Child Friendly Interiors
Design Studies
Dry Construction Systems
Energy Saving Measures
Finance Systems in China
Floating Spaces
Urban Aesthetics
Vernacular Housing

In this issue:
The journal of an association of institutes concerned with the quality of built environment. The publishing framework is shaped around the forces which act on the built environment, which maintain, change, and transform it. The content consists of articles which deal with these issues in particular with responsive, self-sustaining and re-useable environments which have the capacity to respond to change, provide user choice and value for money.

To achieve its aims, the OHIA organizes and co-ordinates a number of activities which include the publication of a quarterly journal, and, in the near future, an international seminar and an annual competition. The Association has the more general aim of seeking to improve the quality of built environment through encouraging a greater sharing of decision-making by ordinary people and to help develop the necessary institutional frameworks which will support the local initiatives of people in the building process.

Open House International

The journal of an association of institutes and individuals concerned with housing, design and development in the built environment. Theories, tools and practices with special emphasis on the local scale.

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The Open House International Association (OHIA) aims to communicate, disseminate and exchange housing and planning information. The focus of this exchange is on tools, methods and processes which enable the various professional disciplines to understand the dynamics of housing and so contribute more effectively to it.

Aims

The OHIA organizes and co-ordinates a number of activities which include the publication of a quarterly journal, and, in the near future, an international seminar and an annual competition. The Association has the more general aim of seeking to improve the quality of built environment through encouraging a greater sharing of decision-making by ordinary people and to help develop the necessary institutional frameworks which will support the local initiatives of people in the building process.
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Open House International has been selected for coverage by EBSCO Publishing, the ELSEVIER Bibliographic Database Scopus and all products of THOMSON ISI index bases, SSCI, A&HCI, CC/SS&B and CC/A&H. The journal is also listed on the following Architectural index lists: RIBA, ARCLIB, AVERY and EKISTICS. Open House International is online for subscribers and gives limited access for non-subscribers at www.openhouse-int.com
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TRANSFORMATIONS IN ARCHITECTURE AND URBANISM OF CITIES IN THE GLOBAL SOUTH
Guest Editors: Ashraf M. Salama and David Grierson
University of Strathclyde, Glasgow United Kingdom

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The 40th year of publication of Open House International is now complete. That means one hundred and sixty manuscripts have been published since the journal’s inception forty years ago. To keep standards high we impose strict regulations for writing and we wish to see that there is always a clear and understandable focus to the subject at hand. In the application of this approach approximately seventy five percent of the manuscripts received are rejected each quarter whilst the remaining twenty five percent continue on to the production and final publication stage.

The subjects covered in this issue are Facades, Finance (in China), Design Studios, Interiors, the Urban Square, Architectural Design and Built Heritage.

The annual number of four issues a year is generally split into two. These comprise two theme issues a year each with their own guest editors and two issues are “open” containing a mix of manuscripts and are edited by the editor of the journal.

As an example this particular issue is an “open” issue where the first manuscript is titled the “Dilemma of Representation Through Facades” (see images 1-4 page 7 of this issue.) The sixth manuscript titled “Adaptive Design Language for Anatolian Vernacular Housing” (see image page ? of this issue) These two manuscripts have been selected to show the diversity and range of manuscripts in an “open” issue.

Whilst the “open” issues have a breadth of manuscript subjects, a theme issue has a title to which all manuscripts must address in depth. Details of our writing rules, the length, the style and referencing rules for manuscripts can be obtained from the editor.

Open House International is a Thomson ISI indexed data base and is also covered by EBSCO and ELSEVIER data bases. You may receive the publication on-line or by subscription or both. It costs 225 GBP per year. (On-line only is 70 GBP less)

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THE DILEMMA OF REPRESENTATION THROUGH FACADES.

Duygu Koca

Abstract
The exterior surface of a building -façade- as a communicative ground reflects the burdened meaning of its structure. Besides communicative capacity of façade, its independency, individuality and image dominancy can define exterior surface as an autonomous architectural element in terms of both physical and moral freedom. However, in the twenty-first century, this autonomy has undermined by globalization, technology and communication tools which are among the rapidly increasing activities of the century. Location of architecture in economic transactions and financial market has caused a loss in its internal dynamics and value system. The endeavor of providing the visual appeal only through the façade formation has caused the transformation in the dependency of exterior surface being devoid of content and context. The surfaces have been treated as changeable and renewable advertisement grounds concentrating on the visual appeal of the product, whether the aim is marketing, advertising or commercializing. Thus, the link between architecture and social structures has weakened through the commodification of the end product. In this framework, aim of this paper is (a) to make the description of façade, (b) to define the autonomy of façade through its physical and moral independency by examining cases and (c) to put forward a logical argument on the aspects which make façade an element pursuing only the visual pleasure by oversimplifying its significance in the generation of architectural idea.

Keywords: Facade, Autonomy, Visual Appeal, Globalization, Representation.

INTRODUCTION

The façade is still the most essential architectural element capable of communicating the function and significance of a building. I say still, having in mind its theoretical destruction proclaimed in the twentieth century where the ideology of the free-standing object, visible from all sides, became predominant (1992).

Discussing the elements of architecture, Rob Krier described the exterior surface of a building -façade- as a communicative ground reflecting the burdened meaning of its structure and the current dominating architectural discourse through its imagery. Although façade is emphasized as one of the elements of an architectural construction, it becomes an independent, self-standing and autonomous component by the deconstruction approach in architecture evoked in the late 20th century. Besides communicative capacity of façades, their independency, individuality and image dominancy can define exterior surfaces as autonomous architectural elements in terms of both physical and moral freedom. However, in the 21st century, this autonomy has undermined by globalization and technology which are among the rapidly increasing activities of the century. Location of architecture in economic transactions and financial market has caused a loss in its internal dynamics and value system. To gain a particular importance in between these new dominated disciplines, architecture has focused on different formation methods or transformation of its own inherent dynamics. Especially, the visual appeal of the end product has been used to entice the society and to augment the consumption so that the architectural product can find a significant place in financial market. The endeavor of providing the visual appeal only through the façade formation has caused the transformation in the dependency of exterior surface being devoid of content and context. The surfaces have been treated as changeable and renewable advertisement grounds concentrating on the visual appeal of the product, whether the aim is marketing, advertising or commercializing. Thus, the link between architecture and social structures has weakened through the commodification of the end product. In this framework, aim of this paper is (a) to make the description of façade, (b) to define the autonomy of façade through its physical and moral independency by examining cases and (c) to put forward a logical argument on the aspects which make façade an element pursuing only the visual pleasure by oversimplifying its significance in the generation of architectural idea.
Definition and Characteristics

The definition of façade is significant in perceiving its representational capacity and in exploring the architectural theory built upon the exterior surfaces. Façade is originally a Vulgar Latin word. Its root comes from facies, facia which refers to respectively ‘front’ and ‘face’ and corresponds to a visual term in English ‘appearance’ (Merriam-Webster Online 2014). Façade is defined in the Oxford English Dictionary as ‘The face or front of a building towards a street or other open place, esp. the principal front (Oxford English Dictionary 2014).’ Another statement emphasizes the outer response of façade as ‘any side of a building facing a public way or space and finished accordingly’ (dictionary.com 2014). Considering these several dictionary definitions, when the façade is subject in the discipline of architecture, the intended meaning is ‘the face’ of the building which is expected to have visual appeal seen from the street or included in the urban fabric.

The exterior surface is accountable to the surrounding urban fabric and to the inhabitants of the city. Although the outer skin has a unique style in which the degree of complexity is special for its construction, it has to have capacity to adapt itself to the surrounding environment in order to align itself with the pre-established values of the urban fabric. Besides being faced with the street or the urban fabric, the façade is also a boundary limiting the interior space of the construction. The initial essence of a façade ramifies into two directions. According to the first estimation, the façade has a more private relationship with the inhabitants of the building. The aim of the exterior surface is to create a shelter for any kind of function in order to sustain the life inside. In addition to providing a physical protection to the building as a technical function, the cover also has an ability to create an intimate place for the inhabitants. When the bilateral relation of façade with interior and exterior is considered, the building cover can be identified as an interface between the private and public, or between interior and exterior by mediating these two different scales and contexts.

The examples of architecture, in which this dual character of the exterior face is negotiated, have realized that the building elements have the potential of being a tool to found new territories for the conception of space and its perception. One example is Ford Foundation Building, designed by Kevin Roche and John Dinkeloo, in 1967, in New York. Two different scales and contexts of interior and exterior can be successfully realized through its layered and recessed façade. The surrounding scale, the positions of the other buildings and the landscape play significant roles in the formation of the building and the morphology of façade. The keystones of the design idea are the height and the solid-void balance of the surrounding fabric (Figure 1-2). In addition to its responsibility and its capacity of participating in the context, the façade is treated by taking into consideration of human proportions, which is smaller than that of the urban scale. The central atrium and the leveling created by the movement of the floors articulate the interior space (Figure 3-4). Thus, façade, while representing the relation between surrounding environment and the architectural design, generates interior spaces where several functions are performed in a more humanistic scale.

Another example is a housing complex constructed in 1970-1980, in Newcastle-upon-Tyne, England, and designed by the architect – Ralph Erskine. In this example, different attitudes are followed to mediate two different scales. The outer façade of the perimeter block, which faces the large-scale urban fabric, is an unbroken wall (Figure 5). The inside part of the wall, which is in a more private relation with the interior space, is articulated in smaller features to maintain the sense of human scale such as; its pitched roof and several balconies in different orientation. The inside part of the wall, where the balconies and verandas are attached, faces the public space to encourage social interaction (Figure 6).
Although many architectural projects, which mainly derive their design idea from the dual character of façade, have been designed and constructed, the surface of the building has been the subject of several arguments in architectural discipline to define new theoretical concepts and production practices.

Is façade only an element which ‘keeps out the outside environment’ and ‘maintains the inside environment in an efficient, economical manner?’ (Kelly and Johnson 1998),

Does the façade have to be designed by the reflection of the inner structure and interior organization while it keeps its references for the surrounding urban fabric?,

From a totally different point of view, does the façade is only an element expected to be visually ‘impressive, inviting or deterring, informative, etc.’ for the inhabitants of the city or only for its investor? (Arnheim 1977)

In architectural discourse, these questions have been discussed and answered through different ideologies under the name of different stylistic approaches. For instance, Rob Krier (1992) refers the dual character of the exterior skin in his two-way façade definition: (1) a supplementary element being in a strong relation with the interior structure and (2) an autonomous, self-standing element, independent from its structure and mostly dependent to the city fabric as a communicative ground. Functionalists have adopted the first approach, which is to express the construction of building and its function through the exterior face, as one of the main concepts of their design principles. They have linked the generation of interior space and the composition of the structure with the formation of exterior surface. The relation between interior and exterior was described as an ‘inextricable mutual connection.’ Inside has to reflect its all characteristics to outside so that the form of the façade can be derived from ‘the division of interior space’ (Klotz 1988).

However, the face of the building emphasizes more than its construction or its function according to the second definition. Façade is supposed to be formed and characterized by its own functions, which have a direct influence on generating the significance of the building. Opposite to functionalists, ‘the meaningless correspondence between interior and exterior’ diminishes the perception and the vision of the outside viewer that can be specified as one of the fundamental aspects of a new architectural style – Postmodernism. Robert Venturi is averse to the normative prescription of a formalist attitude, which is described as the interior organization of the building should be observable from its exterior (1977). In the examples of this approach, the façade has been an individual, self-standing architectural element, where the formal definition of it only reflects its purpose of existence.

Taking into consideration the two different approaches, it is possible to state that the significance of façade is not based on the formation of interior structure or functional organization. On the contrary, the fundamental aspects in façade formation originate from its own essence. Façade is the place where the idea of building is established, improved and shared socially and physically with its inhabitants and its surrounding fabric. Besides its communicative capacity, the exterior skin has also the ability to form itself with its own premises. It means façade has an independency both physically and morally. The help of developing technologies in construction methods and material specifications have obtained the physical independency of façade. Thus, the outer skin of the building has developed its own formation technology, methods and its own structure.

The rediscovery of the social response in the definition of façade has provided the moral independency. Krier defined the revaluation of social responsibility through the visual capacity of façade as such:

The perfection of the building body had priority over the creation of a specific show-side facing street. It is only in recent years, after the rediscovery of the importance of the public realm and the value of
urban life, that the façade regain a new valuation (1992).

Today, with the emergence of different design conceptions and driving forces in cultural and economic domains, the fundamental shift can be easily seen in the autonomous character of façade. The transformation in the definition and characteristics of the exterior surface is the main reason to define the incited force for a breakdown in the autonomy of façades. Before analyzing these transformations in 21st century architecture, this paper outlined firstly the aspects, which provide façade physical and moral independency that are the technology and the revaluation of social responsibility. After realizing these two aspects, the study clarified how the breakdown of the autonomy which is raised by the dominancy of financial sector and the emergence of the commodity in architecture.

PHYSICAL INDEPENDENCY - TECHNOLOGY

Developing technologies and material specifications have helped the façade to be independent from both the structure and the functional organization of a building. Technology, as a consequence of the scientific developments, provokes significant changes mostly in the construction practices. The emergence of new technologies and the scientific thought in architectural practice can open up a new basis to realize the architectural ideas eventuated in innovative and unique solutions. Technological improvements have initiated not only the creation of different formal descriptions but also the emergence of new materials, which have been used to construct façades such as; wood, stone, brick, concrete, steel and glass (Burden 1996). Beginning with the masonry construction, the façades have begun to burden meaning due to the constructional capacity of the material. In masonry construction, the wall, which is made up of very small elements and combined with mortar, has to be in a certain thickness. Thus, this masonry exterior wall can be capable of carrying its own load through the soil and there is no load transmission through the interior structure. It is possible to identify the disperse of exterior surface from the structure in consequence of load bearing capacity of the masonry wall as the first step in defining the autonomous character of façades.

One example, where structural segregation of skin was emphasized, is Strozzi Palace designed by Benedetto da Maiano and constructed in 1489-1539 in Florence, Italy. The independency of façade is in accordance with one of the design principles aiming to reflect the monumentality of the building (Figure 7-8). Although the formal expression of façade was parallel with the geometry of the interior structure, the solid-void relation of façade does not correspond with the functional organization or even with the structural layout of the building. The palace seems to have three stories with semicircular arched windows however, there are seven stories. The openings on the front façade, only formed to represent their own existence do not correspond with each story (Venturi 1977). Apart from the structural system and interior function of building, the exterior skin sets its own rules and physical independency.

Besides the masonry construction, new technological methods started to appear in the constructional and architectural practices after French revolution (1789-1794). The mass-production method became dominant in the construction sector, since the mass-production of iron and then, the usage of steel, concrete and curtain wall systems as building materials begun to dominate in the formation of built environment. Particularly, steel as a...
structural material, has a high tensile strength and so that ‘the constructional consequences of this attribute were quickly appreciated’ (Joedicke 1959). In the early 19th century, using steel as a construction element became significant in USA, especially in Chicago. In the first high-rise building constructions, the internal structural system was made by steel, and surrounded by stone cladding (Figure 9).

As well as using stone and steel as construction materials in buildings, concrete and glass have begun to be utilized in the construction of structure and façade respectively, especially in Modern period (Innes 1990). A French builder, Francois Hennebique, was the first designer who attempted to develop the modern reinforced concrete technique used in buildings as a construction material in 1876 (Figure 10). In fact, this was the first time that reinforced concrete piles, beams and columns were used for constructing multi-storey structures (Barry 1969). Furthermore, concrete has become to be one of the expressing elements in the basic building vocabularies for Modern Architecture, particularly in the works of Le Corbusier. In 1914, Dom-inno System, which has a capacity to carry its own load by its own concrete columns and beams, while the walls have been freed from their load-bearing function underlined Le Corbusier’s notion of independent skeleton structure (Sanderson 1981). Therefore, the self-standing skeleton structure has started to be combined with another self-standing building element – the façade (Figure 11). This freedom provides a physical autonomy to the exterior surface.

Besides using of concrete as free-standing structure, the capacities of new materials and new methods have been explored to open up new territories to the façade formation in 20th century. World War Two had great influence on new technologies and on the usage of new materials, especially glass and metal curtain wall for façades in the Western tradition. After the war, the main aim was to reconstruct the damaged cities in the shortest time, and thus, the design statements has begun to be based on mass production by the emergence of prefabricated construction materials. Industrialized living conditions have forced the constructional practices in terms of speed and economy, which are the basic advantages of the curtain wall construction system. The technical solutions have dominated the formation of façades due to economic superiority.

In technical terms, the curtain wall is defined as ‘an exterior building wall made of non-load bearing panels that are supported on a structural frame’ (Kelly and Johnson 1998). The system is composed of prefabricated units being mostly iden-
walls’, but they become ‘walls themselves’ by the physical façade-structure segregation particularly by the means of curtain wall technology (Leatherbarrow and Mostafavi 2002). Together with the emergence of the global dissemination of technological improvements, the façade can be formulated as a component independent from its structure and interior organization in almost all geographies and in any kind of typology. In addition to being free from the structure, the exterior surface has gained independency in terms of social response to the surrounding environment and its context through the representational capacities of new materials. However, the plasticity, visual aesthetics and the figurative identification of the built environment has begun to disappear with the domination of glass boxes. The dual response of façade—one interior and the other exterior—have begun to be limping. Wrapping the structure with a glass skin, composed of standardized curtain wall construction, poses danger in losing the formal unity and visual stability due to both the standard configuration and the reflective character of the material. Therefore, the building not only invalidates its own significance through the creation of standardized exterior image, but also deceives its social response by its shiny and reflective surface but silent and unreactive, as well. In that point, the representational capacity of new techniques and materials used in façades has begun to be discussed in order to establish the social response of the exterior surface, and to define its self-governing rules through its own characteristics.

The conception of Postmodernism that the main objective is ‘to create the architecture of narrative contents’ originates as a critique of functional and productional characteristics of Modern Movement. The emphasis is mostly on the contemporary architecture shaped through ‘non-architectural as well as architectural concepts’ (Klotz 1988). The functional attitude of Modern Movement has been transformed into a more representational manner of Postmodernism. The visual reconstruction of exterior surfaces has fostered new understandings within representational tendency of the period. The postmodern formation is not the product of any technical praxis, contrarily, ‘architecture becomes a work of the visible emergence of beauty’ (Frampton 1992). Furthermore, the postmodern architectural attitude rejects the new -the dominated notion of Modernism. The Postmodernism can be characterized as ‘previously revoked stylistic means regain their validity’, and called the method as ‘the fictionalization of architecture’ (Frampton 1992). The pluralism of styles allows architecture to create its own meaning through the representational quality of production.

One of the significant approaches in postmodern period was found to be the consideration of façades as representation grounds embellished arbitrarily with historical elements to generate a familiar imagery. The exterior response of façade can be regarded as an endeavor of façade to correlate itself with the city and with people who observe it from outside through a collective background. From this perspective, exterior surface can state its own moral independency by its own morphological governance through its exterior response. The formation of free façades can be legible in the works of Venturi, through his notion of decorated shed (Venturi 1977) (Figure 12). Venturi concentrates on the formation of exterior surfaces in his arguments, in which the functional reflection of the internal organization to façades are criticized. According to his premises, the formation of exterior surfaces does not have to be treated only as instruments of any kind of symbolic representations or only as mirrors displaying the internal configuration of structure and function. On the contrary, the significance of façade originates from creating, sustaining and promoting ‘its own particular functions’ (Venturi 1977).

CONCLUSION: BREAKDOWN OF THE FAÇADE AUTONOMY – THE COMMODITY

Even though there were not many remarkable arguments on the formation process of façades after the idea of Venturi, the instantaneous communication and global improvements in the twenty first century have directly affected an entirely different formation concept, emerged due to the commodification of the architecture. The capitalist economy, the rapidly developing communication tools and integration of markets and technologies have expanded the financial volume. In the capitalist world, the speed of technological developments
and the improvements of communication tools have redoubled the performance of financial index and the money exchange traffic above all. The norms of society, culture and economy have been in a state of flux where consumption supersedes production, which is the fundamental principle of Modernism, and fictionalization, which is that of Postmodernism. All modes of production whether they are physical or not, have lost their significance in this financial capital. In fact, these financial transformations have mostly affected the physical production, which mainly refers to the architectural domain. However, in order to gain a particular importance, physical production has tried to find different ways so as to be a part of the financial transactions (like mortgage or similar techniques). The final product has begun to be considered as an asset valued through its capacity to liquidate. The construction has turned into a security having the ability to move in finance sector as an investment. Even though the physical production has increased in value through these transformations over against financial production, architecture began to lose its own dynamics and the value system which are constructed by different and unfamiliar formation methods and processes. Thus, the architectural end product became a commodity.

In this context, it seems pertinent to quest the status of commodity in order to understand the changes in value system and to clarify the depreciation in the façade autonomy. The use value of built environment, which is recognized through its functionality, applicability, accessibility, livability, has transformed into an exchange value based on how rapidly the structure is liquidized or exchanged. Fast production by the help of technology has to be consumed fast by the help of communication tools and the circulation of corporate images. In other words, the dominated tendency is that ‘...recourse was had to appearance’s seduction of the senses: an appearance which becomes independent of content’ (Korkmaz 2005). The images, whether real or illusionary, consumed by the viewer, have dominated the built environment instead of any kind of need or satisfaction, except the visual one. The appearance based attitudes have overspread a new kind of visual culture by the communication technology mainly based on 2D screen images. At this point, the thin, reflected glass exterior surfaces of buildings become the perfect grounds to display the provoked appearances of different expressions. Media has occupied these advertisement grounds - façades- to nourish the new dynamics of commodity aesthetics. The surfaces have been treated as changeable and renewable advertisement grounds concentrating on the visual appeal of the product, whether the aim is marketing, advertising or commercializing. Thus, the link between architecture and social structures has weakened through the commodification of the end product. Façades have not been treated through their purpose of existence or the architectural idea. Contrarily, the ideological and metaphorical dynamics of commercial patronage have promoted false façade ‘merely for consumption’ (Cunningham 1998).

To sum up, the exterior surface had gained its self-directing freedom in terms of physical and moral independency through the technological improvements and the transformation in the social response of façade explained in the beginning of this study. However, mostly with the emergence of capitalism, the inherent values of architectural discipline has transformed by consumerism. In this context, architectural production comes down to consumerist and populist category provoked with images, visual illusions or representations instead of satisfying its own internal set of artistic concerns. Capitalism and finance sector are the new holders of the architectural products in which advertising and marketing become more valuable than the end product itself. By the commercial aspect of consumerist architecture, the primary concern in the formation process is to create fascinating images and to put forward a planned marketing strategy with this appearance. In that point, façade is an element of architectural unity, which totally loses its internal dynamics and self-governing rules by this new visual culture, interested only in images instead of the content. The consumerist architecture has discovered its best means of expression in building façades, treated as advertisement grounds. In the framework of this image based attitudes, the moral independency of façade changes its direction from autonomy towards the independency of any substance, content and context. Therefore, the façade, that the essence is totally generated through its relation with content and context, is redefined as a domain producing blankness in order to be filled with images, visual illusions and several representations, just for pleasure.
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Abstract

Over the past three decades, China has established a housing finance system that borrows from the collective experiences of advanced economies. After examining the evolution of China’s housing finance system, the paper focuses on analyzing its challenges and recent changes. The paper argues that China’s highly-centralized financial system prefers financial stability but neglects financial liberalization, and then resulted in severe financial repression, which hurts the efficiency and equality of the housing finance service. After recovering from the 2008 financial crisis via high-cost financial intervention, China took some policy innovations to promote a decentralized finance mechanism, expand finance resources, and support affordable housing financing, through which China hopes to provide a more stable, affordable, and equal housing finance service to help more households own homes.

Keywords: Housing Finance, Housing Studies, Housing Policy, Finance System, China.

1. INTRODUCTION

Purchasing housing is the largest investment made in a lifetime for the majority of people in the world (United Nations 2005), and access to housing finance is critical to allowing more people to become homeowners. This is especially true in the urban areas of China. The price-to-income ratios in many Chinese cities are relatively high in recent years. For instance, Beijing’s housing price-to-income ratios hovered between fourteen to fifteen-to-one from 2006 through 2007, and climbed to eighteen-to-one in early 2010 (Wu et al. 2012). Comparatively, price-to-income ratios in western countries are typically between four and eight-to-one (Warnock & Warnock 2008). High price-to-income ratios mean that homebuyers have to rely on borrowing.

Market-oriented housing finance was practically non-existent until China began to reform its socialist welfare housing system in the 1980s to encourage private ownership. To support that housing reform, China has established a housing finance system that borrows from the collective experiences of advanced economies. The housing finance system includes these major components: the Housing Provident Fund (HPF) scheme based on the experience of Singapore, the commercial bank mortgage scheme based on the experience of many western countries, along with two supplementary housing finance schemes: the Contractual Housing Savings (CHS) scheme based on the experience of Germany and the Mortgage-Backed Securitization (MBS) scheme based on the experience of the United States.

However, China’s housing finance system faces many challenges due to the inherent administrative, legal, and institutional constraints in the finance sector. The finance system in China is a highly centralized one, which has faced a chronic dilemma: whether to emphasize liberalization or stability. Though the government realized that liberalization and market-oriented reform are important for the finance sector, it gave priority to financial stability, which it deemed an important political goal. This kind of bias resulted in severe “financial oppression,” defined as granting privilege to the state-owned sector in accessing financial resources, which hampers the non-state-owned sector (Yao & Wu 2011). The result has negatively impacted the efficiency and equality of the finance sector. Fortunately, in recent years, the government has adopted some policy innovations in the housing finance system, such as encouraging market-oriented reform, expanding finance channels, and enhancing equality through financing affordable housing.

There is a growing literature that examines China’s housing issues. The studies of China’s housing issue have been overwhelmingly concerned with changes in housing supply from the 1980s to the present, the unequal access to housing for different groups, the market dynamics of housing shortages, bubbles and other market conditions (Wang & Murie 1999, 2000; Wu 2001; Deng & Fei 2008; Deng et al. 2011; Logan et al.
2010; Huang & Jiang 2009; Chen et al. 2011; Wu et al. 2012). In comparison, the quantity of literature examining housing finance is smaller. Zhang (2000) introduces the framework for restructuring the housing finance system in its early stages. Chen (2010), Yeung & Howes (2006), Burell (2006), and Deng et al. (2011) focus on the evaluation of the HPF scheme. Li (2010), Li & Yi (2007), and Wang (2001) describe case studies on housing finance performance in Beijing, Shanghai, and Guangzhou. Deng et al. (2005) and Chen & Stephens (2011) report on empirical studies of the mortgage market. However, few researchers have comprehensively assessed the long-term evolution, challenges, and recent changes in China’s housing finance system, especially after China began to recover from the 2008 financial crisis via a costly financial intervention. This paper tries to fill this gap.

The remainder of this paper proceeds as follows. The second section analyzes China’s financial dilemma between liberalization and financial stability. The third section introduces the evolution of China’s housing finance system. The forth section focuses on the challenges of the housing finance system faced. The fifth section introduces recent changes aimed at a more efficient and equitable housing finance mechanism. The last section concludes.

2. CHINA’S FINANCIAL DILEMMA: LIBERALIZATION VS. FINANCIAL STABILITY

China’s finance system is a highly centralized one, under which the central government controls the majority of financial resources. This highly centralized finance system has certain advantages, which have been proven by China’s capacity to deal with two serious financial crises in the past two decades. To combat the Asian financial crisis in 1997, the central government launched a large-scale affordable housing program to boost the domestic demand in 1998. That measure worked well – China passed the crisis smoothly and reached a GDP growth rate of 8% in 1998. Compared to the 1997 crisis, China suffered much more heavily from the global financial crisis of 2008. To pull the economy out of that recession, the Chinese government implemented a set of monetary and fiscal policies. The monetary policies included cutting interests and lavishly originating loans for infrastructure investment (Liang 2010). The highlight of the fiscal policies was a 4 trillion Yuan ($586 million, or about 2% of the GDP) stimulus package launched in October 2008. These measures helped China maintain the stability of the financial market and a GDP growth rate of 8.7% in 2008 (Yao & Wu 2011).

The government’s intervention, employing its massive financial resources, however, imposed high costs. For instance, most loans and funds in the 4 trillion stimulus package went to local governments and state-owned enterprises, which used some loans to invest in government-backed infrastructure projects, but others to engage in speculative investments (such as the real estate market) and wasteful projects (Liang 2010). The massive flow of funding into the real estate market acted as a catalyst for skyrocketing housing prices. The average housing price nationwide rose from 3576 Yuan in 2008 to 4725 Yuan in 2010, increasing 32.13% in two years (NBSC 2011). Affordability of housing declined sharply, which resulted in widespread discontent among people who could not afford to buy. Furthermore, massive funds flowing into the real estate sector worsened the disconnection between the financial system and economy, because widespread real estate speculation drained off financial resources from the real economy. Though China’s highly centralized financial system could alleviate the short-term risk, it generated accumulating risks for the long term, and aggravated a long-standing problem in the economic structure (Liang 2010).

The financial crisis also uncovered a long-standing problem of China’s financial system – financial repression. The financial system gives priority to loans for local governments and state-owned enterprises. For instance, local governments in China cannot issue debt themselves, so instead they borrow from state-owned banks, using land as collateral. That borrowing has produced a surge in local-government debt in many cities – in 2012, the government of Kunming borrowed 46.4 billion Yuan, when its revenue was only 37.8 billion Yuan, suggesting its debt ratio reached 122.9% (Xinhua Net 2013a). The central government also encourages state-owned banks to extend loans to local governments to stimulate economic growth. For instance, in August 2013, China Agriculture Bank extended a loan of 250 billion Yuan to the Shanghai Government, which is approximately 12.5% of Shanghai’s GDP in 2012 (Daily Economic News 2013). Usually, local governments repay the loans through the revenue they gain from leasing land. However, that land revenue depends on the future performance of the local economy and land market. If land revenues decrease due to a sluggish land market, local governments have to default. From this perspective, the privileged access to debt granted to local governments creates significant risk to the financial system.

