this zone. This location decreases the level of privacy.

<p><i>Figure 5.0 permeability structure of apartment</i></p>	<p><i>Figure 6.0 zoning of apartment into two zones of less private and more private zones</i></p>

### Conclusion:

This study examined the impact of design on privacy achievement and it shows how the location of apartment spaces can increase or decrease the level of privacy. In conclusion this study supports Vaziritabar (1999) hypothesis that “privacy is related to built form”. It is apparent that, in the privacy satisfaction in the apartment can not have all these criteria. The design of apartment in Iran need to consider the need of he occupants as well as the religious aspect of the concept of “mahram” as explained earlier in this paper. The provisions of modern design is restricted by the cost, space dispositions ad the cost of the land in urban areas. However, it is the ingenuity of the architects to consider all the variables in order to achieve privacy as required by the religious requirements. For example while the majority of respondents desired to have their own personal room, it is impossible especially in the apartments with 70m square or less because generally these types of apartments comprise two bedroom including a sitting room and a kitchen. However, the result of the study could provide an insight for design of apartments. Although the method is applied for Tehran apartments but it is flexible enough to be applied for different societies with different contexts. The differences will be shown through the level of desired privacy in different societies according to the design.



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## **Factors Influencing Low Cost Housing in Sana'a – Yemen**

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### **Abstract**

The Purpose of this study to identify the factors influences housing cost in low cost housing projects in Sana'a the capital of Yemen. A questionnaire survey has been used as the tools to carry out this study. The questionnaire survey consisted of 32 factors which were grouped into five major categories named; land factors, materials used factors, construction methods used factors, finishing works factors and external factors. The level of importance of the categories was measured and ranked the relative importance weights. This study found that land cost factor, cement cost factor and steel cost factor are the most important factors influencing housing cost in Sana'a. Based on the analysis of the ranking and intensity of a housing cost factors, this paper suggests possible improvements that could be made in order to decrease the housing cost.

**Keywords:** housing cost, land cost, materials cost, construction methods cost, and finishing works cost, Sana'a.

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### **1. Introduction**

Housing plays a very important role in human life and human society. Housing has tremendous social and economic impact on the total living environment of the world. It has direct and immediate influence on health, education, economy, environment, political and social life of any society. The shortage of houses in developing countries for low-income group is of colossal magnitude. Yemen is one of undeveloped countries that suffer from housing shortage. The high growth of the population and the return of more than a milion of immigrants after the 2<sup>nd</sup> Gulf War execute increased the demands of housing. The continuous use of conventional construction method as well as slow-pace of construction and higher cost, still cannot meet the demand of housing. The problem worsens as the government does not make the necessary plan or arrangements to meet the demands and the caused sequences.

The urban population growth has increased to 33% in (1994), from 9% in (1960) has made the need for adequate housing for low income people a very important concern of the Yemeni Government. However, the rush to respond to these needs seems to result in a low quality housing that does not adequately match the needs of these people (Djebarni & Al-abad 1998).

The main problem lies in the need for houses particularly for low income group. The problem of low-income group can be observed clearly through the unorganized and random housing (informal housing) in squatter and slum areas, which are built as an urgently solution for low income group. It is clear that the rapidly growth of demand for low cost housing. Actually, there is housing gap in which there is mismatch between shortage low cost housing, housing needs and housing supply for low income group in Sana'a. Al-Eriani (2007) presented in workshop of Sana'a city experiences in solving the phenomena of spontaneous residential areas that the shortage of houses in Yemen is 1,279,569 units.

### **Housing in Yemen**

The construction industry and its activities have an important role to play in socioeconomic development and quality of life. Construction activity accounts for more than 50% of the national outlays. Building Construction costs registered an increase in rates year after year at scales much faster than inflation. It is seen that in view of the increase in cost for basic input materials like steel, cement brick timber and other materials as well as the cost of construction labour, buildings cost increase at around 20% to 30% annually even when inflation is in single digit. Even though income levels of people are by and large brought in line with the levels of inflation through inflation indexed rise in salaries, year after year, housing is moving beyond the reach of the majority of the people. The reducing housing size for various categories in consecutive years in respect of the plinth areas, nature of specifications even with increased income levels would indicate the rapid increase in cost of construction (Sultan and Kajewski, 2005).

The report of Macroeconomic and Sectoral performance of housing Supply Policies in Selected MENA<sup>1</sup> Countries: A comparative analysis in April 2005, which it analyzed housing sector policies and their effects on macroeconomic and Sectoral performance in Yemen and in some MENA countries. The report findings are summarized as follow:

- Housing affordability rather than availability is the main problem. This problem is a shortage of supply of housing as a whole, although shortage may exist for certain categories of housing products (e.g., low income housing). The price of housing is extremely high in five of Middle East countries; Algeria, Iran, Lebanon, Morocco, and Yemen. The suggestion that the affordability problem is largely the result of housing and land supply policies. In addition, inadequate housing supply relative to

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<sup>1</sup> MENA: Middle East and North Africa countries.

increasing demand and constrained flexibility with which the housing stock is used contribute to high housing prices and low levels affordability (Baharoglu et. al, 2005).

- Demand by low income groups is left to the informal sector. The high cost of housing is not the only housing problem in Yemen. Informal settlements are another consequence of the affordability issue. In Yemen and in several countries demand by lower income groups is reflected in squatter settlements and un-serviced peripheral neighborhoods. This measure of exclusion from formal housing services appears to be a growing concern in countries like Algeria, Morocco, Iran and Yemen, as there are strong signals that informal settlement ratios are increasing. The ratio of informal settlement is already very high in Egypt and in Sana'a the capital of Yemen the informal settlements occupied 70% of the growth in the city (Al-Shalabi et. al, 2006).
- The land development process is inherently risky, and rarely is the public sector well placed to assume a major share of these risks. Public control and ownership of land usually results in these risks being borne in such a way that land is supplied where there is less demand for it, the housing that is built is not responsive to the demands for land use, and the process conveys non-transparent subsidies, often unintentionally, to middle and upper income households rather than the poor. All of these problems cause land and correspondingly house prices to be higher. Public land ownership accounts weak in Yemen and land development costs are high (Baharoglu et. al, 2005).
- The city of Sana'a, within its capacity as capital of the Yemen, has undergone tremendous urban growth in the last half century. It has the fastest-growing towns in the nation (Census, 2004). The census record shows that the number of population in Sana'a city increased rapidly from 1,003,627 in 1994 to 1,747,627 in 2004 with annual growth 5.5%, which increased 2.52% more than the annual population growth for Yemen. The growth has created a higher urban land demand than previous decades, leading to significant change of landscape and land uses (Al-Shalabi et. al, 2006).

The problem is the need for houses in general and particularly for people with low income. The problem of low-income group can be observed clearly through the unorganized buildings, random buildings and urban sprawl, which they built it as a solution for their problem and their economic situation. There is housing shortage of low cost housing in Sana'a that because the rapidly growth of population and the rapidly growth of demand for housing.

Sultan and Kajewski (2005) mentioned that the housing construction costs in Yemen registered an increase in rates year after year at scales much faster than inflation. It is seen that in view of the increase in cost for basic input materials like steel, cement brick, timber and other materials as well as the cost of construction labour, buildings cost increase at around 20% to 30% annually even when inflation is in single digit.

This study is to identify the significant factors influencing low cost housing price in Sana'a.

## **2. HOUSING COST**

### **2.1 Housing Cost or Housing Price**

Fleming (1965) draws a distinction between building (house or other building) prices and building costs by referring to the building prices as the market price for building work payable by a client and the building costs as the costs incurred by a contractor in carrying out work. Building price reflects variation in profits whilst building cost does not. Another way to describe the relation between the concepts is to say that building costs can be estimated and described in two ways. One is the price charged for the finished building - building price according to Fleming - and the other is the cost of the resources to create it (Ferry et al, 1999) - building cost according to Fleming. The seller's price is a buyer's cost, such that the contractor's price is the client's cost.

### **2.2 Cost Categories**

Having discussed the difference between price and cost in the previous section, further clarification of the word "cost" itself is indeed necessary in order to be able to identify whether a specific cost element is quantity, location, or time dependent. In accounting circles, the word "cost" is seldom used without qualifying adjectives and hence different kinds of cost must be clearly explicated (Lock, 200).

There are some costs that are simply recognizable and self-explanatory that relate to a specific item or product such as labour or material costs. Thus, they have been termed as direct costs. Other costs that are neither specific nor easily identifiable, i.e. overhead costs are often labelled as indirect costs. Carr (1989) define direct cost as the costs that are not counted if the activity has not been performed and indirect costs as the ones that would have occurred even if an activity had not been performed. Materials, labour, and equipment qualify as direct costs

because of their physical traceability to the construction activity taken place while project and general overhead, and (perhaps) profits are indirect costs. Indirect costs are also those small costs that would be direct except that assigning them to activities is not economical (Carr, 1989). Ferry et al (1999) did not consider profit as part of the contractor's costs. They see it as the difference between the builders' cost and the client's price. Akintoye and Skitmore (1991) regard the mark-up as a prior estimate of profitability.

Variable and fixed costs are two often-used terms in the construction literature that relate to direct and indirect costs respectively in an unclear way. While the distinction of direct and indirect costs depends much on traceability of specific cost to a particular activity, variable and fixed costs emphasise the rate at which different costs vary when the level of the work activity changes. Costs that remain virtually unchanged and continue to be incurred even though the workload might fluctuate between extreme limits are termed as fixed costs (Lock, 2003). Indirect costs usually represent the largest component of fixed costs. To the contrary, variable costs are typically confined to the direct costs and their rate of incurrence depends on the level of work activity. Stewart (1982) claims that fixed costs are only truly fixed over a given range of output because of the inflation that swells the operating and general overhead costs over time.

More broadly defined and less used construction cost terms are hard and soft costs. Geltner and Miller (2001) describe the former as direct costs of the physical components of the construction project such as land cost, labour, material and equipment, developer fees, construction management, and overhead costs. The soft costs included cost of design, legal, and financing. Most of the components of construction costs are integrated in the above cost related sets of terms and some authors have tried to quantify them and put a figure on the different weights of these components in the total construction costs. Labour and materials costs have not only been prominently cited as components in the construction cost structure but they have also been tagged as the largest proportions in the total construction costs. Bertelsen and Nielsen (1997) mention that in Denmark the typical building costs for social housing schemes can be divided as follows; materials 50% , labour 30%, heavy equipment 5%, construction management and supervision absorbs the other 15%. The Construction commission (SBI:s Byggekommisionen 2002) reports that construction materials were approximately 40% of contractors' costs in multi-family housing projects though this figure could be lower due to discounts on bulk material. Construction materials account for over half of the final cost of housebuilding while the cost of labour account for less than third, and overheads and profit stand for the rest (Stone and Reiners, 1954).

Adams' (1975) study that examines residential construction industry in the early nineteenth century not only supports the importance of labour and material costs in the total construction costs scheme but it also highlights the ambiguity surrounding the inclusion of other elements in the construction costs structure. He mentions that a simple labour-material breakdown in 1859 of all construction projects surveyed indicated that 56 % of total costs were attributable to direct, on site, labour costs and 44% to materials. Beyond the labour-material structure of the construction costs, Adams (1975) counted overhead and profit in labour costs in the 1959-1962 figures (it is not clear whether he included it in the 1859 figures). However, Xiao and Proverbs (2002) in their comparative analysis of the performance of contractors in three countries used unit price that is composed of labour, materials, plant, overheads and profits as separate percentage components. Adams was surprised to find out that the 1959-1962 cost structures was similar to those of the early century in terms of the total breakdown of costs between labour and materials (52 and 47% respectively). His data show that there has been very little basic change in cost structure of residential building over a period of almost two centuries. He concluded that the cost structure of the industry has been stable for on site building over a long period of time.

Labour and materials costs alone would not provide an accurate picture of the movement of total construction costs (Adams, 1975). Wigren (1995) tries to separate construction costs changes into three main components; change in factor prices, in quality, and in efficiency. He uses a factor price index that measures price changes of all factors of production i.e. wages, prices of different kinds of building materials, transport costs, interest, value added tax, etc. However, the index was not constructed to measure regional cost changes.

Meikle (2001) states that a contractor's construction costs are not generally known and describes them as an aggregate of the costs of materials, labour, and equipment to undertake the work and the contractor's finance, management and various site and office overheads. The contractor then charges these costs plus a margin profit to the developer. When the developer's cost is added then its called the total costs of the production factors (Jagren, 2003). The level of the project costs is dependent on whether the analysis is based on contractor or developer's estimation and the two estimations differ because of the extra costs incurred by the developer such as land cost, finance, etc. Berger (2004) argues that often when we say construction cost we mean total production costs while the term production cost refers to the sum of land cost and construction costs. Construction cost means cost for erecting buildings and construction components but excludes the land cost.

It is also difficult and subjective when one tries to differentiate direct and indirect cost elements from the tender price (Tah et al, 1994) but one can simply define these costs in terms of their tractability to the specific work. Tah et al (1994) note similar components of direct and indirect cost as Carr (1989) but they also include subcontractors' costs as part of the direct cost and allowances for risk as part of the indirect costs. Akintoye (2000) also considers subcontractor costs as a factor of production just like labour, material and equipment. He argues that it is often the case that subcontractors carry out more than 50% of the work of any particular project and hence the main contractors include subcontractors' prices in their estimation.

Friedman, 2005 mentioned that builders divide the cost of housing into categories: hard costs and soft costs. Hard costs are the sums of money that are spent acquiring the site and building the dwellings. Soft costs are the amounts spent on indirect expenses related to the execution and the marketing of the project. Hard costs may include many components such as:

- Land cost,
- Material costs,
- Development costs include (necessary utilities, roads, infrastructure in project site),
- Labour costs, and
- Landscaping costs.

Soft costs expended in the construction of a single home or an entire development may include the following components:

- Financing,
- Professional fees,
- Marketing costs,
- Overhead,
- Taxes, and
- Profit.

Table (1) shows a short summary of the construction cost components according to different references.



*Table 1: A short Summary of the construction cost component*

<b>Author</b>	<b>Components</b>	<b>Comments</b>
Adams, R. (1965)	Labour and material as well as overhead and profits.	Includes profits and overhead cost in the labour cost
Carr (1989)	Direct costs: labour, material, and equipment. Indirect costs; project overhead, general overhead, and profit	Did not include subcontractor's costs in the direct/indirect costs of the contractor. Considers project overhead as indirect costs.
Tah et al (1994) and Akintoye (2000)	Similar as Carr (1989) plus subcontractor's costs and risk allowance as indirect cost component.	Define mark-up as indirect costs without site overhead.
Jagren (2003)	Material, labour, equipment, transportation utility, electrical power, and overhead costs	Emphasize the difference between total production costs and construction costs.
Friedman (2005)	Hard cost; land cost, material costs, development costs, labour costs, and landscaping costs. Soft cost; Financing, Professional fees, Marketing costs, Overhead, Taxes, and Profit.	More clear and including all costs that do not include in others sources

### **3. Data Collection**

#### **3.1 Sampling Technique**

A total of 60 samples selected for the professionals survey for the engineers, architects, and consultants who are working in the field of housing sector.

#### **3.2 The Questionnaire**

The instrument used in the study was structured questionnaire. The questionnaire was designed to include all information needed in the study. They include open and close-ended and multi-choices questions regarding the objectives of the study.

The information needed and obtained from the questionnaire of professionals consists of the following:

- a. The respondent's information,
- b. Information pertaining to housing strategies and factors affect the housing strategies in Yemen.
- c. The suggestions and mechanisms to solve low cost housing problems for low income group including; type of houses, materials used in housing projects, construction methods used, and kind of finishing works, and

- d. The factors affect the housing cost in Sana'a. Thirty two factors were grouped into five groups regarding to works and cost of housing projects.

The groups namely; factors related to project location, factors related to materials used, factors related to finishing works, factors related to construction methods used and external factors effect cost of housing projects construction. Every group contains some factors as follows;

The first group contains the variables related to land as follows;

- i. Cost of project land.
- ii. Relation between projects location, services, and transportation.
- iii. Relation between project location and job location,
- iv. Land topography.

The second group contains the variables related to materials used in low cost housing projects in Sana'a as follows;

- i. Cost of building by Stones
- ii. Cost of building by Red Bricks
- iii. Cost of building by Local Bricks (Yagoor)
- iv. Cost of building by Concrete Blocks
- v. Cost of Cement
- vi. Cost of Steel for Reinforced Concretes

The third group contains the variables related to finishing works as follows;

- i. Cost of formwork elements works and preparing for reinforced concrete works
- ii. Cost of plastering works
- iii. Cost of painting works
- iv. Cost of tiling works
- v. Cost of doors and windows works
- vi. Cost of plumping network and requirements works
- vii. Cost of electricity network and requirement works

The forth group contains the variables related to construction methods used in low cost housing in Sana'a as follows;

- i. Traditional Methods used (load bearing walls)
- ii. Concrete Frames used
- iii. Using external load bearing walls & central columns
- iv. Using new technology and Industrialized Building Systems (IBS)

The fifth group contains the variables of external factors as follows;

- i. Materials available in local market
- ii. Tools and equipments available in local market
- iii. Political condition
- iv. Economic condition and fixedness exchange money cost
- v. Transportation and fuel cost
- vi. Security condition
- vii. Establish legislations and acts
- viii. Administrative procedures and licensing
- ix. Projects Designs
- x. Projects construction supervision
- xi. Executor Contractors

#### 4. Ranking Factors Affecting Housing Cost

The respondents identify variables that they perceived as likely to contribute to ranking factors affecting housing cost in Sana'a by responding to a scale from 1 (the fastest) to 5 (the slowest). The five rating Likert Scale is, 1 = very strong relationship, 2 = strong relationship, 3 = medium relationship, 4 = weak relationship, and 5 = very weak relationship or no relationship. This scale was chosen to avoid the neutral answers which do not provide answer on the strongest or the weakest with the statements. Mean score (MS) of each factor was calculated by using the following formula which used also by Chan and Kumaraswamy, (1996) Lew et, al, (2002), Alaghbari (2005) and Alaghbari et, al. (2007):

$$MS = \left( \frac{\sum (f \times s)}{N} \right) (1 \leq MS \leq 5)$$

Where;

MS = mean score

f = frequency of responses to each rating (1 – 5)

s = score given to each factor by the respondents and ranges from 1 to 5.

N = total number of responses concerning that factor.

## 5. Results

The price of housing is the dependent variable for housing demands everywhere. For example the increasing in housing cost that influences the total number of housing demand which decrease. The housing cost influenced by independent variables that it divided in five groups as follows:

### 5.1 Factors Related to Project Land

This group contains the following variables;

- i. Cost of project land.
- ii. Relation between projects location, services, and transportation.
- iii. Relation between project location and job location,
- iv. Land topography.

*Table (2): Ranking of the Significant Factors Influence Housing Cost Related to Land*

Factors Related to Land	Group Ranking	Final Ranking	Mean	Std. Deviation
Cost of project land	1	1	1.02	.144
Relation between projects location, services, and transportation.	2	6	1.79	.713
Land Topography	3	22	2.57	.927
Relation between project location and job location	4	31	3.64	1.009

Table (2) indicated that the “cost of project land” is the most significant factor influence housing cost related to land factors which it is ranking first in the list of all factors influence housing cost. In addition the “relationship between project location, services, and transportation” is the second significant factor related to land.

### 5.2 Factors Related to Materials Used

This group contains the following variables;

- vii. Cost of building by Stones
- viii. Cost of building by Red Bricks
- ix. Cost of building by Local Bricks (Yagoor)
- x. Cost of building by Concrete Blocks
- xi. Cost of Cement
- xii. Cost of Steel for Reinforced Concretes

*Table (3): Ranking of the Significant Factors Influence Housing Cost Related to Materials Used*

Factors Related to Materials Used	Group Ranking	Final Ranking	Mean	Std. Deviation
Cost of Cement	1	2	1.30	.507
Cost of Steel for Reinforced Concretes	2	3	1.38	.606
Cost of building by Stones	3	10	1.96	1.010
Cost of building by Concrete Blocks	4	16	2.27	1.020
Cost of building by Local Bricks (Yagoor)	5	25	2.79	.954
Cost of building by Red Bricks	6	28	3.11	.759

Table (3) shows that the “cost of cement” is most significant factors influence housing cost related to materials used which it is ranking second in the list of all factors influence housing cost. “Cost of steel for reinforced concretes” is the second significant factor related to materials used. “Cost of building by red bricks” is the last factor influence housing cost related to materials used.

### 5.3 Factors Related to Finishing Works

This group contains the following variables;

- viii. Cost of formwork elements works and preparing for reinforced concrete works
- ix. Cost of plastering
- x. Cost of painting
- xi. Cost of tiling
- xii. Cost of doors and windows
- xiii. Cost of plumping network and requirements works
- xiv. Cost of electricity network and requirement works

*Table (4) Ranking of the Significant Factors Influence Housing Cost Related to Finishing Works*

Factors Related to Finishing Works	Group Ranking	Final Ranking	Mean	Std. Deviation
- Cost of doors and windows	1	13	2.04	.798
- Cost of electricity network and requirement works	2	19	2.46	.840
- Cost of plumping network and requirements works	3	20	2.49	.688
Cost of formwork elements works and preparing for reinforced concrete	4	21	2.52	.989
Cost of tiling	5	24	2.76	.794
Cost of painting	6	26	2.83	.975
Cost of plastering	7	27	2.85	.899

It is evident from Table (4) that the most significant factor influencing housing cost in Sana’a related to finishing works is “cost of doors and windows” which it was ranking thirteen in the list of all factors influence housing cost. The second significant factor in the ranking related to

finishing works is “cost of electricity network and requirement works”. The last factor in the ranking list related to finishing work is “cost of plastering”.

#### 5.4 Factors Related to Construction Methods Used

This group contains the following variables;

- v. Traditional Methods used (load bearing walls)
- vi. Concrete Frames used
- vii. Using external load bearing walls & central columns
- viii. Using new technology and Industrialized Building Systems (IBS)

*Table (5): Ranking of the Significant Factors Influence Housing Cost Related to Construction Methods Used*

Factors Related to Construction Methods Used	Group Ranking	Final Ranking	Mean	Std. Deviation
Concrete Frames used	1	5	1.66	.745
Using new technology and Industrialized Building Systems (IBS)	2	12	2.02	1.151
Using external load bearing walls & central columns	3	18	2.36	.685
Traditional Methods used (load bearing walls)	4	23	2.64	.838

It is very clear from Table (5), that the “concrete frame used” in housing project is the most significant factor influence housing cost related to construction methods which it is ranking fifth in the list of all factors influence housing cost. In addition “using new technology and Industrialized Building Systems IBS” is the second factor. “Traditional methods used” is ranking the last factor influence housing cost related to construction methods used.

#### 5.5 External Factors Influence Cost of Projects Construction

This group contains the following variables;

- xii. Materials available in local market
- xiii. Tools and equipments available in local market
- xiv. Political condition
- xv. Economic condition and fixedness exchange money cost
- xvi. Transportation and fuel cost
- xvii. Security condition
- xviii. Establish legislations and acts
- xix. Administrative procedures and licensing
- xx. Projects Designs
- xxi. Projects construction supervision

## xxii. Executor Contractors

The result in Table (6) illustrated that the “economic condition and incertitude cost of exchange money” is the most significant external factor which it is ranking forth in the list of all factors influence housing cost. The “materials available in local market” is the second important external factor influence housing cost. The table shows that the “projects designs” and “projects construction supervision” are ranking ninth and tenth in the ranking.

*Table (6): Ranking of the Significant External Factors Influence Housing Cost*

External Factors	Group Ranking	Final Ranking	Mean	Std. Deviation
Economic condition and incertitude cost of exchange money	1	4	1.50	.762
Materials available in local market	2	7	1.81	1.006
Political condition	3	8	1.86	1.060
Transportation and fuel cost	4	9	1.91	.936
Tools and equipments available in local market	4	9	1.91	1.109
Establish legislations and acts	5	11	2.00	1.104
Security condition	6	14	2.07	1.043
Administrative procedures and licensing	7	15	2.20	1.173
Executor Contractors	8	17	2.30	1.036
Projects Designs	9	29	3.28	1.202
Projects construction supervision	10	30	3.33	1.358

## 6 The Top Ten Significant Factors Influence Housing Cost in Sana’a - Yemen

Mean value used to rank the factors to get the most significant factors influence housing cost. The ranking illustrated that "cost of project land" the most significant factors with mean value of 1.02 then the second factor is "cost of cement" with mean value of 1.30 and then the third factor is "cost of steel for reinforced concretes" with mean value of 1.38.

Table (7) shows the ranking of the significant factors influence housing cost; the smallest mean value became the most significant factor influence housing cost in the market. It is clarified that 2 factors related to land factors group allocated in the top ten significant factors influence housing cost. "Cost of project land" the first and "Relation between projects location, services and transportation" the sixth factor in the top ten significant factors influence housing cost in Sana'a. In addition the result revealed that 5 of external factors in the top ten significant factors. "Economic condition and incertitude cost of exchange money" the forth and "Materials available in local market", "Political condition" allocated in the ranking of the top ten significant factors seventh, eighth. Then "Transportation and fuel cost" and "Tools and equipments available in local market" both factors rank ninth because they have same mean value of 1.91. The table shows that 3 factors related to Materials used in

housing projects at which "Cost of cement" the second and "Cost of steel for reinforced concretes" the third of the top ten significant factors influence housing cost in Sana'a. Only one factor in the top ten significant factors related to construction methods used in housing project that "Concrete frames used" and it rank fifth the list. The table also shows the ranking for all other factors in the five different groups.

*Table (7): Final Ranking of the Significant Factors Influence Housing Cost*

Factors	Group	Rank	Mean	Std. Deviation
Cost of project land	Land	1	1.02	.144
Cost of Cement	Materials	2	1.30	.507
Cost of Steel for Reinforced Concretes	"	3	1.38	.606
Economic condition and incertitude cost of exchange money	External	4	1.50	.762
Concrete Frames used	CM*	5	1.66	.745
Relation between projects location, services, and transportation.	Land	6	1.79	.713
Materials available in local market	External	7	1.81	1.006
Political condition	"	8	1.86	1.060
Transportation and fuel cost	"	9	1.91	.936
Tools and equipments available in local market	"	9	1.91	1.109
Cost of building by Stones	Materials	10	1.96	1.010
Establish legislations and acts	External	11	2.00	1.104
Using new technology and Industrialized Building Systems (IBS)	CM*	12	2.02	1.151
Cost of doors and windows works	Finishing	13	2.04	.798
Security condition	External	14	2.07	1.043
Administrative procedures and licensing	"	15	2.20	1.173
Cost of building by Concrete Blocks	Materials	16	2.27	1.020
Executor Contractors	External	17	2.30	1.036
Using external load bearing walls & central columns	CM*	18	2.36	.685
Cost of electricity network and requirement works	Finishing	19	2.46	.840
Cost of plumping network and requirements works	"	20	2.49	.688
Cost of formwork elements works and preparing for reinforced concrete works	"	21	2.52	.989
Land Topography	Land	22	2.57	.927
Traditional Methods used (load bearing walls)	CM*	23	2.64	.838
Cost of tiling	Finishing	24	2.76	.794
Cost of building by Local Bricks (Yagoor)	Materials	25	2.79	.954
Cost of painting	Finishing	26	2.83	.975
Cost of plastering	"	27	2.85	.899
Cost of building by Red Bricks	Materials	28	3.11	.759
Projects Designs	External	29	3.28	1.202
Projects construction supervision	External	30	3.33	1.358
Relation between project location and job location	Land	31	3.64	1.009

CM\*: Construction Methods

## RECOMMENDATIONS

1. Land should be set aside which is free from encroachment of squatters and other parties.



2. Support the high rise housing project to decrease the land cost and thus to decrease the housing cost.
3. Sourcing for cheaper and appropriate financial resources needs to be taken seriously as one of the key factors in the provision of low cost housing.
4. Building codes should be written down and revised to incorporate indigenous and appropriate building materials and standards for low cost housing.
5. Support the investment of cement and steel to increase the production of cement and steel to meet the rapidly growth of demand for these materials.
6. Support the studies to get the best low cost materials to use in low cost housing projects in Sana'a

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## **The Principles of Housing Typology in Renewal of Deteriorated Fabrics**

(Case study: Tehran-Iran)

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**Abstract:** In recent years, in order to provide housing for the low-income population, different policies have been adopted in Iran. Yet, no attempts have been made to formulate the adequate housing typology for this population, so far. In recent years, with the promotion of discussions concerning the renewal of deteriorated urban fabrics, the necessity of formulating adequate housing typology for this population has become apparent. This is because these types of renewals often entail the demolishing of existing timeworn houses and constructing of new ones.

The present essay tries to find an effective way for the construction of adequate houses for the habitants of these fabrics through examining the key factors in formulation of housing typology in deteriorated fabrics, and also through studying of two example cases in Tehran.

**Key words:** Deteriorated urban areas, Urban fabric, Housing Typology

### **1. INTRODUCTION**

One of the most basic elements of human rights is the right to adequate housing. All international covenants have stressed the right to enjoying adequate housing. According to the declaration of the United Nations Committee on Economic, Social and Cultural Rights, the right to housing means the enjoyment of the right to live somewhere in security and peace with ensuring of human dignity for all persons. Therefore, the components of adequate housing can be counted as follows:

- Legal security of tenure
- Availability of services and infrastructural facilities of the residence

- Conformity of new houses to the inhabitants financial power
- Accessibility to housing for the poor population of society
- Adequate place in healthy environment
- Conformity to the cultural needs of the needy population

No actions have been taken in Iran, so far, in order to formulate adequate housing typology for the low-income and the inhabitants of deteriorated urban fabrics. Therefore, in this essay the deteriorated fabrics of Tehran and housing characteristics of these fabrics are examined, and some principles in adequate housing typology will be stated.

### **A. The Concept of Deterioration and Deteriorated urban areas**

The concept of urban deterioration can be considered as a decline in the social, economic and physical fabric of the city. If the life of a region in a city declines in any ways, it will be lead to its deterioration. This affects its physical fabric and also the economic and social activities in it. The physical, social and economic deterioration, in a reciprocal relation, intensify one another and therefore result in the decline of the urban life. Urban deterioration generally, is known as: old, unstable buildings, narrow passages, with low-income residents having social problems.

Yet in most of the specialized references, deterioration has a much deeper meaning. It includes areas in the legal boundaries of the cities where lack of control over social, economic, and cultural conditions, not only make them susceptible to the natural disasters but also gives them an improper economic, environmental and social quality. Due to underprivileged residents of these areas, there is not the possibility of self-renovation of the fabrics and moreover the private investors have no motivation do invest in these areas. (Tehran Renovation Organization, 2006)

With incorporating the specialized and general meaning of the deterioration, it can be concluded that when the physical, social and economic fabrics in cities become dysfunctional, they would be in the way of deterioration.



The social condition of Tehran deteriorated areas

Deteriorated areas in Tehran have different features as follow:

#### **Population**

- High population density
- Irregular population dispersal
- High illiteracy percentage

#### **Social**

- Original residents abandoning the region
- Non-native (immigrants) and underprivileged residence
- High percentage of the residents being tenants
- Prevalence of addiction and behavioral anomies and juvenile delinquencies

- Insecurity for the residents especially women and children
- Maze-like, unsafe passages and insecure indefensible places

#### **Economic**

- The cheap prices of the land in comparison to the other parts of the city
- Poor underprivileged residents
- High unemployment rate
- The residents' inability to renovate their houses
- Lack of motivation for the investors to invest in these areas

### Physical -Functional

- The instability of the buildings against earthquake due to old age and using inefficient materials
- Narrow passages and therefore inaccessibility for cars
- Density of the fabric which causes narrow passages and makes it difficult for emergency access
- Lack of interrelation in the passages
- Not separating the passage for pedestrians and vehicles
- Improper landuses in residential areas (workshops, troublesome industries, etc.)
- Not meeting today's needs
- Lack of urban services



The physical conditions of the deteriorated urban areas

- Lack of entertaining, cultural and sport facilities



- Abandoned and inactive business units
- Inappropriate image of the city

### Environmental

- Polluting uses (workshops, industries and...)
- Lack of proper sewage system
- Lack of green spaces

### B. Characteristics of Housing in Tehran Deteriorated Fabrics



The existing houses in Tehran deteriorated fabrics, like other Iranian cities, possess particular characteristics. The following can be counted among the most important of these characteristics:

	
The instable buildings	1 or 2 story buildings

- Instability of Structures: Many of the existing structures in these fabrics are instable because they are too old, have been constructed with poor quality materials and do not meet the constructions regulations. Considering the fact that Tehran is an earthquake-prone city, the existence of these structures is a great threat to the city.
- Very Few Stories: Many of the structures in these fabrics are 1 or 2 storey houses. This is the result of the inhabitants' lifestyle, and the old materials and methods of construction.



- Communal Housing: The inhabitants of these types of housing are often lessees and come from the poor class of society. Due to their weak financial situation, these families are unable to live in independent houses, and they have to live communally. The physical condition of these housings is extremely old, besides they lack the essential facilities of residing, too.
- Workshops and Storerooms within Housing: This problem is often seen in the deteriorated fabrics of city center. The existence of workshops or storerooms in residential buildings reduces the quality of life, and causes social and environmental problems.
- Small Housing: This characteristic is often seen in Tehran deteriorated fabrics, which is a major problem considering the population of these big families.

	
Workshops in the houses	Communal houses

## 2. METHODOLOGY

### A. The principles of the housing typology design in the deteriorated fabrics

Since housing in deteriorated urban fabrics can be discussed from different aspects, each of these aspects and their effects on formulation of housing typology will be discussed.

#### - *Economical Aspect*

One of the most important principles in formulation of housing typology in deteriorated urban fabrics is the economical aspect. Since these housings are designed for the middle and weak class of society, they must meet their financial

power. Therefore, elements like construction method, materials, infrastructure, architecture design, and so on, must be in a way that the final expenditure of housing meet the economical level of inhabitants.

On the other hand, though the existing houses in these fabrics are often 1 or 2 storey buildings, they are no more economical, nowadays, due to the high price of land. Therefore, the number of stories needs to be added reasonably in order to employ the land to its best.

- *Managing Aspect*

As mentioned before, due to the high price of land in big cities, it is no more economical to construct buildings with only few stories. Apartment residence in country, which came into existence because of the housing need, and urban lands limitation, added to our urban vocabulary such expressions as “apartment residency culture,” “apartment management” and so on. Scientific societies and responsible organizations have had considerable activities in studying, designing and performing housing projects. But, unfortunately, these activities only continued to the completion of the projects, and no actions have been taken in the utilization management field. Whereas, not only is the utilization step as important as the previous steps, but it is a supplementary to them. Disregarding this issue causes undesirable consequences in different economical, legal, social and cultural aspects, that some of them are as follows:

- Decline in useful lifetime of buildings because of improper maintenance
- Incompatibility and irresponsibility of inhabitants
- Tension between inhabitants
- Tendency to possess individual housing units and avoid living in apartments, which result in horizontal expansion of cities.

In general, the following factors play an effective role in degree of agreement or disagreement between inhabitants of apartments and housing complexes:

- Inhabitants' past record of urban residency
- Inhabitants' cultural and economical level
- Number of units in a building or a housing complex

Among these factors, only the number of units can be defined by the architect. Therefore, it must be defined in a way that facilitates the proper managing of the apartment or the housing complex.

- *Social Aspect*

Concerning the ethnology of the inhabitants of apartments and housing complexes, neighboring of families with different, and sometimes opposing, cultural and social tastes and characteristics, can cause various problems.

On the other hand, existence of so many families in one building reduces the inhabitants' relations with each other, and so reduces their participation in controlling common spaces. Therefore, the mutual effect of physical and social factors on each other cannot be disregarded.

Among the most important social issues in apartments and housing complexes are "security" and "crime," which are linked, directly, to the architecture of buildings. Comparing tall and small (up to 4 stories) building complexes shows that in tall building complexes there are more crimes and less security. Whereas, in small building complexes, it is easier to control common spaces, and the possibility of committing crimes is lower. According to the mentioned points, it is possible to define the appropriate number units in each storey, and also the number of stories in each building. Besides, in order to prevent crimes, construction of unprotected spaces must be avoided in building complexes.

- *Architecture and Urbanization Aspect*

Architecture design is the result of economical, social, and managerial factors. In architecture design, particularly in deteriorated fabrics where inhabitants have special social, cultural, and economical characteristics, these factors must taken into consideration:

- Designing housings according to the lifestyle of inhabitants
- Designing housings according to the families economical situation
- Employing traditional housing patterns in designing new housings, where possible
- Paying attention to the safety measures considering earthquake, fire, and the possibility of giving assistance when accidents happen

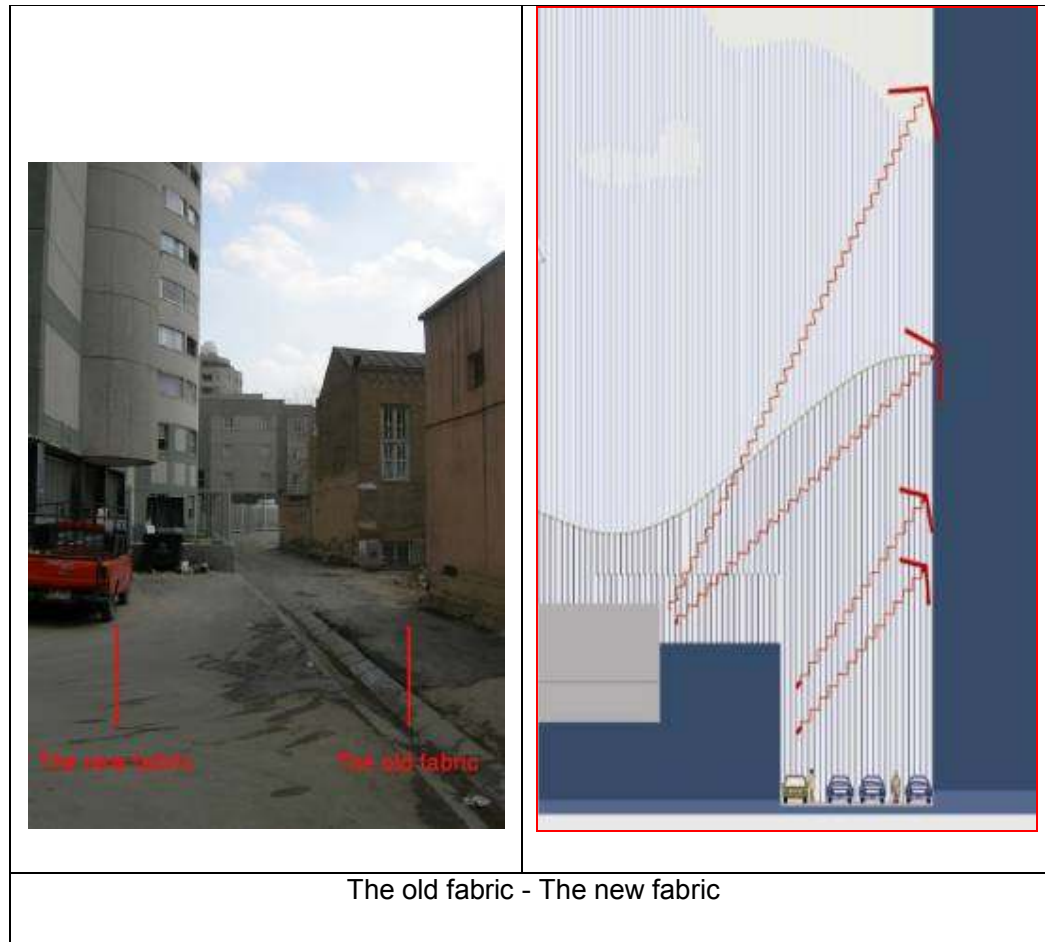
- Paying attention to aesthetics in designing interior and exterior spaces

As for urbanization aspect, factors like location of structure, composition of mass and space, structure height, and facing materials play determinative roles in the quality of space, and look of the city.

## B. Case studies

- **Navab Project:** This project, which can be considered as the biggest urban renovation project in Tehran, was conducted following the same policy and due to ignoring the public participation resulted in population displacement. The initial goal of this project was to construct a highway to connect North of Tehran to the South of the city. To do so, many of the houses were destructed and the residents had to immigrate to the other parts of the city or even the suburban areas. To compensate the destruction of residential buildings and also returning some parts of the capital which had been spent on the project, in other phases of the project the decision to build high-rise residential and business buildings on the two sides of the highway was made. Constructed housings have no common grounds with old housings, and are in complete conflict with them. Characteristics of the new housings can be counted as follows:

	
Navab highway and the new buildings	The defensible spaces



- Tall buildings in place of old 1 or 2 storey houses
- Existence of unprotected and unsafe spaces
- Lack of green space to meet inhabitants' need
- Air and sound pollution as the result of being in the vicinity of expressways
- Too many housing units in each block
- Absence of an efficient management
- New housings are in no accordance with cultural, social, and economical characteristics of the original inhabitants of the fabric

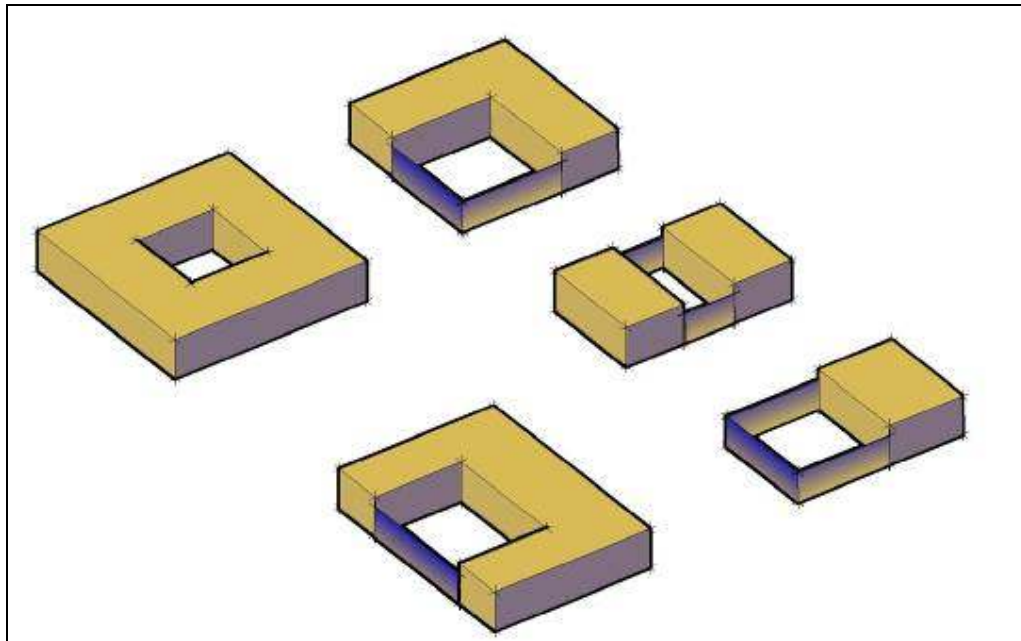
As a result of these problems, the old inhabitant of the fabric did not return to the constructed housings, and emigrated to other parts of city, and even to the suburbs. In their place, in new housings settled low-income emigrants and families with different, and in some cases opposing, cultural and social characteristics. This resulted to many social problems in this district.

Navab project is, presently, under severe criticism in professional, and even nonprofessional, circles as an unsuccessful urban project.

- **Oudlajan Project:** considering the discussed factors, and the Navab experience, the project in Oudlajan region was designed differently from Navab project. The main goal in Oudlajan region planning was to maintain the original inhabitants of the fabric, prevent them from emigrating, and to attract new population, too. Before start of designing, cultural, social, and economical characteristics of inhabitants, and also, different types of traditional housings was studied. The effects of these studies in the designing of new housings are as follows:
  - Construction of new housings with various sizes according to the economical level of inhabitants.
  - Employing traditional types in designing new housings
  - Paying attention to deprivation
  - Considering spaces according to the inhabitants' needs and interests like yard, green space, and so on.
  - Considering the standards of housing designing



The traditional housing typology



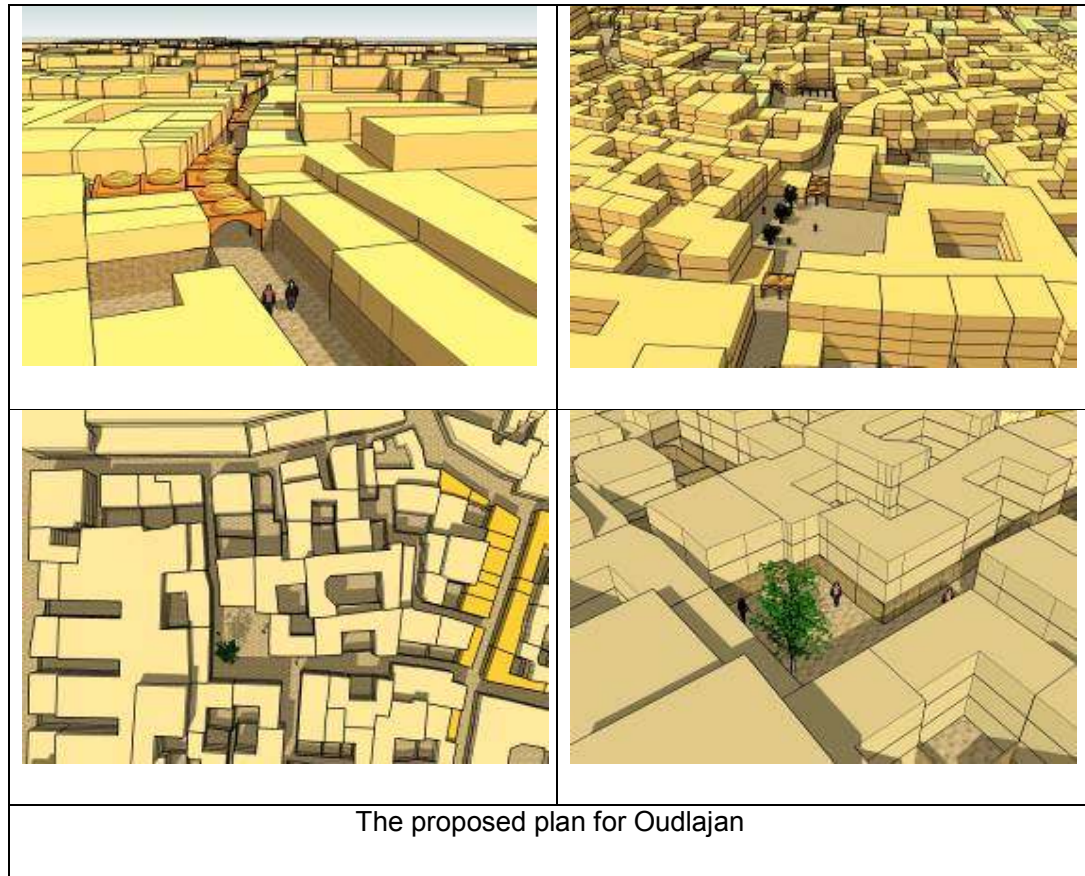
The traditional housing typology in Oudlajan

In general, traditional types of housing in this region can be classified in this way:

Since these types have been formed according to the cultural and social characteristics of inhabitants, their interests, and even the characteristics of the region, the designing of new housings has tried to employ these factors, as far as possible.