On the other hand, financial oppression has resulted from severe discrimination against private
sector borrowers. As most loans have gone to local governments or state-owned enterprises, private enterprises have had difficulty obtaining credit from state-owned banks. They have had to borrow from private individual lenders, illegal private banks, or usury. High-cost financing has heavily hurt local economies. The City of Wenzhou is an example. During the housing boom in Wenzhou, the real estate sector absorbed huge funds with high interest rate, while private enterprises could not obtain sufficient funds and had to declare bankruptcy (Xinhua Net 2013b). In addition, due to the huge demand for private credit, small loan companies mushroomed in recent years. There were 6,555 small loan companies by the first quarter of 2013, with a loan balance of 635.7 billion Yuan (China Times 2013). As the majority of small loan companies in China are not regulated financial institutions and highly vulnerable to risk, their proliferation resulted in widespread corruption and illegal activities.

Financial repression heavily decreases the financial system’s efficiency in allocating resources. By 2013, China had $3.4 trillion in foreign currency reserves, topping other countries in the world (China Money Network 2013). The surplus liquidity, however, could not be fully used. For instance, China is known for buying huge government debt of the United States; in 2013, it held $1.2 trillion U.S. government debt (China Money Network 2013). Yet China is a capital scarce country – in the housing sector, non-state-owned housing developers find it very difficult to obtain bank loans and have to rely on high-cost financing.

The solution to the problem of financial repression lies in reforming the financial system, especially resolving the long-standing contradiction between liberalization and financial stability. The government acknowledges that market-oriented liberalization can increase the competitive strength of the financial system (Yao & Wu 2011). However, the financial crisis in 2008 increased the government’s reluctance to pursue financial liberalization. While many of America’s insolvent financial institutions were transferred to new owners during the financial crisis, the Chinese government maintained stability in its financial markets (Yao & Wu 2011). Yet by neglecting financial liberalization and globalization, China’s government may make the financial repression worse (Yao & Wu 2011).

The financial repression resulted in negative impact on the housing financial system, including the low ratio of the outstanding mortgage to GDP, low efficiency of PHF, and the obstacles to expand MBS program to link the financial market and the housing market. In all, the primary challenge of the financial system in China is how to balance financial stability and financial liberalization. This challenge is embedded in four components of the financial system. After briefly examining the evolution of China’s housing finance system, this paper will provide an in-depth and critical look at the challenges faced by it.

3. THE EVOLUTION OF CHINA’S HOUSING FINANCE SYSTEM

3.1 The Housing Finance System under the Centralized Planned Economy (Prior to 1988)

Starting in 1949, China employed a socialist welfare housing allocation system in urban areas. By the 1980s, approximately 82% of urban residents lived in publicly-owned housing (Wang et al 2012). Tenants paid low rent as the compensation for accepting low wages. The housing finance market barely existed. State or work units allocated funds to develop publicly-owned housing. Under those conditions, residents had no need for mortgage credit to purchase housing.

The welfare housing system, however, put a heavy financial burden on the government and work units. In the early 1980s, the central government decided to convert the welfare allocation housing system to a monetized housing provision system. In 1982, the central government enacted a housing reform pilot program in Zhengzhou, Shashi, Changzhou, and Shiping. Under that program, city governments and work units would subsidize two-thirds of housing construction cost. Residents could purchase the housing at one third of the building cost. The pilot program, however, failed because too few residents took advantage of the option to purchase houses for three reasons. First, they were accustomed to living in welfare housing with low rents. Second, they had accumulated little savings to purchase housing due to low wages. Third, they had no access to mortgages at that time. Learning from that failure, the central government realized that establishing a well-functioning housing finance system was necessary to accomplish housing reform.

Under the highly centralized planned economy framework, China’s financial system took the form of “great unity.” Prior to the 1980s, China had only one bank – the People’s Bank of China (PBC), which was the center of the nation’s credit and currency, controlling all credit and fund transactions in China. Under this monopolistic banking system, financial institutions played a role in accounting and auditing, rather than a role in allocating resources (Bardhan & Edelstein 2007). At the end of the 1970s, China decided to break the “great
unity” into a multi-level structure with diverse financial institutions. In 1984, China transformed PBC to a state central bank, which played roles in credit management, currency issuance, and commercial bank supervision. On the secondary level, China established “big four” state-owned commercial banks, namely, China Industry and Business Bank (CIBB), Bank of China (BOC), China Agricultural Bank (CAB), and China Construction Bank (CCB). Different commercial banks were assigned to serve different economic sectors. The last of these four (CCB) took responsibility for financial services related to construction, investment, and housing sectors. In 1986, CCB originated the first housing mortgage loan in China (Deng et al, 2005). This reform kept the banking system firmly under the control of the state.


After the reform of the banking system, housing financing sources shifted from government fiscal allocation to bank loans, but bank loans only focused on the supply side – the majority of loans flowed to housing developers. Demand for individual housing mortgages remained extremely small due to the widely available welfare housing and the ambiguity of housing ownership rights. In 1988, the central government started the process of privatizing China’s housing stock by converting its welfare housing allocation system to a commercial system, and clarifying housing ownership rights (Wang & Murie 1999). Work units sold state-owned public housing to sitting tenants at a discount (Wang & Murie 1999). Different commercial banks were assigned to serve different economic sectors. The last of these four (CCB) took responsibility for financial services related to construction, investment, and housing sectors. In 1986, CCB originated the first housing mortgage loan in China (Deng et al, 2005). This reform kept the banking system firmly under the control of the state.


In 1994, the central government divided housing credit services into two sets of institutions: (1) the policy-oriented credit institutions to serve government or work-units’ housing funds, including the HPF scheme, and (2) market-oriented commercial banks that would use their own capital to provide loans for housing developers and consumers. This division helped the government supervise the policy-oriented funds, while enhancing the banks’ ability to use their proprietary capital to expand ownership.

In 1994, based on the experiments in Shanghai, the government expanded the HPF scheme nationwide (Chen 2010). PBC demonstrated that the HPF could provide a long-term, steady stream of funds for consumers’ home purchases. Since then, the HPF scheme has been extended to most cities.

The government also used the housing finance system to support affordable housing programs. In 1995, China launched its first affordable ownership program – the Peaceful Living Project (PLP, Anju Gongcheng). The central government...
provided 40% of the total investment, through loans from the state-owned banks. Local governments drew on diverse capital sources, including HPF, to provide the remaining 60% (Wang 2001). In 1997, the central government decided that housing mortgage loans would only be available in cities that had launched the PLP program. In addition, the government gave priority for mortgages to homebuyers who were purchasing PLP units. However, the mortgage underwriting standard was quite strict – the down payment had to exceed 40% of the housing value, and the maturity term could not exceed 10 years, limiting buyers’ ability to take advantage of the program. Since the PLP program left intact the link between work units and housing provision, many work units purchased the PLP units as collective consumers, and then allocated them to employees. As a result, individual consumer demand for mortgages remained weak. By the end of 1997, the housing mortgage balance was around 22 billion Yuan, which is only 0.28% of GDP in 1997 (Deng et al 2005; NBSC 2011).

3.4 The Housing Finance System Takes Shape (1998 to Present)

In 1998, the central government announced its decision to terminate the welfare housing allocation system and initiate a monetary provision system (The State Council, 1998). As this policy cut the link between work units and housing provision, residents could no longer rely on work units and had a greater incentive to purchase housing on the open market. To support this reform, China launched another large-scale affordable housing program – the Economic and Comfortable Housing (ECH, Jingji Shiyongfang) program. The central government planned to establish a multi-layered housing system, in which the ECH program could cover approximately 70% of urban households. The policy expanded the demand for housing loans as local governments needed to borrow funds to develop large-scale ECH projects, and as residents needed more mortgages to finance home purchases.

In response to increased demand for housing loans, the central government took the following measures to improve the housing finance system: (1) expanding housing mortgage originations, (2) improving the registration system to enable borrowers to use property as collateral, (3) developing mortgage insurance to decrease mortgage default risk, and (4) developing a hybrid individual mortgage scheme, which includes commercial mortgage loans and the HPF mortgage loans (The State Council 1998).

In addition, the government introduced the experiment with the CHS scheme to Tianjin and Chongqing, having learned from the experiences of Yantai and Bangbu. In the secondary mortgage market, China initiated a Mortgage-Backed Securitization (MBS) program in 2005 to expand more alternative housing finance channels. So far, China’s housing finance system has become mature, with a framework of the HPF and commercial bank mortgages as the principal, while the CHS and the MBS schemes as the supplement.

4. CHALLENGES OF FOUR COMPONENTS OF CHINA’S HOUSING FINANCE SYSTEM

4.1 Challenges of the HPF Scheme

Starting in 1991, the compulsive HPF scheme became the core component of the policy-oriented housing finance system. Compared to the voluntary housing saving scheme, the compulsory HPF savings scheme was easier to implement, because employees saw the contribution by work units as a kind of benefit.

During the 1990s, the HPF scheme supported relatively few mortgage loans. Between 1993 and June 1998, only 0.2% of HPF contributors obtained HPF loans in Beijing; the total mortgage amount was 368.1 million Yuan, which was only 8% of available deposited funds over the period (Wang, 2001). To enhance its efficiency, local governments established HPF management centers, which are the decision bodies of the HPF scheme at the local level. The management centers are responsible for collecting and depositing funds, as well as reviewing loan applications (Wang 2001). The central government also established an agency to supervise the operation of the HPF scheme. In April 2002, the State Council issued a law regarding the HPF scheme – The Provisions of Housing Provident Fund Management, which provided a solid national foundation to the HPF scheme.

Despite that national foundation, the implementation of the PHF scheme is localized. Local governments set rules for PHF mortgage application. In most cities, households need to maintain local population registration status (Hukou) to apply for HPF mortgages. Shanghai has also stipulated that only first time homebuyers are eligible to obtain HPF mortgages. The amount available to consumers for mortgages is decided by certain multiples of savings in applicants’ HPF account. In Shanghai, the multiple is 20 (Chen 2010); in Beijing, the multiple is between 10 and 15 (Wang 2001). In addition, local governments set caps on the total size of HPF mortgages. For instance, in Shanghai, the cap was 600,000 to 800,000 Yuan.
in 2009 (Chen & Stephens 2011). Local governments can adjust the caps to stimulate local housing markets. For example, over the period of 2008 global economic recession, many local governments raised the cap on HPF mortgages to boost housing consumption.

Though the HPF scheme played a critical role in expanding capital sources for housing development and consumption, an official report by China’s central bank shows the HPF scheme is not effective in supporting low- and moderate-income households to become homeowners (PBC 2005). Many researchers have criticized two faults of the HPF scheme – inequality and inefficiency (Chen 2010; PBC 2005; Li 2010; the World Bank 2006).

First, the HPF can be faulted for inequality across regions and across work units. The coverage rate in some eastern cities exceeds 90% of employees, while the figure is less than 50% in some western cities. In some coastal cities of migrants, the coverage rate is especially low – in Donguan, 340 million of total 424 million employees, namely 80.2% of all employees, remain uncovered by HPF in 2012 (Information Times 2013). Employees in different work units also face severe inequalities in employer contributions. Nationally, the average HPF contribution rate is approximately 7% of employees’ wages. Affluent work units, such as central state-owned enterprises, are inclined to contribute more, for the sake of increasing employees’ incomes and evading taxes. Poor work units, however, contribute at very low rates. Research shows that the average employer contribution going to workers in the top 10th percentile is approximately 30 times the average employer contribution to the bottom 10th percentile (Chen 2010).

The inequality of the HPF scheme is also reflected in the reality that poor households subsidize affluent households to become homeowners. According to the HPF program rules, savings must be used in housing-related consumption or for pensions after retirement. Middle and high-income households find it easier to purchase housing, and therefore have a higher possibility to withdraw HPF savings and obtain HPF mortgages. In contrast, low- and moderate-income households have difficulty purchasing housing, and thus have little chance to use HPF. Under this situation, low- and moderate-income households contribute HPF savings every month but capture little benefit from the HPF scheme.

The second challenge faced by the HPF scheme is its low efficiency. Many households hope to apply for HPF mortgages for the low interest rate. However, actual usage of the HPF is fairly low. According to Chen (2010), in 2008 the number of households that obtained HPF mortgages was less than 20% of all contributing households. One of explanations for the low usage rate is the imbalance between HPF loan demand and HPF savings supply. First, the HPF is a closed-end system based on jurisdictions. A serious geographic disparity of supply and demand exists – the regions with expanding housing markets need more funds than regions with stagnant markets. However, the HPF is not allowed to transfer across jurisdictions. This fragmentation has not only decreased the efficiency of capital allocation, but also increased liquidity risks (Chen 2010; Burell 2006). For instance, in 2013, the housing boom dramatically expanded the demand for HPF mortgages in many cities with spiraling housing markets. Some cities announced that their HPF liquidity was used up and stopped accepting applications (China News 2013). Those suspensions hurt households who held deposits in HPF. Second, HPF management centers have little incentive to expand mortgage origination. By the end of 2011, HPF deposits across China had reached 2.1 trillion Yuan, about 4.4% of the GDP of 2011 (People Net 2013). However, so far there have been only two channels for investing HPF balances – buying government bonds or depositing in banks. As the purpose of HPF management centers is to keep the funds safe, they are inclined to deposit the funds in banks, rather than originate loans to applicants and bear the risk of mortgage default. Unfortunately, high inflation erodes the value of HPF. Third, the absence of effective public supervision jeopardizes the funds’ efficiency. Employees and work units cannot hold HPF management accountable, making it difficult to correct misuse and corruption when they appear in HPF management centers.

4.2 Challenges of the Commercial Bank Mortgage Scheme

Commercial banks provide a primary channel for financing housing consumption. In 1999, PBC established a framework for commercial bank mortgage lending, including mortgage underwriting standards: (1) the maximum ratio of loan to housing value (LTV) is 80% of appraised value; (2) the longest amortization term is 30 years; (3) the mortgage interest rate is adjusted periodically by China’s central bank; (4) the majority of commercial mortgages are self-amortizing; and (5) applicants must provide a commercial guarantee or use the purchased property as collateral (Deng et al. 2005; Chen & Stephens 2011). However, the government or banks were permitted to adjust underwriting standards in response to variations in housing market conditions. Since the end of the 1990s,
China has witnessed a rapid expansion of commercial mortgages despite some challenges due to institutional defects and cultural factors.

The first challenge is that the ratio of housing mortgage balance to GDP is relatively low. Since 2006, China has become the largest mortgage market in Asia (Zhu 2006). Nevertheless, the ratio of housing mortgage balance to GDP was only 11.7% of GDP by 2004 (PBC 2005). By 2012, the ratio had reached 15.61% (PBC 2013), which still lagged behind the U.S. and many European countries. Figure 1 shows the outstanding mortgage-to-GDP ratios in China and some selected OECD countries. One of the explanations for China’s low ratio is that housing finance services lag badly behind mortgage demand. If a nation’s credit institutions generate too large a debt load, that may cause financial instability; if they generate insufficient credit, that may constrain housing demand (Warnock & Warnock, 2012). In China, the government is most concerned about financial stability and thus constrains the scale of mortgage debt. In 2013, because huge loans have flowed into local governments and state-owned enterprises at the same time that the housing boom has boosted credit demand dramatically, banks have experienced a severe liquidity problem — “money shortage”. In addition, state-owned banks set quotas on mortgage credit origination — if mortgage originations exceed the quota, they stop extending new mortgages. In August 2013, due to “money shortages” and mortgage quotas, banks in many cities including Guangzhou and Zhengzhou announced they would not extend new housing mortgages (Daily Economic News, 2013). In this situation, some homebuyers who have been unable to obtain mortgages from banks have had to rely on unregulated private lending outside the formal banking system. According to a report on “Banking and family financing behavior”, 33.5% of Chinese families have participated in private lending, with the total amount of 8.6 trillion Yuan, approximately 50% of which was used to purchase housing (People Net, 2013).

Commercial banks also face the challenge that they lack experience in dealing with default risk. Up to now, commercial banks mortgages have experienced very low default rates — in 2011, the rate of Non-performing loans (NPL) was only 1.1% (The World Bank 2012). One explanation is that households have benefited greatly from housing price appreciation over the last decade. Due to house price appreciation, households rarely default on mortgage payments. From this perspective, China’s mortgage finance system has not been tested by a period of decreasing housing prices since 1998. It needs more time to assess the potential mortgage default risk (Chiquier 2006). Another reason why banks lack experience with default is the high prepayment rates. Influenced by Chinese culture, households are not used to carrying debt. According to Liu & Sun (2007), among a sample of 4,000 mortgages originated in 1999, 427 were prepaid by October 2002, which means the ratio of prepayment was 13.7% (Liu & Sun 2007).

China’s relatively brief experience with mortgage financing explains the immaturity of the housing finance legal system. Though China has passed some laws related to housing finance, its legal system needs to strengthen property rights, contractual freedom, and the ability to secure collateral (United Nations 2005; Warnock & Warnock 2008). For instance, during the housing boom over the last decade, the incidence of foreclosure was very low. The scarcity of foreclosure cases has actually discouraged legislation on foreclosures. According to the Supreme People’s Court of China, in 2005, if a borrower defaulting on his mortgage payment possesses only that property as collateral, then banks have no authority to foreclose on the house. That law is still much debated, as it restricts the lender’s right to seize collateral.

### 4.3 Challenges of the Contractual Housing Saving (CHS) Scheme

Individual savings accounts dedicated to financing home purchases originated in the UK approximately 300 years ago and have become popular in Germany and Austria (United Nations 2005). China conducted experiments with such a scheme in 1987 and 1988, establishing housing savings banks in two cities, Yantai and Bangbu. However,
urban residents were reluctant to use voluntary savings to purchase homes in a rapidly transitioning housing market. The housing savings bank scheme, while no immediately popular, was the rudiment of the Contractual Housing Savings (CHS).

Despite the failure of early attempts to establish individual deposit accounts in the absence of employer contributions, the government attempted to revive the Contractual Housing Savings (CHS) scheme in 2004. China Construction Bank and the Germany Bausparkasse Schwabisch Hall (BSH) Housing Savings Bank jointly established Tianjin Sino-German Bausparkasse (TSGB). The government expected TSGB to introduce German CHS experiences into China. TSGB copied the Germans’ operational and management rules, as well as taking advantage of the technical and human resource of BSH, including some German executives dispatched to TSGB.

The CHS scheme has numerous advantages for both borrowers and lenders. First, it establishes a closed-end system, which can avoid the impact of fluctuations in the capital market. Second, compared with the HPF scheme, the CHS scheme maintains more social equality. Recall that the HPF scheme operates through participants’ work units, so people who are not formally affiliated with work units are excluded from the HPF scheme. However, those people can voluntarily participate in the CHS scheme. Third, the CHS scheme is more flexible than the commercial mortgages. Self-employees, temporary employees, and households with unreported incomes have difficulty obtaining income certification to apply for commercial mortgages. Unreported income is common in China—the amount of unreported income is estimated to be 30% of China’s GDP (Wu et al., 2012). People with such income can take advantage of the CHS scheme. Finally, because CHS applies the rule of “deposit before loans,” a customer’s credit record depends on his/her previous accumulation of deposit. That decreases the possibility of loan default.

Nevertheless, the CHS scheme has not been widely accepted by the public. The first challenge was that the target customers of the CHS overlapped with the HPF scheme. Many potential savers were attracted by the mandatory HPF schemes because their employers would contribute a part of savings. Second, the long-last housing market boom dampened households’ enthusiasm in choosing the CHS scheme. During the housing boom, increasing household incomes did not keep pace with housing price appreciation. In order to get into the rapidly-appreciating market, people were inclined to borrow from commercial banks with higher interest rates instead of waiting to accumulate savings in the CHS. Furthermore, China lacked an institutional and legal environment to apply CHS in the transition economy, and also lacked trained professionals to adjust the CHS scheme to the Chinese context. In the case of TSGB, foreign executives were unfamiliar with the administrative, cultural, and institutional environment in China. For instance, Chinese consumer behavior differed from that in Germany, where the CHS operated through sales agents. In China, however, customers are inclined to trust banks rather than sales agents. That suggests that the CHS scheme needs further improvement to adjust to the cultural shift.

4.4 Challenges of the Mortgage-Backed Securitization (MBS) Scheme

In advanced economies, the security market is an effective instrument to enhance the banks’ liquidity and spread the risk widely. A good example is the U.S., where securitization revolutionized the housing finance system in the 1970s, successfully enhanced liquidity, and expanded capital sources for the housing mortgage market (United Nations, 2005; Green & Wachter, 2005). Through securitization, commercial banks can recycle the capital they have invested in mortgages, and then obtain more capital to issue new mortgages. Inspired by the achievements of the securitization scheme of the U.S. in raising homeownership rates and expanding capital sources, many scholars, policy makers, and experts suggested that China needed to initiate its own securitization scheme and promote the secondary mortgage market. In 2003, for the first time, the central bank encouraged commercial banks to develop housing mortgage securitization. In March 2005, the State Council approved the State Development Bank (SDB) and China Construction Bank (CCB) to initiate securitization pilot programs. In December 2005, SDB issued asset-backed securities with a value of 4.177 billion Yuan, and CCB issued securities with a value of 3.017 billion Yuan, respectively. Unfortunately, the 2008 subprime mortgage crisis in the U.S. gave a warning to China’s incipient securitization scheme. As a result, the process of promoting securitization was temporarily terminated.

China faces many obstacles to implementing securitization. First, government-owned commercial banks lack motivation to promote it because they would have to share the revenue generated by mortgage lending with other institutions such as rating agencies, insurance corporations, and securities investors (Zhu, 2006). For the banks
Currently, China’s housing mortgage loan business is a high-yield enterprise due to the low default rate. Commercial bankers would like to maintain their comfortable position.

Second, the pressure on commercial banks to increase capital liquidity and spread risk is not very heavy. Due to the limited alternative investment channels and the weak welfare system, households are inclined to deposit their money in banks. According to China Securities Regulatory Commission (CSRC), the saving rate of China in 2011 reached 52% of disposable personal income, far outstripping the world’s average saving rate, which was only 19.7% in 2005 (Xinhua Net 2012). Those savings have become a dependable capital source for state-owned banks.

Third, the infrastructure of the secondary mortgage market is still weak. China needs to establish more professional intermediary organs, including guarantee agencies, credit rating agencies, accounting firms, law firms, and mortgage corporations, to link the traditional housing mortgage market and the broader capital market. In addition, China needs to improve some techniques such as automated underwriting and risk management, as well as needing to recruit more experienced professional talent.

5. CHANGES IN CHINA’S HOUSING FINANCE SYSTEM

5.1 Promoting Decentralized Housing Finance System

Redefining the role of the government is needed to expand the housing mortgage market (Gallardo, 1998). Recently, China has taken some measures to promote a more decentralized housing finance mechanism through encouraging private banks, foreign banks, and market-oriented interest rates. The government realizes that the monopoly of state-owned banks in the housing finance market can lead to the risk of “too big to fail”. According to a report by the central bank, four state-owned banks have issued approximately 80% of all housing mortgages nationwide (PBC 2005; Chen & Stephens 2011). In a massive country with uneven local housing markets, decentralization would enhance the efficiency of the housing finance system, because local governments would have an information advantage over the central government. In addition, decentralization would help banks take more flexible swift actions to avoid the risk of default.

In July 2013, the State Council announced that the government would encourage the establishment of private banks (The State Council 2013). There is a huge demand for private housing finance to supplement the state-owned banks. Housing mortgages represent an attractive investment vehicle for private capital – as the housing mortgage scale is still small and has a lot of room for growth, private capital can fill the gaps in the mortgage market. In addition, China has abundant private capital seeking investment channels. Many provinces welcome the initiative of private banks. In 2013, three cities in Guangdong province – Guangzhou, Shenzhen, and Jieyang – applied to establish private banks within their jurisdictions (Shanghai Securities Daily 2013). Private banks can serve as a bridge between private enterprises’ capital demands and abundant private capital supplies.

China also has taken measures to encourage foreign banks to finance housing consumption and investment. In 2001, China entered the World Trade Organization (WTO) and must fulfill the commitment to open up its banking sector. In addition, as foreign direct investment burgeons, foreign investors need more diverse financial products and service. By the end of 2012, foreign banks had established 412 branches across China, many of them participating in the housing finance business (Sohu 2013).

In addition, PBC announced that China would deregulate the interest rates offered by financial institutions as of July 20, 2013 (PBC 2013). That was a milestone of market-oriented finance reform, suggesting that financial institutions can adjust the level of interest rate based on the market performance. Market-oriented interest rate can help banks enhance independence and scientific pricing, and expand financial support to housing developers and households.

5.2 Expanding Housing Financing Channels

Due to the real estate boom, the demand for mortgage credit has increased dramatically. In addition, many housing developers that have spent funds to purchase land and expand their investment have encountered severe cash flow difficulties. The government has taken several measures to expand financing to solve the problem of liquidity.

In August 2013, the central government announced that China would put the credit asset securitization scheme back on the agenda (The Government Net of China 2013). As previously mentioned, China temporarily terminated the asset securitization scheme after the 2008 financial crisis. The government now acknowledges that asset securitization is a beneficial instrument to attract more stable funding from the rest of the financial
market. Unlike the deregulation of the U.S. housing mortgage market before the Great Recession, the Chinese approach includes very stringent regulations to control the potential risk related to securitization.

The government has also encouraged banks to increase the capital turnover to increase the available stock credit and decrease financing costs. The amount of the stock credit in China is huge—by July 2013, the savings balance reached 68.78 trillion Yuan, which can be utilized to expand liquidity through increase the capital turnover (The Government Net of China 2013). Housing developers also expand financing channels through financial innovations, such as direct financing, overseas financing, and seeking funds by issuing shares of stock on the stock market. For instance, the percentage of direct financing of real estate developers increased from 30% in 2008 to 40% in 2012 (Xinhua Net 2013b). These innovations alleviate some real estate developers’ pressure of liquidity.

5.3 Supporting Affordable Housing Financing

Promoting affordable housing financing is a specific embodiment of maintaining housing finance equality. Over the last two decades, China has launched several large-scale affordable housing programs, which not only played critical roles in promoting housing privatization reform, but also helped millions of people become homeowners. However, between 2004 and 2010, the share of affordable housing provision in China continued to decline, partly due to the severe constraint of funding. In 2010, China launched the Social Housing program, targeting at developing 36 million affordable housing units in the five years after 2011. Accordingly, the government emphasized support for affordable housing financing. For instance, in August 2013 the central government requested that financial institutions extend 100 billion Yuan loan with below-market interest rates. They will continue to invest a trillion Yuan over five years, to help redevelop affordable housing units in the five years after 2011.

As a response to “money shortages”, many real estate developers have hoped to raise funds by selling shares in their companies on the stock market, which means developers must seek profitable returns to satisfy shareholders. But the government has given priority to those developers willing to build affordable housing, which is not the most profitable option for developers. For the first time since 2009, the government allowed Xinhu Zhongbao Co. Ltd to issue stock to seek 5.5 billion Yuan in August 2013, because this company promised to use the funds for two redevelopment projects in shanty areas in Shanghai (Xinhua Net 2013b). The government has also encouraged private capital to develop affordable housing through issuing corporate bonds, short-term financing bills, mid-term note, etc.

Some local governments have introduced changes to enhance the efficiency of Housing Provident Funds (HPF) in supporting affordable housing. For cities with surplus deposits in HPF, local governments can borrow from HPF reserves to fund affordable housing development (Xinhua Net 2009). Local governments use land as collateral for those loans. This measure provides a capital source for local governments while generating some interest on the surplus HPF. A different option has been tried in several cities experiencing shortages in HPF funds during the housing boom period. They have launched a policy innovation – “HPF mortgage to commercial mortgage” (HTC, Gong Zhuan Shang) – to support affordable housing consumption (China News 2013). This allows HPF applicants to apply for mortgages from commercial banks in advance, and subsidizes the mortgage interest rate gap between HPF and commercial mortgages. The HTC policy guarantees households that participated in the HPF program can enjoy the affordable housing finance with equality.

In addition, the Contractual Housing Savings (CHS) scheme has also adjusted its focus to target affordable housing consumption. Many low- and moderate-income households have no HPF accounts or have made only small HPF contributions, but they can deposit savings in advance to obtain qualification to borrow money through the CHS scheme. In 2006, the Tianjin municipal government initiated a combination of the HPF and the CHS loans, which help low- and moderate-income households to take advantage of both the HPF and the CHS schemes. In 2011, TSGB established its first branch in Chongqing. The Chongqing municipal government also works with TSGB to use the CHS scheme to fund local affordable housing consumption. Overall, the CHS scheme has become an experiment to explore an effective housing finance channel for affordable housing consumption.

6. CONCLUSION

Since the 1980s, based on the experience of advanced economies, China has established a basic framework for housing finance, which has played a critical role in supporting housing investment and consumption. The housing finance system, however, is still plagued by the challenges of inefficiency and inequality. These challenges are embed-
ded in the financial oppression under China’s highly-centralize finance system. Due the financial oppression, China is hesitant to promote financial liberalization, and more concerned with financial stability. However, this paper has shown that by maintaining central government control over mortgage financing, Chinese leaders have actually created certain problems and risks for the system: the lack of market-oriented mechanism which constrains the scale of housing mortgages, the low efficiency of the HPF scheme, the low motivation of state-owned banks to promote securitization, etc. As a result, housing financial services lag behind the development of the housing market. In recent years, the government has launched policy innovations to promote a more decentralized finance system, expand liquidity sources, and support affordable housing. Despite those changes, China’s housing finance system needs further reform to make it possible for financial liberalization and stability to coexist, to help more households own decent homes.