At the present time, designing stages of Oudlajan region has ended, and soon its construction will be started. Hence, we are waiting to see the results of this project, and to see if this method is really successful in designing of new housings.





### 3. Conclusion

Due to the fact that in designing housing for deteriorated urban fabrics low class population of the society is involved, it requires particular attention. Housing issue cannot be studied only through physical aspect. There are many other factors involved in the formulation of housing typology. Among them are economical, managerial, social, architectural and urbanization aspects which are all, to some extent, effective in the formulation of housing typology.

Economical aspect through considering economical situation of inhabitants, price of land in deteriorated fabrics, construction expenditure and so on, finds a very important role.

Another aspect, which is linked directly with the social aspect, and needs a lot of attention in these fabrics, is building management.

And in order to provide the inhabitants with comfort and peace, the architecture and urbanization aspect, which also affects the city look, must be taken into consideration as an important element.



Consequently, to formulate adequate housing typology for all levels of society, and the low-income population in particular, considering all these aspects is indispensable.

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## THE COMPARSION BETWEEN TRADITIONAL AND NEW DOMESTIC ARCHITECTURE IN KERMAN, IRAN

### Abstract

Traditional architecture introduces the best ways of using environmental energies and adapting with nature. On the other hand new architecture is considered financial goals, follow new techniques and materials and the most using of high-priced lands.

This article studies on characteristics of traditional domestic architecture and compares it with its new residential architecture in Kerman, a city of Iran.

Accordingly the comparison is based on some main subjects such as house plans, construction Techniques, materials used, identities and styles of architecture. The article has also referred to the relationship between architecture and culture and climate in both traditional and new houses.

Then the problem of two fabric architecture has been mentioned. Finally it has some suggestion about design of future residential buildings.

### Key words:

Architecture, climate, culture, domestic, environmental, Kerman, traditional

### Contents:

- Introduction
- Old City
- To Describe an Old House
- The Middle Age Houses
- The New Age Houses
- Culture
- Color

- Conclusion
- Keywords
- References

## Introduction

*"The city of Kerman is located in the south-east of the country; just over a thousand kilometers from Tehran. The climate is temperate, although the amount of precipitation is comparatively low. Being a historical city, it was the national capital in different periods. There are a number of monuments dating back to the Sassanian era. The Ardeshir Castle and Dokhtar Castle are notable among them. In the Safavid period, the governor of Kerman, Ganj Ali Khan, built several notable buildings, most of which have survived the time and now are called the "Ganj Ali Khan Complex." The old architecture of Kerman, the important features of which are high walls, narrow alleys and domed roofs is of considerable attraction."*<sup>(1)</sup>

Kerman is a city that located in the edge of desert that its history returns to thousands years before Christ. *"Habitation in the land of Kerman dates back to the fifth millennium BC."*<sup>(2)</sup>

The modification of housing in Kerman is not an evolution. If the development of traditional architecture follows, the result will be something completely different with today of Kerman.

In general the residence fabric of Kerman has three main types and some exceptions which have formed in ages. This article refers to the main types. The principal differences between these parts are in the style of architecture and the material of buildings both. The first one is old fabric that was formed along centuries and extended until 50-60 years ago. It has traditional architecture and materials. The middle age fabric was found around 55 years ago and extended until last couple of decades. It was the first sign of modern architecture and has two different types which the plan in both is common but the materials are different. It is clear that new material has new construction and vice versa. The new fabric residential buildings are found more than 20 years ago and are continued until now. The new part has been built by modern architecture and materials.

## Old City

The water of city was provided by kareezes. Kareeze is a style of bringing water out of the ground. *"A kareez is a water management system used to provide a reliable supply of water to human settlements or for irrigation in hot, arid and semi-arid climates. The technology is known to have developed in ancient Persia, and then spread to other cultures, especially after the Muslim conquests, to the Iberian Peninsula, southern Italy and North Africa."*<sup>(3)</sup> Kerman had several kareez that flowed on the city and made the public reservoirs full of water. Some of the houses had their own reservoirs that became full with a particular plan by the flowed water. Some of houses had well water.

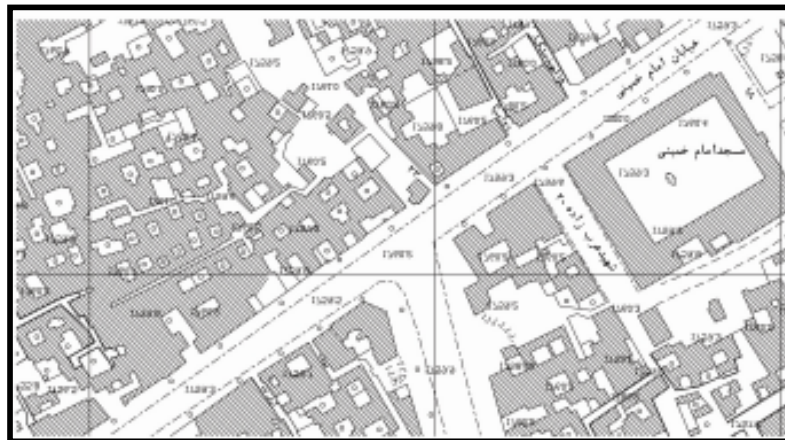
The baths were public and have remained many of them as cultural heritage in city. (The oldest bath has remained since 1000 years ago and the most famous one belongs to 400 years ago.) Rich people had private bath.

The main direction for buildings in Kerman is Kiblah and this direction has considered yet, even though this side has to be change for using less electrical energy.

Kerman used to have some semi public spaces which are called “neighbourhood unit”. Neighbourhood unit was a complex of houses which were near to each other and often had a common entrance. It was like a private small alley or one polygon as a vestibule (Hashti) which displayed the entrance of each house that was a member of neighbourhood unit. These members had strong and special relationships. They were responsible of each other. They had some common benefits. For example something their water source was shared. Or their women apportioned in cooking bread. They needed to each other because the shops and their goods on the city were so limited. Some of them had common transportation too. Unfortunately the neighbourhood units have not remained anymore.

All the streets were covered by flagstone or pounded soil. The façade of old alleys in Kerman is completely homogeneous. All the materials, in fact domestic materials, were covered by mud-straw mixed. So the external walls of houses are hidden and whole of the alley had the same surface. All the passageways had their organic winding shapes and the main ways were a bit wider than an alley. Transportation was done by carriage and coach. The first cars entered to Iran in 1900. After that cities were changed one by one and initial streets were appeared. In Kerman the main street cut the old fabric before 1940 and after that the second street was built in the next decade.

*“There are more than 30 urban divisions in Kerman. The division is proof of antiquity of the province in vicinity of the desert.”<sup>(4)</sup>*



One part of Kerman city, old fabric

### To Describe an Old House

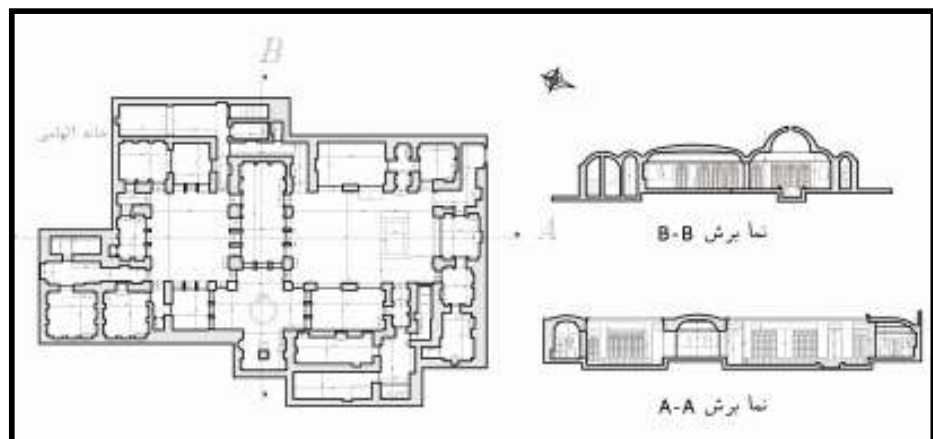
The age of these houses is 60 years or more. In special case an old house was located in one neighbourhood unit. It has one specified entrance and a door which had two knockers with different sounds for men and women. Each gender knocked the own knocker. After entrance normally there was a bending passageway that reached to the main yard. Yard was often deep and had small garden or small pool or usually both. The depth of courtyard and trees and water kept its weather cool and fresh. There were at least 2 sides of yard building that one side was sunnier. Some houses had more buildings and yards. The residents changed their rooms in the different seasons. Each side had several rooms and sometimes in two rows. The first row could give light from the yard. But the second row, if there was, had just a sky light and used as a store or nook. The building was higher than yard and there were many staircases here and there. Normally the rooms were related with each other directly or by a strip.

All the rooms had in each side a few recess and at least two doors. Special rooms had more doors and their name's belongs to them, for example 3 doors room is a room with 3 doors in the main yard side. The other numbers of doors is 5 and 7.

"Ivan" was another member of many houses. It had columns and arches and kepted the summer used part in shadow. But the best part of old houses in summers was wind catcher that made the weather fresh, wet and cool. *"A wind-catcher (badgir) is simply a ventilating shaft which projects above the roof of a building and provides it with air-conditioning of a most effective kind. Wind-catchers are among the most spectacular and best-known elements of Persian architecture, yet it is surprising how little information exists about the detail of their interior design."*<sup>(5)</sup> Unfortunately the main parts of wind catchers were destroyed and there are a few of them in all over of Kerman.

The kitchen (Matbakh) was on the one corner and had a store for firewood. (Wood was the most important fuel in the past times. But now all of the houses have gas pipe). Normally the kitchen was related with yard by a strip too. The toilet (Mostarah, restroom) was located at the darkest part of home and always had a dark path for move flies away.

Big houses had more than one yard. These yards allowed to the women that keep their private open space. All openings were into the yards. These houses are named "introverted". This matter is one of the most important differences between old and new houses in Kerman. Most of the new houses are not introverted anymore.



One sample of a rich house in old fabric of Kerman

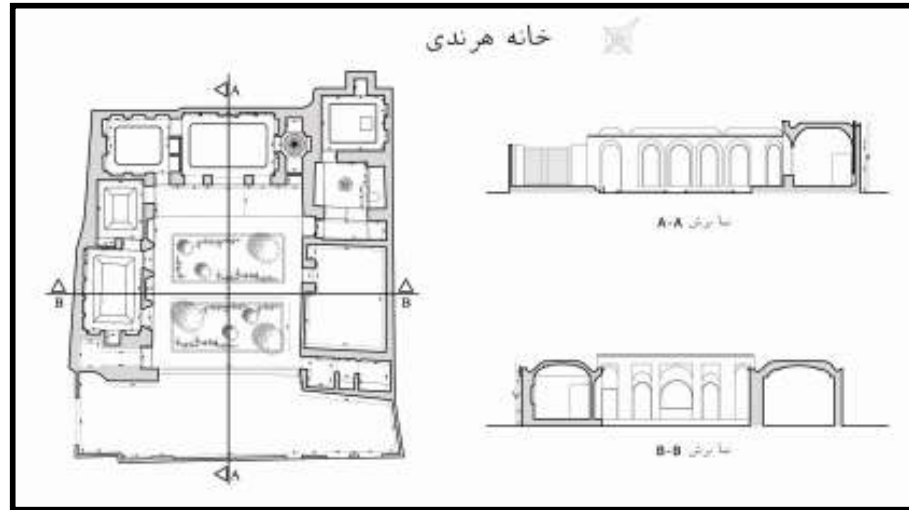
The old houses had built by domestic materials and in old styles. The main material was soil that had changed into adobe and brick. The walls were wide for holding the cupolas. The openings were smaller for keeping the inter temperature and the sunlight controlled better than the new one.

Some houses had an especial space for keeping domestic animals. They used the animal for caring them. They kept chicken too.

Although the rich houses had tow storeys or more, the one-storey houses are more than the others at the old fabric.

To study of designing shows that symmetry, equilibrium and balance was very important and designers had tried to create symmetrical spaces for living comfortable.

Although unfortunately the main parts of old fabric have been destroyed and there are just a few of houses here and there in old fabric, fortunately the most beautiful houses were stronger and some of them were saved by owners or government.



A sample of usual house in old fabric of Kerman

### The Middle Age Houses

As it was mentioned before, the middle age houses were found as a sign of modern architecture around 55 years old in Kerman. In Iran it had been happened before. *“Modern architecture was introduced in Iran 60 years ago and we are now witnessing the fourth generation of Iranian architects. With architecture how a productive activity, we should admit that considerable progress has been made in this period. Today, most buildings, at least from a bureaucratic perspective, are “engineer-built” and the number of graduates and students of architecture has increased. The Construction Engineering Association has many members and large construction engineering consulting firms have been established. However from an artistic perspective, and especially if we expect our building activity to signify as well a cultural advance, we cannot cite a particular work as a brilliant example from recent decades. In architecture, cultural progress is not synonymous with the number of buildings constructed or the changes in tastes and trends that are always manifest among the younger generation of architects.”* (Kamran Afshar Naderi 2003). These houses are two types which the plan in both is common but the materials are different. The plan is a large hall which all rooms are arranged around it. Bedrooms, guest room, kitchen, bathroom and store connect directly with hall. The most activities happen in the hall and often TV is in the hall too. The guest room is a big salon that is decorated more beautiful than the other parts and is always ready for entertaining of guests. This salon is completely separated from the other parts of house. It means the hall and rooms are private places and only the family members and close relatives can be there.

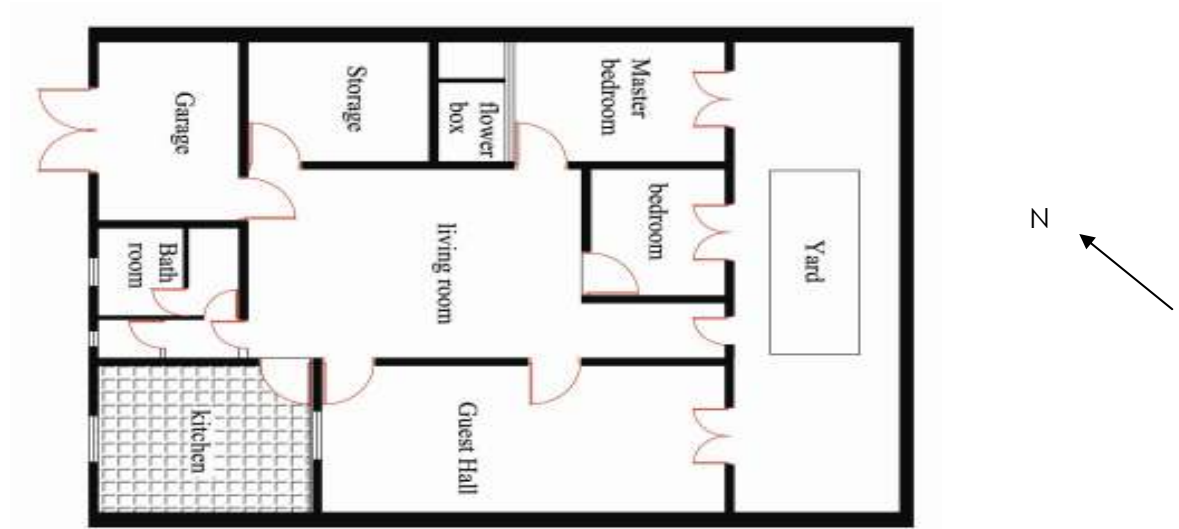
The middle age houses were built by two different materials. At first they were created by domestic material and in the same style of old fabric. The walls were thick for keeping the cupolas. The most common material is brick. These houses act very weak in earthquake which is a usual danger in Kerman. After that the domestic materials changed into newer one. This type of houses especially by newer material and with flat beamed ceiling, instead of dome, is more common in Kerman. They did not have column and the load bearing walls held the beamed ceilings. Some of them had vertical reinforced concrete brace for making them stronger and actually they are very strong too. They have one or two storey.

These houses have at least three rooms, guest room, kitchen, store and bathroom. They were built just in one side and have got their light from north and south sides. The yard has often located in the south side of site and north side or a part of north side is open space. The buildings are side by side in west and east edges. The openings are located in south and north sides. (In fact they are in north-west and south-east). Most of the alleys and streets are checkered and the houses get light from them.

This fabric has the first houses in Kerman that did not the signs of introversion. Actually the modern houses in Kerman are not “extroverted” like north of Iran. But they get light from public places and they do not have private quarter like old houses.

After appearance of modern architecture the surface of alleys has changed. The edge of houses was come into view and the façade of external walls with different materials.

The second form of middle edge houses were built by newer materials.



A sample of middle age house in Kerman

### The New Age Houses

The new houses in Iran were founded at first in Tehran around 30 years ago. After that big cities have followed this trend one by one, and then in Kerman these buildings were appeared more than 20 years ago. The new houses are similar to each other in whole of Iran. Unfortunately they are not belonging to cities anymore. The material is similar too. Domestic materials are forgotten and all materials are independent of the lands. These houses are appeared as apartment more than the other types. The openings are each side that they have open space. In fact they are careless in the climate and direction of layout. Using the land as much as possible is the most important factor on them. The style of construction depends on the price and the strength of materials. The south side has still been the best part of site for yard. But if it wastes the land, it will be turned to the other sides. Some houses which are not enough large, even do not have yard. The houses and apartments are become smaller and the buildings are become taller.

## Culture

In Iran there has always been a strong relationship between architecture and culture. In fact culture is the most important reason for difference of style of architecture in similar climates and also the similarity of architecture in different climates.

Before Islam the main religion of Iran was Zoroastrianism. In that time the ladies took part in all activities. After Islam the culture was changed little by little. The rulers kept the women away of social activities and forced them to stay at home most of the time. The houses became introverted and the ladies were hidden there. The other reason was the living style. Some families were so big because the sons stayed at the same houses with their parents after marriage. At that time the relationship between inside and outside of houses was limited for a long time. The neighbourhood units were founded strongly and product of handicrafts were extended. There was a strong relationship in neighbourhood units and houses between their residents. They needed to each other because they had to prepare many things for their life. Before modern architecture, culture had always been strong effects to architecture especially for residential buildings. Everything in architecture was defined by local architects who considered to culture and domestic materials and climate.

In Pahlavi dynasty the rule of Iran was changed in following the western world. The ladies could be more active and getting job. Then the architecture was changed too little by little. On the other hand the style of living was turned into single families. The shops were extends inside the city and people could find their requirements easily. The neighbourhood units were forgotten and the human relationship was limited. Afterwards the population get more and the price of land and new materials were created appropriate conditions for increasing the storied and limited in area. At the same time the furniture turned into the smaller sized.

The first modern houses were made in different style of cultural architecture. The people did not turn them into their culture. They adapted their culture with the new architecture. After that this trend happened more and more. The people ignore their culture in their architecture. Then they have found themselves not satisfied and disappointed in their homes.

*"Iranian architects in the ancient Achaemenid period as well as in the recent Qajar period have demonstrated how elements from foreign architectural influences can be employed to create works that are in complete harmony with the Iranian spirit and culture, Nowadays, however, in using elements from "traditional" architecture, the resulting buildings are completely incongruous with the spirit and culture of our nation."* (Kamran Afshar Naderi 2003)

But it will be totally unfair if we believe this trend will be extending in the future. Recently the number of architects who are worried about Persian architecture and the distance between that and culture has increased. It has been many seminars and deliberations about this disaster in Persian architecture. *"In the last few years in Iran & worldwide we happen to see projects that have cleverly combined local culture and today's contemporary architecture and therefore have raised the interest of critics. Designs that in one way focus on the international / regional debate and also tend to respect in most aspects a certain culture, as well as complying with contemporary trends.*

*These architects, considered as Regionalist critics offer a different view. They have freed themselves of constraints that vernacular elements of architecture impose.*



*These architects consider their designs are based on different cultural and social footprints found in literature or other mottoes.”* (Memar magazine, number of 25, page 36), (Negar Hakim, 2004)

Now some modern houses have appeared in Kerman which considered to the historical architecture. Some architects found out the symbols of Persian architecture and imitated them in new buildings such as arcs, niches, swastika and glazing. Sometimes they use the domestic materials as decorating which are framed by the modern materials like valuable tableaux inside or outside the buildings. This kind of decorative is taken into consideration by most of the people. It seems the residential buildings need to be more Iranian mixture of traditional memories. The residences of especially modern buildings have complained about boring of their houses.

## Color

Color was as same as importance of light in traditional architecture of Kerman. Most of the opening which lead light was colored even in a small part. Color was applied both for architectural ornaments and functional reasons. The past generations used some colored materials such as glasses for getting light openings especially in sash windows. It caused various lights in internal spaces which had harmony and changed with move of sunlight. Then the inside of rooms was always beautiful and exciting. Some researchers believe these color lights keep also away flies and mosquitoes.

The other colored materials in usual were used as decoration of buildings like tile, brick, marble and so on. Some colors are symbolic and representative of Persian ritual. *“In the same way that light has always been important in Persian architecture, a sense of color and its harmony, which is of course directly related to the awareness of the role and significance of light, has dominated all the arts of Persia.”* (Seyyed Hossein Nasr, 1971)

This is interesting that some colors have registered as Persian colors. ISCC-NBS 1955

*“**Persian blue** (not to be confused with prussian blue) comes in three shades: **Persian blue** proper-a bright medium blue; **medium Persian blue** (a medium slightly grayish blue that is slightly indigoish); and a kind of dark blue that is much closer to indigo; this darker shade of **Persian blue** is referred to as **Persian indigo** or **dark Persian blue**.). Other colors associated with Persian include **Persian red** and **Persian green**.”* <sup>(6)</sup>

When the modern architecture was started, the using of colored materials changed. The painted materials did not employ for functional anymore and using of symbolic materials was limited. Now the colors are as same as other cities or countries just for decoration.