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PERFORMANCE EVALUATION OF OPEN AND CELL TYPE DESIGN STUDIOS.

Umut Tuğlu Karsli

Abstract
Design studio courses take place at the core of education disciplinary design such as architecture and interior architecture. Studios in which design studio courses are conducted can also be used for other practical courses as well. Another important feature of these studios is that they are extensively used by students for individual or group work other than during class hours. Since the students, either on their own or with the project coordinator, experience design process in these studios, their spatial characteristics are highly significant to conduct this process effectively. Within this scope, the aim of the research is to evaluate open and cell type studios commonly used in traditional architecture education through Post-occupancy evaluation (POE) approach, to discuss to what extent these studios meet the spatial requirements of today’s instructional methods and to develop a suggestion for design studio spatial use by taking the strengths and weaknesses of these studios. Accordingly, technical, physical and behavioral variables determining the performance of design studios within the context of spatial requirements have been identified through reviewing the related literature. In framework of a case study, a survey formed with the aforementioned variables was administered to architecture and interior architecture students studying in open and cell type design studios in order to measure their spatial performance. Following the final part of the study, referring to survey results and evaluation of spatial requirements of today’s instructional methods and tools, a combi design studio space organization has been suggested.

Keywords: Design Studio; Studio Spaces; Architectural Education; POE

INTRODUCTION
Design studios are accepted as the center of design education and also most significant physical space. The most common environment for teaching are classes where education practicers teach students by lecturing and assigning homework. Whereas, in design studios, students are expected to offer solutions to design problems assigned by the instructor and they learn by working on projects (Oh et al. 2012). Schön (1985) suggests that the studio tradition builds examples of practice and critical reflection on practice, into the core experience of learning architectural design. The studio contains its own traditional events such as “design reviews”, “desk crits” and “juries”, all of which have grown up around the central theme of practice in designing. Besides, all or some of the methods such as problem solving, discussion, individual working, demonstration, case study and lecturing can be conducted in a design studio, which is very unusual in other disciplines (Ketizmen 2003). The unique nature of communication tools and instructional methods used in design education implies that the spatial characteristics of studio environments, unlike common classrooms, should be specialized according to architecture and design education. In traditional architecture and design education, design studio courses take generally place in two types of studios in terms of spatial use: “open design studios” and “cell-type design studios”. The main difference between these types of environment is that one or two project groups have the course in “cell-type design studios”, whereas five-ten project groups share the same space in “open design studios” (Gur 2010). The physical and the psychological characteristics of design studios have a very important effect on design and learning to design activities. Providing indoor comfort conditions of these studios, arranging them according to the applied instructional methods/tools and users’ satisfaction of studio space are directly related to student performance (Yang et al. 2013; Dinç 2007; Demirbaş and Demirkan 2000). In this scope, the object of the research is to evaluate two type of studios through the approach of Post Occupancy Evaluation (POE), to identify their strengths and weaknesses and to develop a combi design studio space organization embodying the strengths of both types, meeting the spatial requirements of today’s design education.
2. THE PERFORMANCE VARIABLES OF DESIGN STUDIO WITHIN THE CONTEXT OF SPATIAL REQUIREMENTS

Post-occupancy Evaluation (POE) is a method of evaluating the performance of buildings and environments that have been established for many years in order to consider the extent to which a building or an environment satisfies the needs of its end users and to identify ways in which design, performance and fitness for purpose can be improved (Turpin-Brooks and Viccars 2006). Performance is typically measured on three dimensions such as technical, functional and behavioral. The first measurement category, technical variables evaluates environmental aspects of the building. However, the second addresses the user’s ability to function effectively and efficiently in the building environment. The third performance criterion refers to psychological and social aspects of user satisfaction and to the general well-being of building inhabitants (Preiser et al. 1988).

There is a few and limited research about the performance evaluation of open and cell type design studios within the context of spatial requirements. A research evaluating the design studios through spatial variables belongs to Dinç (2007). Dinç hasn’t examined the studios as open and cell type; she has come to the conclusions that are valid for both types. According to Dinç, the variable that has the most impact on space-student interaction is the confidence felt for educational/social environment. The second effective variable is perceptual characteristics of studio environment. Dinç suggests that functional and technical factors has no a significant impact on space-student interaction.

Demirbaş and Demirkan (2000) discuss design studios by means of privacy, one of the behavioral variables, in their research. Findings of the research are that students need partitions for more privacy, they place their desks in a way that they can group with their close friends, columns, niches and corners in the place are important for students to make a place for themselves.

Gur (2010) has identified students’ satisfaction with open and cell type design studios’ physical environment and advantages and disadvantages of these studios regarding to their capability of meeting spatial requirements in her research. As a result, Gur (2010) presents the common view of students as “an open design studio with individualized space is the best form of study environment and a flexible arrangement of space within the cell-type design studio will enhance their satisfaction with their working environment”.

Although Stone’s research (2001) isn’t directly related to design studios, it is related to study environment design. Stone (2001) suggests that open-plan studios tend to be more flexible and increase social contact, leading to a loss of privacy and an increase in visual and auditory distractions. Individuals tend to experience a loss of privacy when they move from a private space to an open-plan design and an increase in privacy after moving from an open-plan to private space. In open-plan design, the use of partitions can increase perceived privacy and satisfaction without eliminating the flexibility of the open-plan design or auditory input.

In this research, the spatial characteristics affecting the efficiency of the education that is being experienced by the students who have studied in open and cell type design studios have been evaluated through POE under the subtitles of technical, functional and behavioral variables.

2.1. TECHNICAL VARIABLES

The first of the variables affecting the efficiency of education process in design studios is “technical variables”. Environmental factors of the building affect the process of learning and teaching. A poor performance of learning environment will have an effect on both the understanding of the students and the physical stress of the instructor. Also inadequate lighting and thermal discomfort will have an effect on attention and student’s performance (Krüger and Zannin 2004). Within this context, lighting, acoustics, heating and ventilation conditions affecting the visual, acoustic, thermal comfort and indoor air quality of the users of study environment can be considered as technical variables (Yang et al. 2013). Lighting, the first one of these technical variables, is vital since the design studios are the places where the act of working is carried out. In order to provide visual comfort in design studios, the natural lighting possibility supported with artificial lighting is expected. The artificial lighting should provide sufficient general lighting as well as local lighting in individual student work stations so that the students can fix the lightening level according to their needs. The second technical variable is the acoustic quality of the environment. Designs studios are not only study environments but also a complex social organization. There is a constant informational transfer and communication between the tutor and the students. Besides, design studios are sometimes supported with seminars. Therefore, it is important to control the noise level in regard to acoustic comfort and quality of communication. Dividing design studio working groups with light partitions covered with sound absorbing materials might increase the acoustic quality. The heating
and ventilation conditions of design studios are another technical variable. Optimum heating and cooling level must be provided for thermal comfort in design studio. The necessary ventilation conditions must be provided in order to supply a constant fresh air circulation with regard to indoor air quality; individual control possibility must be provided for users through openable windows (Ketizmen et al. 2002).

2.2. FUNCTIONAL VARIABLES

A product is called functional when the means which are used are suitable for the purpose. With reference to buildings, functionality may be defined as the degree to which the activities are supported by the environment (Voordt et al. 1997). The functional variables in architectural design are issues related with the position and organization of furnishing equipments, their ergonomy, circulation areas and spatial sizes (Demirbaş 1997). In design studios there is a need for individual student workstations where students can work on their own, group critic areas arranged according to collective works and discussions and finally meeting areas required for project presentations, jury critiques and seminars. Moreover, spaces for model making, computer use etc. which are necessary for today’s design studios and a library environment containing up to date professional publications are included in the studio (Ketizmen 2002). The desks used in the design studio must be large enough both for drawing and model making and the seats must be convenient for long working hours, comfortable and ergonomic. The height of the desks and the seats should be fixed ergonomically according to each user for the efficiency of the work (Pheasant 2000). It is important for the functional quality of space that the desks and seats are positioned in a way that do not prevent user circulation in the studio. Likewise, the dimension of design studio is closely related with an efficient education. A highly populated design studio results in communication problems and it decreases the efficiency (Dinç 2002).

2.3. BEHAVIORAL VARIABLES

Another variable affecting the spatial performance of design studios is behavioral variables. The factors that affect behavioral variables are “environmental themes” and “personal characteristics”. Environmental differences and different characteristics of individuals cause different behavioral variables for each user. Two features are expected from a design studio: the privacy needed during designing/drawing and social communication experienced during jury works (Demirbaş and Demirkan 2000). According to Voordt et al. (1997), privacy and social contact are two sides of the same coin: self-determination and freedom of choice in entering into or avoiding contacts. Too little contact leads to feelings of social isolation, too much contact leads to feeling of crowding. Rosenfeld (1977) defines the appropriate learning environment as an environment which provide a variety of stimuli, be adaptive to the student activity and allow for some privacy. There are three types of privacy such as visual, auditive and social or territorial privacy. The design studio should provide a comfortable working environment for all these privacy types and social communication. The most effective solution for this is “flexibility”. It is necessary to create individual working areas allowing some privacy required for design activities for the students. However, since the design studio is the place where the group and jury critics are conducted they are also communication environments. Therefore design studios are working environments that must be designed flexibly so that they can both provide privacy and social contact.

3. METHOD

3.1. PLACE

The research was conducted at Doğuş University Faculty of Fine Arts and Design, with third and fourth year design studio students of department of architecture and interior architecture in open studio (no:9) and cell-type studios (no:2, 3, 4, 5 and 6). The students of both departments use these studios as design studios on different days of the week for eight hours. The open studio is 180m² and hosts 5 project groups. Each of the cell type studios is 45m² and hosts a single or two project groups.

3.2. SURVEY

In the research, a survey prepared as 3 parts and consisting of 20 questions was administered to architecture and interior architecture students only who had this course in both type of studios. In accordance with Post-occupancy evaluation approach, each part of the survey aiming to measure the technical, physical and behavioral performances of open and cell type design studios was about one of these variables. Each variable was separated in components and questioned through 5-point Likert scale. In this survey, the students were asked to determine to what extent open and cell type studios met the aforementioned spatial requirements and they were asked to tick one of the answers “very low (1), low (2), moderate (3), high (4) and very high (5)”. Since it was not possible to
make an analysis based on the features of the participants, the data related to gender and demography were not included in the survey. The survey was applied to students in the middle of 2013-2014 fall term and at the beginning of the design studio course. The number of students who participated in the survey was 52.

3.3. ANALYSIS

In the analysis of the responds, first of all, reliability coefficient was calculated. Therefore, the consistency of values among themselves was analyzed. (α=.75). This value provided the lower limit such as 0.70 identified in literature (Cronbach 1990; Punch 2005). After that, values for each variable were obtained and each component constituting the variable were ranged from the highest value to the lowest value and therefore, the positive and negative components of each variable were identified. The research findings were obtained from the analysis made through SPSS 21.0 packaged software on data gained from participants.

4. FINDINGS AND DISCUSSION

4.1. FINDINGS RELATED TO TECHNICAL PERFORMANCE OF OPEN AND CELL TYPE DESIGN STUDIOS

The research about the technical performance of open and cell type design studios consisted of 5 components. At the end of the research, technical performance of the open design studio was (2.54) and the technical performance of cell type studios was (3.06) in total. In open design studio, the visual comfort (artificial lighting) (Mean=3.25 SD=1.10) and indoor air quality (Mean=3.13 SD=1.29) components got a value over average whereas thermal comfort (Mean=2.27 SD=0.84), acoustic comfort (Mean=2.21 SD=0.93) and visual comfort (natural lighting) (Mean=1.87 SD=0.90) components got values under average. In cell type design studios visual comfort (natural lighting) (Mean=3.38 SD=0.86), visual comfort (artificial lighting) (Mean=3.25 SD=0.78), thermal comfort (Mean=3.19 SD=0.90) and acoustic comfort (Mean=3.12 SD=0.83) components got a value over average whereas indoor air quality (Mean=2.38 SD=0.91) component got a value under average. The values related to technical performance of open and cell type studio environments are shown in figure 1 and 2.

4.2. FINDINGS RELATED TO FUNCTIONAL PERFORMANCE OF OPEN AND CELL TYPE DESIGN STUDIOS

The research about functional performance of open and cell type studios consisted of 10 components. At the end of the research, the functional performance of open design studio was (2.97) and the functional performance of cell type design studios was (2.28) in total. In open design studio, jury-meeting possibility (Mean=3.90 SD=1.05), group working possibility (Mean=3.73 SD=1.03), dimension of the studio (Mean=3.69 SD=1.02), ease of circulation (Mean=3.52 SD=1.12), comfort of seats (Mean=3.00 SD=0.65) and comfort of drawing desks (Mean=2.98 SD=0.63) components got a value over average whereas computer using possibility (Mean=2.46 SD=1.07), individual working possibility (Mean=2.44 SD=0.91), model making possibility (Mean=2.42 SD=1.09) and library using possibility (Mean=1.71 SD=0.72) components got a value under average. In cell type design studios individual working possibility (Mean=3.73 SD=1.17), comfort of drawing desks (Mean=2.62 SD=0.71), comfort of seats (Mean=2.60 SD=0.74) and ease of circulation (Mean=2.35 SD=0.81) got a value over average whereas group working possibility (Mean=2.27 SD=0.75), dimension of the studio (Mean=2.06 SD=0.93), jury-meeting possibility (Mean=1.90
SD=0.93), model making possibility (Mean=1.88 SD=0.73), computer using possibility (Mean=1.85 SD=0.69) and library using possibility (Mean=1.40 SD=0.53) components got a value under average. The values related to functional performance of open and cell type studio environments are shown in figure 3 and 4.

4.3. FINDINGS RELATED TO BEHAVIORAL PERFORMANCE OF OPEN AND CELL TYPE DESIGN STUDIOS

The research about the behavioral performance of open and cell type design studios consisted of 5 components. At the end of the research, the behavioral performance of open design studio was (2.78) and the behavioral performance of cell type design studios was (2.87) in total. In open design studio, social contact (Mean=3.87 SD=1.06) and communication (Mean=3.63 SD=1.01) components got a value over average whereas order (Mean=2.44 SD=0.75), possibility to make a corner (Mean=2.08 SD=0.88) and privacy (Mean=1.92 SD=0.81) components got a value under average. In cell type design studio privacy (Mean=3.52 SD=1.21) and possibility to make a corner (Mean=3.46 SD=1.22) components got a value over average whereas communication (Mean=2.73 SD=1.03), order (Mean=2.37 SD=0.84) and social contact (Mean=2.31 SD=0.80) components got a value under average. The values related to behavioral performances of open and cell type studios are shown in figure 5 and 6.

4.4. DISCUSSION

In this subtitle, the reasons for the findings obtained at the end of the survey have been discussed. The comparative evaluation of the strengths and weaknesses of open and cell type design studios has been used as pre-data to suggest a combi design studio having the strong features of both studios. Within this scope, why 3 spatial performance variables and components constituting each of these variables have been assessed either negatively or positively for open and cell type design studios have been interpreted as:

With regard to technical performance;

-Visual comfort (natural lighting) component has got a positive value for cell type studio whereas it has got a negative value for open studio. The reason for this might be that cell type studios are provided with controlled natural light whereas open studios due to their depth of plan (10 m.) are provided with natural light which might not reach to the deep parts of the studio.

-Acoustic comfort component has got a positive value for cell type studio whereas it has got a negative value for open studio. The reason for this might be that cell type studios are well-insulated and have a smaller area which does not vibrate easily.

-Indoor air quality component has got a positive value for open studio whereas it has got a negative value for cell type studio. The reason for this might be that cell type studios are well-ventilated and have a smaller area which does not accumulate dust easily.

-Group working possibility component has got a positive value for open studio whereas it has got a negative value for cell type studio. The reason for this might be that cell type studios are well-equipped with furniture and have a smaller area which does not vibrate easily.

With regard to functional performance;

-Individual working possibility component has got a positive value for cell type studio whereas it has got a negative value for open studio. The reason for this might be that students can easily study in cell type studios during course hours and in their free time, whereas students might have concentration problems while they are developing their design individually in open type studios due to the reason that these studios have no individual spaces reserved only for them or spaces divided by partitions.

-Group working possibility component has got a positive value for open studio whereas it has got a negative value for cell type studio. The reason for this might be that cell type studios are well-equipped with furniture and have a smaller area which does not vibrate easily.
With regard to behavioral performance;
- Both privacy and possibility to make corner components have got positive values for cell type studio whereas they have got negative values for open studio. As far as it is observed, in cell type studios, the students can make a corner for themselves by putting their personal stuff such as bags, drawing materials etc. as borders thus they can work individually without being interrupted by external factors. However, in huge volume of open type studio since the students do not have individual working spaces, they don’t have the chance to make a corner for themselves and have privacy.
- Communication and social contact components have got positive value in open studio whereas they have got negative value in cell type studio. The reason for this might be that in cell type studio a single group can work whereas in open type studio, many groups have the chance to work altogether in one space.
- Order component has got a negative value for both studio types. This component is one of the most significant behavioral components to obtain efficiency from working and learning activities. The fact that students feel lack of order in both studios and this might be considered as a result of all technical, functional and behavioral malfunctions.

5. A SUGGESTION FOR A COMBI DESIGN STUDIO

The different education philosophies of design schools and different instructional methods of tutors create different spatial requirements with regard to studios. Besides, the developing technology and new learning methods come up as data which change the spatial requirements of the studios. Today, design studios are not only environments of information transfer and social contact, but also the social organizations where creativity is stimulated. The most important reason for this is the fact that they provide different environments than traditional design studios with regard to tutor-student communication, information acquisition and instructional methods. In opposition to being a physical place where design information is defined and transferred through clichés and patterns, a design studio is a place where new design information and ideas are created all together; it is a collective and productive environment (Paker Kahvecioğlu 2007). The unifying effect of the physical environment plays a significant role in this collective environment. Within this scope, the traditional cell type and open design studios where only critics are made can be changed into combi design studios to meet the spatial requirements of new education methods and tools shaped with technology. A combi design studio is meant to be a flexible space incorporating both open and closed spaces. Within this scope, considering aforementioned spatial requirements and findings obtained from survey, a combi design studio combining the strong sides of both open and cell type studios might be developed. The spatial characteristics expected from combi studio with regard to technical, functional and behavioral aspects are identified below:

Spatial characteristics with regard to technical variables:
Having a plan depth enabling the access of controlled natural light,

Providing the local lighting possibility for individual working spaces in addition to sufficient general lighting,

Dividing the different work places with light and flexible partitions covered with sound absorbing materials,

The use of combi studio providing individual control over heating, cooling and ventilation conditions can be offered.

Spatial characteristics with regard to functional variables:

- Design education is a problem solving focused education. There should be flexible places for desk, group and jury critics which are accepted as communication tools in design studios.
- Since design studios are also the places where students work in their free time, there is a need for individual working spaces divided from each other with light separators and these spaces should have ergonomic desks and seats.
- In today’s design studios, the projects can be supported with seminars; the project juries can be realized at the end of the term and projects can be exhibited. Within this frame, it would be beneficial to create a meeting place with a necessary sound insulation in the design studio space.
- The possibility to access sample projects can be provided by separating a small area for virtual or a real library.
- “Over the past decade there have been extensive applications of computer and information technology in design pedagogy. This has led to the emergence of several underlying trends, such as paperless studio and the virtual studio” (Salama and Wilkinson 2007:309). Due to these new trends shaped by the developing technology, the traditions of design studio go into a change, which makes computer use obligatory.
- Another trend applied in today’s design studios is “learning by building” approach. Similar to architecture practice, in “learning by building” approach, first of all, the idea is put forward; the idea is concretized and becomes three dimensional; the space is experienced and if necessary, it is possible to go back to idea and restart the process (Carpenter 1997:8). This approach requires working spaces for students to work with models and storage places.

All these environments, being in a single volume but divided with light partitions change the design studios into a laboratory and places of communication in accordance with today’s design education approaches.

Spatial characteristics with regard to behavioral variables:

Today, due to the changing trends in design education, design studios have become creative places of communication, cooperation, interaction, participation and production of new information. The students also use design studios for individual work in their free time. Combi studios can provide the possibility to communicate and share while the students are developing projects and it can also provide order and privacy while the students are working individually. In combi studios, all students can participate in critics, make models, watch seminars all together and they can also work individually in working spaces divided with partitions.

6. CONCLUSION

The studios, where the design studio courses known as the core of architecture and design education are carried out, have a significant role in the effective execution of these courses. Open and cell type studios hosting traditional design studio courses up to now, do not completely meet the requirements of today’s design pedagogy. In this research, first of all the technical, functional and behavioral requirements of studios in today’s architecture education are identified and the extent to which traditional open and cell type studios meet these requirements have been investigated through POE survey applied to the students. At the end of this research, a suggestion for a combi studio incorporating the strong features of open and cell type studios has been developed. In today’s design studios, it is fundamental that the design information is produced by tutor and students together. Moreover, the tutors, due to nature of architectural education, apply a mix system combining many instructional methods instead of a single one. Therefore, designing studios, as combi studios fulfilling the need of constant communication plays an important role to meet spatial requirements of all methods. In this context, a space organization for combi design studio is suggested. This design will have working and individual working places divided with flexible partitions providing the possibility for seminars, critics, model making, library and it will also provide social contact and communication for students in a single volume. Moreover, it will meet the need of privacy and to make corners through individual working spaces.
divided with separators. The developing technology, the changing education methods and materials make the nature of architecture education much more dynamic and this shifting structure requires more flexible design studio spaces.

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A SOCIAL RESPONSIBILITY DESIGN PROJECT FOR CHILD-FRIENDLY INTERIORS.

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Abstract
Interior design is a process which collaborates different approaches, strategies, methodologies and practices. This study is a social responsibility project which had been conducted under the supervision of the author and the authorities of The Educational Volunteers Foundation of Turkey (TEGV). The purpose of this project is to investigate how effective the integration of knowledge-based sessions and research-project development phases, while trying to increase students’ motivation. The project had been regenerated twice, in 2014 and 2015 spring terms, during which the visual research method was photographing, computer modelling, interviews with authorities and children. In regard to the mission of the foundation, twenty-eight interior design students (in 2014 spring term) and seventeen students (in 2015 spring term) developed concept sheets, prepared design proposals, presented and submitted them to the authorities. This paper is a brief discussion and evaluation on the design process which may help to provide a base for similar social responsibility projects. Design proposals in the study may also help to identify new research questions such as whether/how changes in social, physical and cognitive concerns may influence the psychological reactions to educational activity centers and how such impacts may help enhance the affective quality in designs where necessary. In the project, each project team was asked to develop a concept map and to identify the most important words. It was recorded that all groups used “children” as the main keyword in their concept maps. Hence, the most frequently referred terms in the concept maps were grouped, analysed and interpreted, which can also be defined as the “concept map” of the project. Another concrete outcome of the study was the encouragement of students, they got involved in the design process equally. They were honoured by “TEGV social responsibility certificates” which supported their awareness and motivation to the design process as well.

Keywords: Child-friendly interiors, Social Responsibility Project.

INTRODUCTION
Jormakka (2008) has indicated that, design is a process which collaborates different approaches, strategies, methodologies and practices. Technical and economical conditions are affective on design process, while on the other hand, design is grounded in methodological principles that reflect various models, process and attitudes into a coherent whole. The design education provides a platform where students start to acquire a sense of decision making and getting responsibility. As Kolb (1984) has suggested, at the most general level, students engage in activities to produce suitable response to a particular design problem and in skilful execution. A design studio setting with multiple sources of information leads students in social interaction and dialogue. The design studio experience is the most important part of the design education which helps to encompass many learning and synthesis opportunities.

Some scholars have indicated that understanding how a student’s approach to learning new information, technology and how to visualize solutions during the design process is of high importance. (e.g., Demirbaş and Demirkan, 2007; Uluoğlu, 2000). During the design studio, the main focus is on the design process including distilling, analyzing and synthesizing, abstract and holistic thinking, critical thinking, decision making, problem solving and drawing (Harpe, 2009). Hence, assimilation of knowledge through decision making and problem solving process enables students to have a number of observations and to bring up thoughts into an integrated whole.

As explained in Orr et al. (2014), the process in design education - experience is a project centered learning which has three sub-categories pertaining to different aspects namely; sharing responsibility for learning, expertise, meaning making and managing diverse feedback. Meanwhile, parallel to the discussions by Lee (2014), the collaboration process in design is closely related with the design process for creative artefacts. The major design phases are; analysis of the task, conceptual design, embodiment design and detailed design.
Children are highly motivated to interact with surrounding environment, they learn via interaction with the physical and the social environment. In their study, More et al (1994) claimed that the overall quality of the interaction with the environment depends on engagement possibilities with the environment as well. Moreover, Gür (2014) studied the impact of physical and environmental factors at child development centers via questionnaire. The study underlined that, design should be away from formality, the environment shall be warm, inviting and comfortable for children, parents, as well as the staff. The interior design should look homey as well. The general image shall also provide safe playing, possibility for activities that enhance a child’s bodily and mental development, disciplined with amity, it shall not be boring. There should be a family environment with discipline, warm and understanding, friendly, a clean and well-cared atmosphere, a place that can make a child feel like an explorer, free and happy.

In addition to field studies, in order to understand children needs, cognitive development issues shall be studied as well. Several different paradigms have been proposed for understanding individual differences in cognitive development (Goswami, 2014). In his book, Goswami discussed the following issues; Sternberg made a detailed analysis on the paradigms by studying individual differences in cognition and underlines the importance of various ideas, tests and models. The education models have been settled on models as useful characterizations of individual differences in cognitive abilities. The same reference addresses to the Gardner’s view of the mind which is based on modularity. Modularity theorists believe that different abilities can be isolated as emanating from distinct portions or modules of the brain. However, today there are multiple kinds of intelligence beyond those suggested by Gardner, as explained in detail by Goswami (2014). Another pioneer in the field Salovey and Mayer (1990) have suggested the existence of emotional intelligence which involves the child’s ability to understand and regulate one’s emotions, social intelligence which is a form of intelligence used in interacting effectively with other people, practical intelligence which is the ability to function effectively in everyday life. It can be stated that, clearly psychological concepts of intelligence are becoming much broader than they were a few years ago (Goswami, 2014).

Today’s approach in designing interior spaces for children covers these paradigms and models. As well known, children play in different ways according to their own interests and abilities. Related literature addresses the role of play on the physical, social and cognitive development of children (Shackell et al., 2008). Playing activity lets children to improve their personality and helps to communicate with social environment as well. Researches prove that children behaviors are determined by psycho-social environment more than personal characteristic such as personality and intelligence (Moore, 1986; Senda, 1992; Olalaye et al, 2009). Therefore, the physical learning environment should be more inspirational, challenging and provoking. This is possible by utilizing suitable architectural elements, by designing and developing playgrounds in the service of children. Dudek (2007) believed that designed elements with their texture, sound, light and color shall challenge and inspire children. It shall have a user-centered approach with qualitative techniques, such as product personality profiling, mood boards and visual product evaluation. McDonagha et al., (2002) claimed that an environment which is designed for children shall involve child centered specially designed playground modules. Typical educational models lead students to

- learn concepts from working with materials, rather than by direct instruction,
- have freedom of movement within the classroom
- help young children to gain practice in language and shed light on cognitive learning
- promote independence, curiosity, decision-making, cooperation, persistence, creativity, and problem solving

which are the fundamental skills that help to determine success in adult life. Meanwhile, in these educational models child-centered learning is at the core of the system (Figure 1 is taken from a typical kindergarten classroom where social projects, motor activities of the children are supported by group work). As Abbas and Othman (2011) discussed, there is universality among preschool children social behaviours, wherein they tended to exhibit significantly more appropriate behaviours.
when spaces are more well-defined as compared to those which are more poorly defined, in both urban and non-urban locations.

**DEFINING THE PROJECT**

Discussions by the pioneers in the field are precisely studied for Design Proposals for TEGV Education Park. This is a project which underlines the importance of designing child-friendly environments and it is a voluntarily activity. Students practiced a real design problem, they improved design proposals by 3D modelling and presented the final case to the real authorities. Meanwhile, it is aimed to practice the assimilation of theoretical knowledge through decision-making, problem solving and developing ideas while improving a child friendly environment. Hence, different education models and children needs are studied in order to develop a concept map.

The Educational Volunteers Foundation of Turkey -TEGV is a foundation which creates, implements educational programs and extracurricular activities for children aged between 7-16. The foundation aims to acquire skills, knowledge and attitudes, whilst supporting children’s development as rational, responsible, self-confident, peace-loving, inquisitive, cognizant, creative individuals. TEGV implements unique educational programs, with the support of its volunteers, in the Education Parks, Learning Units, Firefly Mobile Units, City Representative Offices and in primary schools through the Support for Social Activities Protocol (TEGV-Educational Volunteers web site, 2016).

Educational activities involve programs for developing life skills in children by using child centered educational methods. Also, it is intended to support these educational methods by active learning environments for different age groups. This is not a preschool, nor a primary one, but it shall be a specially designed building to serve for extra curricular activities. Also, planned activities are completed at different activity zones at the same time. These are some of the critical issues that are taken into account all through the planning process.