## Conclusion

Comparing between traditional and new architecture is related on consider to all Persian and domestic factors. This article is just about the most important of these factors. There are some other reasons such as light, water, surface, space, garden, shape and form that can be representatives of Iranian architecture. Actually this article is not that extended for explanation all of them.

In general Persian traditional architecture has some special characters which have to be introduced for adapting as patterns of Persian new architecture.

## Key Words

Architecture, Color, Culture, Domestic, House, Kerman, Persian, Traditional

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## HIGH QUALITY HOUSING ESTATE PLANNING FOR GREATER YANGON METROPOLITAN REGION

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**ABSTRACT:** Improvement in space requirements and building services becomes more and more sophisticated because of the technological changes and changes of living style. Moreover, changes in life style of the citizens, family size and structure mainly effect the consideration of today's Architectural Planning. Housing estate development is therefore more essential and reasonable to create quality living standard and pleasant environment. Many countries accept that housing estates can be able to provide not only better security, more pleasant and healthful environment and quality living standard but also quality of life issues. Housing estates have been remarkably redeveloped in Yangon City after 1993 and it has been improving in the architectural design of the estates and amenities of the community. Most estates can provide some amenities and some estates have been built without considering to neighborhood condition. It is, therefore, required to carry out a detailed analysis in housing estate planning. Physical planning of the site is analyzed by layout plan and site densities. Communities facilities provided are found by analysis on the existing situation of residence inhabitants, family size and structure of housing estates. Finally, high quality housing estate is defined by correlation between physical planning and communities' facilities. The existing situation of residence inhabitants are known by questionnaires survey on residents. The main focus of this research has been to analyze the existing housing estates condition in Yangon and to recommend the factors for future housing estates planning to meet the users' requirements and to relevant their environment.

**Keywords:** high quality housing estate, pleasant living environment, physical planning, communities' facilities

### 1. INTRODUCTION

With the changes of Time, Space, and Technology, the living standard of the people is also changes. Nowadays, people want to live in pleasant environment and security spaces for their life. Many countries tried to fill the needs of their citizen by doing many research upon housing and their environment. The modern

concept in housing takes into account the importance of environment as well. Not only must the dwelling be structurally sound and livable inside, the environment must also be pleasant and serve as a physical setting for community development.

Yangon, the capital of Myanmar is situated on a peninsula surrounded by the waters of the Hlaing River, the Yangon River and the Pazundaung Creek. The first plan of Yangon city was made by Dr. William Montgomerie. His plan was modified by Lt.A.Fraser in the year 1852 after second Englo-Myanmar war. In that plan, the city was laid out on a chessboard pattern for a population of 36,000 with the Sule Pagoda at the center as a hub of the road system. The city was formed as a rectangle and the center has been the central business district since that time. The city's boundary has changed and expanded to 242 square miles in 1995. Nowadays, Yangon city consists of 33 townships and it can be classified into seven zones. Among these seven zones, high density area around 100 population per acre can be found in CBD and inner urban ring, medium density area around 65 population per acre can be found in south of CBD, older suburbs and outer ring, and low density area around 40 population per acre can be found in northern suburbs and new suburbs<sup>1</sup>.

Nowadays, Yangon city with a population nearly 6 million, and the city is being transformed into modernized city by providing many types of housing and others requirements of the city. The city has grown rapidly in recent years and increasing demographic rate of Yangon city is averagely about 4.65% a year within the last decade. So, new suburban satellite townships have been developed by the government to accommodate the increasing population and many more housing estates are likely to come up.

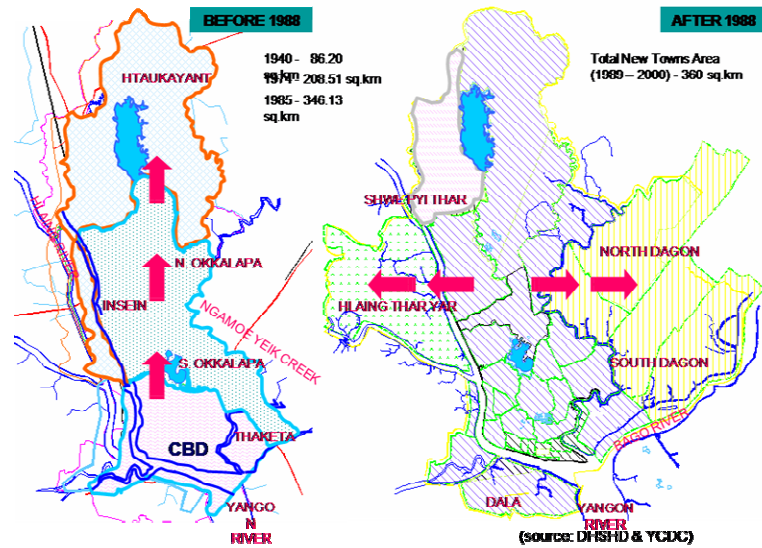


Fig. 1. Development of Yangon City Structure Plan

## 2. METHODOLOGY

Field study and data collection on selected housing estates are conducted in this research and questionnaires survey is intended to collect information regarding residents' opinion on their environment. Three types of questionnaires were used to get the information from the four focus groups; workers, students, housewives and older persons. There have been known that not only good

<sup>1</sup>Swe Swe Aye, Daw. December 2000. *Formulation of Guidelines for Urban Design in Yangon City Residential Areas*. Ph.D. Thesis, Yangon Technological University.

quality buildings but also pleasant environment and communities facilities should be provide in the creation of high quality housing estate. Housing Estate can therefore be defined a housing complexes with the difference in lifestyle in which the amenities and well planned communities provide. Quality Housing Estate can therefore be defined a housing estate in which not only the quality building themselves but also good housing layout and pleasant environment with amenities are provided.

## **2.1 Development of Housing Estates in Yangon**

Housing estates with amenities have been provided since 1952. For example, Yankin housing estate was the oldest estate and it comprises eight varieties of house types and self contained amenities such as nursery, health clinic, post office, schools, shopping center, community hall and playground<sup>2</sup>. Many projects and actions effecting the housing sectors in urban development were launched because of a change of Government policy from socialist economy to free market economy since 1988. Residential housing estates are being constructed everywhere in Yangon<sup>3</sup>. There are several types of Housing Estates which can be classified into the following five groups: High-rise Housing Estates, Condominium Housing Estates, Aerial Development Housing Estates, Single Family Housing Estates and Garden City Housing Estates<sup>4</sup>.

Most of the housing estates are high-rise housing estates which can mostly found in inner urban ring and outer urban ring. The following Fig 2 presents number of housing estates in each township. As the changes of time, space and technology, people wanted to quality living standard with pleasant environment and safe for their lives. So, housing estates with pleasant environment and amenities were remarkably redeveloped after 1993 and it has been as so-called garden city housing estates. Most of the garden cities housing estates are constructed in suburb area<sup>5</sup>.

## **2.2 Selection of Study Area**

Preliminary survey had already done all around the city to understand the general condition of housing estates planning and facilities provided in Yangon. And then three survey centers which are middle class housing estates have

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<sup>2</sup> DHSHD. *Housing in Burma*

<sup>3</sup> DHSHD. (1988-1994). *A Report on Construction Activities*

<sup>4</sup> Htay Htay Myint, Ma. (September 2002). *Analysis on Recently Built Housing Estates in Yangon*. M.Arch Thesis, Yangon Technological University

<sup>5</sup> Yangon City Development Committee. 2004. *The Map of Yangon*.

been selected to make detail analysis and questionnaire survey. FMI, Nawaday and Mingalardon garden city were selected to study. All of these estates are garden city housing estates with different site areas and located suburb area as shown in Fig 3. There was a very good response from the residents of the estates under survey, in which 20% of the total dwelling units were chosen as sample unit areas at the time of the survey.

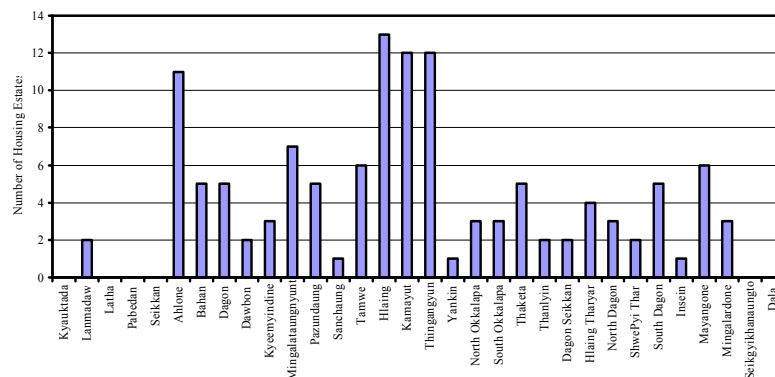


Fig. 2. Number of Housing Estates in Each Township

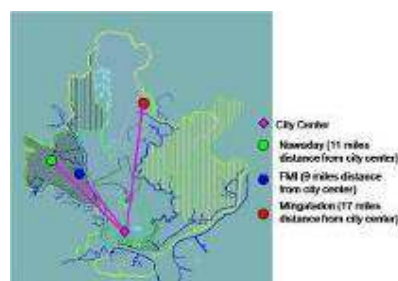


Fig. 3. Location of Selected Housing Estates



Fig. 4. Site Plan of Mingalardon Garden City

### 2.3 Study and analysis of Selected Housing Estates

FMI and Nawaday Garden City are located in HlaingTharYar Township at the north west of Yangon city and have developed since 1994. The site area of FMI is

about 500 acres and Nawaday is about 214 acres. Mingalardon garden city is located in Mingalardon Township at the north of Yangon city. It has developed since 1996. The site area is about 3000 acres (including industrial park about 1000 acres). At these estates, variety of house type and different plot size are provided for different income groups.

### Density

In FMI garden city, the maximum FAR is 0.84 in condominium and its population density is 83 per acre and unit density is 26 plots per acre. Average plot per acre of all plots groups is 12 plots per acre. In this estate, total plots area is 55 %, total road area is 36 %, total green area is 5 % and total public area is 4 %. In Nawaday garden city, the maximum FAR is 0.8 in shop houses and its unit density is 18 plots per acre. Average plot per acre of all plots groups is 12 plots per acre. In Mingalardon garden city, maximum FAR is 0.527 in Kayay Yeiktar and its unit density is 2 plots per acre. Average dwelling density of all groups is 1.88 plots per acre. In this estate, some plots cannot get their floor area because they are now conceptual design stage.

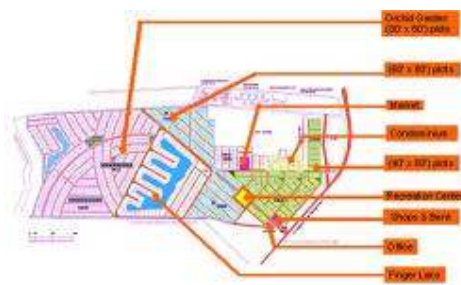


Fig. 5. Site Plan of FMI Garden City



Fig. 6. Site Plan of Nawaday Garden City

### Layout Plan

The shape of the site of FMI garden city is rectangular shape as shown in Fig 5. Type of the houses are single storey detached houses, two storey detached houses and condominium. Most of the plots except from 80'x 80' plots are located within ½ mile radius far from recreation centre. Shops, bank and market are also located within ½ mile radius as shown in Fig 7. In this estate, there was used curve street pattern and loop street pattern, and long blocks and sharp angle lots can be found in this estate as shown in Fig 8,9,10. Green spaces are provided and bounded by lots. Lots are facing to green spaces but some given open spaces are unusable because of non facing lots and lacking maintenance.



Nawaday garden city's site plan is square shape plan as shown in Fig 6. This shape can create well layout plan. All of the street patterns are grid street pattern. All of the houses are located within 1/4 mile radius far from recreation centre. So, residents can easily access to community facilities. There was used rectangular or grid street pattern so most of the plots are rectangular shape as shown in Fig 11. The blocks lengths are mostly too short less than 750 ft.

The shape of this site of Mingalardon garden city is irregular shape as shown in Fig 4. This shape can create attractive layout plan. All of the street patterns are grid street pattern as shown in Fig 12. There are seven types of plots groups by name. Those of four groups, detail analysis are carried out on four groups. because some layout plan of plots groups are nearly the same. All of the houses are two storey detached houses and located near main entrance.



Fig. 7. Analysis on Access Way  
to Community Facilities



Fig. 8. Analysis on Streets and Lots  
Layout Plan



Fig. 9. Analysis on Streets and  
Lots Layout Plan



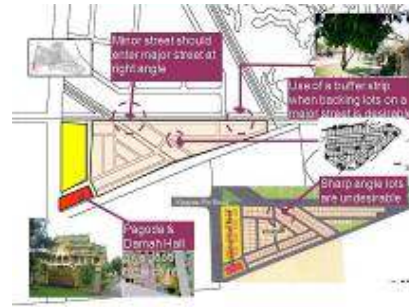
Fig. 10. Analysis on Access Way to  
Community Facilities and Layout Plan

Commercial area and religious facilities are also located near the main gate. So, residents can easily access to commercial area, pagoda and damma hall. But

there is no special recreation area given for residents. Golf course is quiet far from most of the residential area.



*Fig. 11. Analysis on Streets and Lots Layout Plan*



*Fig. 12. Analysis on Street and Lots Layout Plan*

Most of the residential areas are so far from public transit and there is no internal public transit and pedestrian friendly environment within the blocks in all these estates. There is no buffer zone between industrial park and the residential area and not safely traffic because of mix use of truck from industrial park.

The junctions between major street and minor streets around recreation centre are not desirable as a pedestrian and motorize traffic can conflict as shown in Fig 7. The blocks along the major road, in which use of buffer strip when backing lots on a major street is desirable. When considering the corner lots arrangement, there are undesirable sharp angle lots as well as desirable corner lots arrangement are found. Lots that have sharp-pointed corners are wasteful of land because the resulting wedge-shaped areas have little or no utility. Such lots also constitute poor building sites as shown in Fig 8.

There was used rectangular or grid street pattern and some blocks are too short less than 750 ft. The initial construction cost can be increased because of the large number of cross streets, and also increase traffic hazards and travel time through such districts as shown in Fig 8. The planning of suburban residential blocks 750 to 1300 ft in length by two lot-depths wide, bounded by streets that are adjusted to topographic and traffic requirements, are recommended as being most economical.

If the length of the blocks were long, it should provide crosswalks near the centre of the blocks to afford more direct access to nearby community facilities. Such pedestrian ways near the middle of all blocks exceeding 1000 ft in length

are recommended. When a nearby shopping centre, school, or park is so located that a large number of residents of a neighbourhood are forced into circuitous routes in order that they may reach their destination, it is often desirable to provide crosswalks in shorter blocks- those over 750 ft in length. This often brings the playgrounds or grocery store as much as a 1/4 mile nearer in walking distance to the doorsteps of many homes<sup>6</sup>.

### Community Facilities

FMI city had been provided the community facilities to create pleasant environment: shops, market and supermarket, bank, recreation centre, clinic, school bus and ferry. All of the community facilities are located within 1/4 mile far from recreation centre<sup>7</sup>. Shops, supermarket and bank are located in one building and it is located near main entrance. The design of this building can enhance the quality of its environment. Market is located near condominium and it can be easily access from most of the residential area. Clinic is also located within recreation centre. It can clearly see through the main entrance.

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<sup>6</sup> Joseph De Chiara, Julius Panero, Martin Zelnik. (1995). *Time-Saver Standards for Housing and Residential Development*. 2<sup>nd</sup> ed.

<sup>7</sup> Field Study

Table 1. Area Ratio of Each Community Facilities(FMI garden city)

Type of Community Facilities	Floor area (sqft)	Land area (sqft)	Land area (acre)	Area per person (sqft)
Office Area	17,321.5	63,144	1.45	1.4
Recreation Area	10,176	97,200	2.2	2.12
Shopping Centre and Bank Area	18,000	32,105	0.74	0.7
Market Area	16,000	63,731	1.51	1.4
Green Area and	-	1,067,716	24.5	23.6

Nawaday garden city had been provided the following community facilities:

shop and supermarket, recreation centre, restaurant, damma hall, school. All of the community facilities are located within 1/4 mile far from recreation centre<sup>8</sup>. Total land area of shops area is 1.02 acre for 800 populations. Local shopping

centre should be located within convenient and safe walking distance for the residents and designed to afford adequate off-street delivery and parking facilities. Recreation centre is located in the middle of the site and it can easily access from all of residential area. School and Damma hall are also located within recreation area. Total land area of recreation centre is 8.24 acre and recreation area per person is 30 sqft. Table 2 shows detail analysis of area ratio of each type of communities.

*Table 2. Area Ratio of Each Community Facilities(Nawaday garden city)*

Type of Community Facilities	Floor Area (sqft)	Land Area (sqft)	Land Area (acre)	Area per person(sqft)
Office	-	10,000	0.23	0.42
Recreation Area	11,986	358,778	8.24	15.23
Green Area	-	707,590	16.24	30.0
School	-	93,922	2.16	4.0
Religious	1,855	27,300	0.63	1.16
Restaurant	-	40,254	0.92	1.7
Shopping Centre	-	44,584	1.02	1.9

Mingalardon Garden City is quite different with as it has industrial estate with golf course. But it is no special recreation area given for residents. There had been provided the following community facilities: commercial area, hospital, golf course, pagoda and damma hall, school. Total land area of commercial area 20.349 acres for 12900 populations (approximate population). Local shopping centre should be located within convenient and safe walking distance for the

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<sup>8</sup> Field Study

residents and designed to afford adequate off-street delivery and parking facilities<sup>9</sup>. Golf course area is located in the middle of the site and it can easily access from all of residential area. Moreover, it serves as buffer strip between residential and industrial zone. School and Damma hall are also located adjacent to main entrance. Table 3 shows detail analysis of area ratio of each type of communities.

*Table 3. Area Ratio of Each Community Facilities(Mingalardon garden city)*

Type of Community Facilities	Floor Area (sqft)	Land Area (sqft)	Land Area (acre)	Area per person (sqft)
Golf Course	-	7,927,920	182.0	615.0
Commercial area	-	886,402	20.349	68.7
Hospital area	-	1,328,580	30.505	103.0
School area	-	2,178,000	50.0	168.8
Religious area	-	348,480	8.0	27.0

### Analysis from social aspect

The population of FMI garden city is presently estimated 4800 in 925 dwelling units and its expected population is 7500 for 1500 dwelling units. There had considered population of this estate by age group. It has fourteen ages groups see detail in Fig 13. In this Figure, demographic structure shows that the amount of middle ages groups 15 to 34 is greater than younger and elder ages groups because most of the industrial stuff and students rent by grouping about 10 to 24 person per dwelling unit in this estate<sup>10</sup>.

It is absolutely different with demographic structure of Myanmar based on 1998 statistical year book and Yankin estate based on population of year 2001.

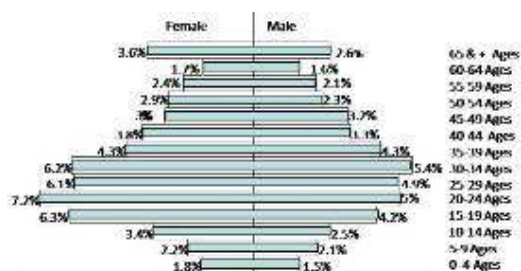


Fig. 13. Demographic Structure of FMI City

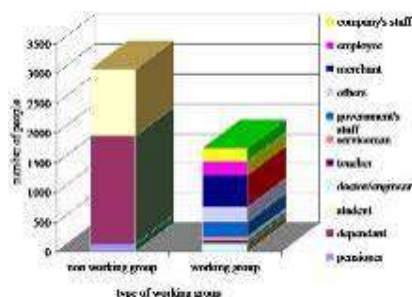


Fig. 14. Occupation of Residents in FMI City

<sup>9</sup> Field Study

<sup>10</sup> Field Study

The nature of the demographic structures of developing countries is like pyramidal shape. So, the shape of the demographic structures of this estate is like the shape of the demographic structures of developed countries.

### Type and size of families

There had divided into four groups in the consideration of no. of families in this research as shown in Table 2. The total number of families is 925 and its population is 4800. Couple with children is 44 % of total family and it is the largest amount of all type of family. The second largest amount is 24 % of total family in the type of couple with parents and children. Moreover, 4 to 6 ages group is the largest amount of number of families and 7 to 10 ages group is the second largest amount of number of families as shown in Fig 15.

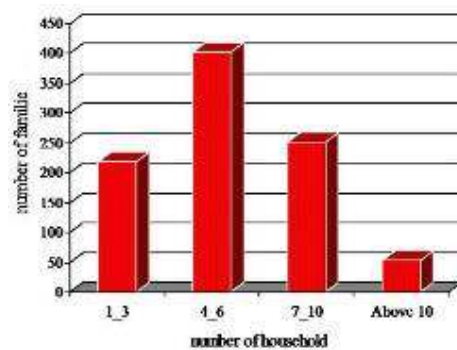


Fig. 15. Size of Families Live in FMI City

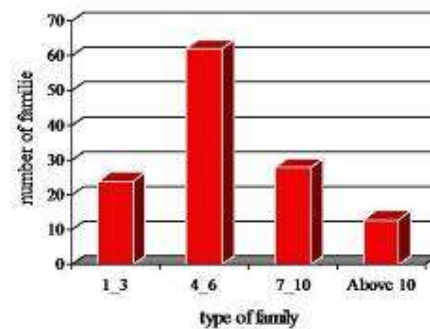


Fig. 16. Size of Families Live in

Nawaday Garden City

In Nawaday garden city, it is just get no. of household per family to analyse. The population of this estate is presently estimated 800 in 130 dwelling units and its expected population is 7500 for 1500 dwelling units. There had divided into four groups in the consideration of number of families in this research. The above Fig 16 shows that 4 to 6 ages group is the largest amount of number of families and 7 to 10 ages group is the second largest amount of number of families.

In Mingalardon garden city, the detail data cannot get to analyse from social point of view. So, there is just estimated expected population of this estate based on 5 households per family. There is presently estimated for 2580 dwelling units and its expected population is 12900.



### **Occupation of residents**

When considering occupation of the residents, it had divided into two groups such as working group and non-working group. In non-working group, it includes pensioners, students and dependents. In working group, most of the residents are merchants, businessman and governments stuff. The above Fig 14 shows the amount of non-working group (64 %) is greater than working group (36 %).

In non-working group, especially pensioners and dependents are living in their home in a whole day, and students are also living in their home most of the time. Therefore, it should provide more facilities and more convenient layout plan for pensioners, dependents and children. So, the planner should attention to this effect in the creation of layout plan and the provision of facilities for pensioners, dependents and children.

### **Evaluation and Findings of the Selected Housing Estates**

The master plan of Nawaday garden city is quiet relevant to standard because of the provision of community facilities within the maximum walking distance (1/2 mile) from all of the residential area. The following Table 4 is the comparison of these estates. The layout plan of Nawaday garden city is not an attractive plan. Because it used just only one type of street pattern and not provided variety of lot size, for these two aspects, it does not enhance the visual character and residential amenity of the site. The layout plan of FMI city is an attractive plan because it provided variety of street pattern and lot size that makes variety of dwelling design. It can, therefore, enhance the visual character and residential amenity of the site and the residents will consider this estate is an attractive place with pleasant environment, so it will enhance their living standard.




In summary, the layout plan of FMI city is the best among these estates because of the provision of the variety of the size of the lot and the type of street pattern. Most of the community facilities of Nawaday garden city can serve all of the residential area of this estate because the shape of the site of this estate is square shape. So, the square shape site is more effective than the rectangular shape site or irregular shape in the provision of community facilities.

### **3. CONCLUSION**

In this study concluded that the housing estate in which simple house types are grouped together, the hierarchy of vehicular and pedestrian access, the extent of

landscaping, play provision, and many other considerations in the detail design of the layout are just as important to the final quality of a residential environment as the design of the house themselves. For further study, questionnaires survey need to conduct to find out the residents requirements for the quality housing estate. This study intended to find out the quality of the places where people will live. Guidelines and recommendations will be given after conducting questionnaires survey.

Table 4. Comparisons of Selected Housing Estate

Nawaday Garden City  214 acres	FMI Garden City  500 acres	Mingalardon Garden City  3000 acres
Street and Lots layout -Rectangular or grid street pattern -T-junction	Street and Lots layout -Rectangular or grid street pattern -Curve Street -Cul-de-sac Street	Street and Lots layout -Rectangular or grid street pattern -Curve Street -A group around a green
Observation  -Pedestrian friendly environment together with green open spaces should be given -Shop houses do not have security	Observation  -Need to provide more community facilities especially educational facilities, health care facilities and religious facilities such as damah hall -Given community facilities should be within minimum walking distance of all types of housing groups and pedestrian friendly environment should be created	Observation  -Given community facilities should be within minimum walking distance of all types of housing groups -Pedestrian friendly environment together with green open spaces should be given -Buffer zone should be given between residential zone and industrial zone

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## **ARTISTIC EXPRESSIONS IN ARCHITECTURAL BUILDINGS IN NAIROBI**

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### **ABSTRACT**

Architecture is both an art and a science. There has been the old age theoretical question as to which one comes first: form or function. The science is recognisable in technological and functional aspects addressed in architecture but the artistic part expressed by the form is hardly recognisable in modern buildings. While we all agree that the artistic expression make architecture interesting, many of the modern day buildings have little regard for artistic expression. The design process has an effect on the resulting design and determines whether the function or form is highly regarded. There are some buildings that define the Nairobi city landscape and have an artistic expression and theory behind their design. This paper examines some of these architectural pieces and analyses their functional aspects as well as resulting artistic expressions. There is an analysis of the process involved in the development of the design of these buildings. It aims at pointing out the strong artistic expressions brought out by these masterpieces and reasons why they stand out amongst others. The design method employed by Architects in developing countries therefore needs to result in functional buildings as well as give the artistic feel that is lacking in many modern day designs that made architecture very interesting in ancient days.

### **Keywords:**

Artistic Expression, Form, Function, Concept, Design Process

## **1. INTRODUCTION**

The design process world over is evolving with new technologies and innovations. The Architect of the early 20<sup>th</sup> century cannot be compared to the architects of modern age, hereby referring to the 21<sup>st</sup> Century, in terms of the technology employed.

An architect ideally is meant to be involved from the brief development stage to the handover stage of a building. In the current times, Architects are seen to be taking up different roles in the design and construction process with some specialising in different areas. There are some who are purely in the housing sector; some have gone into urban planning while others are in project management. This research paper looks at the architect as a designer of spaces and more specifically buildings.

It is not easy to place architecture within the arts or the sciences. This is because it has an aspect of both categories of study.

The science is in such aspect of architecture as the building services, sound insulation and absorption, the thermal comfort levels and the functional aspects of the spaces being created in architecture. This cannot be complete without the expression and passion that comes with the form of the spaces that are being created and is mostly appreciated in the shell. It has to do with the aesthetic quality that is in these spaces. It needs an artistic mind to create such spaces. For this reason, an architect is best if he or she is both an artist and a scientist.

## **2 PROBLEM STATEMENT**

- There has been the old age theoretical question as to which one comes first: form or function.
- Form refers to the shell or cover appearance of a space. Function on the other hand is the practical usability of the various spaces.
- What guides the design of a building? Some architects design the building to function and fit a shell to it while others design the shell and cover artistically then force the functions to fit within.

### **3 DESIGN PROCESS IN EAST AFRICA**

In East Africa generally most of the architectural design work is carried out by architects in the private sector. The government projects are also carried out by private sector architects who are selected after a tendering process.

The architects meet with the clients and after understanding the client needs, develop a brief then goes into the design stage and other subsequent stages after approval and confirmation by the client. This process can be broken down as follows.

#### **Stage1 – APPRAISAL AND DEFINITION OF THE PROJECT (INCEPTION)**

- Receive, appraise and report on the client's requirements with particular regard to site information, planning and statutory requirements.
- Advise the client on the need for the appointment of consultants and procedures to meet his requirements including methods of contracting and on any supplementary service which may be required.
- Confirm in writing the client's instructions to proceed.

#### **Stage 2 – DESIGN CONCEPT (SCHEME DESIGNS)**

- Advised by any consultants appointed, prepare a design showing space provisions, planning relationships, standards of materials intended to be used and standards and suitability of services, in sufficient detail to enable the design to be approved by the client.
- Advise the client on the feasibility of the project as designed, the estimated cost, budget, time schedule and statutory requirements and on supplementary services.
- Confirm in writing the client's instructions to proceed.

#### **Stage 3 – DESIGN DEVELOPMENT AND APPROVALS**

- Incorporate any changes on the design by the client.
- After approval of the design, develop it sufficiently to co-ordinate the work and services of other consultants and specialists who have been appointed.
- Discuss the design with the statutory authorities concerned, and submit for their approval.
- Review the budget and time schedule.
- Confirm in writing the client's instructions to proceed.

#### **Stage 4- DETAILED TECHNICAL DOCUMENTATION**

- Prepare working drawings, specifications and other technical documents necessary for the execution of the project.
- Correlate the work of any consultants in the preparation of the documentation.
- Attend any regular progress review meetings called by the client, the form, frequency and duration of which are to be agreed to and stated in the schedule hereto. Unless otherwise agreed herein, where meetings exceed four hours a month, the excess ranks for charges under supplementary services.
- Confirm in writing the client's instructions to proceed.

#### **Stage 5 – CONTRACT ADMINISTRATION AND SUPERVISION**

- Call for tenders and/or negotiate the building contract where required.
- Advise the client regarding the award of the building contract and the
- Completion of Contract documents.
- Confirm in writing the client's instructions to proceed.
- Prepare the building contract documents and present same for signature by the parties thereto.
- Administer the building contract/s.
- Inspect the works. This form, frequency and duration of meetings and visits related to administering the building contract/s and inspecting the works will vary according to the nature and stage of the construction and the architect should clarify for the client the attention to be provided pursuant thereto, such to be stated in the schedule hereto.
- On completion of the project, provide the client with as-built drawings.

The 5 stages above have their influence on the outcome of the design with the first 3 having the most influence on the process. The paper will discuss some issues that determine whether an architect stresses more on the form or function.

#### ***Factors Influencing Design and Its Outcome***

##### **3.1 Client's Brief**

The resulting design is majorly a result of the client's needs and influence within the process. There are circumstances where the architect is used by the client simply as an advisor and the basic concept will have come from the client. Depending on the level of exposure and influence a client wields, the architect

eventually produces a design which (s)he and the client are happy with. In some circumstances, the architect ends up doing a design which he might not be so convinced with just because the client wants a design done in a particular way.

A client's priority is normally the function of the building. Most clients in E Africa, whether individual or corporate, stress on the function and are less concerned with the aesthetic value, mostly blaming it on cost implications.

### **3.2 Cost**

The amount of funding available for a certain project determines the resulting design. More often than not, designs which stress on form and aesthetics end up being a little costlier than the designs that stress on the functionality. Due to budget limits by the clients, the designers' creativity is limited as the clients are not willing to spend on aesthetic features.

### **3.3 Project Size**

Smaller projects have less opportunity for the designers to exploit their artistic skills and creativity as compared to larger projects.

### **3.4 Time Constraint**

With less time there is less stress on the creativity. This is mainly because designers take a considerable amount of time to exploit their creativity and it keeps developing with time. When proper design procedures are followed A design done over a long period is bound to end up with more creative design as opposed to one done within a short time.

### **3.5 Function**

The function of a building determines whether the designer can do artistic forms and expressions on it. The more formal buildings like government offices are less fancy in terms of exterior design. Schools and hospitals also require less fancy design so as to fit with the function. The less formal buildings like shopping malls normally exploit more fancy designs.

#### 4 CASE STUDIES

On the landscape of Nairobi, some buildings can be seen to stand out for their architectural features. These can be described as artistic landmarks within the city. This city gives an insight into three of the buildings that stand out to the author as architectural masterpieces and still providing logical and well functioning spaces. The buildings studied are all large scale architectural projects according to the East African standards in terms of both cost and size.



*Fig 1: Buildings Forming the Nairobi City Skyline*

##### 4.1 *Kenyatta International Conference Centre*



*Fig 2: The Main Tower  
of the KICC*



*Fig 3: The Auditorium with a  
Form Like the Traditional  
African Hut*

This is one of the most popular buildings in Nairobi. It is a major international conference which stands as a landmark in the middle of Nairobi City. Kenyatta International Conference Centre, was initially designed as a nondescript seven-storey structure meant to house a few Kanu(then ruling political party) offices. When the

architects took it to former President Jomo Kenyatta for approval, he trashed it and sketched another one on his notebook, featuring 28 floors and told them to re-draft the original.

David Mutiso, Kenya's first African architect, was part of the Ministry of Public Works architects who had designed the original seven-storey building, before Norwegian Ckarl Nostvick was called in to help plan the taller version.

### ***Artistic Concept***

The concept behind the conference centre is based upon the African forms of Architecture. The circular form of the African hut features very prominently in the main building which has the offices and the small conference hall on the side. The colours employed by the designers are earth colours used in the traditional African architecture.



*Fig 4 and 5: The Traditional African Hut Form compared to the KICC*

### ***Planning and functionality***

From the master plan one can see the main areas existing in the Kenyatta International conference centre. These can be broadly clustered as the  
Main tower

This is composed of offices, service areas and large the plenary halls at the lower levels. Apart from the main function of hosting international conferences, meetings and exhibitions, the complex serves as an office block. The offices are located on the main tower.

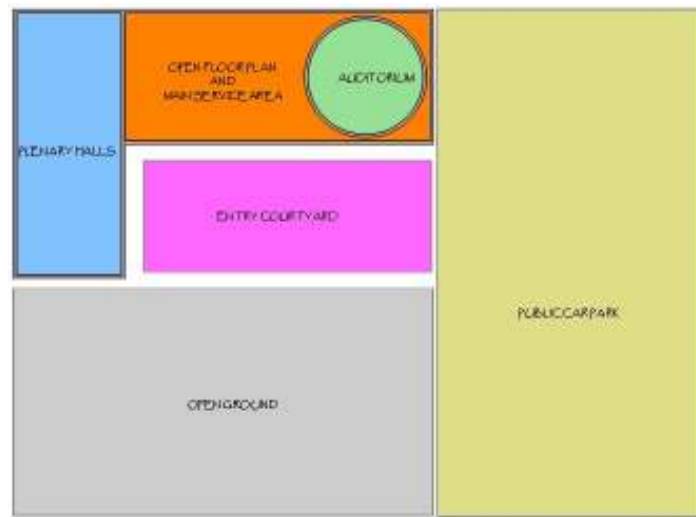
Auditoria

These are used for smaller meetings and round table kind of conferences.



### External spaces

This refers to the exterior spaces found in the centre. This space serves so many functions apart from the aesthetic qualities it accords the centres. Many social events in Nairobi like musical concerts, marathon start and finish points among others are held in this courtyard. There exists a large space which is normally utilised as a public car park.



*Fig 6: A Representative Plan of the KICC*

### 4.2 Lilian Towers

Lilian Towers is a building that is located in the centre of Nairobi City and is best known to house one of the prestigious hotels in the country.



*Fig 7 and 8: Comparison between Lilian Towers and the Original Concept, a*

### **Artistic Concept**

The building's architectural form is very symbolic and looked at closely can be seen to have derived from a maize cob. The bulging that can be seen on the exterior articulates the maize grains on a cob. The external finish is also white in colour and can be seen to mimic the breeds of maize that can be found in Kenya and larger East Africa.

### **Planning and functionality**

The hotel rooms are centered around an internal space within the building. The hotel rooms have windows on the exterior of the building and therefore accords wonderful views looking out towards the rest of the city.

### **4.3 Nation centre**

The building belongs to one of the most prominent media houses in Kenya, the Nation Media group. It stands at a very strategic position and its front elevation can be appreciated from a distance along Banda street. The building was designed in by

#### **Concept**

The clear concept that can be seen from the elevation is an African face mask with two eyes depicted by conspicuously large windows. The red antenna at the front which is majorly a decorative element depicts the nose. The alternating white and grey colours on the major façade further articulates the symbolic mask.

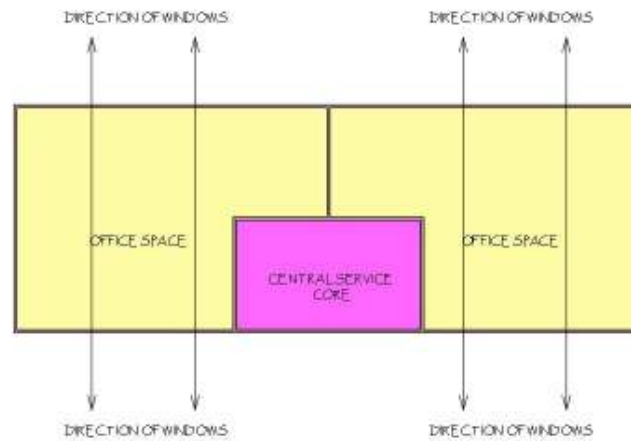


*Fig 9 and 10: The Nation Centre*

### **Planning and Functionality**

Apart from the owners, Nation media group, the building houses a number of offices and most notably, the Nairobi Stock Exchange offices is in this building. The media group has its newspaper offices, the radio and television station on this building.

The planning is typical of most office blocks in Nairobi. There is a centrally located service core with staircase, lifts and toilets and two large wings housing the main facilities like offices, and the television and radio studios.



*Fig 11: A Representative Plan of the Nation Centre*

## **5 CONCLUSION**

From the 3 case studies above, there is possibility of achieving a very artistic form while still providing functional spaces within the buildings. The buildings studied function pretty well and can be considered among the more functional buildings within the city while still giving Nairobi city the much desired aesthetic beauty. The two factors namely function and form need to be considered hand in hand and cannot be seen to compete against each other.

It can be seen that the resulting design is greatly determined by the process of design followed. A systematic design process as described above is good for the final product as it allows constant communication with clients and an assessment of the process.

The more informed clients appreciate both form and function of a building. Architects need to take control of the design process and act as professional advisors to the clients. This means that their professional input needs to be seen in the final design and implementation of a building project.

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## **SUSTAINABLE DEVELOPMENT: DIVERGENCES AND COMPLEXITIES IN INTERPRETATION**

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**ABSTRACT:** Unprecedented complexities in confronting economy, society and environment in addition to myriad of systematic dysfunctions resulted in UN sponsored World Commission of Environmental Development (WCED) led by former Norwegian Prime Minister Brundtland in 1987. Its report, *Our Common Future*; is a well known mile stone in history of eco-friendly thinking since it has a significant effect on sources exploitation, decision making and governance while reinvigorates local and ethnical approaches. Shedding light on future of human and his life on the earth, implications of WCED was legitimating through extensive initiatives taken after 1987 successively. To enhance and develop the WCED achievements, series of them ensued then namely Rio declaration (1992), agenda 21 which followed by local agenda 21 and Habitat (1996). These initiatives were launched to implement diverse facets of sustainability while mostly relied on the definition delivered by Brundtland. Despite of widespread concurrence with that definition, a large number of scholars challenge comprehensiveness of definition and strive to fill its gaps to prevent misleading and ill interpretation. Even several go further and propose definitions based on holism and sophistication.

This paper reviews sustainable development concepts and definitions in historical and contemporary context. It discusses on flaws of Brundtland definition and delves into remedial attempts to tackle the issue.

**Keywords:** sustainable development, precursors' and contemporaries' definitions, Brundtland report, epistemological and normative approaches, and UN initiatives.

### **1. INTRODUCTION**

'Sustainable Development' is part of our common lives every day utilised more and more by people (Loomis, 2000) in different ways (Kelly, 1998). Our flourishing approaches to utilize the term have resulted in wide spectrum of definitions and interpretations based on what we perceive by it. These assumptions directly affect decision making, political legislation, governing and even implementing its results. It is of great importance since globe is overloaded by issues such as fragile economic growth, social catastrophes and environmental hazards, all associated with uncertainty in entire aspects of life. 'Sustainable Development' definition, however, does not a concrete answer to all afore mentioned apprehensions, but may shed light on our methods coping with periphery. Notwithstanding divergences, the term was legally introduced in WCED, 1987, but can be studied via diverse stances that profoundly provide a basis to understand gist of the term and hinders ill conceiving. Therefore, WCED as a mile stone stands in the middle of the term history while all related events and discussions encircle it.

## **2. HISTORICAL BACKGROUNDS**

Due to the main ambition of sustainable development to embody holistic views of objectives, study on historical backgrounds of it cannot simply lie on a single view but through diverse angles.

### **2.1. Economy drivers:**

In contemporary era, Rostow's *the stage of economic Growth* (Rostow, 1971) and Kuznet's *Modern Economic Growth* (Kuznet, 1966) are among of economist who discussed about economy and development while Malthus the first precursor who pointed out that growth rate is limited as a reason of resources scarcity (Oser, 1975). He showed that with passing time and exploitation of resources due to increase of population, limitation will hinder growth.

Today, two school of thought argues the sustainable economic development via environmental thinking, first strongly insists on maintain and conservation of existing natural source and second one in contrast with the first, draws on the issue with dependency on "long-term non-declining per capita utility" (Bithas, 2008).

### **2.2. Social beliefs:**

Beliefs in historical context can be classified under religious credence. Religion plays a crucial role in our learning, while its teaching determines barriers of our behaviour in deal with our surroundings. How our particular beliefs affect our environs is discussed in the book '*This Sacred Earth*' (Gottlieb, 1996). He concludes that religion has a dual effect on environment which cannot be simplified as an agent of environmental degradation or unmixed repositories, but has been both simultaneously. For instance, old Hawaiian believed that entire world is living in the same as human and so there was close parallel with them (Dudley, 1996) while old Africans saw the world infinite without limits and both visible and invisible in form of major and minor rhythms which man is in centre of that but still the friend and beneficiary (Mbiti, 1996).

Definitely, constructing today's notions on basis of this tenets if is not wrong, at least is not sufficient because of emerging new issues in

environment and economy which is explicitly the result of advanced technology. Nevertheless, the most addressable precept of those religions is compatibility in idea of living in harmony with the nature as the one of fundamentals in concept of sustainable development. In modern time, however, severe forms of sustainability concept do not allow substitution of resources as emphasized in 1972 by A. Naess, a Norwegian philosopher, who was believed in minimizing of consumption (Weddell, 2002) (Naess, 2005), although softer approaches allows compensation of resources by another (Barbier, 1987). These views are fitted in school of thoughts which is come in very previous section.

### **2.3. Political perspectives:**

Sustainable development includes multitudes of people from employees to employers and from civil servants to politicians (Priemus, 1999). According to Voinov (Voinov, 2008), sustainability is now a more political issue than a scientific concept. Taking into account that accentuation of term 'sustainable development' is a development rather than sustainability; which should be amended to 'developing sustainability' (M.M'Gonigle, 2003) that means to establish an institution shift from economy to ethics (Robertson, 2001) because the point of economic transaction of business is usefulness for improvement not sustainability (Andrew H.T. Fergus, 2005); in some extents this concept is a new instrument for Western countries to how best modernise the former colonies (Cecile M. Bensimon, 2006). This is the reason that Roszak (T.Roszak, 1989) admires Schumacher who refutes advanced technologies that give a rise to depletion of sources and taken place far away of human spirit and hence, eventually cause to failure of such economic uncaring of non-economic factors in process of decision making (Schumacher, 1989). Therefore, immediate precursor to concept of sustainable development is appropriate technology and pressing social needs (Mebratu, 1998) without just stressing on growth and not emulating the Western economy as the best model.

## **3. IDEOLOGICAL CONTEXT**



Via other perspective, worldviews informing development can be debates as mechanistic and systematic worldviews based on North/West philosophical heritage and South/East philosophical heritage respectively (Plessis, 2000):

### 3.1. Mechanistic worldview:

Drawing on doctrine of Rationalism and Empiricism, the view sees the world and human separately but still human is part of it but the world serves to human. World is as a machine, while human position is above the nature in terms of ecology. So he can rule it and has right to exploit it.

### 3.2. Systematic worldview:

Drawing on ideas of holism and communalism, the view sees the world and human together. World as an organism consists of subsystems within subsystems, which in addition with humankind is greater than sum of its part. So he is part of that without power of ruling, however he can influence it, but also he maybe being influenced by it.

### 3.3. Comparison between worldview:

Mechanistic and systematic worldviews have differences which major of them are shown in table1. These differences can be observed via different lenses:

*Table1. Differences between mechanistic and systematic worldviews based on Plessis.*

	<b>Mechanistic</b>	<b>Systematic</b>
<b>Heir</b>	North/West philosophy	South/East philosophy
<b>Doctrine/ Idea</b>	Rationalism and Empiricism	holism and communalism
<b>Tools</b>	Observation, measurement and rational analysis	Intuition, participation and adaptability
<b>Framework</b>	Linear casual	Cyclical casual
<b>World</b>	As a machine	Organism
<b>Human</b>	Separated as a ruler and above	Involved as a part and within

<b>Sociology</b>	Individual good	Communal good
<b>Ecological term</b>	Anthropocentric	Eco-centric
<b>Paramount objective</b>	Fittest individual survives	Community survives
<b>Social status based on</b>	Individual success	Group success
<b>Orientation</b>	Goal- oriented	Process-oriented
<b>Development perspective</b>	Increasing growth	Continuous improvement
<b>Emphasis on</b>	Quantities and formula	Quality and pattern

Mechanistic views result in questions such as 'how much/how long we can use' and 'how we should measure it' whilst in systematic views one may confront with instructions such as 'as little/long as possible' and 'continually' (Plessis, 2000).