**The Participant Group, Project Phases And Concept Mapping**

A group of juniors from the Department of Interior Architecture Department attended the course and involved to this project with the following topic; “How to design a child-friendly environment? How to improve the interior quality?” In 2014 spring term, twenty-eight students participated the course, while in 2015 seventeen students attended the classes (the quotas of the elective course were filled in both years).

In the integrated design process, concrete goals and tasks were not defined to the students. Instead, they defined their own tasks by themselves through analytical researches on the selected building. As an introduction to the course, child friendly design themes and concepts were all identified, analysed and presented. Typical educational buildings’ design proposals in regard to educational models such as Montessori, High Scope weee introduced, concepts such as “emotional intelligence and social intelligence” were all discussed and a series of studio-based lectures were presented before visiting the TEGV Building and meeting with authorities and children.

Breakdown of the design phase, together with the role of the instructor can be seen in Figure 2. The design process is similar to most of the project solving issues; the role of the instructor covers the whole process. The design project team followed a series of steps during the design process. A list of issues are evaluated orderly; such as the success in the integration of the project topic to the developed concept, effectiveness of design drafts and collaboration with the authorities, as well as the final presentation and portfolio submission to the authorities.

Students worked in groups which was defined as a project team. Each project team completed conceptual design studies in regard to the interviews with the authorities and the children at the educational building (Figure 2). This interactive study provided intergroup management as well. During the interviews, children were asked to define their most favourite color(s), hero(s), game(s). Children stated color(s) of their favourite football teams, such as red and yellow, blue and yellow which are all brilliant and saturated colours. Superman, Spiderman and Batman were indicated as fascinating, hence they influence childrens’ lives. Also, entertaining cartoons like Tom and Jerry, Garfield are some of the most favorite cartoon(s) of the children. Sometimes, children get too much
indulged in this world of fantasies that they do not want to come out of it. They found digital reflections on walls with these heroes fascinating. The TEGV authorities were asked to indicate their needs in regard to planning issues at circulation areas and corridors, learning units and activity zones. These were recorded and considered at the planning stage.

ANALYSES, DESIGN PHASES AND SPACE PLANNING ISSUES

The project topic considers a two-story building with different space planning problems inside. This building is used as a learning and activity center for a group of children at different age groups. Major planning issues of the design project can be grouped as follows;

- circulation areas and corridors which are used for as exhibition and socializing area
- learning units which are used for classrooms for extracurricular activities
- activity zones which are used for social and scientific research, improves curiosity and creativity.

Space planning issues such as building service and sanitary systems, management units such as the director’s office are overestimated in this project and no design proposals have been improved for these units. In the paper, some of the projects which are developed throughout the course are introduced and discussed with a special focus on concept maps and design proposals.

Circulation areas and corridors - The main entrance to the building is through a corridor where posters, pictures and TEGV news are placed on the walls irregularly, no special colour palette is applied, the general lighting system is supplied by 60x60 cm cold color tubular fluorescent tubes with low colour rendering indexes. Floor coverings are achromatic ceramic tiles, which are used all through the building. There is not a child-friendly environment at the entrance floor and the main entrance is not designed properly.

Design proposals were developed in regard to the analyses of various education institutions’ interior design qualities. For example the symbolic meaning of bright green at corridors was selected accordingly. Bright green made the space intimate and enjoyable (similar to the corridors at Artek Arquitectura which was constructed in 2004 as illustrated in Canizares (2008)). Meanwhile, the power of colour at space perception shall not be underestimated. In addition, the lighting system needs to be designed in order to fit in with the overall concept of the interior environment (Bean, 2004). Figure 3 illustrates the concept map of this project team; the term unity was their starting point, which was integrated with harmony, integrity, cosy atmosphere, colourful interior, having its identity. Throughout the project development stages, children was the main keyword of the concept map and the whole project.

The final design proposal helped to offer unity, integrity and identity for the main entrance, circulation areas and corridors. The corridors were thought as enjoyable areas where students’ paintings, posters and TEGV news could be exhibited in an organized way. To improve the interior design quality and to realize this idea, a dinozour figure was selected as a metaphor. The dinozour figure was used as a wall pattern, which was multi-functional having art-works exhibition units with their own lighting fixtures (LED spots movable and rotating on an electro-ray system). Hence some of the articulations were used as children waiting area, music listening units, puzzle solving boards, magnetic painting wall units et cetera (Figure 4).

Colours were selected in regard to their psychological meanings and colour-mood associations as well. The selected colour palette had highly saturated colours with medium values. The positive connotations of colours green, yellow and orange were studied and selected on purpose. It is intended to design a cheerful, colourful, enjoyable and a vivid entrance space. The corridor was also intended to be used as a socializing space for various activities. This proposal was indicated as very useful and affordable, the TEGV authorities asked for sponsorships in order to realize the project.

Learning units - Learning units shall capture the attention of children. These spaces shall be useful...
to perform various extracurricular activities. Hence, the same space shall lead to various functions such as writing, reading, painting, organizing workshops et cetera. As pointed in Hallam et al (2014), children generally speak positively about art and they are satisfied with art lessons which are practiced in group working. This concept brought up the idea of open-spaces and open-classroom idea for learning units. An open classroom allows students to learn in various ways while considering their individual differences. Instead of seating in rows regularly, students perform visual and audial activities by flexible and modular units which are effective to useful for teaching and learning strategies.

In Figure 5, a module is illustrated and presented as the basic unit of the playing-cube. Seating and playing units were made up of colourful pieces, these could be re-organized, which in turn made a flexible and a modular interior space planning. The project team kept children as the keyword again, with the following words; creativity, flexibility, open classroom, colourful interior, modular solution which is free from boundaries.

In the proposal for the learning units, children’s colour preferences and correlations between colour attributes were studied as well. Interviews with children on colour preferences were considered while practising design proposals. Red, blue and yellow with high saturation were selected and applied at the 3D modelling stage.

While designing an interior space, visual perception is very important and vertical surfaces take the attention of users. In one of the design approaches, walls of a classroom (defined as learning unit in the project), which are adjacent to the corridor, has been designed by niches. These niches are thought in different sizes which could provide seating and reading units for children during break-time (Figure 6). Walls were designed as exhibition

Figure 4. Corridors, proposal for exhibition units (3D modelling by V. Uludağ, R. Aydın, N.Boydan).

Figure 5. Designing a play-cube as a learning unit (3D modelling by N. Çınar, İ. Özcan, L.Aydın).

Figure 6. Classroom walls designed to seat, read and study (3D modelling by A. Yedikardeşler, S. Kurel, A.Z Yurttaş, B. Bıçar).

Figure 7. Music making center illustration (3D modelling by L. İlhani).
units where art and craft works, as well as posters could be placed. Specially selected terms that were used in the concept map are, wall design, read and rest during free time, colourful classroom to improve curiosity, enjoyable interior space. The project team tried to keep the close loop with children throughout the process.

**Activity zones** - In the project, concept development is improved for different activity zones. One of this is music making center and the other one is little inventors’ area. In music making center, the inspiration was from the order and the rhythm at music, followed by a colourful, interactive and multi functional interior space.

Apart from visual and plastic arts, music is another art performing activity. It touches on all learning domains, including the psychomotor activities and cognition. In other words, music helps the development of skills, the acquisition of knowledge while supporting environmental sensitivity. In Figure 7, present view and the design proposal are given together. It is suggested that, students can learn musical notes by the help of colours. Each colour corresponds to a different note that appears either on tables or walls. There is a LED wall which is designed to visualize important knowledge about music and musical instruments, as well as the reflection of cartoon characters suggested by the children. Apart from this, storage items were designed for books and documents related to music. Colour palette and furniture selection were based on children and authorities views.

The other activity zone was little inventors’ area. This area was intended to be an innovative and stimulating place of learning that would inspire children, with a reference to the Astronomy Classroom, designed by Studio E Architects in United Kingdom illustrated in Canizares (2008). In the present project, this area was designed as a scientific research unit, where students could conduct experimental studies. Students could study in groups as well as under the supervision of a scientist. They could study geography and/or biology. Studio-based lectures could be presented, discussions and debates could be generated. The built-in and movable furniture units were selected in regard to the colour inspiration of the user group and the needs of the TEGV authorities again. Figure 8 illustrates the concept map of the project team and the finalized 3D modelling. The inspiring term was “creativity, followed by colourful interior, enjoyable space and an interactive interior space”. Similar to the other presented project, “children” was the main keyword.

**ASSESSMENT CRITERIA**

Throughout the project, including the first collaboration in 2014, followed by the one in 2015 spring term, the issues concerned and the questions asked at the assessment stage are as follows;

Is the design topic analysed carefully and is it deduced from a multidisciplinary approach?

Are the roles of each project team member distributed equally?

Are all of the project team members get involved in the design development process?

What is the integration of the final design proposals and project presentations with the concept map?

What is the degree of completion for the issues?

Could the design problem be solved?

What is the degree of communication of the project team members to the Educational Volunteers Foundation of Turkey –TEGV team (children and the authorities)?

During the project, every member in each project team investigated and discussed the needs of a child-friendly environment firstly. This phase was completed by site visits, photographing, interviews, sketch making and presentation. All design proposals were tried to be deduced from a multi-disciplinary approach which was improved by TEGV authorities. It was intended to distribute the roles of each project team member equally. Every project team member tried to improve the selected idea and was encouraged to get involved in the design process equally.

A special care was given to the concept development, final design proposals and presentations were evaluated by means of their integration with the concept map. Student presentations were assessed in regard to their originality, completeness, (furniture, finishing, colour palette et cetera),
considering the boundaries of the physical space, improving the interior design quality both physically and psychologically. The degree of their communication with TEGV team was considered as well.

In the last session, TEGV authorities were invited to the studio-class and each project team presented their portfolio(s). Discussions on the projects made valuable arguments, ways to realize the design proposals were discussed. Finally, TEGV authorities prepared and presented certificates to the students.

CONCLUSION

The overall aim of a child-friendly interior is to design child-centered activities which are highly motivating and educating. In the project, interior spaces (circulation areas and corridors, learning units and activity zones) were intended to be designed similar to the suggestions by McDonagha et al., (2002). Throughout the project, design proposals were tried to be parallel to the suggestions by Dudek, 2007; Moore, 1986; Senda, 1992; Olaleye et al, 2009. In this strategy, an interior shall lead children to learn concepts from working with materials rather than by direct instruction (learning units and activity zones), children shall have freedom of movement within the building (circulation areas and corridors, learning units), an interior space shall help to improve cognitive learning, promote independence, curiosity, decision-making, cooperation, persistence, creativity, and problem solving (circulation areas and corridors, learning units and activity zones).

Apart from practising a real design problem, throughout the project, care was taken to improve students’ motivation. It was observed that, there was an effective integration and collaboration in design education, integration of knowledge-based sessions and research-project development phases were effective. Hence, the success can be seen at the project scores (decided together with the foundation authorities). The official grading system of the University uses letter grades with pluses and minuses for performance scores. Passing grades range from ‘A’ to ‘D-’ and letter ‘F’ is the failing grade (student must repeat the course). Both in 2014 spring and in 2015 spring, none of the students got F grade. In 2014, there is only 1 student (3,57%) with grading D-, who did not attend to the courses regularly and could not finalize the project. Also, in 2015, there is only 1 student (5,8%) with grading D+, who attended to the courses several times, but could not manage to complete the project phases. In 2014 spring 15 people out of 28 (53,57%) achieved A grade and 9 students out of 28 (32,14%) got A-, whereas in 2015 spring term, 9 people out of 17 (52,9 %) achieved A grade and 4 people (23,5%) got A-. Students having grades above C were honoured by TEGV social responsibility certificates.

The outcomes of the process can be summarized as follows:

- Students practiced a real interior design problem for the first time, they were in co-operation with children, as well as with real authorities,
- Students were highly encouraged to get involved in the design process equally. They were honoured by “TEGV social responsibility certificates” which supported their awareness and motivation to the design process as well.
- Design proposals in the study may also help to identify new research questions such as whether/how changes in social, physical and cognitive concerns may influence the psychological reactions to educational activity centers (regarding furniture type, colour scheme ) and how such impacts may help enhance the affective quality in designs where necessary.
- TEGV authorities took care of some of the design proposals, they asked for sponsorships to realize the projects.
- Each project team used “children” as the main keyword in their concept maps. The most frequently used terms in the concept maps are analysed and grouped, which is defined as the “concept map” of the design study (please refer to Figure 9).

The concept map indicates the relationship of the terms to each other, hence all terms are closely related to “a child friendly space”. The concept map may challenge a number of similar project works as well. These efforts and discussions may contribute to designers at their design development stage for a child friendly space. Further studies may be carried out by conducting activities with children, for instance ask them to take part at the final jury presentations.
Acknowledgments

Special thanks to the authorities of TEGV for their valuable collaboration, and to the students who completed the project and also submitted their projects for publication.

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Abstract
Konya developed as a city with a single centre in historical period, the mound (höyük) known as Alaeddin’s Hill. This is still the central feature of the urban settlement of Konya. The tomb of the great humanist, poet and philosopher, Mevlana Celaleddin-i Rumii, is also here. The most prestigious section of Konya during the Seljuk and Ottoman periods was the Konya Türbeönü, the space in front of his tomb. The historical city centre maintains its liveliness in the area between Alaeddin’s Hill and the tomb of Mevlana. This historical city centre is the most accessible area in the city and functions fully as such while bearing its historical identity.

The transformation of Konya from single-centred city to multi-centred city resulted in considerable changes in the city’s silhouette. The Konya Türbeönü Square was redesigned and presented for use. While defining the effect of outdoor spaces on human life, they are evaluated as places that meet basic physical, social and psychological requirements. Since the planning process of the Konya Türbeönü Square was not participative, it has remained a focal point of intense discussions and debates about its meeting users’ needs have arisen.

This article studies user satisfaction with the design of the Konya Türbeönü Square and investigates the effects of changes on users. The study survey, asked for demographical information about the users, the sensorial effects of the outdoor space, the effects of its landscape and general satisfaction. The questionnaire was administered to 300 people, including 100 architects who are educated in designing, shopkeepers who are interaction with this area everyday and laypersons. Evaluating the questionnaire data revealed the physical landscape quality and the behavioural and functional qualities of the users along with the visual qualities of the historical urban square’s former/older condition. This study aims to show how participative planning can improve future projects.

Keywords: Aesthetics, Visual Quality Evaluation.

1. INTRODUCTION

Urban spaces are unchanging compositions that organise spaces. What is urban, on the other hand, are human practices against the visible form of cities. It is not stable, but variable. The urban is the dynamic side of the city. The concept of aesthetics of the urban evaluates that which is stable and has already been designed, while the concept of urban aesthetics is appraised on the basis of legibilities that are transformed by human practices. Aesthetics is one of the most important elements of cities, which are historical human products that bear all the technical and poetic dimensions of art and culture (Erzen, 2010). According to urban theorists, space is shaped by activities, concepts and physical behaviour, and all these are associated with the aesthetic dimension of the city (Montgomery, 1998). The principles of aesthetics have long been studied by philosophers, designers and researchers. When the principles of aesthetics are interpreted by mathematics, methods linked to physical stimuli and human reactions are used (Wohlwill, 1976). The interpretation of urban aesthetics is associated with environmental perception (Nasar, 1998).

Environmental aesthetics consider the environment as a whole that is perceived and experienced by the human senses. The environment causes human reactions, and these reactions influence the behaviour of humans in an environment.

Seeing the environment as a whole and conceiving of humans and their environment as an inseparable whole is the main principle of environmental aesthetics. If aesthetics is related to the human senses and wholeness, urban aesthetics then is based on the idea that humans are connected to their environment by their reason, senses and bodies. In addition to being part of nature, humans are unified with the environment by perception. Rather than being passive observers, humans are active subjects experiencing their environment and participating in it. From this perspective environmental aesthetics is in related to phenomenology and psychological theories of perception and cognition (Erzen, 2006). Lynch developed a theoretical and methodological framework on the concepts of image and cognition using Gestalt psychology’s theories of perception. In this method, subjects conceive of their urban environments based on the analysis of images they produce in
their minds, and urban imageability is calculated quantitatively. Lynch (1960) asserts that the urban image is constructed with the help of five urban elements: paths, edges, nodes, districts and landmarks. The imageability of an urban element is directly related to its legibility. Legibility is not only related to subjects’ sense of vision, but also linked to the other senses (Pallasma, 2011). Merleau-Ponty (1997) asserts that humans conceive of their environment using five senses, perception and intuition. They communicate with the environment and are unified with it. Lynch defines the concept of imageability as a physical object’s ability to create a powerful image for the observer. Form, colour and composition enable the identification of environmental image, its concrete structuring and its utilisation (Lynch, 2010). An environment becomes distinguishable from others by having a legible order, a structure and a sense of place (Shulz, 1984).

Singularity within unity (Bosanquet, 1892), order and diversity (Berlyne, 1971) have been studied by theorists. Using factor analysis, Canter (1969) concludes that aesthetics is the main factor for architects and non-architects. Lowenthal and Riel (1972) analysed people’s concepts of beauty, ugliness, satisfactions and dissatisfaction using repertory grids and identified the main factor as satisfaction. Visual quality also affects human behaviour. Researchers (Griffin et al., 1969; Moslow and Minz, 1956, Samuelson and Lindauer, 1976), have studied the effect of diversity on aesthetics empirically. Russel and Ward (1982) relate aesthetics to changes of scale in an environment. Kaplan (1982) created a preference framework for aesthetic analysis. In this framework, he defines environmental qualities on the basis of time (with concepts such as consistency, complexity, clarity and mystery). Heath claims that spaces with high aesthetic quality will become the landmarks of the city (Heath, 1988). At the same time, he underlines the importance of symbolic architecture, or putting symbols in environment using five senses, perception and intuition and composition enable the identification of environmental image. Imageability as a physical object’s ability to create a powerful image for the observer. Form, colour and composition enable the identification of environmental image, its concrete structuring and its utilisation (Lynch, 2010). An environment becomes distinguishable from others by having a legible order, a structure and a sense of place (Shulz, 1984).

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Konya is a historical settlement area. It has been the home of many prehistoric and historic civilisations. The city has been built up around Alaeddin Hill since the time of Seljuks. As an old burial mound, Alaeddin Hill has been a landmark for many years. In the time of Seljuks (thirteenth century) the settlement developed around Alaeddin Hill. During the Karamanid dynasty (fourteenth century), urban development spread to the hill’s western and northern slopes, and in the Ottoman Period (fifteenth to seventeenth centuries) the settlement expanded to its eastern and north-eastern slopes. From the seventeenth to the nineteenth centuries, settlement intensified on the southern and south-eastern slope of Alaeddin Hill. The Tomb of Mevlana and its surroundings began to be the most popular area of the city during fifteenth and sixteenth centuries.

Old transportation arteries have an important effect on the crystallisation of the borders of the historical city centre. Konya developed as a single-centred city. Its business districts are located on and around Alaeddin Hill. The historical city centre is located between Alaeddin Hill and the Tomb of Mevlana, on the southern side of Mevlana Avenue, which is the city’s most important transportation artery. It is home to numerous historical buildings: Şerafettin Mosque, İplikçi Mosque, the Town Hall (from the Ottoman Period), the Post Office, Ziraat Bank (Agricultural Bank) and the Tekel Building (Republican Era). Aside from its historical identity, the historical city centre is still the most accessible area in the city and still functions as the city centre. The Tomb of Mevlana Celaleddin-i Rumî, the prominent Sufi philosopher and poet, not only contributes to the importance of the square, but also gives its name to the area. Rumi still influences many scientists and theorists with his poems and philosophy. The Mevlana Dergahi (Türbeönü) area’s importance is not only visible to the inhabitants of Konya, but can also be sensed by visitors

2. “KONYA TÜRBEÖNÜ” THE HISTORICAL URBAN SQUARE

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who come to see the Mevlana Dergahı (Mevlana Dervish Lodge). The structures that form the külliye and Kubbe-i Hadra at the top are the symbolic structures in both Konya and Turkish-Islamic architecture. Kubbe-i Hadra is the symbol of Seljuk and Ottoman enlightenment and Mevlana’s humanist principles of peace and tolerance (Karpuz, 2007). Each year, thousands of visitors come to visit the tomb, increasing the square’s use. At the same time, the presence of The Sultan Selim Mosque at the square results in the utilization of the square as a prayer area at the moments of Friday prayers. Over time the square was modified slightly, but in 2012, the square was radically transformed by the Konya Türbeönü Square Renovation Project of the Greater Municipality of Konya. This study investigates this landscape and the sensorial effects of its renovation on users before and after the renovation.

3. METHOD

A questionnaire was prepared to study the visual quality of Konya Türbeönü Square by assessing user satisfaction. Users’ behaviour in the square, their needs, actions and expectations, the square’s features and their quality, the reasons why users use the square and these reasons’ emotional effects on users and the relationship between sensory effects and landscape elements will be determined. The questionnaire was administered to three groups of people: architects having the notion of design, shopkeepers interacting with the square and its surroundings on daily basis and laypersons. One hundred questionnaires were distributed to each group, and 300 questionnaires were returned. The shopkeepers own shops in and around the square. The laypersons group included undergraduate students with no design education. The participants were selected at random. Equal representation by gender was a goal. Of the participants, 39% (117 persons) were female, and 61% (182 persons) were male. Of them, 68% were 20-35 years old, 21.3% were 36-45 years old, and 10.7% were more than 46 years old.

The questionnaire first asks for demographic information. Then it asks users how they spend their time in it and about its deficiencies. After that, it asks about the square’s sensory effect and its environmental effects. During the determination of the visual quality of the study area some parameters were used in relation to space’s sensory effects. The parameters of space’s sensory effects are:

- General appearance
- Naturalness (untouched, wildlife, ecological stability, health of the vegetation)
- Tranquillity
- Diversity (vision having too many differentiated elements)
- Quietness
- Cleanliness
- Security (the association of visual components with risks and dangers, or being hospitable, safe and secure)
- Coherence (harmony, unity, wholeness)
- Complexity (differentiation, diversity, texture and complexity of the shapes)
- Attractiveness
- Legibility (conceivability, describability, visibility, accessibility)
- Describability (sense of place, genius loci, identity, livability, uniqueness)
- Historicity (historical and cultural elements and their continuity, visibility of historical layers)
- Sense of place (cognition of place identity, objects that reflect the culture of the place, powerful relationships between the elements in the place)
- General satisfaction
- General aesthetics

The landscape impact of the square’s renovation was assessed by looking at its benches, garbage receptacles, ground cover, lighting, water elements, green areas, limiting elements, monumentally and orienting elements.

Eight photographs of the square before and after renovation were shown to the participants. Special attention was given to select photographs that show the renovated square at its best. New photographs of the square were taken in September 2013, and its active uses and the areas that are directly observed by people were into account. The photographs include both close and wide range perspectives (Figure 1).

4. EVALUATION

SPSS software was used to evaluate the questionnaire results. Descriptive statistics, correlation analysis, the paired t test, ANOVA and for advanced findings Tukey’s test were used. For the use and spatial deficiencies dimensions of the questionnaire, the Cronbach’s alpha reliability coefficient was found to be 0.80. For emotional...
impact, the Cronbach’s alpha reliability coefficient was found to be 0.96, and for landscape impact, the Cronbach’s alpha reliability coefficient was found to be 0.90.

The study investigated how users spend their time in the square and what they see as its deficiencies. According to the results, users use the square most as for transit (X=6.4), second, to take photographs (X=5.3) and third, to rest (X=4.6). The square is also utilised as a place to walk, for its appearance and for chatting. It can be said that the square has a picturesque effect regarding the most frequent utilisation aims of the square.

After the square’s renovation, users evaluated what they found lacking in it: green areas (X=5.2), recreation areas (X=4.2) and car parking areas (X=3.0) (Table 1).

Correlation values show relationship between users’ evaluation of the landscape (benches, garbage receptacles, ground cover, lighting, water elements, green spaces, delimiting elements, monumentally, orienting elements) and their sensorial ideas about the square (general appearance, naturalness, calmness, diversity, quietness, coherence, attractiveness, legibility, historical character, sense of place, general satisfaction and general aesthetics). The R values calculated for this purpose are at a 0.05 level of significance, demonstrating that there is a significant relationship between landscape and sensorial elements (Table 2). No significant relationship was found between only water elements and diversity, quietness, cleanliness, security, orderliness, coherence. According to the results of the analysis, almost all the sensorial concepts are highly correlated with monumentally, indicating that monumentally is the most important element for squares in outdoor space quality.

To test the results of the different users (architects, shopkeepers and the laypersons) about the renovation before and after situation of the square arrangements, the paired t test was used (Table 3). After the renovation, the architects mean values of general appearance, naturalness, calmness, diversity, quietness, coherence, complexity, attractiveness, imageability, historicity, sense of place, general satisfaction decreased. They found the square to be cleaner, safer and more orderly. For the laypersons, the naturalness (X=3.07), diversity (X=3.01), and historicity (X=3.47) of the square were reduced by the renovation, while other concepts were improved. According to the shopkeepers, all the concepts were improved by the renovation.

The architects’ general aesthetics (X before=2.86; X after=2.39) were not satisfied with the space after renovation. However, both the laypersons’ (X before=3.39; X after=3.44) and the shopkeepers’ (X before=2.98; X after=3.42) were more satisfied with the environment after the renovation. When the groups are compared with each other, interestingly, the shopkeepers are the most satisfied group, perhaps because of that their shop windows become more visible and their turnover was positively affected by the renovation (according to information obtained from the results of the interviews). When looking at the general aesthetic evaluations, the architects’ general aesthetic values (X before=2.96; X after=2.35) decreased after the renovation. However, the public’s (X before=3.31; X after=3.37) and the shopkeepers’ (X

Table 1. Users’ use of the square and its deficiencies.

<table>
<thead>
<tr>
<th>Uses of the Square</th>
<th>Mean (X)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Transit</td>
<td>6.4</td>
</tr>
<tr>
<td>Photography</td>
<td>5.3</td>
</tr>
<tr>
<td>Recreation</td>
<td>4.2</td>
</tr>
<tr>
<td>Walking</td>
<td>4.2</td>
</tr>
<tr>
<td>Scenery</td>
<td>4.2</td>
</tr>
<tr>
<td>Other</td>
<td>3.7</td>
</tr>
<tr>
<td>Chatting</td>
<td>3.6</td>
</tr>
<tr>
<td>Reading</td>
<td>3.6</td>
</tr>
<tr>
<td>Eating</td>
<td>3.1</td>
</tr>
<tr>
<td>Scientific</td>
<td>2.1</td>
</tr>
<tr>
<td>Sports</td>
<td>2.1</td>
</tr>
<tr>
<td>Gathering</td>
<td>1.9</td>
</tr>
</tbody>
</table>

Table 2. Correlation values between landscape and sensorial concepts of the square.

<table>
<thead>
<tr>
<th>Landscape Concepts</th>
<th>Naturalness</th>
<th>General Appearance</th>
<th>Calmness</th>
<th>Diversity</th>
<th>Quietness</th>
<th>Coherence</th>
<th>Complexity</th>
<th>Legibility</th>
<th>Historicity</th>
<th>Sense of Place</th>
<th>General Satisfaction</th>
<th>General Aesthetics</th>
</tr>
</thead>
<tbody>
<tr>
<td>Mean</td>
<td>4.13</td>
<td>3.80</td>
<td>3.65</td>
<td>3.48</td>
<td>3.24</td>
<td>3.07</td>
<td>3.05</td>
<td>2.98</td>
<td>2.86</td>
<td>2.81</td>
<td>2.39</td>
<td>2.15</td>
</tr>
</tbody>
</table>

Table 3. Results of the paired t test for architects, shopkeepers and the laypersons before and after the square’s renovation.

<table>
<thead>
<tr>
<th>Concepts</th>
<th>Architects Before</th>
<th>Architects After</th>
<th>Laypersons Before</th>
<th>Laypersons After</th>
<th>Shopkeepers Before</th>
<th>Shopkeepers After</th>
</tr>
</thead>
<tbody>
<tr>
<td>General appearance</td>
<td>3.05</td>
<td>2.42</td>
<td>3.27</td>
<td>2.85</td>
<td>3.44</td>
<td></td>
</tr>
<tr>
<td>Naturalness</td>
<td>2.44</td>
<td>2.07</td>
<td>3.45</td>
<td>3.07</td>
<td>2.94</td>
<td>3.05</td>
</tr>
<tr>
<td>Calmness</td>
<td>3.19</td>
<td>2.31</td>
<td>3.4</td>
<td>3.13</td>
<td>2.65</td>
<td>5.43</td>
</tr>
<tr>
<td>Diversity</td>
<td>3.07</td>
<td>2.14</td>
<td>3.18</td>
<td>3.01</td>
<td>2.56</td>
<td>3.22</td>
</tr>
<tr>
<td>Quietness</td>
<td>2.76</td>
<td>2.54</td>
<td>3.20</td>
<td>3.26</td>
<td>2.14</td>
<td>3.56</td>
</tr>
<tr>
<td>Coherence</td>
<td>3.85</td>
<td>2.61</td>
<td>3.68</td>
<td>3.77</td>
<td>3.16</td>
<td>3.95</td>
</tr>
<tr>
<td>Legibility</td>
<td>2.54</td>
<td>1.20</td>
<td>3.67</td>
<td>3.00</td>
<td>2.79</td>
<td>2.97</td>
</tr>
<tr>
<td>Historicity</td>
<td>3.77</td>
<td>2.39</td>
<td>3.81</td>
<td>3.36</td>
<td>2.43</td>
<td>2.90</td>
</tr>
<tr>
<td>Sense of place</td>
<td>2.61</td>
<td>2.33</td>
<td>2.33</td>
<td>2.33</td>
<td>2.33</td>
<td>2.33</td>
</tr>
<tr>
<td>General Satisfaction</td>
<td>2.11</td>
<td>2.39</td>
<td>2.38</td>
<td>3.44</td>
<td>0.77</td>
<td>2.47</td>
</tr>
<tr>
<td>General Aesthetics</td>
<td>2.86</td>
<td>2.39</td>
<td>2.31</td>
<td>2.32</td>
<td>2.98</td>
<td>3.42</td>
</tr>
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</table>
Table 4. One way ANOVA results for the sensory concepts of architects, shopkeepers and the laypersons.