In conjunction with above theories, three other tenets are distinguished (Pepper, 1993):

- a. Eco-feminism: referring to feminism movement, its theoretical positions rest on assumption of correlation between nature-women domination.
- b. Eco-socialism: a manifestation of ecologically crisis as inherent crisis of capitalist system which can be overcome by ecologically oriented socialist development.
- c. Eco-theology: based on mankind ignorant of wealth within ecologically material in religious traditions.

Other studies are tended to see the term via two so-called paradigms: strong sustainability and weak sustainability (Neumayer, Global Warming: Discounting is not the Issue, but Sustainability is, 1999):

Weak sustainability: in weak sustainability preservation of value of total aggregate stock of capital is necessary.

Strong sustainability: is preservation of natural capital stock itself (Neumayer, Weak Versus Strong Sustainability, 1999).

#### 4. GLOBE CONCERNS BEFORE WCED

Use of word 'sustainable' can be traced to at least 600 years ago which was in relation with nature and sustainable life, in conjunction with some wonderful

landscapes in Shiraz and Esphahan; in Iran; demonstrate a “deep-rooted feeling linkage between surrounding Nature and Muslims” (Jefferson, 2006). The term’s concept, also, can contemporarily back to 60’s and 70’s when a conscious group of citizens congregated in a club which later known as Club of Rome, discussed global environmental crisis and published the results in a book known as “Limits to Growth” (Donella H. Meadows, 1972). International attention emerged as a result of UN (United Nations) attempts in 1972 by UN Conference on the Human Environment while the corner stone laid by World Conservation Strategy (1980) of the International Union for Conservation of Nature and Natural Resources (IUCN). The term ‘sustainable development’ did not appear in the text of IUCN but according to Khosla, concept of sustainability was certainly highlighted with strategy’s subtitle of IUCN, “Living resource Conservation for Sustainable Development” which was working closely with UNEP (United Nation Environment Programme) (Khosla, 1995).

Reviewing the literature of sustainable development and influence of WCED, Riggs found 72 definitions for development which are replaced for former term including ‘progress’ and ‘evolution’ (Riggs, 1984).

## **5. WCED LAND MARK**

In 1987, World Commission of Environment and Development report, *Our Common Future*, established the term ‘sustainable development’ in public minds via stressing on strong relation between economic development and sustainable environment now and future. It was led by former Norwegian Prime Minister Gro Brundtland, hence the report is well celebrated as Brundtland report. The report defines the term as:

*“meet the needs of the present without compromising the ability of future generations to meet their own needs”* (WCED, 1987).

This definition is the most well-known definition of sustainable development amid institutions and people (Mauerhofer, 2008). Newman argue that the definition is purposefully set with ambiguity till provokes others to work on its concept, a manipulating leading toward profoundly understanding of concept (Newman, 2006).

## **6. VERY POST WCED INITIATIVE**

After *Our Common Future* in 1987, United Nation inaugurated several initiatives in line with goals and concerns of WCED including conferences and publications in world-scale. But the best known of them was Rio declare which has a major effect on popularization of term sustainable development among people of world (Meg Holden, 2008).

In 1992, Earth summit was a climax of UN process to introduce the achievements of WCED to all its members, which even was even unprecedented in both size and scope of concerns with theme of environment and sustainable development and 172 participants, 108 head of state or government (Earth Summit, 1997). It immensely evolves world leaders' attention to importance and legislation of sustainable development (Barber, 2005). It leads sustainable development in global agenda (Annan, 2002).

## 7. DEFINITIONS

Almost of all scholars are agreed on the point that there is not precise definition on sustainable development (Alexey Voinov, 2007) however yet, the Brundtland definition is commonly concurred as not an acceptance but general agreement on concept . The vagueness of definition perhaps was a “good political strategy” in 1987 but since then, “no longer a basis for consensus, but a breeding ground for disagreement” (Daly, 1996). The problem with a largely undefined term is that however may pin his/her definition to the term and “win a large political battle for future’ (Mebratu, 1998), and the term as a cliché like a “plastic word” can means anything that may results of people agreement upon nothing (Mitcham, 1995). Furthermore, it prompts dichotomy between intellectuals, whereas some argued that it cannot be precisely defined (Prezzy, 1989) (D.W. Pearce, 1993) (Costanza, 1991) in contrast of those who still endeavour to adequately define it inter alia:

Costanza's and Patten's definition lies on basic idea of sustainability: ‘a sustainable system in one which survives or persists’ and add: “A system is sustainable if and only if it persists in nominal behaviour states as long as or longer than its expected natural longevity or existence time; and neither component- nor system-level sustainability as assessed by the longevity criterion, confers sustainability to the other level” (Robert Costanza, 1995).

Without strating forward definition, Graaf et.al. merge two definitions one formal but not operational and the other procedural but not with guarantee for sustainability: “sustainable development is a development of a socio-environmental system with a high potential for continuity” because it is kept within economic, social, cultural, ecological and physical constrains” (H.J. de Graaf, 1996).

Mestrum with emphasising on that which sustainability needs a broader meaning, discloses employing the term by some international institution, particularly World Bank, may cause ambiguity and agitation in situation, even if they are totally agree with the Brundtland report as official accepted definition (Mestrum, 2003).

Scott’s definition comes with: “sustainable development improves lifestyles- by bringing cultural and economic growth embedded within environmental gentility- without jeopardizing the ability of future generation to live even better (Scott, 2004)”.

## 8. INTERPRETATIONS

Once somebody attempts to adequately define the term ‘sustainable development’, definitely will confront lots of inherent problems with the matter of comprehensiveness. So approaches vary due to the stance of definer because in some extents it carries different meaning for different people (Guler Aras, 2008). *World Conservation Strategy* (section1, paragraph 3) defines development as “modification of biosphere and the application of human, financial, living and non-living resources to satisfy human needs and to improve the quality of human life” (World Conservation Strategy: Living Resource Conservation of nature and Natural Development, 1980) which implicitly stresses on pattern of consumption which profoundly affect resources and energy profile of economy growth (Frans Berkhout, 2008). Concept of sustainability among the scholars is even more controversial. Purists’ believe is adhered to nothing than stasis and often imply development in a sustainable manner (Stuart L. Hart, 2003), while Guler and Crowther (Guler Aras, 2008) argues that development is neither a necessary nor desirable aspect of sustainability.

In both ways of theoretical and practical components, a greater description and discrimination would not solve the conceptual ambiguity of 'sustainable development' because of heterogeneity of the perceptions of reality based on fallacious dilemma of two opposed though systems (L.A.R.Osorio, 2005)

## **9. OUTCOME**

Divergences and complexities in interpretation of term 'Sustainable Development' is debated. Study indicates that despite of lately introducing the term in 1987, the term benefits a history as long as human's history and has been considered as an incessant concern along his maturity within either facet of the life and advancement. 'Sustainable Development' has not been precisely addressed until 1987 but has been acknowledged in some degrees, particularly in those areas or times that he was more dependent to nature or certain types of sources like water or land. Due to its points of view in his surrounding and level of his discernment about himself, his insight and perception regarding the term has been changed. By passing time and attaining more sophisticated cognition on phenomena's reason, he initiated manipulating the nature for more and better exploitation which in parallel led to developing concerns in same contexts regarding the sustainability by evolving from moralities into physical matters. Anxiety of 'Sustainable Development' always has been composed of minority and micro-organism with a holistic view to majority and macro-organism; hence its definition must encompass all these and denotes its integrations otherwise it fails in its mission. Delivering a single definition for 'Sustainable Development' is a vain attempt since the term has been made up of concept of diversity and its comprehensiveness would be a pose for questions raised. Human experience to cope with such problems in terms of definitions signifies that the apt solution is adopting notions and accepting it as a principle or fundamental concept. For instance, one may refer to the history of geometry as one of the old branches of knowledge, which instead of endeavouring to define 'point'; it was accepted as a fundamental.

Furthermore, the Brundtland definition should deem just as a concept for main idea of 'Sustainable Development' with no more effort to define it again, however a true and inclusive understanding of the term necessitates

literatures in history, conceptions, notions and viewpoints which shape interpretations.

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<sup>1</sup> World Health Organization

<sup>1</sup> Good Manufacturing Practices

<sup>1</sup> In treatment productions complex, that part including the virus and bacteria vaccines, treatment serums, and antigens are called the biologic productions for the type of production. In the production of such products, alive and half- alive viruses and bacteria are used in the preliminary stages and up to the end of the production process sometimes.

<sup>1</sup> Bio Safety Level

<sup>1</sup> critical zone, may include the distinguished air class or the fully sterilized conditions. Temperature, light, humidity, and other environmental factors should be at a determined and defined level. Obviously, the input and output method of materials, personnel and equipment has weal models. In addition, other physical and structural factors such as the final materials, doors, and windows should have correct specifications.

<sup>1</sup> Reference: Zareh Shahneh, Abolghasem (2006), "Designing the Cleaning Room", 1<sup>st</sup> Edition, Tehran, Farhange Eslami Press.

<sup>1</sup> The transferable pollutions include the contaminations caused by the humankind, air and material contamination. The human factor is a main source for pollution. Particles are excluded from the mouth and nose of people and yet the physical movements of the humankind general particles. The more is such movements the higher will be the generated particles. If the air is not cooled, it will carry the contaminated particles with itself. The next contamination factor is the consumed materials in laboratories. In case of contamination the origin of which is the space itself, we may introduce the laboratory equipment and tools. In this kind of spaces, we should avoid creation of surfaces, because surfaces absorb contaminations.

<sup>1</sup> Air Lock Room is a space that functions as a device for establishing relation between the spaces with different classes or different air quality and is designed for this purpose.

<sup>1</sup> For instance, this matter may have impact on the selection of the sticking and air lock materials of the final work or materials used for sitting and air tightening the air filters.

## **ASSESSMENT OF RECREATIONAL PATTERN OF STUDENTS IN HIGHER INSTITUTIONS OF ONDO AND EKITI STATES, NIGERIA.**

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### **ABSTRACT**

Recreation is very vital for all categories of persons in the society no matter the age, social or economic status considering the stress placed upon each individual in order to make ends meet and the resultant hazard on individuals. The assumption is that Nigerian students are too encumbered with heavy academic burden such that they are too busy to recreate. This paper focuses on the recreational pattern of students in institutions of higher learning in two contiguous south-western states in Nigeria, namely Ondo and Ekiti. In particular, the study looked into the adequacy of facilities available in the institutions, the frequency of students' participation in recreation and factors inhibiting their participation in recreational activities. In addition, students' preference for the different forms of indoor and outdoor recreational activities and the propensity to pay for the use of recreational facilities were investigated. Fifty questionnaire copies were administered on randomly sampled students from each of the six institutions of higher learning in both states. A total of three hundred questionnaire copies were thus administered. It was discovered among other things that more students gyrate by going to parties rather than night clubs while (as a big surprise) the greatest number of students see their academic work as posing very little hindrance to their recreation and more than two-third will be willing to pay for the use of recreational facilities provided on campus if the need arises.

**Keywords:** Outdoor recreation. Indoor recreation. Students. Participation in Recreation.

### **1. INTRODUCTION**

All categories of people need recreation. Students need to recreate for almost same reasons as other individuals. Despite the tight academic schedule of students, it is very important to find time to rebuild mentally and physically in order to be equipped for another round of academic work. The cliché that "all work and no play makes Jack a dull boy" may be applicable here. School authorities have thereby made it a point of duty to provide facilities for students' recreation on campus.

Recreation comes in various forms which could involve both outdoor and indoor games. Except at the level of tourism, which involves major time and

financial outlay, recreation can be embarked upon by all categories of people at any free time. Recreational activities range from playing common table games to watching movies; from reading for fun to visiting resorts or clubs. At times, recreation involves an expression of talents and interests or hobby pursuits of man. No matter that which is involved, it causes a refreshing to the individual. Some students have also found recreation to be a supplement for their social life on campus and a means for character formation (University of Louisville, 2005).

At times, students engage in organised competitive games. In Nigeria, the Nigerian University Games (NUGA) and Nigerian Polytechnic Games (NIPOGA) are avenues for students to engage in such games, though the goals of such games are for students to find an avenue to interact and to develop future sports stars. There are other organised games which the students engage in such as the chess competition organised by various bodies.

The need to assess students involvement in recreational activities cannot be overemphasised in the light of the workload associated with the school course curriculum in virtually every course of study in Nigerian universities. This is not to mention other numerous benefits associated with recreation.

Consequently, this paper focuses on students' recreational pattern in colleges of education, polytechnics and universities in two south-western states of Nigeria. It highlights their form of recreation on campus during the semester, their level of association with the various facilities available on their campuses and the use of such facilities. Also, the functionality or efficiency of the available facilities is judged from the students' perspective and their propensity to pay for the use of some recreational facilities if the need arises is determined among other things.

## **2. REVIEW OF LITERARY WORKS**

Recreation has several benefits attached to it. Observations and researches have revealed that a wide range of benefits which cut across diverse geographical, cultural and age divisions do exist. This is based on the various needs and interests of these various groups. This is not to mention the

religious limitations on a range of sports or recreational activities which some groups could engage in. In certain quarters, benefits of recreation have been categorised into individual, household and communal benefits (Harper, Neider and Godbey, 1997). In any case, availability of recreational facilities at different places also determines the access to such benefits that could be drawn from recreation.

The government spends on the development and maintenance of local recreational facilities as a way of investing in the environment while the people (both residents and visitors) pay to use those facilities to give back to the macro-economy of the region and the country at large (Philip Gray and Associates, 2001). As a matter of fact, certain forms of recreation such as walking for exercise or jogging do not require monetary expenditure but those that require facilities also attract some payment for their use.

The involvement of youths in recreational activities is believed in some quarters to be an antidote to juvenile delinquency. This may not be far from the assumption that organised sports build character in the hands of trainers who emphasize discipline and good character. It is another way of saying that recreation helps to keep idle hands which could have been the 'devil's workshop' busy in the face of lack of employment or qualification for one. As recreation addresses the issue of idle hands, one of its benefits is to relieve 'stress-full hands' of hectic activities and bring a refreshing and renewal to both body and soul.

At times interesting and uncommon benefits are associated with certain groups in the society. Among students, such benefits as improvement of time management skills and retention impact may not come as a surprise though may sound strange in certain quarters. However, it has been found that students' involvement in both informal regular workout and structural intramural sports programme have made them to fix practice and games times which consequently influence disciplined allotment of time for other activities including their academic work throughout the semester. Also, it is a fact that a wide range of facilities and recreational activities on some campuses creates a world of difference between what the students were able to enjoy before campus life and their present experience. This gives them the desire to want

to stay for as long as legally possible on such campuses and also favours their academic performance among other benefits (University of Louisville, *op. cit*).

Other benefits enjoyed by campus students include the fact that recreation acts as part of the learning experience especially for those in physical and health education and also helps to associate with persons from different backgrounds. In order to complement government's efforts, diverse youth organisations provide facilities for youth development even outside the campus community. In county Kilkenny, Northern Ireland, such organisations include youth clubs and centres, debate clubs, drama clubs, sports clubs, scouts and guide among others (NGM Limited, 2002). Additionally, Oyeyinka and Fadamiro (2006) in their study of available open spaces and recreational facilities for children and youths in high density, low-income *Arowomole* and low density, medium/high income *Bodija* residential neighbourhoods of Ogbomoso and Ibadan respectively (in Nigeria) found that available open spaces generally improved social relationships and educational standards and also enhanced physical development among children and youths.

In the larger world, under the auspices of tourism, well developed recreational environment will help to achieve regeneration of urban and rural areas, provide a catalyst for growth in an area by raising its profile and stabilising out-migration. It will also provide opportunities for retraining for the resident workforce and help to diversify over-specialised economies (Department for Communities and Local Government, 2006).

The issue of needs assessment cannot be overlooked in the process of providing facilities for campus recreation. From time to time, based on the perceived and measured demand for facilities, proper needs assessment will always point the direction to follow in terms of which and what quantity of facilities to provide both for the general public and the campus environment. Based on the recommendations of Monteith Brown Planning Consultants in her report titled "Needs Assessment Studies for Outdoor Recreational Opportunities" the Waterloo City Council supported the provision of sports field on the University of Waterloo north campus as earlier recommended by her earlier staff report (Anderson, 2007).

Recreation will continue to be part and parcel of human existence. The benefits are inexhaustive. Benefits change from time to time as man passes

different phases of his life. His recreational needs as child changes as he becomes a teenager and also becomes different as he grows into adulthood and becomes a worker with his own family. Later on in life when old age begins to set in, his recreational needs become a totally different “kettle of fish”. This paper looks into the recreational lifestyle of campus students within the study area.

### **3. MATERIALS AND METHODS**

#### **3.1 Participants**

A total of three hundred (300) Students from six (6) institutions of higher learning were targeted to elicit information for this research. Equal number of fifty (50) students were selected from each institution. Three (3) institutions were selected from each of Ondo and Ekiti states. The three institutions from each of the two states were a combination of a university, a polytechnic and a college of education. The institutions are listed below:

1. Federal University of Technology, Akure, Ondo State.
2. Rufus Giwa Polytechnic, Owo, Ondo State.
3. Adeyemi College of Education, Ondo, Ondo State.
4. University of Ado-Ekiti, Ado-Ekiti, Ekiti State.
5. Federal Polytechnic, Ado-Ekiti, Ekiti State.
6. College of Education, Ikere-Ekiti, Ekiti State.

#### **3.2 Instrumentation**

A multiple-choice questionnaire which was validated by professionals was employed in the gathering of data. A total of 300 copies of the questionnaire were administered while 299 copies of the questionnaire were retrieved. This represents 99.67% return rate.

#### **3.3 Procedure**

Forty-one undergraduate students of the department of Urban and Regional Planning from the Federal University of Technology, Akure, Nigeria during the 2007/2008 session were engaged as field assistants to administer the copies of the questionnaire for this research. The questionnaire copies

were administered on a weekend on students who were resident on campus in the various halls of residence of the institutions and retrieved immediately by the field assistants.

### **3.4 Statistical Analysis**

Basic descriptive statistics were involved in the presentation of data collated from the questionnaire to show the relative magnitude of the response for choices in the variables being investigated while inferential statistics using T-test analysis was carried out to determine if there was any significant difference in the students' regularity of involvement in watching movies and watching football which appeared to be the two forms of indoor recreation with the highest frequencies.

## **4. RESULTS AND DISCUSSION**

This section introduces the study area and highlights the major findings of this research. In certain cases, the total number of respondents to questions on particular variables were used in computation in order to have a good sense of judgement with respect to ratio of support for each choice available while in some other cases also, the respondents could possibly select as many choices as are applicable thereby giving rise to figures that could exceed the number of total respondents. In this case, the total frequency of response per choice available is important.

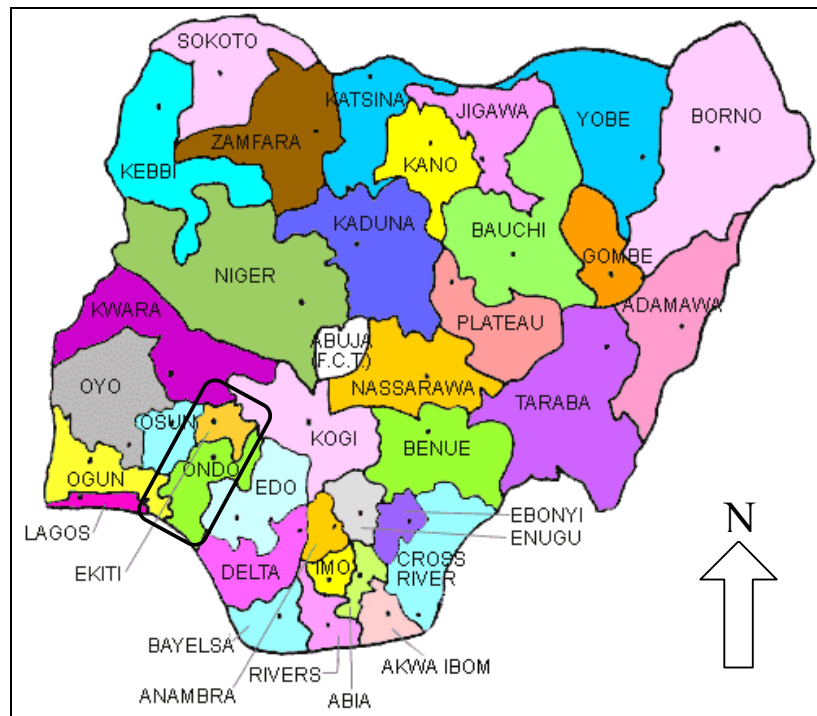
### **4.1 The Study Area**

The study area which is in the south-western part of Nigeria consists of Ondo and Ekiti states which were formerly a single state named Ondo state until the year 1996 when Ekiti state was carved out by the then military government of Nigeria. After the creation of Ekiti state out of the old Ondo state, Akure remained the capital city of Ondo state while Ado-Ekiti became the capital of the new Ekiti state. Ado-Ekiti which is the largest city in Ekiti state had always been privileged with the presence of many facilities and government offices which include two government-owned higher institutions (University of Ado-Ekiti and the Federal Polytechnic, Ado-Ekiti) both of which were included in this study. Akure city also has two government-owned higher



institutions (the Federal University of Technology and Federal College of Agriculture) one of which was included in this study. The third institution selected from Ekiti State is found in Ikere-Ekiti which is about 15kilometres from the state capital, Ado-Ekiti while the other two institutions selected from Ondo State are located in Owo and Ondo towns both of which are about 60 kilometres from Akure, the state capital. The study area is shown on the map below in Figure 1.

**Figure 1:** Map of Nigeria showing the location of Ondo State and Ekiti states.



Source: <http://www.nigeriamasterweb.com/5mbebe/NigeriaStatesMap.gif> retrieved Monday September 8, 2008.

#### 4.2 Students' Characteristics

The number of students whose questionnaire copies were retrieved amounted to a total of 299 as mentioned earlier on. Due to the fact that most of the field assistants were male, it was easier to get access to the male students' halls on the campuses rather than the female students' halls. This influenced the fact that 57.5% of the respondents were male students while 42.5% were female students as shown on Table 1. The levels of the students were collated and the result on Table 2 resulted. It is not a surprise that only 4.1% of the students were in 500-level as only the two universities among the

six institutions investigated could have students at that level. 100 to 400 level students were distributed in the percentage range of 21.0 to 31.0%.