<table>
<thead>
<tr>
<th>General Appearance</th>
<th>Sum of Squares</th>
<th>df</th>
<th>Mean Square</th>
<th>F</th>
<th>Significant</th>
</tr>
</thead>
<tbody>
<tr>
<td>Between Groups</td>
<td>29,727</td>
<td>2</td>
<td>14,863</td>
<td>10.712</td>
<td>0.005</td>
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<tr>
<td>Within Groups</td>
<td>936,637</td>
<td>99</td>
<td>9,445</td>
<td>1.767</td>
<td>0.010</td>
</tr>
<tr>
<td>Total</td>
<td>966,364</td>
<td>101</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

Table 5. Tukey's test results for the architects’, laypersons’ and shopkeepers’ sensory concepts.

<table>
<thead>
<tr>
<th>Sensory concepts</th>
<th>(j) Profession</th>
<th>(j) Profession</th>
<th>F</th>
<th>Significant</th>
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<tbody>
<tr>
<td>General appearance</td>
<td>architect shopkeeper</td>
<td>10.712</td>
<td>0.005</td>
<td></td>
</tr>
<tr>
<td></td>
<td>layperson shopkeeper</td>
<td>2.940</td>
<td>0.090</td>
<td></td>
</tr>
<tr>
<td>Naturalness</td>
<td>architect shopkeeper</td>
<td>16.192</td>
<td>0.000</td>
<td></td>
</tr>
<tr>
<td></td>
<td>layperson shopkeeper</td>
<td>2.940</td>
<td>0.090</td>
<td></td>
</tr>
<tr>
<td>Calm</td>
<td>architect shopkeeper</td>
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<td>0.000</td>
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<td>layperson shopkeeper</td>
<td>2.940</td>
<td>0.090</td>
<td></td>
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<tr>
<td>Diversity</td>
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<td>layperson shopkeeper</td>
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<td>Cleanliness</td>
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<tr>
<td></td>
<td>layperson shopkeeper</td>
<td>2.940</td>
<td>0.090</td>
<td></td>
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<tr>
<td>Coherence</td>
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<td>0.000</td>
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<tr>
<td></td>
<td>layperson shopkeeper</td>
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<td>0.090</td>
<td></td>
</tr>
<tr>
<td>Complicity</td>
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</tr>
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<td></td>
<td>layperson shopkeeper</td>
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<tr>
<td>Attractiveness</td>
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<tr>
<td></td>
<td>layperson shopkeeper</td>
<td>2.940</td>
<td>0.090</td>
<td></td>
</tr>
</tbody>
</table>

DISCUSSION and CONCLUSION

City is an open culture area that is open to all, that is created by the human for himself and forms the human in the course of time. They are created by humans for humans, but in time they reciprocally determine human identity. The most important elements of cities are its features that enable human to live in the present, to develop expectations for tomorrow and to feel rooted in the past. Urban physical structures cause humans to feel and comprehend the past and historical processes and orient them towards the future.

The relationship between history and the city has different forms. It is important that the city should not be a frozen entity that only makes one feel the past. It has to live out the transformations that occur in the course of time. From this point of view, the existence of modern artistic and architectural practices enables humans to feel attached to their own time and feel contemporary.

Urban aesthetics is primarily related to the social and psychological dimensions of urban life.
Cities become open spaces for citizens by having museums, opera houses, concert halls, libraries, monuments, governmental buildings and other public and cultural structures. The existence of a park, library and or a museum in a neighbourhood makes people happier and more creative and increase real estate values, too (Erzen, 2010). Easy entrance and exit structures makes one feel at home. Parks and squares can be used for social gatherings and artistic purposes, drawing urban inhabitants together and enabling them to meet one another.

Konya Türbeönü Square occupies an important space adjacent to the Tomb of Mevlana. Although over time Konya has been transformed from a single-centred city to a many-centred city (Zafer, Real and its surroundings, the Old Exhibition Area, etc.) this square retains its importance. By focusing on a 2012 square renovation project, this study aimed to determine different users’ positive and negative ideas, to define its users’ needs and to identify criteria for high visual quality. Analysis of their responses shows that the visual quality of the square is seen differently by different groups of users. User needs were ignored during the planning process, leading to spatial quality deficiencies. The negative factors that affect the functionality of the square came from ignoring user demands and include incompatible pedestrian and vehicle usage and the lack of green space, recreation areas and car parking. Administrative changes that ignore user needs cause dissatisfaction and lead to the under-utilisation of spaces.

The principles of spatial quality include utility, diversity in utility, fluidity between indoor and outdoor spaces, security, the suitability of outdoor spaces for different users, and visual aesthetics (Marcus and Francis, 1990). There is a strong relationship between the quality of outdoor spaces and the activities that occur in these spaces. The quality of an outdoor space may positively or negatively affect the activities. Gehl (1987) classifies outdoor activities as necessary activities, optional activities and social activities. If the quality of an outdoor space is low, only necessary activities are performed in it. However, if the quality of an outdoor space is high, the frequency of optional activities increases. When the frequency of optional activities increases, the number of social activities also increases. High quality outdoor spaces affect user satisfaction and increase optional social activities. Users prefer to use Konya Türbeönü Square for transit and then for taking pictures of historical buildings and the Tomb of Mevlana. This shows that the square is still picturesque. The under-utilisation of the space for recreation, for its views, for chatting, and, finally, for gathering, and, relatedly, its lack of green areas, benches and orienting elements, shows that the space is not supporting social activities.

Users prefer spaces that positively stimulate their senses and perceptions. Cleanliness, comfort, relaxation and security are elements that affect spatial quality. Landscape furnishings and general appearance of the environment stimulate users to use the space. The quality of landscape elements and their responsiveness to user needs are the criteria for outdoor activities (Marcus and Wischemann, 1990). The quality of its components is integrated with the overall quality of the space. The lack of landscape furnishings in Konya Türbeönü Square badly affects the social activities. Both affect the quality of the square negatively.

This study analysed the mean values for the sensory concepts of architects, laypersons and shopkeepers. Naturalness, calmness, attractiveness, imageability, and historicity were found to be important to all groups. Although, according to users, the naturalness and calmness of the square were reduced by the renovation, its historicity, imageability and desirability were retained. If the planning of the square had taken user needs and expectations into consideration, it would have better spatial quality. If a planning intervention brings the space backwards, it would be better not to touch to the space at all. Renovation should be consciously by taking all dimensions of the project into consideration. This approach would lead to much higher functional and aesthetic satisfaction.

This study examined the relationship between emotional impact and landscape elements using correlation analysis and found a significant relationship between environmental and emotional concepts. The monumentality of the square was underlined by all participants. Almost all the emotional concepts were highly correlated with monumentally. It can be claimed that the square is at desired level of visual quality in terms of monumentally. This may be due to the removal of elements such the concrete pool and tall trees. Removing them made it possible to see the entire square from the main axis leading to the square. Monumental structures are very important for urban identity. These structures are also symbols of the cities. For the city of Konya, the Tomb of Mevlana and Konya Türbeönü Square have become the symbols of the city.

The laypersons and shopkeepers thought that the renovation improved the square. Unlike the other users, the architects’ appreciation of the square was reduced by it. The architects thought that, apart from its order, security and cleanliness, the square loses most of its sensory qualities, especially its naturalness and calmness. This result is
supported by the literature, which claims that architects have different evaluation standards than others. This study's results reveal that users consider functionality, security, livability, beauty, historicity and especially monumentally the most important elements of spatial quality for Konya Türbeönü Square. The protection of monuments and improvement of conservations should be ensured in historical city centre. The memorial images of the city should be protected for future generations.

To create high quality spaces that maximise user satisfaction one needs to examine the quality of physical elements and their symbolic meanings. Identification of the criteria for high quality spaces is made possible by the identification of user expectations and feelings about planned areas. Such data can be used to generate criteria for the production of high quality outdoor spaces. This study is important since it establishes a framework for establishing outdoor space quality criteria.

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ADAPTED DESIGN LANGUAGE FOR ANATOLIAN VERNACULAR HOUSING.

Ömer Erem, Selen Abbasoğlu Ermiyagil

Abstract
This paper aims to define an adapted contemporary design language for housing built next to vernacular residential buildings of Anatolian villages. The case has been selected from Balıkesir province in the North-western part of Anatolia within a corpus of 104 houses from selected 81 villages of the region. Originally, vernacular house plans consist of allocation of rooms around a hall: sofa. Each room is a core living space with everyday living needs for a family. House is formed with various spatial relations between sofa and rooms around it. This relation is the determinative feature in formation of vernacular language for each Anatolian house. The study has three phases: analysis, adaptation and generation. The first phase analyzes the elements of vernacular by decomposing its language into sub-parts. In the second phase, the inadequacies of existing vernacular structures were exposed with methods of observation and questionnaires applied on users and new demands for living have been adapted with vernacular existing language grammar rules. In the last phase within the framework of adapted language rules for Balıkesir vernacular, numerous novel design alternatives were generated. This study claims to sustain the existing socio-cultural spatial configuration by adapting newly built contemporary houses to actual vernacular architecture in the planning context.

Keywords: Vernacular, Architectural Language, Novel Design, Adapted Design, Balıkesir.

Introduction

Language has the voiced and written system and creates a communication between human beings (Stiny et al. 1978). “.....Language itself is menaced in its very life, helpless, adrift in the threat of limitlessness, brought back to its finitude at the very moment when its limits seem to disappear, when it ceases to be self-assured, contained, and guaranteed by the infinite signified which seemed to exceed it” (Derrida J. 1976). Noam Chomsky defines language by its “alphabet” (i.e. the finite set symbols out of which its sentences are constructed) and “grammatical sentences” (Chomsky N. 1957). Because of its structural hierarchy, architectural design is compared with the language structure.

Both linguistics and architecture have numerous rules. Signs (alphabet) form language and geometric shapes form architectural designs. Correct sentences within proper structure form words as a part of vocabulary and these are generated in relation with contemporary needs of language. New addition of spaces (words) to former vocabulary does not create change in grammar structure of language as they are adapted to existing structure. Novel architectural structures next to actual ones are up to adaptation process and this process creates a coherent system in case of proper designs. In Linguistics-architecture relationship, linguistics concepts are used to create terminology of architecture (Branko et al. 1987), Hierarchical order of linguistics known as the “rank scale” is especially powerful in relationship between architecture and linguistics (Yürekli H. 1980). Table 1 identifies equivalency between language and architectural elements based on Yürekli’s rank scale.

Linguistically, vernacular is a term related to using “native” language of a selected region (Merriam-Webster). In the architectural context, vernacular refers to “the architectural language of the people with its ethnic, regional and local dialects” (Oliver, 2006:17.) ‘Anonymous’
Ömer Eren, Selen Abbasoğlu ermiyagilopen house international vol.41  no.1,  March 2016. Adapted design language for Anatolian vernacular housing.

(1969), ‘non-architect’ (Rudofsky B.1965) and rural habits create a unique language to its built region. Rapoport (1969) states that the vernacular architecture has individual variability that meets special needs with additive quality, unspecialized, open-ended nature different from typical high-style design. The importance of vernacular studies increased after 1950s because critiques against prototyping attempt of global, modern movement began to ascend. Some professionals recognized the capability of traditional built environment in covering basic human needs and circumstances without dictating any common living style within the values, economics and culture (Oliver, 2003:14.) Vernacular study is an instrument to understand the significance of historical background and spirit of a given space within a given period (Fuchs and Meyer-Brodnitz, 1989:419). Thus, the integration of vernacular architecture with natural geography and social formation is an important lesson that we need to learn from history in the name of people-space relations. Learning, adapting and using habits represented by vernacular is a guarantee for a favorable future living.

This study aims for contribution to design issues coherent with vernacular architectural language. Previous studies are limited (Beken G.1949, Köse A.2005, Ceylan S.2010). Firstly, the language of vernacular Turkish house for a selected sample region – namely Balıkesir – has been analyzed on a corpus of 104 typical residential buildings. Secondly, this work determines the vernacular language elements as a result of the analysis. Finally, this framework establishes a novel design generation that responds to contemporary demands coherent with cultural and social life in the region.

Anatolian Vernacular Language Analysis And Balıkesir Region

In Anatolian geography, ‘village’ is settlement type in which all kinds of “…vernacular architecture is widely observed” (Akan et.al., 2012:176) and house is a home in which living, agricultural based production and other vital activities with face to face neighborhood relations occur. So the usage, lifestyle, cultural structure, social and historical relations become important. Vernacular houses maintain the continuity of Turkish housing tradition for future generations by transferring norms, traditions and values (Günce et.al. 2008).

Balıkesir is a province in the North-western part of Anatolia in Turkey. It has a wide variety of vernacular architecture dispersion in 892 villages with nearly half a million people living in rural areas (TÜİK, 2013). So rural settlement preservation become extra important for this region especially when we consider the decay of village pattern by means of social, physical and perceptive change. This article is based on regional rural research for Balıkesir made on 2010 (Çorapçıoğlu et.al., 2010a, 2010b). In order to establish a successful preservation, an extensive analysis was provided to examine the equivalence between language and architectural structure of the area. The regional features are as follows (Refer to Table 1):

Architectural composition (eq.: TEXT): The village pattern has three different types due to topography: hillside, plain and mixed. The parcel geometry is invariable. Central parcels are smaller than peripheries ones. The average building/parcel ratio is 39% for central parcel and 12% for periphery. Parcel areas are bigger for plain topography compared to hillside (Figure 1).

Buildings (eq.: SENTENCES): Houses have one (yer ev), two (hanay) or three floors with a basement aligned to slope and have rectangular plans. Building configuration on parcel has two alternatives of houses within garden or courtyard (Figure 2). Building construction material is adobe, stone, wood or brick and they are generally used in dual combinations.

Building parts (eq.: Word group): The main elements of the building are main mass, windows, doors, stair and roof. If the building has open sofa (hayat) in front of the main entrance columns are added and optionally wooden lattice covers the outer facade. Some buildings have bay windows on the upper floor. Bay window is a domination symbol over the street. (Oğuz et.al. 2003:12) Cantilevers can be wooden with buttresses or stone with limited support distance over the facade (Figure 3).

Space (eq.: WORD): Primary Vernacular Turkish house spaces are room and sofa and relation between these two organizes the spatial layout. Some rooms are for wet spaces: kitchen and bathroom. Other additional elements are bakery stove,
• Rooms: Numerous studies have been made to identify roots of "Turkish Vernacular Architecture and Identity." Some define the correlation between Turkish nomadic tent in Middle Asia and existing housing characteristics (Eldem S. H. 1955; Küçükerkman Ö. 1991; Köse A. 2005). “The formation of ‘room’ is interpreted as the settled reflection of the nomadic tent” (Asatekin, 2005:389). Due to the Anatolian family tradition, mother, father, son, bride and grandchildren live in the same house within the adjacent rooms (oda) and each room is a home for a nuclear family (Bertham, 2008:28). Therefore the room is flexible and versatile (Küçükerkman Ö. 1981) with raised sitting couch (sedir or divan), cupboards (yüklük) for packing up beds in the day time (Asatekin, 2005:390), bathing closet (gusülhane or banyoluk) (Bertham, 2008:28) for ablution and bathing purposes, a fire-place for heating and cooking possibilities (öcak) (Oğuz et al., 2007:10) (Cengizkan A.1999) and niches for storage within walls (Figure 4).

• Sofa: Turkish housing language bases numerous geometrical relations between room and sofa as gathering space. Semantically sofa is house exterior, because it is outside of the room (Küçükerkman Ö. 1985). Researches highly concentrate on sofa-room relations in-house plan typologies (Eldem S. H. 1955, 1984; Kuban D. 1995) of house upper floors where the ground floor is for farming or storage purposes. The reciprocal relationship creates hierarchical territorial organization from the public level on the street to semi-private level in courtyard or garden and finishes at private level inside the house. This systematic relation is realized from simplest plan type to more complicated, but street/courtyard-garden/sofa/room order is invariable. Sofa is the basis for this typology and room is its satellite unit and is always connected to the sofa in various types. Respectively, there are five kinds of sofa for Balıkesir vernacular houses: Front, L-shape, Side, Central, T-shape (Figure 5).

• Courtyard: Courtyard is an open social space with its open sitting area. It has been formed in harmony with natural and cultural environment as a result of privacy needs (Köse A.2005).

• Wet spaces: In vernacular houses there is no extra space for kitchen or bathroom inside the house. In some conditions a room is allocated for kitchen function with niches, shelves, fireplace and storage. Bathrooms are originally built outside the house in garden or courtyard. In some Balıkesir region houses, they still remain outside, and some appear inside the sofa or a room as an addition.

• Additional spaces: Storage is outside the house aligned to house or stands as a single unit on site for farming tools and food. Bakery stove is a freestanding domed oven for cooking facilities outside the house. Mostly, vernacular housing sites have barn and poultry house. Barn is originally located in the ground floor of the house or as an independent unit on site for courtyard or garden houses.

Building elements (eq.: VOICE VIBRATION): Walls are built with massive stone or half-timbered skeleton system. On the ground floor, walls are built with water resistant material like brick or stone. Roofs are covered with pantile. Columns in front of

Figure 3. Building parts.

Figure 2. Building types.

Figure 4. Typical Balıkesir vernacular room and elements.
Adaptation of Contemporary Housing To Vernacular

Vernacular structures and buildings are in the process of deterioration in many ways. Livable and sustainable environment is possible with appropriate interpretation of historical heritage without ignoring contemporary needs of people living either in urban or rural settlements (Lawrence, 2006). Every year, conservation becomes more difficult than the former one, because the structural decay increases with needs for modern living. Unless the vernacular buildings fulfill the demands of the modern life, abandoning old buildings will be inevitable due to the lack of comfort issues. This paper is interested with the new adjacent or integrated structures’ adaptation to the existent vernacular rural settlements as villages. General problems of villages are concretization, structuring in forest zones, deterioration in nature, lack of infra-structure and various man-made or natural environmental problems (Özdaydın et.al. 2010).

Balıkesir villagers define ideal village house to be in climatically proper location, cool in summer and hot in winter, useful, located in a quiet and calm place, built with a masonry structure in a separate order. House should be big enough to live with bigger size kitchen, garden, balcony and terrace, bathroom and WC inside the house, with an open vista to the landscape and a breezy environment (Özdaydın et.al. 2010).

Lawrence (2006:122-126) defines principles about the adaptation of contemporary structures to vernacular as: “compactness of the settlement for sustainability reasons, adaptation of existing historical building stock, identify principles of good practice for vernacular buildings, provide interrelation among different scales from urban to a single room, investigate cultural diversity of the region to predict future change in social life, participation and maintain public awareness in innovative local projects.” Primary reason to study a vernacular environment is to learn from it (Rapoport, 1999). Vernacular studies focus on typological record and documentation of regional building types. Lesson taking and interpretation studies are limited. There are three possible policy approaches in adaptation of contemporary housing to the vernacular environment. First and the most common approach is ‘copying certain formal qualities like shape, mass and details’ without any judgment. Second valid approach is “… to derive more or less general lessons and principles by analyzing vernacular environments using ‘Environment & Behaviour Studies’ concepts, models and the like, and applying these lessons to design” (Rapoport, 2006:182) (Figure 6). Third approach ignores the first and second approach and concentrates on building a contemporary stereotype placeless structures seen in any part of the world. It seems essential to filter vernacular principles and mechanisms within the contemporary design concept without copying formal features by adapting today’s demands to potential future users of villages.

Novel Adapted Language For Balıkesir Vernacular Housing

The spaces of 104 vernacular houses from the region have been tabulated in MS Excel. Width (w) refers to the direction parallel to the entrance and depth (d) refers to the direction perpendicular to the entrance of the house (Çağdaş G.1996). The analysis has calculated average values for primary spaces as sofa and room width and depth. Mean room width is 353 cm. and depth is 330 cm. Mean sofa width is 369 cm. and depth is 303 cm. Approximation of values have directed authors to creation of a rounded “basic module” (M) with a depth of 360 cm. (M_d) and a width of 320 cm (M_W). To increase the modular precision for bathroom, kitchen and storage, a half-module was defined as 180x160 cm (1/2M_dx1/2M_W).

Parcel typology

Parcel size and housing are reciprocal design problems, and both are generated from the “basic module” (M) in this study. Extended basic module (EM) for a single space has been calculated as 460x420 cm with the addition of 50 cm. wall thickness to the basic grid system. In a generation for parcel area, parcel depth and width affects design of main building, secondary buildings and the formation of courtyard or garden on site. Width (P_W) and depth (P_D) of parcels are calculated according to the following formula where n is the number of modules M_W or M_D:

\[ P_W = EM + MW \times n \] (Parcel width)

\[ P_D = EM + MD \times n \] (Parcel depth)

Parcel width is ranked in three scales as narrow, medium and wide where parcel depth is ranked as
shallow, medium and deep in design. Parcel dimensions are all multiplied by “extended basic module” (EM) array in house design (Figure 7). Dimensional width (W) rankings are as follows:

- **Narrow (W<460):** Central parcel located perpendicular to the street on mostly steep hillsides.

- **Medium width (460<W<1180):** Square or rectangular shape on plain or hillside region. House is located as leaving a space at side next to the street or the back of the house as a courtyard. 

- **Wide parcel (W>1180):** In the periphery location or scarce pattern. House and secondary buildings are located randomly on the site leaving a space for courtyard or garden.

Depth (D) rankings are:

- **Shallow (D<840):** Central parcel located parallel to the street at steep hillsides with significant elevation difference between the front and back of the parcel.

- **Medium depth (840<D<1260):** A courtyard or garden can be shaped on site. Front facade or courtyard wall faces to the street.

- **Deep (D>1260):** Located on low sloped hillside. Mostly garden house is preferred but occasionally a courtyard can be organized.

House-parcel relation is developed by preserving the street-courtyard/garden-open sofa-closed sofa-room hierarchy. Distinctive alternatives are organized on different parcel width and depth for courtyard or garden houses (Figure 8)

### Novel Typological Generation Rules

Novel housing typology has been generated from derivation of traditional living spaces. The design alternatives were tested on 2M_D, 2.5M_D and 3M_D parcels with 2M_W, 2.5M_W, 3M_W, 3.5M_W, 4M_W, 4.5M_W and 5M_W. All these trials were organized under L, Central, Front, Side and T-sofa type rules. Plans were extended with newly added secondary elements: bathroom (B), kitchen (K), storage (Sto), hall (H) and entrance stair (St) next to primary elements of sofa (S), room (R), courtyard (C) or garden (G). The linkage elements are separative walls (W). Therefore, novel contemporary language is composed with above ten elements with following properties (Figure 9):

![Figure 7. Parcel dimensions](image_url)

![Figure 8. House formation possibilities on a different type of parcels](image_url)

![Figure 9. Novel design elements for Balikesir vernacular houses.](image_url)
• All design work is done for single-floor houses.

• Maximum sofa Width/depth ratio is 6.

• Minimum short edge of the sofa is 1M for front, central and side types. In T and L types one arm should be minimum 1/2M and maximum 2M.

• Minimum, any edge dimension for room, is 1M, for kitchen, bathroom, storage and staircase is 1/2M.

• Maximum room number is three.

• There is one bathroom for one or two rooms and two bathrooms for houses more than two rooms.

  • In one bathroom house type, bathroom can contain the water closet, washbasin and shower.

  • In two bathroom house type, one 1/2M module can be for only water closet and 1/2M for shower and washbasin.

  • In three bathroom house type, one 1/2M module can be for washbasin and water closet, one 1/2M for shower and washbasin and one 1/2M can be for washing machine.

  • For two –floor houses, staircase can be either on left or right side.

  • Total plan can be in rectangular or square form.

  • Every house should contain a minimum 1/2M storage with the proper ventilation possibility

    1MW=360 cm and 1MD=320 cm.

  • There can be maximum two adjacent 1/2M Hall module to form a hall.

  • There can be maximum two adjacent 1/2M bathroom module and two adjacent 1/2M storage module.

  • Storage is preferred to be a cellar next to the kitchen

  • Storage can be a closet next to a bedroom

  • Courtyard is located in entrance side of the house located in less and equal to 2M parcel width.

Every design element is formed by the articulation of each 1/2Mx1/2M size module in width and depth direction. The sofa grid group is limited with separate elements from 1, 2 or 3 sides. Separator can be interior or exterior wall. Rooms, kitchen and bathroom grid groups are shaped as closed boxes limited with separators from 4 sides with openings like door and windows on it. The novel design planning is generated by the articulation of closed boxes around sofa grid group.

**Novel Design Results**

Design generation is limited with most recently found sofa types: front, central, side, L and T-shape. Number of room alternatives is 1, 2 and 3. Independent from parcel depth, width changes with 1/2MW incrementation between 1.5M and 5M. The ranges for parcel width are classified according to sofa types within sorted room number as follows (Figure 10):  

Front sofa: One room; 1.5P_W - 2.5P_W, 2 rooms; 3P_W - 4P_W, 3 rooms; 4.5P_W - 5P_W

Side sofa: Minimum P_W is 2. One room; 3.5P_W, 2 rooms; 4P_W, 3 rooms; 3.5P_W

Central sofa: Parcel width ranges between 2.5P_W - 4.5P_W for all room numbers.

L-shape sofa: One room; 1.5P_W - 3 P_W, 2 rooms; 1.5P_W - 3.5P_W, 3 rooms; 2P_W - 4P_W

T-shape sofa: One room; 1.5P_W - 4 P_W, 2 and 3 rooms; 1.5P_W - 4.5P_W

Figure 10. Sample novel designs generated with adapted design rules.
As a result of these design exercises, the minimum flexibility for variance of room numbers is at front sofa type. This situation is affected by the horizontal array type room articulation and determination of house width by number of rooms. The maximum flexibility in planning is at T-type sofa. This can be interpreted as a result of geometrical flexibleness of this sofa type within the house plan among room spaces. In the case of planning inside narrow parcel, L-shape and T-shape sofa types have more flexibility than other sofa types. Except for front sofa type, every sofa type with any number of rooms adapt to middle width parcel type. Maximum flexibility is at T-shape sofa for wide parcel types. L-shape and side sofa alternatives are limited. For wide parcel planning, three-room type front sofa stands out.

Conclusion

In vernacular architecture, the existence of space in social structure is provided with the continuity of unwritten traditional rules (Hillier B and Hanson J. 1984) So the analysis of spatial tradition and the integration of contemporary lacking components to the existing can be a guarantee for the culturally oriented design. For all these reasons, this paper proposes a design basis within the pursuit of Anatolian vernacular tradition. Novel building elements (eq.: Voice Vibration) are added on to the actual ones and give support for the creation of coherent design generations with the rules of vernacular housing. The importance of this study is the proposition of a method for any contemporary design adapted to vernacular that can be a potential future study in any part of the world. The weakness of the study is the dependence of existing regional language. It seems to lack in adaptation to the future social changes and its reflection on space. However, the forthcoming adaptation can be strengthened with extension and revisions on rules.

Acknowledgement

We hereby thank to “Balıkesir Vernacular Research Team” with the leadership of Prof. Dr. Kemal Çorapçıoğlu from Mimar Sinan Fine Arts University, Faculty of Architecture. This study was supported by Ministry of Environment and Tourism, Turkey in 2010.

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A STUDY ON ANALYSIS OF HOUSING SETTLEMENTS: THE CASE OF SENESENEVLER

Guliz Ozorhon

Abstract
This study on the knowledge/experience transfer regarding architectural space has two main objectives. The first of these is to develop an in-depth analysis on housing settlements and the second one is to provide pioneering and unique approach of a housing settlement in the 50s in Istanbul to architectural milieu. In the study, first how it is possible to propose such a method will be discussed, and will be followed by a review of the literature on the subject of housing and by which parameters it can be described. After this preliminary research, a systematic approach consisting of two steps (1. Reading, 2. Conceptualization) to analyze the housing settlements will be proposed and this approach will be exemplified by a housing settlement in Istanbul. In short, this article is primarily concentrated on tools required first to understand and then explain a housing settlement.

Keywords: Housing, Housing Settlements, Analysis of the Housing Settlement.

INTRODUCTION
People mostly enjoy spatial experience of their houses in which they collected childhood memories, sharing and their friendship and hide themselves in its shelter, and also it plays an important role in the formation of their identity. Therefore, it can be argued that housing constitutes majority of the output of the architectural profession and an important part of the research fields of architectural research. So housing is a rich field for architectural researchers where many knowledge production and transfer occur via both experience and in writing/drawing. On the other hand housing/housing design issues defines an actual area of research that needs to be investigated in a continuous renewal. This area of research on the one hand takes people and their needs into consideration while designing new and on the other hand benefits from the past experiences on housing. Therefore, the appropriate method required for a thorough understanding of housing settlements is an important issue for practitioners, theorists, architectural students and local managers. This article based on these grounds is an effort on which tools to use step by step while analyzing a housing settlement and how to benefit from them.