**Table 1:** Sex Distribution of Respondent Students

Sex	Frequency	Percentage (%)
Male	172	57.5
Female	127	42.5
Total	299	100.0

*Source: Authors' Fieldwork, April 2008.*

**Table 2:** Academic Level Distribution of Respondent Students

Academic level	Frequency	Percentage (%)
100	62	20.7
200	90	30.1
300	61	20.4
400	65	21.7
500	12	4.0
Total	290	100.0

*Source: Authors' Fieldwork, April 2008.*

#### 4.3 Students' Participation in Outdoor Recreation

Students were able to acknowledge the provision of facilities for the various outdoor games shown on Table 3 below. Despite the fact that some of these games did not all have their facilities in all the schools, certain games which could have been seen as indoor games (performed in halls) were included in this group as they were practised on open fields with only trainers being provided by the institutions for them. The martial arts belong mainly to this group and the three mentioned by students were Judo, Karate and Kickboxing which attracted a respondent each.

It is also very clear from findings that the highest frequency for students participation time (a total of 258) in the outdoor games while on campus was found to be at occasional periods. This signifies the fact that most students do

not observe a definite time or time interval for their involvement in the various outdoor games identified. Lack of determination to achieve something from the games with the intention to just relax once in a while with the games was likely to be responsible for this attitude of the students. Football attracted the highest frequency for almost all the time of involvement especially at those intervals as daily, once in 2 days and twice a week. This does not come as a surprise with the kind of passion among the students for the game of football.

**Table 3:** Students' Participation in Outdoor Recreation

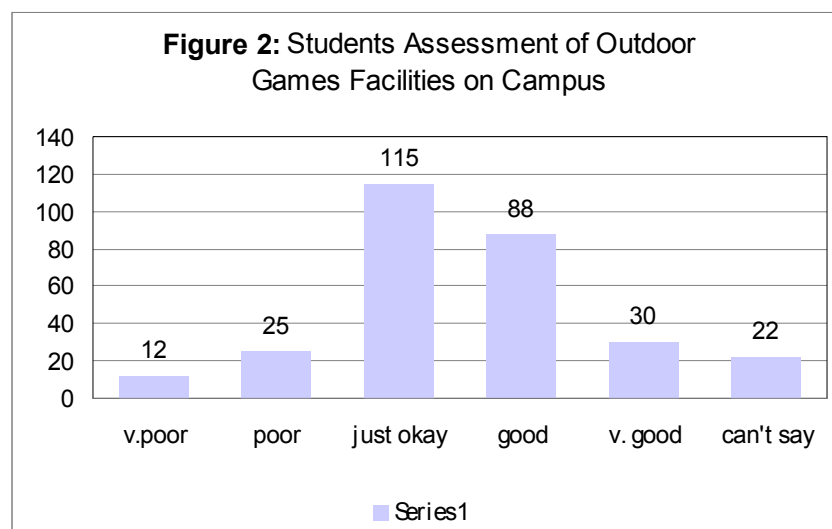
Game Involved in	Daily	Once in 2 days	Twice a week	Once a week	Once in 2 weeks	Once a month	occasionally	Never
Football	73	16	34	20	11	4	70	45
Basketball	32	15	20	25	2	5	49	96
Volleyball	28	3	11	15	4	9	29	126
Handball	24	2	7	18	7	8	26	118
Lawn Tennis	27	4	8	12	2	11	29	104
Badminton	12	3	8	7	4	4	26	130
Table Tennis	26	9	11	7	4	3	29	98
Javelin				1				
Short-put			1					
Weight – Lifting	1							
*Martial arts	1	1	1					
TOTAL	224	53	101	105	34	44	258	717

*Source: Authors' Fieldwork, April 2008.*

#### **4.4 Students' Assessment of Outdoor Recreation Facilities on Campus**

From a range of 20% interval from 0 to 100% (for very poor to very good), the greatest number of students (115 representing 39.5%) felt that the facilities that the authorities of the institutions have provided for outdoor recreation were "just okay" while only 10% felt that the facilities were in very good condition (see Figure 2). This does not speak well of the institutions. Also, it does not encourage or cannot entice the students to recreate and do well academically in the light of the finding in the University of Louisville (*op. cit*) where positive correlation was found between the number of times a student recreates per week and his overall grade point average. The reason is

not far-fetched. When students relax and recreate to refresh mentally and psychologically, their academic performance is likely to be good.



*Source: Authors' Fieldwork, April 2008*

#### **4.5 Students' Participation in Indoor Recreation on Campus**

Table 4 reveals students' involvement in various forms of indoor games during their stay on campus in the semester. The data reveals very interesting findings. It was found that the greatest number of students participate in watching movies and watching football despite the fact that table games dominate the list of games. This is a deviation from the findings of Emmanuel and Olujimi (2008) which reveal that most civil servants play table games as a form of indoor recreation compared with other games or forms of recreation. This reveals variation in recreation interest between workers and students. However, among the table games, Ludo has the highest patronage being a household game in Nigeria.

A closer look also reveals a situation where more people watch football than those who watch movies looking at the frequency of those that indicated for the 2 recreational activities. This is very possible on the premise that the male students who are likely to watch movies and also watch football on a more regular basis are more as respondents than the female students who may not be so much interested in watching football. Also, the greatest frequencies were for *occasional* involvement just like in the case of outdoor

recreation; implying that most students recreate at indefinite times just as situation permits.

**Table 4:** Students' Participation in Indoor Recreation

Game/ Regularity of participation	daily	Once in 2 days	Twice a week	Once a week	Once in 2 weeks	Once a month	occasionally	Total
Monopoly	5	3	3	3	4	3	20	41
Ludo	19	12	17	13	9	12	60	142
Chess	8	9	9	5	7	5	21	64
Scrabble	14	10	6	8	7	7	27	79
Ayo	5	4	9	8	6	1	24	57
Draught	7	6	4	3	5	4	19	48
Card game	14	12	15	13	6	7	34	101
Billiards	3	1	2	3	2	2	15	28
Table Tennis	14	13	20	16	12	5	32	112
Watch movies	61	18	27	16	10	7	38	177
Watch football	50	25	39	34	6	4	68	226
TOTAL	200	113	151	122	74	57	358	1065

*Source: Authors' Fieldwork, April 2008.*

T-test analysis was carried out to compare the students' regularity of 'watching movies' with that of 'watching football' (see Tables 5 and 6). The t-test value of -2.010 was found significant at .046 (while working with 95% confidence level) leading to the rejection of  $H_0$  that "there is no significant difference in the students' regularity for watching movies and that of watching football". Therefore there is a significant difference in the number of times students that students watch movies and football within a given space of time. Looking at specific figures for movies and football on Table 4, the values of higher frequencies for the regularity of visit is hardly skewed towards either of the recreational activities. For movies, the frequencies are higher in three (3) cases while for football, they are higher in four (4) cases. However, there is a greater total frequency of 226 for football which makes the total frequency for movies (177) to fall shorter by 22%.

In conclusion, in addition to the fact that the pair-wise t-test gave a significant difference in "how regular" students participate in these activities, the difference of 22% in frequency of response for these activities is very

important to reckon with considering the fact that this research was conducted across six (6) institutions of different systems.

**Table 5:** Paired Samples statistics for Watching Movies and Football

Pair of indoor recreation forms	Mean	N	Std. Deviation	Standard Error mean
Watching movies	3.39	156	2.313	.185
& Watching football	3.74	156	2.305	.185

Source: Authors' Fieldwork, April 2008.

**Table 6:** Paired Samples Test for Watching Movies and Football

Pair	Paired differences			t	df	Sig.(2-tailed)
	Mean	Std Dev.	Std Error Mean			
Watching movies & Watching football	-0.353	2.190	.175	-2.010	155	.046
at 95% confidence level						

Source: Authors' Fieldwork, April 2008.

#### 4.6 Hindrances to Students' Recreation on Campus

The students identified certain factors as impediments to their recreation on campus at varying degrees for each factor. This information is revealed on Table 7 and Figure 3. The students' response reveal that the greatest number felt that academics posed *very little* hindrance while money, facilities and interest were all of *moderate* hindrance to their recreation on campus. The frequencies affirming this fact are marked on Table 7 below. The Highest frequencies for moderate hindrance with respect to money, facilities and interest were responsible for the highest magnitude pictured on Figure 3 for moderate hindrance for a combination all the hindering factors.

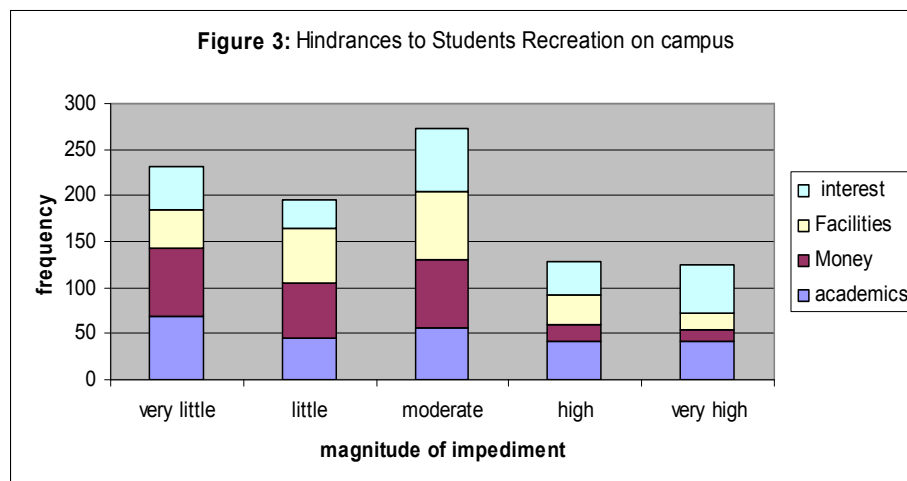
**Table 7:** Hindrances to Students Recreation on Campus

Hindrance level	Academics	Money	Facilities	Interest	Total
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Very little (1-20%)	69*	73	42	48	232
Little (21-40%)	46	58	61	31	196
Moderate (41-60%)	56	74*	75*	67*	272
High (61-80%)	42	17	33	37	129
Very high (81-100%)	42	13	17	52	124
<b>Total</b>					<b>953</b>

Source: Authors' Fieldwork, April 2008

Inferential from this point is the fact that a great number of students have behind their minds a picture of an average or moderate hindrance level of various factors combined. Such that if they actually want to recreate, they could still find time somehow to do and a combination of money, facilities, academics and interest would not pose a *very high* hindrance for their recreation. This agrees with the fact that money, time, academics and interest would not really pose a hindrance to watching movies regularly or watching football occasionally (see frequencies for watching movies daily and watching football occasionally).

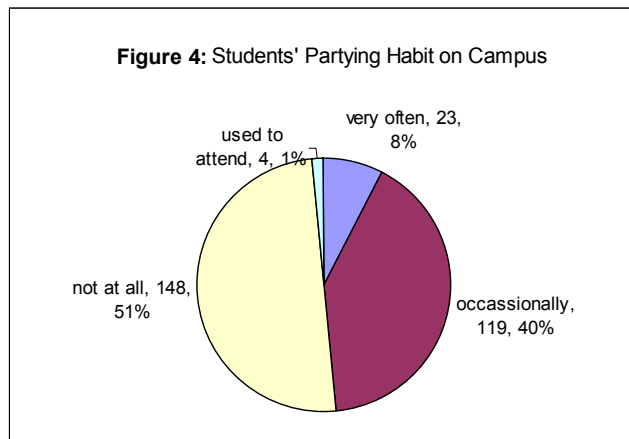


Source: Authors' Fieldwork, April 2008.

#### 4.7 Students' Partying and Clubbing Habit

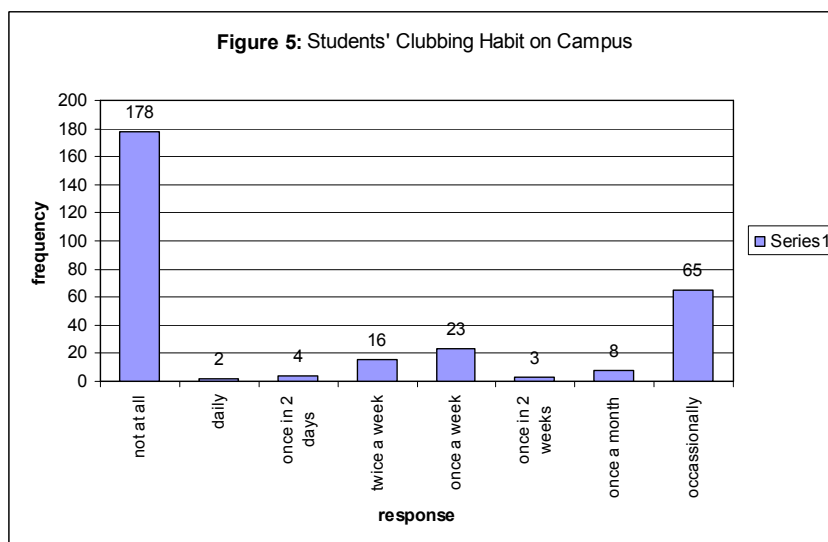
More than half of the students indicated that they do not go to parties at all while on campus while 40% of the students said they attend parties only occasionally. This simply could imply that it is only when the need arises that they go to parties while on campus and not as a habit. Only 8% of the

respondent students make it a habit to go to parties during the semester (see Figure 4).



*Source: Authors' Fieldwork, April 2008*

Similarly, it was found that a very high percentage of students do not go to clubs while on campus. A total of 178 (59%) do not visit clubs while a little over half of the remaining respondents (representing 22% of total) only visit clubs occasionally (see Figure 5). Conclusively, it is clear that most of the students do not go to parties or clubs while a greater percentage of those who do actually do that only when the need arises. In the social environment where most are brought up, such habits as clubbing or unnecessary partying has been viewed by most persons as a sign of irresponsible attitude for any group of people.



*Source: Authors' Fieldwork, April 2008*



#### 4.8 Students' Willingness to Pay for Use of Facilities on Campus

It is also interesting to find out that students will be ready to back up their interest in recreation with their willingness to pay some money in order to have access to good recreational facilities. As revealed on Table 7 below, almost 70% responded positively to this. However, 17.1% could not make up their mind on such decision to pay for using good recreational facilities on campus. This implies that even the private sector participation could be encouraged by authorities of higher institutions to provide facilities that students would need for recreation at a token amount for their use. Since some other services are provided by the private sector on campuses, this will not be a strange approach to allowing students' access to good quality recreational facilities.

**Table 7:** Willingness to Pay for Use of Recreational Facilities on Campus

Willing to pay	Frequency	Percentage
Yes	207	69.2
No	41	13.7
Not sure	51	17.1
Total	299	100.0

*Source: Authors' Fieldwork, April 2008*

## 5. CONCLUSION

From the findings above, it is conclusive to say that students still find time to recreate during the semester and a great number of them even see academic work as posing very little hindrance to their recreation. This is possible because most of them spend time watching football and movies at their convenient time with no financial cost in the various 'common rooms' of halls of residence while the greatest percentage (especially the males) also play football as a form of outdoor recreation. While more than half of the students do not involve in partying or clubbing during the semester, the majority of those that do only do so occasionally and not at regular periods. It is also glaring that many of the students will be willing to pay for the use of good quality recreational facilities on campus if the need arises and when made available. In view of the benefits to the society, the institutions and the students whose social life will improve with sound body and soul as they grow

into adulthood, some recommendations would be necessary in order to improve the status quo.

## **6. RECOMMENDATIONS**

In order to sustain and likely improve the students' recreation habit on campus with the ultimate aim of helping them to maximize the various benefits associated with recreation both for them and the society, the following recommendations are made.

Authorities of higher institutions will need to focus on the provision of good quality facilities for recreation on their campuses. As it could be observed from Figure 2, only 30 of the respondents representing 10.3% actually felt that the facilities on campus are very good. Invitation of private sector participation into the provision of facilities for recreation on campus, in the light of the fact that students will be ready to pay for such, (see Table 7) will favour this recommendation. The entrepreneur with the aim of making profit is bound to ensure that good quality facilities are provided especially in the light of competition and the need to entice the students to patronise. This is also justified in the light of the management skills that are likely to be found in the hands of the private sector.

Additionally, there is need for the ministry of education and sister agencies to encourage students to participate in field games such as javelin and shot-put. The response rate for this is low. The youths are expected to be the age category in the best form for these games. Even those expected to be involved later on in life in international competitive sports are expected to start from the campuses. In this light, the sport ministry should attract students to these games with high value prizes and series of competitions couple with provision of facilities and trainers and tours.

Further reduction in hindrances by money, facilities and interest (which attracted moderate hindrance level) could be facilitated by some of the earlier recommendations. However, the aspect of interest will need more attention. There will be need to introduce a single unit course on recreation in the school system. The single unit is to ensure that the extra load does not put much academic pressure on the students and also to make the students relax and not become desperate in passing the course rather than gaining the benefits

of recreation from the introduction of the course. The course is expected to highly enlighten the students on the benefits of recreation throughout life and to expose them to opportunities at their disposal within and outside school life.

It is necessary to say that students' willingness to pay for the use of recreational facilities (provided by university authorities or the private sector) should be encouraged. This is by charging affordable amounts for the use of such facilities. The contrary could discourage students from patronising such facilities and the purpose will be defeated.

With the implementation of the above recommendations, students' recreation habit on campus will improve and their whole fabric of life will be improved.

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**2<sup>nd</sup> INTERNATIONAL CONFERENCE**  
**ON BUILT ENVIRONMENT IN DEVELOPING COUNTRIES 2008 [ICBED**  
**2008]**

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**Interior Semantics Of The Lobby/Waiting Area In General Hospitals; A  
Preliminary Study**

**Abstract**

Semantics is the study of meaning in communication. The communication interprets in the study is between human and the artefacts in the immediate surrounding. The paper covers the theoretical basis of the study which includes the independent and the dependent variables. It serves as an overview of the literature and theory on the semantics input in the reception/lobby area. The study of perception in the sphere of design is of great interest to interior designers as it can be used to establish relations between the patient's perception and design features. Designers need to understand the end users' needs and requirements in designing for healthcare environment.

Keywords: waiting area, affordances, interior semantics, seating design

**INTRODUCTION**

Semantics in Greeks refers to *semantikos*; significant, to signify; the study of communication, used by the linguists in the interpretation of signs. The word semantics are also used by communities within particular circumstances and contexts. It has related meanings in several other fields. Traditionally, the formal semantic view restricts semantics to its literal meaning, and relegates all figurative associations to pragmatics, but this distinction is increasingly difficult to defend. The degree to which a theorist subscribes to the literal figurative distinction decreases as one moves from the formal semantic, semiotic, pragmatic, to the cognitive semantic traditions.

The word semantic in its modern sense is considered to have first appeared in French as *semantique* in Michel Breal's 1897, *Essai de semantique*. In International Scientific Vocabulary semantics is also called *semasiology*.

According to Alfred Korzybsky's General Semantics, the discipline of semantics is a system for looking at non-immediate or abstract meanings.

Since then the word semantics have been used by product designers to describe the study of the symbolic qualities of product in its social contexts. Product semantics was introduced by Butler and Krippendorf and is defined as the study of symbolic qualities of man-made shapes, in the social context and application in industrial design [Demirbilek, 2003].

In this paper the authors are studying the products in the social context of a particular interior environment. The interior environment which is the focus of the study is the reception/lobby/waiting area of the general hospitals in the northern parts of Peninsula Malaysia. It covers the theoretical basis of the study which includes the independent and the dependent variables. It serves as an overview of the literature and theory on the semantics input in the reception/lobby area. The study of perception in the sphere of design is of great interest to interior designers as it can be used to establish relations between the patient's perception and design features.

## **2.0 THE CONCEPTS OF SEMANTICS AND ITS APPLICATION IN PRODUCT AND INTERIOR DESIGN**

The section is to introduce the concept of the Semantics, its definitions from the views of the attempted to find associations between the physical characteristics of products or interior settings and the observer reaction.

There are many studies on the evaluation of particular aspect of the product or interior settings including for example, observers preferences in the surface finish and touch (Barnes et. al., 2004), relationships between humans and

technology-enhanced spaces and physical objects (Valli, 2006), Emotional Extraction System by Using the Color Combination (Sato, 2005) and to improve the product's ease of use and to promote or negotiate enriched experiences between people (communities) and people.

You[2007] study the application of affordance and semantics in product design. Affordance is one of the semantic dimensions describing operational meanings of objects. He emphasis that affordance could be appropriately denotes as all possible behaviour [form] that confirm what users expected from the objects. Vihma[2003] emphasis that the person-object relationship becomes more interactive by giving the artefact/object a bigger role. The affordance of an object is an example of such interactive role. According to her the position, movement of a particular product or artefact will provokes mental responses and produces impressions, represents and exhibit qualities. In another words users adjust to these affordances to accommodate their needs.

### **3.0 THE METHODOLOGY**

Reviews are made from literature to provide backgrounds and some framework in developing the theory and methodology for the research. The preliminary stage is the study in the context of discovery. The applied methods for data collection at this stage are site visits and observation.

#### **4.0 VARIABLES FOR INTERIOR SEMANTICS / RELEVANCE AND IMPLICATIONS OF SEMANTICS INPUT IN THE RECEPTION/LOBBY AREA**

The research observation took place at the waiting area in the General Hospital in Bukit Mertajam. The area of observation includes the public seating, the counter area, ventilations, floor tiles, plants and the overall arrangements and purpose according to the patients needs. The interior settings in figure 4.1 and 4.2 of the waiting area consist of plastic public seating arranged in the sociofugal arrangements. "Architecture plays an important role in governing our perception and behaviour, including social interactions, within our built environment" (Brebner, 1982, p. 152).

Not only are the interactions within a physical environment determined by the physical setting, but the behaviours and interactions also shape and develop these environments. These behaviour settings provide cues for behaviour and therefore, the physical environment can be seen as a form of nonverbal communication (Rapoport, 1976).

Figure 4.1



Figure 4.2



"The notion that the arrangement of space can influence social support is based on research showing links between environmental factors and social behaviour" (Fleming et al., 1985, p. 328). Each environment consists of a series of behaviour settings. These settings are controlled by aspects of the



environment that support or allow particular behaviours and activities (Al-Homoud, 1996)

## THE SEATINGS



Figure 4.3



Figure 4.4

The figures above showed the typical seating lobby chair and arrangement. The injection moulded plastic chairs are the usual choice in most hospitals waiting and lobby areas. They are chosen due to being the cheaper alternative in the market.

The primary function of a seat is to support body mass against the force of gravity [Bridger, 1995]. In terms of the design outlook the semantic of the waiting chair is quite simple and boring and yet to some extent practical in use. The dark blue colour is a bit toned down and gives a dull look to the waiting area although it is a cool colour which could tune down the worried patients and families. Cool colours brings relaxation, calmness, and assist in reducing blood pressure [Linong, 2006]

Comfort was the last thought in the choice. It was observed that the least waiting time for a patient was 15 minutes and the waiting time could go for 1 hour to 2 hours. Patients would change posture several times to ease the discomfort. The discomfort is resulted from lack of postural variation permitted by a particular design [Bridger, 1995]. The chair certainly does not have any postural variation to reduce discomfort.

Some patients would fold arms or cross their legs in trying to ease the discomfort. Usually after 15 minutes patients start to feel uncomfortable and their reaction is to stand up and walk for a few steps.