Approach to the Problem
No doubt, while basic expectations about housing focus on the "shelter", it actually defines a larger and more complex structure and moreover this structure updates itself ceaselessly based on changes in life. In short, this article is primarily concentrated on tools required first to understand and then explain a housing settlement and identified the main problem areas on two important questions. These questions are,
• How to analyze the architectural structure of housing settlements,
• How to make the data on housing settlements useful after making them visible by analysis.
How to improve the method of the in-depth examination of a structure? Just as the microscope is used to investigate the biological structure of human cells, we can conclude that there should be tools to inspect any other structure. In that case, which tools should we use to analyze housing settlements? Regarding the example of microscope as a magnifier, we can assert that the tool to analyze a structure should be specific for that structure. So naturally we are looking for solutions to problems...
from where we frame it. In other words, the correct understanding of the structure and its properties will lead the researchers to find the right tools. Therefore, the selection of tools to analyze the architecture of the housing settlements is required to demonstrate what is a housing settlement and by which features it is defined. Only then, tools as useful part of the analysis method(s) that help to understand the architecture of the housing settlements can be selected (Figure 1).

WHAT IS THE HOUSING?

Housing is an extremely comprehensive issue that concerns almost every people in the world. Every man wants/dreams of his own house (spacious, clean, warm, big or small, pink shutters, with a large garden ...) Moreover, not only the imagination but develops proposals. These proposals start with the initial sketches of early childhood and early childhood games and vary according to changing identity / needs but never end. In this context, housing is a concern of all people and undoubtedly the most important topic for an architect who has a job to design the space. Regarding the sheltering/housing function, a house can be defined as a place where people and their relatives meet their withdrawal requirements, realize special and intimate acts and divert themselves of the natural and social outside world (Boyacioglu 2010).

With its simplest definition, house is the accommodation protecting the individuals from outside effects and climate conditions (Tezgelen and Karaman 2014). Our house is our corner of the world ... our first universe. The house is a real cosmos. It is a cosmos encompassing the entire meaning of the word (Ersoy 2002; Bachelard 1996). Housing is a multifaceted entity which is important in the life of every human being, is perceived internally and externally day-to-day and conveys different meanings to the perceiver (Ersoy 2002). Housing is a 'physical shelter' or a 'building type'. In the most basic sense, housing is a physical kabuki or shelter to protect people from adverse conditions of the nature. Thus, housing shelters the human being itself as 'physical' in the first place and then his basic functions (Ersoy 2002). On the other hand, housing makes sense with its environment. In the formation of conscious and responsive housing environment, an approach supporting and empowering the development of the potential of community is essential. In this context, a housing settlement should be distinguishable and holistic without being detached from the city's upper scale (region), should support the pedestrian perception and use through functional and formal diversity, should provide certain density without allowing the formation of dysfunctional spaces. In order for the designs to support the sense of security and belonging to a community from the gate to the street, the square, the park and outside of the city; a spatial hierarchy of public spaces connecting the buildings and the building entrance should be provided (Oktay 2003). It can be argued that housing is a natural or artificial structure where people inhabit, sleep and organize to be protected from any kind of external factors (Donmez 2010). Besides the need for shelter, housing plays a role in the social separation as an indicator of current social strata. The addresses of people is an important sign of who they are in the community and which classes and strata they take place in (Erman 2010). The experiences of home are of great importance as they contribute to residents' wellbeing and satisfaction. It is therefore crucial that the place where we spend most of the time is of good quality (Buckenberger 2011). Housing is a social formation; is an item that reflects the economic value; is the expression of different cultures; It is a formation that reflected the technical value is a set of aesthetic values; and is an environmental component (Kaya 1998). The house of a man is his shelter in everyday life, his status among the socio-economic structure, his symbol and is where the emotional relationship with the environment of people with a lot of psychological and social characteristics (Francescato 1998). The concept of ‘dwelling’ is particularly valuable where housing qualities are placed as central. Dwellings for instance provide a context for social interaction, familial engagement and identity formation (Buckenberger 2011). A house, which is a private space, cannot be evaluated separately from its environment because there is an organic relationship between the house and its nearby environment. For that reason, in housing studies, houses should be examined by considering their environment both from a social and a physical perspective (Bekleyen and Korkmaz 2013; Amerigo and Aragones 1997).

Surely, housing / housing settlements not only describe the physical location but also indicate many things in different contexts. However, analysis and understanding of a housing settlement physically based on the data embodying its physical presence and introduction of the beneficial results of this analysis is aimed in this study. On the other hand, the physical analysis of the housing settlements is an important issue concerning the major part of the architectural milieu including architecture students, researchers, practitioners and local managers. Furthermore, the issue of housing settlement analysis associating which scale, context, questions and data is not only diligence but also brings a comment on how to define and design the
future of the new housing settlements and gradually the towns. Thus, understanding of the current housing settlements correctly is an extremely important/vital responsibility.

THE METHOD OF THE STUDY

In order to analyze a housing settlement physically, decisions/determinations at various scales ranging from the environment, spatial organization and structural examinations. A systematic approach is proposed in this study to analyze the housing environment (Figure 2). This approach is based on two-steps (1. Reading, 2. Conceptualization). The first step aims to understand the housing settlement and the second one aims to associate this information with the actual in order to make it useful.

The first step can be described as a thorough examination based on the sample settled. For this examination, research/reading on the period in question (the period of the housing settlement: time) and place (residential environment: environmental) are made. The social-political-economic characteristics of the period/environment in which the housing settlement is produced are set forth in the housing context, and thus tried to understand how and why this production is carried out. After that examination based on this information, the spatial structure is analyzed in detail. In this study, three-stage structure from the whole to the specific (general character of the settlement and facilities, typological diversity and spatial organization, sample types) is proposed.

Regarding the general character and facilities of the settlement, housing settlement is approached within the framework of site plan. At this stage, relationship between the residential units and the residential units and the settlement is discussed and at the same time other functions supplying housing settlement are determined. In the next phase called typological diversity and spatial organization, we take a closer look at the settlement to examine types of housing with different spatial arrangements and programs and how they are distributed in the settlement and to understand how relationship of roads and gardens linking the units is interpreted. In the last phase of the first stage referred to as ‘Reading’, on-site in-depth analysis of different types is made via determinations and architectural drawings. In the method, it is proposed to make this analysis under three topics including environmental, spatial and structural and to examine each title with appropriate tools specific to them. However, it should be noted that these topics may increase/decrease or differ according to the specific features of the housing settlement.

In the second step of the method, how the actual data on sample settlement can be used or associated with the current milieu of architecture/housing. This discussion recommended to be developed on the axis of current parameters seems extremely important in terms of knowledge transfer/transition.

CASE STUDY: SENESENEVLER HOUSING SETTLEMENT

This part of the study offers the experience of proposed method through a housing settlement. Reading / Reading As Regards Time And Place

A housing shortage has reached critical rate after World War II especially due to the rapid and unplanned urbanization in Turkey in the 1950s. The cumulative growth rate of the urban population between 1940 and 1950 has jumped from 20.1% to 80.2% in this period (Sey 1998). The demand of housing exceeded the supply as a result of migration especially from the rural to Ankara, Istanbul and Izmir. By the late 1950s, Turkey’s new urbanization trends have led to faster growth of Istanbul than other cities. In parallel, many different forms of housing provision carried out by individuals, groups or supported by the state have existed in the period of 1950-60 to address the housing needs. These formations quickly focusing on increasing the number of houses in the cities especially in the city of Istanbul, have played an important role in subsequent development/change or in identity formation. The traces of modernism that was highly active and effective in Turkish architectural milieu after 1930s again can be seen in new housing settlements. Senesenevler housing settlement was built in 1950s in the Anatolian side of Istanbul (Figure 3). The settlement generally known as “Bank Houses” among the people was designed by M.A. Feridun Akozan, M.A. Ahsen Yapaner and M.A. Halit Femir (one of three Turkish architects who worked in Le
Corbusier’s office) (Tanyeli 2003) and implemented by a cooperative founded by employees of the bank (Figure 4 a,b,c) (Femir et al. 1952).

**Reading / The General Character Of The Settlement And The Facilities**

The Şenesevler Ziraat Bank Homes was a residential settlement comprised of one and two-story unattached houses. In the design of the 55-unit settlement, a number of different housing variations were established to meet both the demands and spatial expectations of the members of the cooperative and the physical demands of the site’s building lots. The settlement, which incorporates urban living elements, was designed in a manner that it could meet both the accommodation and the social-cultural needs of the bank employees. To this end, the settlement plan design also included a social center consisting of shops, a clubhouse, and a children’s playground (Table 1). It may be said that the project surpassed its role of being a residential housing site in terms of its endeavors to create a new kind of living environment.

**Reading / Typological Diversity And Spatial Organization**

As stated above, resident demands were considered in the designs of the types of housing that were to be provided. A total of 22 different house designs were created by the architects and were presented to the future residents for their opinions. As a result of this process, five different house models were selected for the settlement (Table 2).

Such innovative and original approaches used in this 1950 decade project were not limited to only this endeavor. Efforts were also undertaken to achieve an interrelationship between the disparate units making up the site, thus ensuring that the various elements constituted an integrated totality. Each house was situated within a rather large land parcel, but the yards were designed in a manner that promoted fluid and dynamic relationships that were not hampered by property lines, but rather seemed to give the appearance of a mutual interflow between neighboring yards and gardens. In other words, the design based on variations in compositions in the development of the houses also allowed the houses to both integrate and interface with the greenery of flowing gardens. The social living elements of the settlement were also designed according to this perspective and the social interactions of residents meeting at the clubhouse or in the park were supported and strengthened in a manner that merged the physical elements with the green spaces. Various schemes were configured to ensure that the arrangement of the housing model types were in accordance with environment criteria of wind-sun-roads (Table 3). We can use the first of these as an example, by pointing to the manner that the C1 and F1 housing models located in the south of the unit were shifted. With this approach, the houses were provided with a broader view than that afforded by its own land parcel. In this way, the housing units were surrounded on three sides (either the front or back yards, or the side yards) with a view of nature (greenery). An altogether different approach was used with the F1 housing models located in the north-west area of the site. These models were aligned in a row facing the street, thus giving the houses very spacious back yards (Table 3).

The architects of the Şenesevler housing settle-
ement selected the five different house designs (A6, C1, C2, F1, F2) that best meet the demands and expectations of their users. Of the 55 houses in the settlement, 36% (20) were one-story, while the remaining 64% (55) were two-story houses (Table 3). The C1-C2 models were identical, except for their 3-4 bedroom variations. The F1-F2 models were the same, only differing in the ways they were situated on the plot and in their relationships with the road. Three of these 55 houses (C1-F1 and F2) continue to stand in their almost original states and are still being used as residences. None of the A6 models have survived and, more so, no literature detailing these models has been found to date.

In this work, photographs have been utilized to determine the locations of the C1 and F2 house models and a detailed analysis has been carried out by investigating the plan/function scheme of the houses. In this manner, the collected data have been used to create tables that delineate the details of the unique features of each model. In these tables the photographs and plans of the houses have been visualized so as to reveal the environmental, spatial, and functional characteristics of the settlement.

**Type C1**

Generally speaking, each of the C1 models provides opportunities for natural light and ventilation and may also be categorized as very comfortable residences with dynamic spaces that embrace a meaningful relationship with the garden and greenery. Speaking of these models, Vanli (1954) said: “The C1 type models are truly both functional and as fit as a glove.” In point of truth, these homes are apt demonstrations of a simple plan that is immediately understood to have a direct and comfortable relationship with its surrounding space.

The building is entered through a wide terrace, which itself functions as an outdoor living space that has a direct relationship with the yard (Figure 5). It is an indoor living space that has been designed to function both as a dining and sitting area, but also one whose functions can be separated if wished. This space, which functions as the heart of the residence, enjoys a two-sided visual relationship with the yard (the outdoor space) and thus constitutes a spacious and naturally illuminated space. In this way, the fluid character of the space is strengthened and enriched, and air ventilation is also eased. The kitchen has been situated in close proximity to the living space and also in such a way that it is directly accessible to the yard. Also, the continuation of the service area has a relationship with the yard that gives it access to the wood and coal storage units. These kinds of details can be seen in the attention paid to various features. The stone wall that extends on the left side of the terrace and along the building facade has been provided with small windows that serve the interior space. This stone wall both provides the strong architectural identity of the structure and has also been used as a guide to approaching the building. It is in this manner that the structure has been provided with a restricted and controlled relationship with the street. The detail to design is also seen in the almost sculpture-like stance of the chimney or the design of the windowsill that also functions as a flower box in front of the extended dining space.

**Type F1**

This model has been situated on the land plot in a way that maximizes the outdoor space. The entrance to the building is served from the street side, permitting access to the building from the nearest point (Figure 6). All the spaces of the structure are directed towards the outdoor green spaces. Additionally, the living areas, kitchen, and children’s bedrooms also have balconies that ensure direct relationships with the outdoors, while a roofed terrace connected to the living area and the entrance enable flow from the inner living...
spaces to the outside. The dining and sitting areas in the general living space have been designed in such a manner that they can serve as either conjoined or separate spaces, as desired. Designed to function as the heart of the house, this living space has a two-sided visual relationship with the outdoor spaces and thus creates a living area that is at once spacious and naturally illuminated. With this feature, the space becomes more fluid and enriched, and the air ventilation of the area is also eased. The stone wall with its small windows that serve the inner spaces and that stretches along the street-facing facade of the building both serves to provide the structure with a strong architectural identity and also serves as a guide that directs visitors towards the entrance. In this way a restricted and controlled relationship is established with the street. The wooden shutters that frame the windows also serve as strong delineating elements to the architectural identity of the structure.

Conceptualization Or Knowledge Transfer From Šenesenevler Settlement To Present

Undoubtedly, one of the cases most affecting architecture today as in many areas is the confrontation and the search for a solution of the individuals who are aware of the depletion of the earth’s resources in all areas. For a sustainable environment, residential buildings are considered that are not conflicting with nature but integrated with nature and in harmony with the context, land and environment (Filiz and Hacihasanoglu, 2011). This search is evolving around the concept of “ecology” in architecture. Although this concept that frequently occurs in design competitions, studies on materials and building technology or in curriculums of the schools of architecture is regarded as a new discourse, it is possible to see its architectural traces in the housing settlements of the 1950s. In this sense, natural environment as one of the most important determinants of the design, keeping the size of the unit in optimum and climatic conditions effective in orientation can be considered. Many of the features of the complexes known as 'Mixed use' with a combination of many functions 24 hours a day are quite close, in fact, to “neighborhood” life of 1950-60 period. Architects’ Council of Europe declared its opinion about the architecture and quality of life under the heading “21 important message for the 21st century”. Here, it is asserted that “… it should be encouraged to leave the urban areas to mixed use of different functions and this approach should be reinforced by the concept “neighborhoods” that are human-scale areas where you feel a sense of belonging.” (Tagmat and Erim2004). On the other hand, the concepts such as "user involvement" or "user satisfaction" may seem new in architecture, it seems to be a progressive attitude that 5 of the 22 types were selected in Šenesenevler building cooperative in accordance with the "user" opinion. In addition, understanding of giving place to the typological diversity in these settlements appropriate for different family structures is also instructive. Moreover, as mentioned before, bringing together housing in the different features as a rational approach by taking into account the environmental characteristics has created a live environment rather than a boring-uniform texture. In addition, settlements were not designed as a closed group into its own as in the example of today's many residential housing but on the contrary were designed as a living environment that can establish an active relationship with the city.

The different types are placed in site plan in accordance with of positions and in harmony with each other and with the exteriors they define when they come together in mind. Another important feature of the housing settlement as can be understood from the definition going further than the unit scale is the consideration of social needs of the individual outside housing and to be included in the design. Although Šenesenevler settlement was planned as a small housing group containing 55 residential units, the social center that includes shops, the clubhouse and playground has constructed as a part of the settlement. Le Corbusier (1924) defines the house as “a machine for living”. This expression can be interpreted as the necessity for each part of the housing meet the requirements in appropriate overall relations. The effect of this expression emphasizing the need of a new archi-
tecture can be seen in the plan organization of the residential units in Senesenevler settlement. It can be argued that an understandable and rational choice of design concept in which place, character - as seen in the example C1 and F2 - relationship of each space with each other in the plan were define correctly was preferred. Vanli (1954) described this settlement as a housing group "very successful in the plan" in the journal Arkitekt. Though many were destroyed by the impact of rant and municipal decisions, they are habitable structures despite being about 60 years old. Surely, it can also be interpreted as a result of not only subtle thought planning but also the selection of quality materials and proper construction methods.

CONCLUSION

Rational in architecture, as in all areas, is to benefit from past experience, extract lessons and to move forward with this information by combining the current parameters. This study is proposing a method to make the transfer of architectural knowledge possible by focusing on housing / housing settlements and experimenting this method on a housing settlement. As an example, Senesenevler Cooperative of 1950s in Istanbul which is still-to-date, accurate, defining healthy housing environment with its focus on architectural space, environmental sensitivity and human-life-centered design approach from unit scale to the residential scale was selected. It is argued almost in all studies on housing that architects seek the "ideal". It is obvious that Senesenevler and similar settlements that give children the chance to play in playground and the elderly to be in contact with nature and the environment, the chance for sunbathing, offering facilities such as rest, garden, healthy, spacious venues, simple-simple approach, natural materials could provide guidance when searching for the ideal. They have an attitude of transforming the lives, disrupting old memorizes about the relationship of housing with the city but also traces some of the history of this country. Although it is a small housing settlement, it is worth exploring and being taken as an example due to being a pioneer in many respects such as rational planning, holistic environmental awareness, advanced technology for its time, entirety without ignoring the traditional and, typological diversity and hosting social facilities (Özorhon 2009).

An inquiry from general to specific was made to read the housing settlement and the general character of the settlement and social facilities were focused on in spatial analysis. Following this stage, typological diversity in the housing settlement has been demonstrated and this diversity was expressed on the site plan. Finally, two different types appropriate for observation in place were examined in detail. Among this examination;

- Environmental Analysis (the current status and the location of the sample residential housing)
- Spatial Analysis (spatial organization of the sample)
- Structural Analysis (formal originality of the sample) have been revealed.

Although it is aimed in this study to propose a method of analysis that can be applied to the every housing settlement, at this stage, it should be emphasized that every settlement defines a unique position with its own internal structure and dynamics and the method should be revised, developed and reproduced during the examination of each of them. It can be argued that the method of analysis applied here makes many features of housing settlement readily apparent and thus achieved its goal. The anonymous residential architecture carried out without concern of any scale or size is creating unhealthy environments in modern Turkey. This unhealthy residential environments lead to the growth of unhealthy individuals creating unhappy people. Regarding today's settlement approach placing the same layout without worrying about place, direction or neighborhood, attitude of Senesenevler and similar settlements must be a guidance.

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ARCHITECTURAL DESIGN CRITERIA FOR MULTI-STOREY HOUSING BUILDINGS

Yong Kuan, Yahaya Ahmad

Abstract

Architecture influences people and the environment from the past, present and the future. Nevertheless architecture and design quality is viewed as subjective, and benchmarks to achieve consensus are necessary for design or evaluation of buildings. This paper establishes architectural design criteria for design quality of multi-storey housing buildings. A set of the criteria was established with literature review, an operational definition and survey on qualified persons or architects in the professional practice of architecture. The literature reviews identified seven concepts for architecture and design quality, and the operational definition translated this architectural design quality to measurable and observable cases and variables. The survey collected these variable data from a purposive sample of 95 respondents, and these data were examined by statistical analysis. The results of the descriptive statistics, inferential t-tests \((p \leq 0.05)\) and positive hypothesis testing verified that respondents in general agreed to these seven design concepts as architectural design criteria for design quality. These results established the first ever set of seven architectural design criteria which were ranked in descending order of significance as function, socio-culture, site context, cost, aesthetic of art, sustainability, and Feng Shui. These architectural design criteria can be applied to the design or evaluation of multi-storey housing buildings for the good of people and the environment.

Keywords: Architectural Design Criteria, Multi-storey Housing Buildings, Literature Review, Operational Definition, and Survey.

INTRODUCTION

Scully (1988, p. 297) concludes that architecture is a continuing dialogue between generations which creates an environment across time. Goldberger (2009, pp. 1, 2-235) quotes Sir Churchill (1944) “We shape our buildings; thereafter, they shape us.”, and explains that architecture from its meaning, culture and symbol influences people and the environment. However architecture and design quality is viewed as subjective, and benchmarks to achieve consensus are essential for design or evaluation of buildings. The measurement of architectural design quality thus becomes difficult as exemplified by three researchers. This concern is one of the problems and challenges of architectural practice facing architects and the profession and the public (Gutman, 1988, p. 88). Firstly, Blau (1987, p. 93) explains that there exists a polarity of view in judgment of design quality between the professional standards and their successors or with those of the public. This researcher measures design quality by three evaluations from views of academician of five New York City architectural schools, as well as architectural firms with works reviewed in professional journals, and also firms with awards and competitions won. Secondly, Cuff (1992, p. 198) comments on the philosophical question of whether design quality can ever be absolutely determined, and resolves it to a phenomenological entity. This researcher measures design quality by three evaluations from perceptions of main participants in design process, as well as members of the profession and also the public. Thirdly, Cook (2007, p. 5) explains that architecture and design quality is seldom without controversy because of the subjective views. This researcher measures design quality by three evaluations through visual survey, professional judgment and scientific measurement.

Research on architecture and design quality for multi-storey housing buildings is limited. Malaysia has been a fast developing nation since 1957 with independence from the British administration (1824-1946) (Winstedt, 1986). This British administration has been impactful on the Malaysian governmental, social-economic, educational and infrastructural systems. In 1884, British Resident Frank Swettenham introduced the first building regulation (Yeang, 1992, p. 63) and with this reiterated the duty of Britain to properly develop the country through infrastructure works. The British colonial architects prolifically built historic buildings and these have become landmarks for example, Sultan Abdul Samad (1887) (Ghafar
cost housing in the Klang Valley that residents were dissatisfied with the function, sizes and number of rooms in the design of dwelling units for family needs and comfort. Nurizan and Halimah (1993) conclude in a low cost housing study that residents were dissatisfied with rooms and space deficit in the dwelling unit design. Goh (2007) and Abdul et al. (2009) conclude in low cost housing studies in the Klang Valley that residents were dissatisfied with the design quality of housing buildings for family needs and comfort. Some negative effects of this unsatisfactory design quality in certain multi-storey housing buildings can be seen in these studies’ neighbourhoods as shown in Figure 1.

Much has been written about various concepts on architecture and design quality for buildings on people and the environment. Studies of these design concepts are in general conducted separately. These concepts include site context, aesthetic of art, function, sustainability, cost, socio-culture and Feng Shui which for this study are firstly assumed for design quality and are subsequently being tested. These seven concepts are identified in the following literature review prior to the hypothesis testing. Whilst there appears to be a consensus that architecture influences people and the environment, thus far there are no architectural design criteria based on these seven concepts. A design research was initiated for this paper which establishes these seven concepts as architectural design criteria for design quality of multi-storey housing buildings including flats, apartments and condominiums.

**METHODOLOGY**

This paper for establishing architectural design criteria is based on literature review, an operational definition and survey for conceptualizing and conducting the empirical investigations.

**Literature Review: Concepts for Architecture and Design Quality**

The literature review identified the seven concepts for architecture and design quality for multi-storey housing buildings. These are described as follows:

1. **Site Context**: In essence it plans and designs buildings to achieve harmony between the environment and buildings for people. Lynch and Hack (1984) explain that site planning arranges buildings on the land, shapes the spaces between them and makes places which enhances daily life by liberating and giving inhabitants a sense of the world they
lived in. McMullan and Seeley (2007) inform designers to orientate buildings to effects of wind, water and sun for optimal consumption of energy. Bently et al. (2008) explain the design of buildings and outdoor spaces is making places that can serve as responsive components to their users and the existing environment.

2. Aesthetic of art: Since the beginning of history, art and architecture has created together aesthetic quality in buildings for the human spirit, emotion and thoughts. Hartt (1989) state that architecture has been characterized as the “indispensable art” and through art numerous outstanding buildings are created with rich culture and heritage of civilizations for appreciation by generations after. The first record of written form for design as art in architecture begins in the first century B.C. architect Vitruvius (Morgan, 2005).

3. Function: Adorno (1997) state that functionalism today is important to be resolved critically for the good of humanity. Vitruvius (Morgan, 2005) explain in the first century B.C. that buildings of architecture should functionally fit for all purposes. CABE (2010) helps professionals and decision-makers to create good design and build excellent buildings, places and spaces which function for everyone.

4. Sustainability: In essence sustainability values design of buildings for the environmental, social and economic needs of people. Williams (2007) explains how the ecological model as sustainable design criterion meets these three needs, and architects should concern for the art and science of place making. Edwards and Naboni (2013) describe how the sustainable green buildings are designed to reduce the level of earth material extraction and to enhance the health of users. Increasing number of countries is establishing sustainable design standards such as the LEEDS (USA), BREEAM (UK) and GBI (Malaysia).

5. Cost: Developers need in advance the probable cost involved in the works for development, design and construction of buildings (Ashworth & Hogg, 2007). Cost planning ensure that the project funds are allocated and good value at the desired level of expenditure is achieved (Kirkham, 2007). They want to know two things from project cost planning that are “When can I have it?” and “How much will it cost?” (Smith & Jagger, 2007).

6. Social-culture: There is a significant link between socio-cultural values and architecture. Jacobs (1961) explains the social importance of neighbourhoods for communities and the built environment in large cities. Sommer (1969) analyses mental hospitals, bars and schools on how the organization of physical spaces can encourage people to take part in social activities or vice versa. CABE (2008) is committed in promoting inclusive design which creates places or spaces, facilities and neighbourhoods for everyone. CABE (2009) advises on design and build homes for older people who go to make the most of the next phase of their lives.

7. Feng Shui: Feng Shui has been a traditional practice of the Chinese for the last two thousand years for people to live in harmony with nature (Yoon, 1976). Teather and Chow (2000), geographers conclude that Feng Shui is a way to look into our landscape as produced space and a tradition to explain how people in East Asian countries perceive, apprehend, make sense of, and manipulate space for living with nature. Mak (2011) show a scientific study on how the Feng Shui’s principles and practices can contribute to the effectiveness of a harmonious built environment for people to live in.

Operational Definition: Architectural Design Quality

This architecture and design quality based on these seven concepts has been abstract or subjective as it is characterised by feelings, views, attitudes or perceptions. The measurement of these characteristics being difficult requires an operational definition (Kerlinger, 1986, p. 31). This operational definition translates this architectural design quality to measureable and observable behaviour at three levels which comprise concept (C), dimensions (D) and elements (E) as shown in Figure 3. These dimensions and elements which are represented by cases and variables respectively can be measured by nominal, ordinal, and interval scales.

C = architectural design quality
D1=site context; D2=aesthetic of art; D3=function; D4=sustainability; D5=cost; D6=socio-culture; D7=Feng Shui
E1D1=location; E2D1=orientation; E3D1=topography; E4D1=existing surrounds; E5D1=site history and heritage; E6D1=site planning; E7D1=place making;
E1D2=scale; E2D2=proportion; E3D2=order; E4D2=bal-
With such operationally defined levels, the concept of architectural design quality can thus be measured by survey questionnaire on views or perceptions of qualified persons by five-point Likert scale. An example of one of the survey questions is: Please indicate the extent to which you agree with site context concept as architectural design criterion for design quality of multi-storey housing buildings including the flats, apartments and condominiums. Tick the following scale number:


Survey: Collection of Data

Survey on qualified persons was conducted for collection of data on 2011/2013. It focused on the variable concepts as architectural design criteria for design quality of multi-storey housing buildings. This survey is a purposive sampling design in which the elements in the population have no probabilities attached to being chosen as sample subjects. With what information needed at the outset, structured interview was conducted face to face or and telephone mode with predetermined, standardized questions as shown in an example in the preceding paragraph.

These qualified persons were selected from a cross section of specific types of people who could provide for relevant and in depth desired information. These qualified persons included qualified architects, practitioners, award winning architects, developers of the local business community, academicians of the architectural school of public universities, and council members of the architectural education accreditation bodies. All practitioners were qualified architects and principals or directors of architectural practices. The qualified architects were professional architects registered with the Board of Architects Malaysia (LAM) and have passed Part 1 and Part 2 architectural professional degrees and Part 3 two year post-graduate professional practice examination. The total population of professional architects was 1825, and of architectural practices was 1473 in the LAM register (LAM, 2013). The minimum sample size of 30 (Roscoe, 1975) and minimum sample size of 320 for a 1900 population size (Krejcie & Morgan, 1970) were referred to for the survey. The sample size of 95 was applied for this purposive sampling survey. A sample of 95 respondents was collected. These 95 respondents included: 51 practitioners, 3 practitioners with PhD and 4 practitioners with winning awards of architectural design competitions or works from the PAM; 5 salaried qualified architects; 4 developers and 4 developers with property excellence awards of The Edge Malaysia (The Edge, 2011); 5 members of the LAM architectural education accreditation council; 1 member of the RIBA architectural education accreditation council; 18 academicians of the local architectural schools from the UTM, University of Technology MARA,
University of Malaya and University of Putra Malaysia.

**Analysis of Data: Statistics**

Analysis of data is based on descriptive and inferential statistics. The descriptive statistics include the mean, mode, standard deviation and frequency, and the frequency percentages are used to rank architectural design criteria. The inferential statistics include single-sample t-test which compares the single sample mean with the population mean. In hypothesis testing, we will consider the responses to the variables ‘design concepts as architectural design criteria’ which include ‘site context as architectural design criterion’, ‘aesthetic of art as architectural design criterion’, ‘function as architectural design criterion’, ‘sustainability as architectural design criterion’, ‘cost as architectural design criterion’, ‘socio-culture as architectural design criterion’ and ‘Feng Shui as architectural design criterion’. We are interested in whether the qualified persons’ responses indicated whether they were agreed on average on these seven variables, or whether they were disagreed. We will test these seven variables as ‘non-directional hypotheses’ and label them as hypotheses 1 and 2 respectively. The formulation of null and alternate hypotheses for seven individual hypotheses H1-sitecontext, H2-aesthetic-of-art, H3-function, H4-sustainability, H5-cost, H6-socio-culture and H7-FengShui is briefly described.