When their name are called, the patients seating in the middle row would have some difficulty standing up and walking because they have to walk sideways in front of the other seated patients. Not enough space allowance in between the rows is the problem. The intended affordance is not met. Poor design according to Blumberg and Devlin [2006], can lead to psychological stress which contributed to the feelings of hopelessness, anxiety and frustrations in patients and supportive design of physical features could reduce the stress. The arrangement of the chairs from observation of the users in the waiting area strongly supported their findings.

Another major point in the observation is patient tends to find a seat where there is nobody taken the nearest seat. They would choose an alternate seat. When and only that is the available seat, the seat would then be taken reluctantly. Lawson [1999] attributed the behaviour as a stranger seated next to someone is actually within each other intimate's distance. The seating arrangement is forcing strangers to 'interfere' with another stranger's intimate distant.

## THE COUNTER



Figure 4.5

The transparent window at the counter made of glass is for protecting the hospital clerks from the users or patients. The window is part of the counter compartment as to dealing with the users before given the instruction to be warded. In addition, the transparent quality and the adequate size of the window further offer the users the affordance to “see-through”, which is crucial to the monitoring function. To help the hospital clerks to deal with the customer or patients there are two vertical peep lines functioning for interactions and dealing purposes. The affordance of the peeping line is 160 in centimetres which is too low for some people. Higher people intend to lean and rest their arms on the counter which brings discomfort and stress if the waiting takes a longer time. The design at the top counter is a vertical shaped is a bit off balance from the whole counter outlook. However, this design at the top counter is more decorative than functional.



Figure 4.6



Figure 4.7

The determination of ways the patient handle stress in the waiting area is an important issue. The comfort of the waiting area is not only determined by the conditions of the waiting area, however it is also affected by the impression of

the interior materials. One of the interiors that applied wood into its design is the counter top at the “Unit Hasil and Bilik Daftar Masuk”. In design, it is thought that wood is natural to residents which gives a natural feelings. It is also necessary to give consideration to the active used of wood. It was found that the “natural” image increased when the proportion of wood was higher, and that “closed,” “less tense,” and “dark” image increased when the proportion of wood was increased. Therefore, it was concluded that it was necessary to apply wood in moderation, and to design wood appropriately. According to Broman [2001], preferences for knotty wood, and pointed out that higher lightness and the grain of wood are important, and the vitality of wood surfaces have an effect. Another researcher Ridout et. al. evaluated impressions by the semantic differential (SD) method using projected images of offices in which wood was used for furniture and floors in different proportions. As a result, it was concluded that offices in which more wood was used gave immediate impressions such as “comfort” and “calmness.” Sakuragawa [2006] claimed that wood finishes stimulates geater desire for calmness. His research reveals further that when there is greater proportation of wood finishes, it would induced low desire for activities. On the other hand when there is absent of wood finishes, the ambiance would stimulated greater desires for activities.

## THE FLOOR



Figure 4.8



Figure 4.9

The floor finishes used for the waiting area is the ceramic tiles. The size is 12" by 12".

The main colour for the tiles is lighter shade of brown and some patterns are designed using yellow, brown and light brown. The effect is a pleasing and comfortable feeling without too much of the distraction to the eyes for the people waiting to be seen by the doctors. The texture is smooth but not slippery. People are observed to walk comfortably on the surface. This is in accordance to Akalin-Baskaya and Yildrin [2006] who show that wrong materials choice will harm all the advantages aspects of an interior since interior finishing materials affect the users by their visual, aural and thermal qualities.

## **5.0 PATIENT'S PERCEPTION AND DESIGN FEATURES VARIABLES**

The language of form of the physical features and the space within the waiting area the authors would coin as the interior semantics.

Space is not just a frame or a container but is a tool of thought which individual may give impression to themselves [Halford and Leonard, 2006]. Spaces according to them are physical representation of discursive construction. The current research reveals that furniture and arrangements in the waiting area do give physical representations.

The physical features such as the seating, the seating arrangement, the counter and other features and their relation to human factors plays major part in determining the users' interpretation. The seating clearly afford users' action, they direct and probably limit users' movement. The furniture in the waiting area seems to control the action and leave almost no other alternatives which gives negative interpretation to the users.

How could this negative interpretation be changed to more conducive ones? How could the interaction between users and the interior semantics be change and in what way? A study by Akalin-Baskaya and Yildirim [2006] showed that users had more positive perceptions of the waiting area where the seating were away from the circulation than the waiting area where circulation passed through a space.

The boundary of the waiting area needs to be clearly defined. Vihma [2003] suggests a waiting area should include flexible furniture that can be arranged according to the changing needs.

- Colour [blue chair]
- The arrangement of the chair/benches
- The location
- The counter; the height, the
- The fan, location
- The floor tiles: colour; texture for safety; sizes

## **6.0 CONCLUSION**

The waiting area is a first point entry to users [patients and their companions] in their hospital experience. The physical environment could provide them with welcoming experience or otherwise. Affordances which are the meanings of things for actions in the waiting area do not provide the users with much to be desired. In other words through observation, the interior semantics need some modifications for users' comfort and satisfactions. Designers for the hospital or healthcare environments should plan for the end users' need and requirements.

The next stage of the research would carry more finding and insights to the extent of semantic variables and real suggestions could be made for users' advantage.

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**The Effects of Colours on Preschoolers' Behaviour:**  
**An analysis of Colour-Mood Association on Preschoolers Aged 4 to 6**

**ABSTRACT**

Typically set up learning environments for preschoolers often end up, with just an interior that is only furnished with posters on walls, paste-up decorations, toys, and a typical furniture layout. In reality not much consideration or effort is put into the colour concept in the built environment. We should pay close attention to our children as users of the environment because they are in the process of developing physical, cognitive, social and emotional skills. Their interactions with the built environment can have profound effects on their later development in total. Studies have proven that children learn best when the task is challenging while at the same time maintaining low level pressure. Thus, it is vital to provide a cheerful and inviting environment to sustain the attention of our naturally extrovert preschoolers. Our environment is inevitably dominated by colours that help us to understand our surroundings better. Various studies have supported that colours affect us both psychologically and physiologically. Colours can induce sensory stimulation in our emotional realm and the whole of our being. In many occasions, designers lack the confidence and knowledge on how to apply colour to their built environment. The colourist, with very general understanding and views on colours, applies them into their environment, without much thought of the possible psychological associations. A monochromatic environment is regularly chosen and this has resulted in a mundane experience. The purpose of this study is to find out colour preferences among aged 4 to 6 preschoolers and how they relate each colour-emotion associations with the specifically given characteristics. The subjects of this study will be an estimated total of 150 preschoolers from several preschools located on Penang Island. Spaces in the kindergartens i.e. the classrooms, playroom, art room, and restrooms will be analyzed on how effective the interior colour setting in each room aids the purpose of usage. Naturalistic observation and unstructured interview will be used for preschoolers while structured interview will be applied to education administration staffs and parents.

Keywords: Colour Psychology, Interior Setting, Preschools Environment, Multiple Intelligences.

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**Introduction**

This paper explores the perception of preschoolers on space and colours in preschools on Penang Island. It is known that in 2001, the Ministry of Education (MOE) and other relevant ministries had increased access to preschool education. The review of the Education Act 1996 regulates the provision of preschool, primary and secondary education. The private sector had also complemented the government's effort. In 2002, the Education Act 1996 was amended and the implementation of compulsory education took effect in 2003, making the New National Preschool Curriculum compulsory in all preschool beginning 2003. The Malaysian National Preschool Curriculum (2003) aims to deliver an education for preschool-age children that will strengthen the acquisition of basic skills such as socialization skills and personality development. The basic skills taught at this level are communication, social and other skills (3Rs) in preparation for primary schooling.

Early childhood development programs are also instrumental in preparing the nation's young to participate in nation building. Our nation building policies are the guiding principles to generate our nation into a holistic perspective of intellectual skills and compatible with other nation, thus cognitive and social emotional skill foundation is imperative to ensure life long learning stimulation. Malaysia preschools education centres are implementing their co-curriculum outline based on the nation building policies to instil the life- long learning motivation for our preschoolers before their enrolment into formal education in primary schools.

## Research Background

The Malaysia **National Preschool Curriculum is based on 4 principles:**

(a) Overall & Integrated Self-Development which focuses on the development of individual's potential. Child's potential must be developed in an integrated manner, as each development aspect is influential to each other.

(b) Cheerful Learning which stresses the interest and the motivation to learn instilled through an interesting, comfortable, challenging and happy learning environment. A learning environment that is conducive fosters a spirit of loving knowledge, and later develops the child to be interested in learning with an open mind.

(c) Meaningful learning experience which emphasizes active participation of children in activities so the child can apply learning with daily life experience, to result in effective and meaningful learning.

(d) Life Long Education which requires a continuous effort in acquiring and transferring knowledge, positive values, and skills. Cheerful and meaningful pre-school education experience will foster interest for life long education.

These principles mentioned above highly emphasize on the learning experience which is related to the emotional and cognitive developments of a child. Therefore, this study aims to find out preschoolers' behaviour responses to the built environment from the perspective of multiple intelligences. This is based on Gardner's theories (1999), cited by Smith, Mark K. (Howard Gardner, Multiple intelligences and education), viewed Jan 2008, <<http://www.infed.org/thinkers/gardner.htm>> on cognitive strengths that empower individual learning abilities. This study also provides insight into emotional intelligence and brain based learning concepts, which elevate the ideas of creating a learning environment that is interesting, comfortable, challenging and cheerful.

The purpose of this research is to study the influence of built environment to a child's learning experience. The researcher's choice to analyse the built environment settings of child care facilities and preschools is rooted on the idea that young children spend most of their time in child care facilities and preschools in order to attain foundation skills which are crucial before receiving their formal education in schools. It is essential to build the groundwork for preschoolers during these formative years where their learning experiences will determine their life long learning motivation. It is acknowledged that a schooling experience that is solely dependent on the educators' guidance is not enough to sustain the child's interest. Generally, not much consideration is put into colour design for the interior of a learning environment, a general concept of how children respond to colour was commonly applied through their drawings and wall decorations.

The justification for selecting the preschools centres in Penang Island only for this research study is supported by the following factors;

- The geographic location of the island, which is small yet highly developed in terms of its socio-economy and infrastructures.
- Selected preschools in Georgetown and its surrounding areas are exposed to the same infrastructures and standard of living which provides consistency for the researcher's data.

## Psychology of Colours

Colour and emotional effects is the subject of this research, as may be derived from the problem statement which is, "An Analysis of Colour-Mood Association for Preschoolers". Findings from various researches on colour such as from Frieling, Wohlfarth, and Grangaard (summarized in Mahnke, 1996) have shown that colour has the psychological effects trough

visual experience. From these studies, young children, with their extrovert nature, are claimed to be attracted to warm and bright colours. These studies also showed the architecture of a built environment is significant to provide visual stimulations that also indirectly affect the child, both psychologically and physiologically.

Conclusively, this research hopes to analyse how preschoolers respond to colours. Whether these colours will generate positive or negative emotional responses will always be linked to the relationship between colour and environment. Colour is defined as a form of energy of lights; ranged from different wavelengths and frequencies, this colour range includes all the adjacent hue and for practical purposes forms the basis of a standard twelve-hue colour wheel. The twelve basic hues can be divided into what are termed primaries, secondaries, and tertiaries.

Psychology is the science which deals with the mental process and behaviour and this includes thoughts, feelings and dreams to anything a person experiences. Mahnke, F. H. concludes in his book *"Colour, Environment, and Human Response"* that humans sense colours not only about how we perceive through our eyes but also from a sensation of feeling that arouses our cognitive thought. He stated how humans perceive colours within the six interrelated factors in his "Colour Experience Pyramid".

*We may assume that six basic interrelated factors influence this experience. Using pyramid; (1)Biological Reactions to a Colour Stimulus, (2)Collective Unconscious, (3)Conscious Symbolism, (4)Cultural Influences and Mannerisms, (5)Influence of Trends, Fashion, Styles, (6)Personal Relationship. (Mahnke, Frank H. 1996, p.10)*

Conscious symbolism plays a significant role in various fields, such as advertising, fashion, product and graphic designing, architecture and in our built environment. Colour symbolism have been used to influence how we perceive and interpret our own emotional statement. Mahnke highlighted that each individual has his personal colour preferences and dislikes but to trace the reason behind them is complex, because how we experience colour is influenced by the interrelationship between all the levels of the "Colour Experience Pyramid". Mahnke further pointed out that the Frieling, Pfister, or Luscher psychodiagnostic colour tests can investigate our personal relationship to colour and its significance. (Mahnke, Frank H. 1996, p.18)

The relationship between how important our environment evokes certain mental conscious or emotions that subsequently affect our physical condition are stated by Mahnke who said that designers are responsible to create an environment that will not promote undesirable emotion by having appropriate visual or external stimulation. Mahke further suggested that it is worth to study the subject of emotions and how they are important in psychosomatics. (Mahnke, Frank H. 1996, p.47). Psychosomatic is about the science of mind and body; determines the mind is responsible for physical disorder and vice versa. Mahnke stated;

*Decisions about visual design in our environment should be based on an understanding of aspects of architectural psychology- especially color psychology. (Mahnke, Frank H. 1996, p.49)*

## Multiple Intelligences

The cognitive development of preschoolers has been studied from the perspective of Gardner's theories on Multiple Intelligence that can have profound influence on preschools education approach. This is a teaching pedagogy that elevates individual learning abilities by using the major inborn intelligence and nurtures their minor used intelligences, if proper encouragement, enhancement, and training are given. Gardner pointed out that intelligence consists of eight relatively independent intellectual abilities, namely Linguistic; think in words, Logical-Mathematical; think by reasoning, Spatial; think in images and pictures, Bodily-Kinesthetic; think through somatic sensations, Musical; think via rhythms and melodies, Interpersonal; think by bouncing ideas off other people, Intrapersonal; think deeply inside themselves, and Naturalistic; think via elements of mother nature.

As mentioned earlier, the brain based learning and emotional intelligence that are linked to Gardner's theories are best explained by the interrelationship between emotional,

cognitive and environmental settings. Lackney, J. A. (1998) (12 Design Principles Based on Brain-based Learning Research), viewed Jan 2008, <<http://www.designshare.com/Research/BrainBasedLearn98.htm>>, came out with the list of the brainstormed ideas from participants of a workshop facilitated by Randall Fielding, AIA. The outcome of the workshop enabled participants to start the public dialogue concerning the implications of research on brain-based learning in the design of school environments.

Emotional intelligence is generally defined as the ability to monitor and manipulate one's own or others' emotions. Mayer, Salovey and Caruso (2002) cited by Emmerling, Robert (Mayer-Salovey-Caruso Emotional Intelligence Test), viewed Jan 2008, <<http://www.eiconsortium.org/measures/msceit.html>> describe the followings as emotional branches in one of their publications:

- 1) Emotional perception involves such abilities as identifying facial expression, music and stories.
- 2) Emotional facilitation of thought involves abilities to relate emotions to other mental awareness such as taste and colour and using emotion in reasoning and problem solving.
- 3) Emotional Understanding involves knowing what causes the emotion and what relations they convey.
- 4) Emotional management involves understanding the implications of social behaviour on emotions and control of emotion in self and others.

Study from Stevens and Goldberg (2001) cited by Clemons, Stephanie A., (Brain-Based Learning: Possible Implications for Online Instruction), viewed Jan 2008, <[http://www.itdl.org/Journal/Sep\\_05/article03.htm](http://www.itdl.org/Journal/Sep_05/article03.htm)> also highly give emphasis to emotional and environmental conditions:

- a) Emotions are critical to successful learning,
- b) Multi-sensory input is desired by our brains,
- c) Threat, high anxiety and sense of helplessness impair learning.

Colour preferences by preschoolers are linked to warm, bright colour schemes that complement their extroverted nature. The study by Fehrman (2000, p53), showed that colour preferences by kindergarten children are not limited to only bright primary colours but also a very sophisticated colour palette with an excellent colour balance.

A few recommendations were made by Mahnke regarding colour selection for preschoolers. Mahnke does not agree that the child's need for change in hue, colour intensity and lightness can be fulfilled by pinning drawings, cartoons or cut-out on the wall. He wrote;

*Children of kindergarten ages are majority extroverted by nature. A warm, bright color scheme complements this tendency, thereby reducing tension, nervousness and anxiety. Color may be light salmon. Soft, warm yellow, pale yellow-orange, coral and peach. Colors of opposite temperature should also be introduced as accents. (Mahnke, Frank H. 1996, p.183)*

Birren (1982) also supported that bright colours and warm colours such as soft yellow, coral and peach will have positive effects. He stated that colour is needed not only for aesthetic purpose but more to provide proper emotional outlets. The stimulation of colour is good to the senses and degenerates emotions of fear and apprehension:

*Because visual and emotional interest will proceed outward, the bright, warm color scheme becomes highly appropriate for kindergartens, elementary grades, place for relaxation and diversion. Because virtually all children are born extroverts, the dynamic setting invites an outward release of feelings and emotion – and because of the release, nervousness and tension tend to be dissipated. (Birren, Faber. 1982, p. 81)*

## Methodology

The research undertakes the qualitative approach and it is guided by a few methods. This research approach focuses on the exploration techniques in acquiring data; research begins with a field study which comprises naturalistic observations and field experiments through play and interviews. The objectives are:

- to study the relationship between the environment settings and the emotional behaviour of preschoolers
- to analyse the colour preference by preschoolers on Penang Island
- to justify the colour symbolism that cause positive and negative emotional effects for preschoolers

The research hypothesis is:

- Pre-schoolers prefer more than just bright primary colours i.e. red, blue and yellow, as a wide range of secondary colours that bring positive emotional effects are also within their selection of colour preference.

The subjects for this study are 150 preschoolers aged between four and six, from 5 kindergartens in Penang Island, Malaysia. Selected preschools are from Georgetown and in its close proximity areas. The sampling methods for the selected population of one hundred and fifty preschoolers, who are from the 5 kindergartens in Penang Island, are defined into:

- Selected age groups – aged 4 to 6
- Gender difference

The researcher develops the role as a friend to the preschoolers prior to the field study. This allows the researcher to cultivate trust by providing the subjects with a complete and detailed explanation of the purpose and hypothesis of the research. The researcher introduces herself and explains the research objectives and hypothesis to the preschoolers, and the administrative and academic staff of respective kindergartens. A formal meeting with the administrator is necessary to gain a mutual understanding of the research objectives and procedures. The researcher will then plan a weekly visit to the selected kindergartens to conduct the planned field works. The objective of the pre-observation process is to make the preschoolers familiar with the researcher. The researcher makes no audio or visual recordings of the ongoing behaviour during the class except a diary report which will be assessed outside the classroom. This report will serve as a reference to be compared to the behaviour differences that occur before and during the field observation. Prior to the field observation, interviews with the school administrative staff and teachers will be carried out to gain access into the school management policy. The researcher gets to familiarize with the class schedules and any possibilities of rules and regulations to be adhered to in order not to interfere with the school administration routine.

Field study with naturalistic observation is to determine the relationship between classroom environment settings and the behaviour of preschoolers. Each of the classroom's settings is to be described thoroughly. A video recorder serves as the instrument to record the ongoing naturalistic structure of the class. Each class session lasts about twenty (20) to thirty (30) minutes. Preschoolers are recorded while they are performing their tasks guided by their educators or caretakers in each setting. The researcher's role is to take note of positive and negative emotional behaviour that occurs during each session, a checklist of frequent behaviour is to take note of the frequency of any possible emotional projection. All the emotional expression and body language occurred are to be described without ambiguity. This observation study is to analyse the relationship between the environment settings with the emotional behaviour of preschoolers

A friend role and the gain of trust are cultivated throughout a period of time, after which the researcher is ready to perform the field experiment in a naturalistic class setting. A time slot is requested from the school administrative staff without interference to the respective teacher's teaching schedule. This specific time slot is used by the researcher to perform the proposed field experiment. The objective of this experiment is to measure the level of colour understanding or colour smart among the selected preschoolers. The following task is to discover how preschoolers associate colour with specific emotional experience. Three emotional expressions have been pre-determined namely happy, neutral and sad.

Here, the researcher embarks on the field experiment. With the assistance of the class teacher, the researcher designs a task to be accomplished by the preschoolers. Preschoolers complete a colour associative task to specifically explained characteristic by voting. Instruments used here consist of different coloured chips and three identical boards with the designated character. The preschoolers vote for the colour of their choice after having been informed of the objectives of the voting process. The teacher becomes the medium to convey the subjects of study; story telling of the three different characteristics is to generate possible emotional effect among preschoolers towards each character before they vote. The three characteristics that are designed to induce the emotional effects are happy, neutral and sad.

The researcher gains more understanding about colour association or colour symbolism among preschoolers by conducting unstructured interviews with open ended questions combined with projective techniques. The preschoolers then move into the play phase that indirectly allows for unstructured interviews to take place. The researcher gathers a small group of preschoolers consisting of three (3) to five (5) subjects. Instruments used are video and tape recorders to record the ongoing interview sessions. The researcher illustrates the images of their interior of the preschool centre on a computer screen, followed by inviting them to choose their preferred colour if they wish to repaint the interior of their environment. The researcher then displays to the group of preschoolers the applied colour and further asks for their opinions using open ended questions. Questions asked are aimed to find out how preschoolers associate colour with their surroundings and possible factors which influence their colour choice. The following questions are to be asked during the unstructured interview;

Before the interior projection:

- What is your favourite colour? Why?
- Which colour do you dislike? Why?
- What objects do you think of when you see this colour?
- Do you wish for your room to be painted in this colour? Why?

During the interior projection

- Do you like this colour?
- Which part of the room do you wish to paint with this colour?
- How do you feel when you see this colour?

The researcher makes another effort to gain some insight into the preschoolers' colour preference by conducting a structured interview with the parents and school's administrative staffs. The parents and teachers of the selected preschoolers will be asked with structured questionnaires to fathom further the survey on their children's understanding. The data collected here will be analyzed to verify the degree of colour preference among preschoolers. Information gathered from these interviews will be able to provide additional information that is helpful to justify the colour preferences among the preschoolers.

### **In progress work**

Researcher will carry out a pilot study to test the research hypothesis and research questions before proceeding to the full scale study. Research questions will be tested upon preschoolers whom researcher knows to test the validity of interview questions and methodology. Then, the first preschools centre will be approached to carry out the design structures within a time frame before making the full scale study for the research. Time frame designed for the pilot study estimated to be conducted within 10 weeks; all data are to be collected from the fair amount of 30 preschoolers from aged 4 to 6, their parents and teachers. All the methodology approaches above will be tested upon the selected school. The data collected here will be put into analysis to verify the validity of research objectives.

### **Anticipated outcome**

During the study, researcher gets to access to different cultural and background of preschoolers; different language approach will have to apply to different preschoolers in order



to deliver research subjects clearly. Estimated minority of preschoolers will not give full cooperation where they might be carried away by other possible distractions. In that case, researcher will have to exclude the possible data which are not valid. However, adding the total number of preschoolers from each schools will help to increase the reliability of the study.

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