Hypothesis H1-sitecontext can be presented as: H1O(Null hypothesis) that is ‘The qualified persons or architects are generally agreed to site context as an architectural design criterion for design quality of multi-storey residential buildings.’ and H1A(Alternate hypothesis) that is ‘The qualified persons or architects are generally disagreed to site context as an architectural design criterion for quality of multi-storey residential buildings.’ This can be expressed statistically as: H1O: μ1 = 4 and H1A: μ1 ≠ 4, where μ1 is the mean opinion of the population towards design concepts as architectural design criteria, and 4 is the agree response based on the Likert measurement scale. Following this the remaining six individual hypotheses are formulated correspondingly. All the seven individual hypotheses with their null and alternate hypotheses in brackets are summarized as: H1-sitecontext (H1O, H1A), H2-aesthetic-of-art (H2O, H2A), H3-function (H3O, H3A), H4-sustainability (H4O, H4A), H5-cost (H5O, H5A), H6-socio-culture (H6O, H6A) and H7-FengShui (H7O, H7A).

The results of the data analysis for responses to variables ‘design concepts as architectural design criteria’ are shown in the following Table 1 and Table 2. The Table 1 presents the results of frequency percentages with the ranking for these architectural design criteria. The Table 2 shows the results of single-sample t-tests with the hypothesis testing on assigned Test Value = 4 (agree).

**DISCUSSIONS**

The seven concepts for design quality which were identified and verified as architectural design criteria do not form an exhaustive set. This paper seeks to develop these architectural design criteria through a conceptual, methodological and empirical framework.

The results of the survey show that respondents in general agreed to the set. Some respondents suggested several other concepts or ideas for criteria. These include interior design, bio-climatic design and aphorisms. Interior design and bio-climatic are related and embedded in architecture, and these two can be considered. However aphorisms are personal convictions of individual architects. These relate more to their works and are present in their ideas and opinions such as ‘less is more’, ‘dualism’, ‘universal space’, or ‘inside out’.

The results of frequency percentages in Table 1 show ranking of the architectural design criteria for multi-storey housing buildings in descending order as function, site context, socio-culture, cost, aesthetic of art, sustainability and Feng Shui. The results of single-sample t-test in Table 2 show that the computed p-values for function, site context, socio-culture, aesthetic of art, cost and sustainability are less than 0.05 except for Feng Shui. These results reject alternate hypotheses H1A, H2A, H3A, H4A, H5A, and H6A and accept null hypotheses H1O, H2O, H3O, H4O, H5O, and H6O that are respondents are generally agreed to these six design concepts as architectural design criteria, given their computed mean values in Table 2 which are above 4 (agree). These findings are supported by the results of frequency percentages in Table 1 which show 90% and above majority opinion are with 4. Regarding the position of Feng Shui, the p-values in Table 2 are less than 0.05 but its mean are 3.41 less than 4 (agree). These results reject null hypothesis H7O and accept alternate hypothesis H7A that is respondents are generally disagreed to Feng Shui as architectural design criterion.

Looking at Feng Shui in Table 1 and Table 2, the scores of 3.41 for the mean, 49.5% for the frequency percentage and 4 (agree) for the mode show that ‘agree’ still the popular choice. These results imply that the respondents were within a response zone between the 3 (neutral) and 4 (agree). With the highest scores of 0.83 for the standard deviation which show high variability within the respondents, these results reflect a diverse
and varying opinion on the importance of Feng Shui as a design criterion. These findings are significant to account for Feng Shui as an architectural design criterion for the Chinese ethnic group in the Malaysian community which represents 24.6% minority of the population (Statistics, 2010).

In summary these Survey results show that architectural design criteria were verified and ranked with one other important finding. This one other finding was the measurement of design quality from respondents.

LIMITATIONS

Shortcomings can exist in this research due to bias to the collected data which include peoples’ feelings, views, attitudes or perception. They occur among the purposive sampling, structured interviews, predetermined survey questionnaires, and characteristics of persons.

CONCLUSIONS

The results of descriptive statistics, inferential t-tests (p≤0.05) and positive hypothesis testing verified that respondents in general agreed to the seven design concepts as architectural design criteria for multi-storey housing buildings.

These results demonstrated that architectural design quality can be measured and based on statistical hypothesis testing of variable design concepts as architectural design criteria from perceptions of qualified persons. These seven architectural design criteria were ranked by frequencies in descending order of significance as function (100%), site context (99.9%), socio-culture (98.9%), cost (97.8%), aesthetic of art (93.7%), sustainability (89.5%) and Feng Shui (49.5%).

These findings established the first ever set of seven architectural design criteria for multi-storey housing buildings including flats, apartments and condominiums. These architectural design criteria can be applied to the design or evaluation of multi-storey housing buildings for the good of people and the environment.

FUNDING

The author(s) received no financial support for the research, authorship, and/or publication of this article.

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BETWEEN TRADITION AND MODERNITY:
DETERMINING SPATIAL SYSTEMS OF PRIVACY IN THE
DOMESTIC ARCHITECTURE OF CONTEMPORARY IRAQ.

Ali Al-Thahab, Sabah Mushatat, Mohammed Gamal Abdelmonem

Abstract
The notion of privacy represents a central criterion for both indoor and outdoor social spaces in most traditional Arab settlements. This paper investigates privacy and everyday life as determinants of the physical properties and patterns of the built and urban fabric and will study their impact on traditional settlements and architecture of the home in the contemporary Iraqi city. It illustrates the relationship between socio-cultural aspects of public and private realms using the notion of the social sphere as an investigative tool of the concept of social space in Iraqi houses and local communities (Mahalla). This paper reports that in spite of the impact of other factors in articulating built forms, privacy embodies the primary role under the effects of Islamic rules, principles and culture. The crucial problem is the underestimation of traditional inherited values through opening social spaces to the outside that giving unlimited accesses to the indoor social environment creating many problems with regard to privacy and communal social integration.

Keywords: Privacy, Traditional Built Environment, Social Sphere, Urban Sphere, Public/Private Spaces

INTRODUCTION:
The concept of privacy represents an important factor in the articulation of the built environment which has been largely interrogated in the analysis of the architecture of homes and spatial organisation of social spaces (Abdelmonem M. G. 2010). Privacy, hence, helps to refine the interrelationship between spaces within the same living unit or between the unit and the outside context (Stewart, D. J. 2001). Most cases dealing with privacy end up in separating the public from the private through physical, behavioural and spatial codes which relate them to ‘a consistent set of rules within a specific society’ (Abu-Gazzeh, T. 1993). The house obtains its priority over public realms as it accommodates the social and cultural aspects of life in its courtyard. It demonstrates, moreover, the thresholds of social interaction between male and female members of the same family in the everyday practices (Alizadeh, H. 2005). This is reflected in the architecture and physical properties of the house through dividing it into two distinct parts: male section ‘Diwan-khana’, and female part ‘Haram’ (Fethi, I. 1977).

Intrinsic to modernity is the underestimation of inherited socio-cultural values that have limited the impact of privacy and opening social spaces to the outside, giving unlimited visual access to indoor social contexts and creating many restrictions with regard to privacy and communal social integration. Modern architects and planners tend to neglect the centrality of privacy in the housing design process with some considering it a limitation to freedom of design. Moreover, formal aesthetics, economic factors and new technological methods are among those deemed more important in the progress of design mechanism than inherited social and cultural values (Eben Saleh, M. A. 1997). Concepts of isolated dwellings in a grid-iron planning system and the loss of the notion of space in its social aspect have a great impact on the architecture of the home (Ramezani, S. and Hamidi S. 2010).

This paper offers a conceptual analysis of the meaning of social sphere as an important tool in describing the concept of privacy and its attributes, as illustrated into home, and the neighbourhood unit. It attempts to answer a central question; ‘how does the change of our attitude to privacy affect the latent aspects of house design and planning in contemporary Iraq?’ For achieving a built environment that is more responsive to the needs and requirements of its users in terms of privacy and social interaction, one should analyse both traditional and contemporary settlements in Iraq. Methodologically, this paper depends on theoretical investigation, spatial analysis and narrative analytical discussions with users and residents from both contexts.
ON PRIVACY AND THE HOME

Privacy is defined as the mechanism of developing and maintaining process in the mutual relationship among individuals or within a small social group or in society at large. Irwin Altman (1975) indicated that, individual’s identity and personality can be achieved and maintained by the guidance of privacy through the creation of fundamental personal boundaries. Alan. F. Westin (1967) argued that, privacy works as the withdrawal of the individual from society through the use of physical, behavioural and psychological boundaries. Individual’s need to be included in the social intercourse of everyday life is a considerable determinant in the perception of the social space and boundaries of privacy. In this respect, privacy is never absolute as long as it refers to a changeable social and cultural sphere and interaction. Each individual is responsible for making the balance between this essential need and the desire for disclosure and to communicate and contact others in terms of environmental conditions and social categories and norms determined by the society (Westin, A. F. 1967).

According to Altman (1975), privacy represents the interpersonal boundary-control process which organizes our social interactions in manners similar to the shifting permeability of a cell membrane. Moreover, it is a dialectic mechanism and a system that stands between the restriction of interpersonal boundaries and being part of society through its dynamic ability of pushing towards an essential degree of openness-closeness, or accessibility-inaccessibility (Altman 1975). This mechanism occurs with the presence of the relative reaction of various powers which change temporarily according to different circumstances. Due to determining social aspects of privacy, it encompasses a variety of social units; for instance, individuals, families, neighbourhood’s members, a mix or homogeneous gender groups. Altman presented the ‘desired’ and ‘achieved’ privacy where the subjectivity of the first is in the nobility of the social and cultural interactions between people at a specific period of time (Michael Georgiou, 2006), privacy is the power and ability of managing social and cultural interactions between different social groups and being responsible for achieving the desired and acquired level of interaction (Ramezani, and Hamidi).

THE CONCEPT OF PUBLIC/Private REALMS

Public and private domains have an essential role in the articulation of spaces. These concepts introduce necessary steps towards a complete understanding of the main idea of these domains. The social, cultural or physical division of urban spaces into public and private realms expresses the relation between the two different spheres in society which reflects respectively the different types of relations that combine the individual with society and, in other words, between the self and the others within the same context. Public spaces have basically been related to spaces where social interactions can take place in larger groups without censorship. They show the embodiment of the notion of promotion into the unrestricted visibility or accessibility of social interactions such as being in a street coffee house or in a shopping centre. However, the socio-cultural notion of the public/private segregation refers to the meaning of the private realm and its different spaces. The female domain provides a high degree of desired privacy, secrecy, concealments and isolation from the attention of the public. This mechanism articulates the integral meaning of privacy including visual, aural and accessibility determinants (Rahim, A. A. & Abu Hassan, F. 2011). The inconsistency of public and private domains, as Herman Hertzberger (2005) argued, is completely unacceptable such as the antithesis of generality and specificity. The intimate, closed and separated private domain and the opposite open and shared public one constitute a social and contextual environment of people’s daily life in an interrelated relationship. This idea can be clearly shown when, for example, the public domain of the alleyway ‘agd’ in local communities similar of mahalla transforms into private to accommodate diverse social and cultural occasion (Abdelmonem M. G, 2011).

Social space, as Henri Lefebvre (1997) argued, covers all spaces starting from the small residential unit to the whole urban fabric. It reflects implicitly and explicitly different social interaction and represents the compatible concept of socio-spatial relationship. Accordingly, each place is presenting a system of settings where many activities are socially interacted with each other in different periods of time. In this respect, time and space can mutually replace each other. The capacity of the behavioural space can be affected by the number of settings used for a set of activities (Rapoport). The social sphere can be conceptualised as the domain that encompasses different social interactions within particular spatial context and during specific period of time (Abdelmonem).

SOCIAL PRIVACY IN IRAQI TRADITIONAL HOME ENVIRONMENT

The social and cultural factors, rules and principles of Iraqi society are represented as the main need
and structure of achieving privacy. The perspective of different spaces of the house has been wrapped by various cultural, social and behavioural rules. Social habits, cultural values and lifestyle of the family members dictate the form of the social spaces of the traditional house in Iraq (Khattab, O. 2013). The home represents the fundamental spatial system of a specific culture, social identity and family affiliation and recognition (Fig.1) (Liboye, A. D. & Ogunshakin L. 2010). It is a reliable organisation that can be more responsive to the changing needs of the family which thus can develop flexible solutions to the increasingly limited spaces to encompass the different social and cultural needs. Despite the rigidity of the house plan, there is an opportunity for informality with functions according to the degree of privacy acquired from each space (Boudiaf, B. 2010). This can, for instance, be shown clearly in the case of marriage and when the house is expecting the arrival of a new member through birth or marriage and the need for crucial changes in the spatial organization of the house to embrace the new family.

Physical treatments with regard to privacy, gender segregation and direct visual contacts between male and female or visitors and women have, therefore, been performed in a manner that shows a deep understanding of social, cultural and religious values. This can be clearly shown in the physical, spatial and functional properties of ‘Iwan’, ‘Talar’, the fountain ‘shithirwan’ which divides the court spatially, the plants and the variation in spaces’ levels (Fig. 2). The architecture of the traditional house and the spatial organization of its activities have the aim of holding family gatherings within a single protective shelter without intrusion from strangers (Hall). The real concept of privacy in traditional domestic units in Iraq could be practised in the cantilevered elements (shanashil), the (ursi) and the (kabishkan) which represent physical components within the structural compound of the house that help assert the privacy of its users (Fig.3). They are particularly important for women to ensure the notion of gender segregation and achieve a visual contact to the public outside or visitors inside the introverted compound without being observed except from those who belong to the same family.

At the same time, the components of “shanashil” allow an interpersonal relationship between women of nearby houses to contact freely each other.

Each house shows the private domain in various levels and degrees with regard to the nature of privacy, social groups and mechanisms used. Whilst the private refers in some degree to the concept of the public, the form of this relation and the different transitional spaces has the tendency to vary more and change over the course of time (Rapoport, A. 2007). The house has a range of public and private realms reflecting the different activities over the course of time. It contains many physical boundaries which perform the thresholds between the public domain associated with the outside alleyway (agd); and the semi-public realm of the house illustrated by the entrance (mejaz). This thought can be shown in most traditional houses in Iraq as in the case of Al-Kubai house in Al-Kadhimiya - Iraq (Fig. 4) (Ragette, F. 2003).

The space of the entrance has been articulated in a way that prevents any kind of direct visual intrusion from the outside towards the main
social core of the house. Semi-private and, often, private realms represent particularly the socio-cultural core of the house, while the semi-public realm which, is in direct association with the semi-public realm of the entrance, views the world of men, guests and uninvited visitors as well as many public affairs, such as wedding ceremonies. Public and private relations inside the house are largely arranged in relation to the lines of familiar stranger, guests and, most certainly, male-female relations (Madanipour, A. 2003 ). The space of the entrance hall encompasses an explicit spatial order. It is necessitated in controlling visibility and permeability of people and things. Moreover, it regulates the personal properties of the place as shown in Abd Al-Rasool Hasoon’s house in Kerbala - Iraq designed by the architect Ali Al-Thahab, in 2012 (Fig. 5).

MODERNITY AND THE CHANGING CULTURE OF IRAQ’S HOME ENVIRONMENT

Since the early twentieth century and precisely following the oil-economy boom in Iraq in the 1970s, economic and political changes in Iraq affected social and cultural inherited aspects, traditions and, as a consequence, the behavioural patterns within the home. Due to the continuous migration of the population from rural areas to urban contexts and the large demand for new residential settlements which consequently sprang up in Baghdad, new values controlled by economic and political powers have emerged as the main determinants of the home and affected respectively the latent aspects of society (Raouf, L. A. N. 1985 ). Consequently, the structure and the nature of the family have changed as the family unit becomes smaller. Male-residents tend to spend longer time with their families, thus, reducing their social interaction with some colleagues outside the boundaries of the neighbourhood unit. The elimination of transitional social spaces due to the concept of the neighbourhood unit have forced them to limit the nature of their social relations and interactions with others to some formal visits that frequently take place within the physical properties of the house (Al-Wardi, A. 1965 ). Equally, rapid changes have affected architectural and planning standards following the universal practices of the international style and its association with industrial. Despite the recent concerns for health, safety and welfare, ideological preconceptions have ignored cultural values and, thus, provided a fundamental base for utopian concepts. Accordingly, the vital needs of the human have been neglected at the expense of physical and environmental factors which have been dominated by the concept of rationality, anonymity and increasing abstractions of social relations (Heynen, H. 1999 ). The technological evolution cannot substitute human social needs which have been abstracted and marginalized (Fig.6).

The concept of the public domain has changed to exclusively become squares and wide linear streets of the city. The idea of the semi-private space and the everyday practices that took place in traditional contexts have been rendered undesirable and set to be replaced with a rigid physical barrier between private and public. The provision of the in-between areas in traditional quarters met human needs, socially and culturally, in a more sensitive way than contemporary methods (Bianca and Mousavi, S. Y. 1998 ). As a natural result of modernity and its ideology, the concept of the neighbourhood as a home cannot effectively accommodate the coherent relations between former neighbouring families within the ‘mahalla’. At
the same time, the sensitive hierarchy of the different subdivisions of spaces, where the individual can locate his/her social, cultural and behavioural values into a clear and understood system, are broken by the concept of the strict separation, represented by the rigid physical boundary of the outer wall, in contemporary designed residential quarters (Abdelmonem). The new approach creates an extroverted form of houses, sometimes called villa pattern, situated in the centre of the individual lot (Fig. 7).

The concept of family social space as the main central multifunctional activity space has been diminished through dividing the inside territory of the house into separate closed spaces where each one indicates a specific function (i.e., bed rooms, kitchen, dining rooms, etc.). Some architectural treatments have old and traditional effects such as the balcony, on the first level of many houses, which has been closed by lightweight screen materials to get an additional space and prevent visual intrusion from opposite or adjacent houses reflecting the concept of the ‘shanashil’ in the traditional courtyard house. This can also be recognized in the segmentation of the social space through the use of different levels which has been taken from the difference in levels between the courtyard (hosh) and the open reception space (iwan). In such treatments, families have tried to gain more separate spaces in order to satisfy their basic needs and achieve privacy (Fig. 8).

The changes in the architectural factors and the planning principles of the small neighbourhood unit from organic form to geometric pattern, from pedestrian-oriented type to vehicle-oriented style, affect largely the concept of private and public domains and the prominent impact of transitional social spaces. It also affects the humanity of the individual and his personality as long as it destroys his security and privacy. To recapitulate, the concept of the personalization of space relates, according to Lawrence (1987), to the transition between the private and public domains of the house (Lawrence, R. 1987). Moreover, the rapid social and economic changes in Iraq and the impact of modernity negatively affect the general fabric of Iraqi cities, residential quarters and the house. The residential quarter has gained an extroverted form rather than the introverted concept of the traditional. The new doctrine has led to the transition from the inner core of the mahalla to the outside providing easy and wide accesses for the penetration of the car and direct visual view from the outsider towards the inner social space of the house. Respectively, the social, cultural and structural properties of the newly designed residential quarters have been broken through the elimination of transitional realms which have a negative impact on residents’ everyday social practices and interaction (Fig. 9).

MODERNITY AND PRIVACY IN IRAQ’S NEW QUARTERS

Modernity changes the concept and features of the ‘single family’, ‘home’ and ‘dwelling’ as well. These concepts, according to theorists of modernity, fade into the distance, while all assert that modernity and dwelling are completely opposed to each other (Heynen). Indeed, with regard to the neighbourhood unit, the social gathering space of the residents in traditional open spaces have been diminished and confined to certain areas in specific corners of the residential blocks which then are limited to the use of the children. Moreover, social interactions and festivities in
joy and sorrow have been moved to specific places outside the boundaries of the mahalla and sometimes with the absence of its people especially when there is a differentiation on the basis of wealth and poverty (Eben Saleh). As a result of these thoughts, a sense of privacy, security, belonging and communal affiliation have been marginalized and eliminated.

One of the main deficiencies of modernity was its contempt and disregard for the inherited social, cultural, spiritual and physical environments as proved in its refusal of historically grown built environments (Bianca). This concept was revealed through the rejection of the organic pattern of the traditional in favour of the benefits of the anti-social grid-iron approach. The crucial point was that contemporary settlements have been imported as unquestioned developments where they are used as complete packages implying different factors (Eben Saleh) (Fig. 10). This type of change affects the social and cultural norms of Iraqi people and precisely privacy and social communications. Therefore, elaborating the proper environmental context that control people’s social interaction with each other articulates the underlying concept of modern architecture. These issues were not taken into consideration by most architects and planners of the twentieth century in new developments. Moreover, their work presents clearly a huge gap between architecture and people’s social values and principles (Abdelmonem).

CONCLUSIONS

The need for privacy in the contemporary home environment is crucial but difficult to achieve for designers and planners who try to assimilate privacy into modern architectural practices. For these communities, privacy plays an important factor in strengthening and accommodating communal social interactions which, in turn, strengthens the ability of space in achieving a more sustainable and secured residential environment. The house, as the basic social and human organisation, encompasses many systems of activities which are different in their socio-cultural nature. These systems of activities have been viewed as social spheres which present essential factors in expressing social spaces. This notion is embodied by dividing the space according to the social nature and the degree of privacy that can be obtained. Therefore, the significant concept of the social sphere is in the classification of spaces socially to the public/private and the transitional spaces to achieve the best arrangement for interior and exterior spaces.

The rapid and successive economic and political changes in the last two or three decades; especially after 2003 and Iraq’s entry into a new transitional stage of social, cultural, religious and intellectual transformative conflicts; have affected their social and cultural values and the associated psychological and behavioural aspects to adhere to contemporary principles of the home environment. Furthermore, after a long period of deprivation experienced by the Iraqi people, there has been a sudden openness towards modernity in its all impressive aspects. The physical and spatial arrangement of the house and the use of the social space are metaphors for the invisible image of the social and cultural values of society. The spatial and architectural properties and the differentiation in the layers of Iraqi society have been influenced by the changeable categories of socio-cultural and religious factors. There is a crucial need to understand the concept of privacy and its related social, cultural and psychological issues in architectural practices and philosophies.

The hierarchical and sensitive subdivision of social spaces on the scale of the Mahalla and the house is an effective mechanism in response to the changing requirements and needs of the social group. It reflects the sustainable aspects of the social activities within the home through maintaining privacy and social interaction. The mechanism used in achieving the transitional spatial sequence in traditional context creates the essence of social, cultural and behavioural fluidity in everyday life and the reciprocal relation between the social space and the activity over the course of time. These aspects need to be re-evaluated in contemporary Iraqi settlements to provide an active mechanism for more sustainable developments. This approach can be applied by associated and shared values between decision makers and an effective and active participation from local users. In the meantime, creating responsive settlements to the privacy concerns of their users, building and housing regulations, provisions and frameworks for the use of architects, designers and developers provide a better and controlled application of the concept of privacy in planning and housing design.
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THE DRY CONSTRUCTION SYSTEMS ON THE REHABILITATION OF BUILT HERITAGE.

Pierluigi De Berardinis, Chiara Marchionni, Marianna Rotilio, Avi Friedman

Abstract
The dry construction techniques, widely used in past centuries have seen a renewed interest in the last few years. This is due to different reasons such as the new user’s needs for high quality at low cost, the shortage of traditional skilled labor, the need to reduce delivery times and the rising costs of initiating a fabrication plant. Dry construction methods regard the building site as the place of assembly. The quality of the finish products, are guaranteed by a factory controlled production process and reduction to a minimum of on-site work. The building, designed by "unconnected boxes" becomes an "active machine", capable of ensuring maximum performance for the user. Finally the design of an “open building system” also consists of a set of rules to allow creation of various solutions.

The complexity of this modus operandi increases progressively if the intervention is carried out in small historic centres. Therefore, this research aims at presenting a method of work that uses dry construction systems and that has been developed to intervene in the historic contexts damaged by the earthquake that struck the Abruzzo region on April 6, 2009.

This method develops a process that aims at the rehabilitation of the buildings but also at improving their energy behavior while respecting, at the same time, the vernacular values. It is based on a “case by case” approach that starts from an analysis of the context and its local construction techniques, taking into account the peculiarities of each location. The results of this method have been applied to a small village located in the province of L’Aquila called Santa Maria del Ponte.

Keywords: Dry Construction, Minor Centres, Rehabilitation, Compatibility.

1. INTRODUCTION
1.1 THE DRY CONSTRUCTION IN OPEN INDUSTRIALIZED SYSTEMS

Dry construction methods has its roots in human history and history of architecture. In fact, the first houses were made of branches stacked upon one another and then covered with various materials, depending on the regions and latitude. The technological evolution process that followed knew an almost unstoppable impulse with the advent of iron, then of cast iron and of steel dictating the basis of prefabrication. Monier’s intuition, later developed by Hennebique, led to the creation of the first reinforced concrete prefabricated structure in 1896 for a toll booth of the French railways: this event led to the ‘supremacy’ of wet construction over dry construction (Zambelli E. 1988). Currently dry systems have reaffirmed their importance, given the benefits that they can offer to the industry. Among these benefits, for example, there are speed of execution, reduction of construction costs, energy saving, accurate work, better management of site work, greater safety for the workers, simple dismantle and reuse of components and higher flexibility (Zambelli E. et al 1988). These concepts are now an integral part of contemporary process which regards the building as "active machine" (Le Corbusier 2003) that ensure the maximum performances to the user. Designers are thus the inventors of this living artifact. They must be familiar with technology, user’s expectations, system’s responses and its functional considerations, structural and formal properties.

This requires construction of open and modular building systems so that the building components can easily be combined to form a structure. Thanks to these characteristics, open building systems are an excellent solution for the construction of demountable buildings, or temporary structures which can be recycled easily once their original function changed. They can also be used to manage emergency situations that unfortunately affect quite often the region of Abruzzo.

The first step in the design an open building system is to determine the rules of the design and assembly taking into account the building component, the geometry of the project, the tolerances and adjustments (i.e. the joint, the dimen-
The issue of the minor centres rehabilitation has been developed consistently for many years by the working group founded by Prof. Luigi Zordan, afferent the Dau Department (today Dicea) of the University of L'Aquila, Italy of interdisciplinary skills (Zambelli E.1982).

The reversibility and the possibility of dismantling and removing parts of the structure are the expression of a functional flexibility for present and future use. The flexibility of use involves essentially a spatial context and it permits users to modify spaces, according to their needs. It is based on the research of typological solutions that allow to carry out new activities in an environment whose size stays generally unchanged, as in the case of historic buildings (Imperadori M.2001).

Moreover the chance to start recovery cycles deriving from waste of removal / demolition of dry elements is an important aspect of environmental sustainability and natural resources conservation.

These variables increase, making the design even more complex, when the intervention is carried out in small historic Italian towns. An intervention in a historic town is more complex because all environmental, historical and architectural values must be taken into account as well as all the restrictions arising from the dry modular design.

In addition, special focus must be put on the design of so-called "interface elements", being the elements of connection between the pre-existing building structure and the new one (Capuano, 2007:585-593).

1.2 THE MINOR CENTRES OF ABRUZZO REGION POST-EARTHQUAKE

The small villages spread over the hinterland in the Province of L'Aquila played a major role in the history of the regional capital. In fact, most of them contributed to the founding of the city and to the growth of small communities with identities. These communities respected the topography chose urban plans that suite local climate, and use of local materials and vernacular construction techniques1. These factors contributed to determine the concept of "material culture", that is the set of values representing the history and the essence of a particular place (Zordan L. et al 2002).

Although these villages are the custodians of the material culture that determines the very identity of these places, in the last decades they have been affected by out migration, ageing of the population and left isolated from vibrant economic hubs. The abandonment of these rural areas has inevitably led to a physical decay of the buildings themselves (Rolli G.L.2008). Furthermore, the situation grew worse following the earthquake of 2009 that in many cases led to the death of whole historic centers and, in the remaining cases, threatened the economy and the future vision. Then, it is clear that special attention must be given to strategies that can help those centers regain an active role.

In order to identify which analytical and intervention methods need to be carried out it is crucial to take into consideration the cultural and economic issues as well as recovery strategies to satisfy the contemporary user and uses (Greccchi M. et al 2008). This process requires full assessment of the cultural values to be preserved, the climatic and natural conditions, local resources, vernacular construction techniques and the contemporary technical and technological solutions.

An historic centre, in fact, cannot tolerate invasive or irreversible actions. Therefore, a case-by-case approach must be adopted, through the development of a careful and rigorous methodology that will lead to identify ad hoc design strategies for each site.

2. STRATEGIES OF INTERVENTION IN HISTORICAL CENTRES

Our research proposes the introduction of sustainable systems using the dry construction technology in the recovery of historic buildings in order to rationalize the use of resources, and reduce energy consumption in accordance with the objectives of the European Directives (European Directive 2002/91/EC and followings).

The study included choice of "interface elements" between the new construction system and the existing built structure. In fact, a detailed study of the configurations assumed by the technological solutions in the points of contact between the construction system introduced and the existing one is necessary to determine whether an intervention is reversible and feasible to begin with.

There are two types of elements: those with "passive interface" and elements with "active interface" (Capuano, 2007:585-593). The first ones are characterized by the absence of direct connection between the construction components of the added parts and those belonging to the existing building. The intervention respects the pre-existing structure, favoring a conservative approach to the project.

On the other hand, the second ones favor a transformative approach and require a direct intervention on the original structure. The different connections with the pre-existing building determine the level of reversibility of the intervention that can decrease considerably according to the size and type of connection used. The choice of the type of interface allows, already in the preliminary design phase, excluding the underperforming approaches in terms of energy improvement or any other approach not suitable to measure the level of

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1The issue of the minor centres rehabilitation has been developed consistently for many years by the working group founded by Prof. Luigi Zordan, afferent the Dau Department (today Dicea) of the University of L'Aquila, Italy
The choice of the different interfaces systems and most appropriate design strategies corresponds to the type of recovery engaged and improvement of performance levels to be achieved, that involves the actual “degree of adaptability” (Zordan L. et al 2002) of the building, in relation to the identified values to preserve, through the appropriate test parameters definition that represent judgment criteria and control factors.

A set of contemporary strategies to be used for the rehabilitation of historical buildings have been identified through a critical interpretation and analysis of the most important interventions carried out: “the integration, the introduction, the interposition, the addition, the overlapping and the replacement strategies” (Capuano L.2008). Although the above mentioned strategies are different from each other and characterized by different levels of compatibility with the existing structures, they all share a common interest in the use of dry technology systems.

Design strategies such as integration, introduction and interposition are not too invasive. On the contrary, they are effective in case of performance deficits in the existing closures and functional deficits in existing buildings. The “integration strategy”, in fact, is achieved by integrating new functional construction elements to the existing strategy, in fact, is achieved by integrating new functional construction elements to the existing strategy, and involves a greater figurative impact and a higher level of transformability. The “integration strategy” is very invasive and is generally used only in case of severe performance deficits and poor condition of the building. This approach helps to resolve issues related to energy efficiency upgrade and functional improvement of spaces, by adding a new volume for the new user’s needs. The “replacement strategy” can be applied to a single construction element or to the entire building. This technique is very invasive and it is used only if the components of the existing construction are in an advanced state of decay, in order to improve the performance of those components that are no longer able to fulfill their original functions.

Lastly there is the “overlapping” strategy that is very invasive too and is generally used only in case of severe performance deficits and poor condition of the building. This approach involves the construction of a new envelope that may partially or totally include the existing one.

The design intervention, evaluated case by case, is therefore the expression of one or more prevailing strategies, depending on the level of decay of the building and the possibility to carry out an intervention on the existing building in a more or less transformative way (De Berardinis P. et al 2013).

2.1 A CASE STUDY: THE MINOR CENTRE OF SANTA MARIA DEL PONTE

In the case study, Santa Maria del Ponte (AQ), different strategies were used depending on the objectives set and the degree of transformability of the existing building.

Santa Maria del Ponte is a small village located at about 570 m above sea level, in the municipality of Tione of Abruzzi. Its name originates from a church by the same name belonging to the castle of Tione (Barbato G. et al 1978).

The small town has preserved the characteristics of a fortified village. It is surrounded by defensive walls with two gothic arch doorways, named “Capo la Terra” e “Piedi la Terra”, located at the opposite sides of a line that crosses it and that has determined the trends in its evolution. In addition to these two elements, to strengthen the concept of typical medieval system, there are the remains of a siege tower (a two-storey tower after the earthquake of 1915, now privately owned) that had connections with the towers of the other villages of the district; also the remains of an ancient moat surrounding the historic precinct partly made of defensive walls and partly of dwellings incorporated into the same walls (Battista V.1997).
The urban scheme developed around the typical Roman cardo and decumano structure, within the egg-shaped area delimited by the walls, but the several earthquakes that occurred over the centuries unfortunately erased most of the elements that could have helped to accurately understand the structural evolution of the building aggregates (Centofanti M.1975). However, three “components” can still be distinguished that witness the succession of three different historical phases. Leaving out the above mentioned architectural elements, it is clear that the urban system as evolved through the rise of a building construction system consisting mainly of terraced houses but also of blockhouses and houses with the typical outside staircases called profferli. The typical building structure has generally two or three storeys where the basement floors are used as shed / storage, and the upper floors as living space and barns. This structure, following the traditional scheme of rural house, has undergone significant changes over time like for example the construction of new floors aiming at enlarging the pre-existing living units (Bonamico S. 1996).

The choice of the north-east section of the village for our project is due to different factors, like for example the variety of building types, the complexity of its morphology and also the types of damage caused by the earthquake that offer several project solutions. In particular, the aggregate is characterized by green areas for relaxation. Finally, we reserved a small part of the project in our proposal for a small portion of land to be used for residential purposes, by locating dwellings of different sizes in the northern part of the section analyzed. Any choice of re-functionalization has been made following a constructive analysis. The same type of analysis has been made to fix all the issues relating to the seismic damage and degradation. In fact, the use of dry construction technologies with different strategies helped us on the one hand, to determine new functional uses and on the other hand to cope with the critical issues of the section analyzed. From the point of view of new uses, the construction system used for the new health clinic and day care center is the most interesting proposal. In this specific case, in fact, we implemented the “interposition strategy”, based on the principle of a “house within a house” (Fig. 2) that uses a construction system using a load-bearing panel structure.

This strategy involves the introduction of a new envelope joining the pre-existing closures. This does not modify the original structure and the exterior wall surface but allows a significant improvement in its performance levels. Moreover some active interface elements were introduced to create a continuous connection between the two systems (the pre-existing structure and the new volume). The project consisted of four phases: identification strategies helped us on the one hand, to determine new functional uses and on the other hand to cope with the critical issues of the section analyzed. From the point of view of new uses, the construction system used for the new health clinic and day care center is the most interesting proposal. In this specific case, in fact, we implemented the “interposition strategy”, based on the principle of a “house within a house” (Fig. 2) that uses a construction system using a load-bearing panel structure.

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3), the design of new uses relating to the above mentioned grid, the introduction of the new volume in the pre-existing structure and, accordingly, the design of some special elements if needed and finally the overall assessment of performance levels after the intervention. Actually, five types of packages have been designed: attic-ground floor, inter-floor gap, roof, new wall tied to the existing one and ventilated wall. Similarly, the process of prefabrication consisted of some phases. First, custom-made panels were built in the manufacturing plant, then transported to the job site and assembled.

The installation and set-up processes consisted of the following steps: the installation of laminated wooden structure, the installation of floor panels with horizontal connectors, the installation of wall panels by using vertical or lateral approach, the connection of the wall panels by using closure flaps and bolts.

The “introduction strategy” has been used to design the rooms located in the north part of the section analyzed. It involved the introduction of bath and kitchen facilities within the historic structure and the design of the new functional spaces around this new block.

The historic structure is seen then as a “box” containing new wood layered structures made of medium density fiberboard panels, solid wood profiles, real wood veneer high-pressure laminated that is pre-painted, eco-friendly, fire-resistant and acoustically insulated (Fig. 4).

Another approach has been adopted for the project of the buildings located in the central area of the section studied. This section, in fact, had two critical aspects: on the one hand, the collapse of the roof on the other one the overturning of the load-bearing wall. Our strategy proposed the integration of new functional building elements to the pre-existing ones. The project involved the controlled demolition of the first floor and the integration of the new volume by using active interface elements in a continuous connection. The result has been a new upper floor extension having an independent internal structure.

As previously mentioned, the dry construction technologies have been used also to remove the conditions of damage and degradation of the section studied. For example, water infiltration affected some of the roofs in the west area of the sector analyzed and, in addition to this, most roofs were made of cement and asbestos. The project involved the removal of the old roofing and the reconstruction by using a different technology. The strategy of substitution has been used in this case as the section analyzed was in a state of disrepair and the whole structure showed a deficit in performance. Therefore, in our approach the most suitable solution among those available was the introduction of active interface elements in a discontinuous connection and a type of insulated roof having a discontinuous load bearing structure and ventilated interspace.
3. CONCLUSIONS

The case study analyzed shows how to introduce the dry construction systems in the process of rehabilitation of small historic centres damaged by the earthquake. The main requirement to achieve this is the preservation of the existing values by applying a rigorous methodology that is based on a deep knowledge of the context under study.

Moreover, this methodology can be enriched with a lot of technological solutions offered by the current market and at the same time look for other compatible systems.

On the other hand, it can be strengthened by the introduction of new design strategies.

Finally, and not least, the above described methodology provides an example of a functional method that avoids the simple application of standard solutions or the simple use of the market products but rather prefers a “case-by-case” approach that is a key concept if we truly aim to respect the peculiarities and specificities of each context analyzed.

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THE OPTIMUM ENERGY SAVING MEASURES FOR RETROFITTING RESIDENTIAL BUILDINGS.

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Abstract
A large number of residential buildings in hot summer and cold winter zone of China are non-energy efficient with poor indoor thermal conditions. Retrofitting residential buildings with energy efficiency measures is thus important for residents. However, this work progressed slowly because practically applicable measures that not only have high energy savings but also improve indoor thermal performance have not been studied. Thus, this paper carried out a simulation study on the selection of suitable energy saving measures for residential buildings in hot summer and cold winter zone of China. Five potential energy saving options are considered and the energy, indoor thermal comfort and economic performance are compared. The results show that adding movable solar shades is the optimum option with all performance indices ranking first. Meanwhile, this measure is also the only acceptable energy saving solution for residents since its payback period is less than the lifespan of a building. As a conclusion, it is recommended to use movable solar shades as a first priority when retrofitting residential buildings.

Keywords: Building Energy, Residential Buildings, Indoor Thermal Comfort, Economic Performance.

1 INTRODUCTION
Buildings are huge energy consumer and thus they have a significant impact on climate change. At present, the building sector has account for 27.5% (Florian et al. 2007: 1065-1071) of the national total energy consumption. It is expected that it will increase to about 40% in the next 20 years (Hong 2009: 426-435). Therefore, China started developing policy to promote energy savings in 2000s and by now all new built buildings are energy efficient. Despite the success in new built buildings, existing buildings before 2000 are non-energy efficient and have poor indoor thermal conditions, especially for residential buildings in hot summer and cold winter zone, where the mean temperature of July is about 2°C higher than other places of the same latitude in the world while the mean temperature of January is about 8-10°C lower (Yu et al. 2008: 1536-1546). Therefore, there is a great need to retrofit the existing residential buildings in this climate region. However, only a very few buildings are retrofitted by now due to several reasons including occupants’ attitude, costs and real energy performance improvement.

In China, most residential buildings are apartments with more than about 20 housing units and thus it can be retrofitted only when every occupant in a building agree to do it, which depends on their attitudes toward building energy efficiency. Residents’ attitudes mainly depend on the costs and real improvements in energy and indoor thermal performance. If costs are low and improvements are significant, they are willing to retrofit their building. Thus the key is to identify the suitable measures that are cost-effective.

At present, a design standard for energy efficiency of residential building in this region for new built buildings has been implemented and it requires a minimum set of prescriptive measures that would reduce the total energy used for heating and cooling by 50% compared to the existing building practice of uninsulated concrete or masonry construction and single-pane windows with clear glass and metal frames. For example, the U-value of external walls, roof should not higher than 1.5W/m²K and 1.0 W/m²K respectively and a double-pane window is required (China Academy of Building Research 2007). Whether these methods (such as adding wall, roof insulation (Yu et al. 2009: 2520-2529; Toguyeni et al. 2012: 74-80), using double-pane windows (Urbikain et al. 2009: 687-695) or adding movable solar shades (Yao 2012: 330-337; Yao 2014: 24-32)) also suitable for existing buildings? It remains unsolved since the energy prediction according to the set of the design standard overestimates by about 7 times due to an unrealistic assumption that air conditioner will run throughout the year to keep room temperature between 18°C and 26°C (Ouyang et al. 2011: 4902-4910). However, residents only use air conditioner when they are at home and they fell thermally uncomfortable according to several studies (Li et al. 2011: 101-111; Li et al. 2010: 405-412; Liu et al. 2014: 1-9). Thus there is a need to determine the real energy saving performance and indoor thermal improvements by using different energy saving measures based on real operation of air conditioners, and this motivates the present research.

2 METHODOLOGY
2.1 Retrofitted Building
A retrofitted building was modeled in the simulation software EnergyPlus, a whole-building energy simulation program developed by the U.S. Department of Energy (DOE) (Crawley et al. 2001: 319-331), to carry out the building performance simulation. This building is a typical three-unit, six-story residential building in Ningbo city with one kitchen, one living room, one bathroom and...
three bedrooms in a housing unit. The total area of the building is 3168.9 m² and the height of each floor is 2.8 m. Fig. 1 shows the architectural plan of the typical residential building that has 6 housing units (about 85 m² for each unit) on each floor. The area ratios of window to wall are 0.06 for east and west facades, 0.41 for south facade and 0.28 for north facade.

2.2 Simulation Setting
The simulation settings comply with the real building and the typical meteorological year data was used in 8760 hours simulation. The external wall of the building was a 240mm-brick wall and the windows for this building are 3mm single-pane clear glazing. Split air conditioners were installed in bedrooms and living rooms with COPs of 2.3 for cooling and 1.9 for heating respectively. The room temperatures were set 26 °C for cooling in summer and 16 °C for heating in winter. The total power density of miscellaneous loads (including lighting systems and occupants) is 4.3 W/m² and the air change rate is 0.5 per hour (Gu et al. 2012:36-39). These thermal settings for non-energy efficient buildings are in accordance with the design standard in this region. The detailed values of these settings are listed in table 1. The operation schedule of air conditioner is determined based on field survey as shown in fig.2 and fig.3, where 1 means air conditioners will run if room temperature is not met while 0 means air conditioners are powered off. These operation schedules reflect occupants’ control on air conditioners and thus the following energy and indoor thermal performance analysis are reliable.

2.3 Potential Options for Retrofitting
Since there is no district heating or cooling for residential buildings and the space heating and cooling were supplied by split heat pump air conditioner, the building energy saving measures for residential building in this climate region focus on building envelope. Therefore, the potential energy saving measures for retrofitting were collected from regular used measures in new built buildings, which improve the wall, roof and window thermal performance.

In this paper, nine potential measures were considered that are categorized into two main groups (opaque and transparent). The opaque group can be further divided into walls and roof, while the transparent elements can be considered as windows and shading devices. For walls, there are two potential measures. The first energy saving measure (option1) is adding external wall insulation (2cm expanded polystyrene) to reduce the U-value from 2.0 W/m²K to 1.5 W/m²K, a maximum value allowed for new built buildings according to the standard in this region. And the second option (option2), which is similar to the first one (3cm expanded polystyrene), has a better insulation performance with a U-value of 1.0 W/m²K. For roof, the first measure (option3) is to reduce the U-value of roof from 1.5 W/m²K to 1.0 W/m²K (3cm expanded polystyrene), while the option4 is a further improvement of option3 with a U-value of 0.7 W/m²K (4cm expanded polystyrene).

For the transparent group, two window options and three solar shading devices are considered. The first window option (option5) is replacing the single clear-pane windows by double clear-pane windows with a U-value of 3.5 W/m²K and a solar shading coefficient of 0.84. And the other window option (option6) is similar to the option5, but a low emissivity window is used with a U-value of 3 W/m²K and SC of 0.5. For solar shading devices, the first option (option7) is designed as overhangs for south windows and sidefins for east and west windows according to the sun movement in the sky. The last two options are movable solar shades with shades installed inside windows for option8 and outside for...
The optimum energy saving measures for retrofitting residential buildings.

The detailed information of the nine options are shown in table 2 and the control strategy for solar shading, as shown in table 3, was set to comply with the control behavior of occupants in this region in order to keep indoor condition comfortable.

Note: the season Summer means days from 6. 1-9.30 and Winter means days from 10. 1-5.31; Daytime means the time from 8:00-18:00 while Nighttime indicates 19:00-7:00.

3 Results and Discussion

3.1 Energy Performance

Fig. 5 presents the energy consumption of the baseline (without any energy saving measure) and the nine energy saving options. It can be seen that the baseline has a total energy consumption of 19.81kWh/m² (including space cooling and heating) and the energy consumption for space cooling is about 1.6 times higher than the space heating. Among the nine energy saving measures, option9 achieves the biggest energy saving with the lowest energy consumption (16.91kWh/m²), followed by option8 (18.02kWh/m²), option6 (18.78kWh/m²), and the option7 and option3 are the poorest two measures with energy consumption of 19.60kWh/m² and 19.55kWh/m², respectively.

Fig. 6 further gives the energy saving ratio of each option in terms of cooling, heating and total. It is clear that the significant cooling energy saving (more than 20%) contributes to the overall higher energy saving performance (about 14%) compared to other measures. This is because external movable solar shades block most of direct solar radiation in summer and thus reduce space cooling energy consumption. The energy saving in winter for option9 results from the improved heat insulation performance by closed solar shades in nighttime. Internal solar shades (option8) perform a little poorer than the external one and the total energy saving ratio is about 9%. On the other hand, fixed shading devices (option7) could provide only about 1% of total energy saving. Although its cooling energy saving reaches 5%, the negative impact of fixed shading on winter season increases the heating energy demand by 5.33% and finally offset the cooling savings. Therefore, it can be seen that movable solar shades should be the first choice if shading devices are tried to be used in retrofitting projections.

The window replacement options (option5 and option6) in the transparent group have energy saving ratios of about 3-5%. This energy saving ratio is much less than movable solar shades but still a litter higher than that for opaque options. The first four options in the opaque group reduce the total energy consumption by only about 1-2%. Moreover, a further improvement of the U-values of external walls and roof compared to the design standard requirements leads to an extra energy saving ratio of about 0.5% which is almost marginal.

The building energy standard for hot summer and cold winter zone of China [3] emphasizes that both heat protection in summer and thermal insulation in winter should be considered but designers should give a first priority on heat protection in summer since cooling energy consumption is dominant. Therefore, the first four options focusing on thermal insulation in winter have relatively poor energy performance while the last two options have relatively high energy saving ratios since they not only improve thermal insulation in winter by closing shades at nighttime but also reduce significant solar radiation in summer.

3.2 Indoor Thermal Comfort

Beside energy performance, indoor thermal comfort should also be considered. Fig. 7 illustrates the comfortable and extremely uncomfortable hours before and after retrofitting. Movable shading measures in the transparent group contribute to a significant thermal comfort improvement with option9 not only has a biggest energy saving, but also provides a best indoor thermal condition.
with the most comfortable hours (4268h) and least extremely uncomfortable hours (624h). Option8 is a litter poorer than option9 but still better than the other 7 options in terms of thermal comfort hours. The other 7 options perform on the same level with about 4000h of comfortable conditions.

Fig. 8 further gives the indoor thermal performance improvements and it can be seen that option9 has the highest improvement (7.3% for comfortable hours) compared to the baseline. The comfortable hours for internal shades have been improved by 3.6% while the other 7 options have an improvement of less than 1%. For the improvement of extremely uncomfortable conditions, the option2 and option9 are better than the other measures with a reduction of higher than 8%. Therefore, the option9 is the best option in the transparent group followed by the option8 while the option2 and option4 can be considered as acceptable measures. Since the number of comfortable hours (3978h for the baseline) is much higher than that for extremely uncomfortable hours (684h for the baseline), it can be inferred that the option9 has a better indoor thermal performance than options in the opaque group.

### 3.3 Economic Performance

The economic performance is also an important factor when identifying a suitable energy saving measures. Table 3 lists the comparison of economic performance for the nine options. The material prices in the table were collected from the local market and the energy cost is the price of electricity from the grid (0.58 RMB/kWh, RMB is the currency of Chinese yuan, and 1 US dollar is about 6.3 RMB). The initial cost is calculated by multiplying the retrofitted area by material price and the total saving per year is calculated by multiplying the energy cost by energy saving calculated in section 3.1. Thus the payback period can be calculated according to the total saving and initial cost.

It can be seen that option9 has the best economic performance with a payback period of 33.67 years followed by the option8 (46.39 years), while the other options have relatively poor performance with payback periods longer than 90 years. The option1 and option2 are the 2 worst measures with a payback period of more than 380 years. For the opaque group, the option3 and option4 (a payback period of less than 96 years) have a relatively high economic performance which is even better than the option5 (206.27 years), option6 (175.33 years) and option7 (174.13 years) in the transparent group. In China, the life span of residential buildings is normally 70 years. This means that only the option9 and option8 in the transparent group are economically acceptable energy saving measures for residential buildings.

### 3.4 Overall Performance

To have a clear comparison of these measures, the overall performance improvements are shown in table 4. The number in the table indicates the ranking of each option for two groups while the number in blackest means the ranking in each individual group (opaque and transparent groups). It can be seen that the best option is the option9 for the transparent group while it is the option4 for the opaque group since the overall performance of the option4 is a litter better than the option2. When the comparison is based on all options in the two groups, it can be seen that the option9 is the optimum measure followed by the option8 and the option6. This does not mean that the option9, option8 and option6 should be adopted when only three energy saving measures will be used. The reason is that the option8 and option9 are both solar shading measures (one is internal and the other is external) and normally there will only one option be selected.

Table 4 also offers designers a flexibility and guide when considering possible energy saving measures at different initial costs. It can be seen that the transparent group should be considered prior to opaque group since options in the transparent group have a better over performance. Moreover, the option9 should be considered as the first priority when the cost of building retrofitting is limited allowing for only one retrofitting.
measure being considered. The sequence of potential energy saving measures should be the option 6, option 4 and option 2 for windows, roof and walls, respectively, if initial costs are adequate. Meanwhile, designers can also select the most suitable measures for different regions under the guiding of the performance ranking according to the availability of the materials and labour in any specific area.

4 CONCLUSION
This paper investigates the possible energy saving measures for retrofitting residential buildings in hot summer and cold winter zone of China. Two groups of measures, including opaque and transparent building elements, were considered, and nine potential energy saving options are considered and the energy, indoor thermal comfort and economic performance are compared. The overall performance for each option is ranked in a table and thus designers can easily select the optimum measure in each group. The sequence of potential energy saving measures should be adding external solar shades, using low-e windows and adding roof and wall insulations, respectively. Therefore, the transparent group should be considered prior to opaque group since options in the transparent group have a better over performance.

This research also offers designers a flexibility and guide when considering possible energy saving measures at different initial costs. Based on the ranking of each option, designers can always adopt the best one or more energy saving measures according to the amount of initial costs. For example, external solar shades should be considered as the first priority when the cost of building retrofitting is limited allowing for only one retrofitting measure being considered, and low-e windows and roof and wall insulation can be further included if initial costs are adequate. Meanwhile, designers can also select the most suitable measures for different regions under the guiding of the performance ranking according to the availability of the materials and labour in any specific area.

ACKNOWLEDGMENTS
This work was supported by National Key Technology R&D Program of the Ministry of Science and Technology under Grant 2013BAJ10B06, and the authors would like to thank the K.C. Wong Magna Fund in Ningbo University.


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INTRODUCTION

The development of technology and changing environmental characteristics lead designers and scientists to present different alternatives to the users and do research on achieving maximum efficiency from the perspectives of the staff and the owner. It is observed that apart from alternative living spaces to terrestrial architecture in traditional formation, during the recent years, studies and analyses of spatial characteristics of floating spaces and their effects on the user's environment, preference, and experience have increased. One of the reasons for this is that people's need for alternative living space and resources has come up (Soykut 2006; Oltluis and Keuning 2010). One of them is the boat from floating living spaces joining in with the ones gradually increasing in definition of architectural space. The association of the concept of human-space-marine is being considered together more frequent day by day (Faulke 2001). In particular, the boats over a certain length are evaluated as the large-scaled architectures which have complex interior space systems analyzing different functions in more than one floor. The point is the dynamic volumes which acquire three dimensions by integrating rational and gridal plan schemes (Figure 1.a, 1.b, 1.c) with curvilinear forms on an unstable surface. Considered architecturally, the boat gives clue about the complex relations which emerge from interaction of human-environment-technology facts. One of the pioneers of modernism architect, Le Corbusier interprets ships as architectures and shows them as functional examples of a new architectural understanding in his book named as “Towards an Architecture” (Le Corbusier 1999). During deep-sea voyage lasting for a long time, the effect of physical design elements for user comfort emerges as an example of such topics as the concept of inner and outer in space and the effect of human’s being in an isolated space to his/her behavior. In this context, the idea of building-up environment for people which...
Boats include spaces which have the quality to answer the question about how the user perceives different measurement standards in different atmospheres. On boats with the size and spatial equipment which are increasing day by day thanks to the advancing technology and material facilities, it is required to have indoor design rather than industrial design solutions. However, the boat design process developed in the framework of engineering until today has become the products manufactured with absolute technical specification (larsson and Eliasson 1999; skene and Bray 2001; Tupper 1996). It is seen that design process whose engineering side dominates is carried out because of the fact that boats are considered as floating vessels. While the boats are manufactured during the design process, minimum comfort conditions prepared within the scope of engineering ignore the user’s comfort. Only minimum conditions take part in comfort standards manuals prepared for boat designs and the importance of human psychology in space is ignored (ABS 2008; MCA 2006; IMO 1999). At the same time, the boat seen as a transformation of traditional construction system makes progress independently of architectural movement processes although they have architecture, aesthetics, form, structure in common. Therefore, it leads the designers producing products for the first time to trial-and-error method or directs them to benefit from the graphical representation of the executed samples. The implementation of the datum in design practice, which are not supported in academic sense and does not have a scientific foundation, lead up to the loss in the terms of time and cost. Accordingly, with the increase in space volume and alteration of user expectation, boats/vessels should be considered as architecture samples which contain within itself human rather than product scope.

In this study, principally, the datum regarding the human perception of space and the relation of physical architectural elements are acquired by executing the method of Post Occupancy Evaluation from the users having experienced floating interior space. Later on, in consideration of these data, it is aimed to determine spatial necessities in the floating interior space and enhance the user satisfaction. Therefore, spatial datum as to the boats/vessels is acquired from the users themselves with the method of Post Occupancy Evaluation which is used also in architecture.

**LITERATURE SURVEY**

In floating place, the number of whose made sample is relatively few, the studies regarding user comfort are predominantly in the field of engineering. Although they indicate all the features of architectural structure, the number of the spatial findings is slight because of the fact that floating structures are predominantly developed within the scope of marine engineering. Therefore, guide studies as to the marine environment and evaluation of the user in the context of the human-environment relationship are limited. According to joiner, arguing that it is not possible to experience these structures in advance (Joiner 2007), the value of the feedbacks gotten from the users is very high. As a method, he recommends “Post Occupancy Evaluation” study that architects put to use for different building types.

Emphasizing the necessity of the Post Occupancy Evaluation studies in yachts and the vacancy in this area, A. Joiner refers in his “User Feedback in Ship Design” article: “Only the design process of the ships, especially over 30 meters, lasts for one-year and even the ones over 70 meters and more last more than one year. In a sense, sizeable investments are required for these structures. Having repeated in consequence of improper designs, manufactured goods or loss of energy not only concerns project owners but also harms the environment and causes loss of labor, time and natural resources. Concordantly, the POE method, used by architects, can be used in order to define prototyping and testing phase exactly”. When it comes to the user’s behavior and feelings in the place, how the place is perceived and the change in the user’s request and requirement affect not only indoor design but also cost rates (Presier 2002). There are many studies regarding that physical environment, having a usual formation under normal conditions, and structure types with different functions affect human behavior and health. The studies about user’s place perception in physical environment and the effect of psychosocial characteristics of space on the user give information about the boundaries in the place, the definition of personal space, privacy and territoriality; and the hierarchy in the
space. Also, it is illustrated on different types of architecture such issues as the feeling of density and crowd of the place, the effect of overcoming individual distance on user’s satisfaction (Marans and Spreckelmeyer 1981; Stokols and Altman 1987; Altman and Christensen 1990; Chelrunik 1993; Bechtel 1997).

In his work “Passenger Comfort on board Motor Yachts” (Dallinga 1995), Dr. R. P. Dallinga provides input that could be effective on planned settlement decisions by examining the characteristics of dynamic loads, having an impact on the boat due to water surface, and which way the water affects the boat most. He warns that there may be unpredictable environmental forces for the ship places on a dynamic surface. He suggests that the problems such as seasickness can be minimized by taking correct decisions about the place in the beginning; likewise the wrong decisions about the place can affect the comfort in sea negatively. One of the pioneers of modernism architect, Le Corbusier interprets ships as architectures and shows them as functional examples of a new architectural understanding in his book named as “Towards an Architecture” (Le Corbusier 1999). In her book named as “Interior design methods for yacht design and the boat building industry” (Hix 2001), C. L. Hix provides details about the indoor on yacht production. In his article “The Importance of the Human Element in Ship Design.” (Dobie 2003), T. G. Dobie lays stress on the effect of vibration and movement in boats and acoustic factors. His architectural perspective goes beyond the idea regarding that boats are marine vessels based on pure technical analysis. In this sense, in the article “Comfortable Structures. (Payne and Siohan 2008) belonging to Dr. R. Payne and N. Siohan and issued in “High Performance Yacht Design Conference., the authors mention about the growing importance of indoor design for boats. While defining the comfort, they deduce from a boat sample that is about how to discuss physical space, ergonomics and visual space concepts in boats.

In literature survey in the field of psychology, it is seen that the psychological state of the person on sea and the perceptual extent of the sea that is different from terrestrial place are mentioned. In the book “The Psychology of Sailing” (Stadler 1941), belonging to M. Stadler, he discusses the behaviors of the ones living on a boat with psychological approach and emphasizes that these types of dynamic structures should be examined separately apart from the normal structures. In his book “Crowds and Power.” (Canetti 1984), E. Canetti mentions about the feelings of the crowd and loneliness that sea causes. In the doctorate study “Ocean Cruising: A study of affirmative deviance” (Macbeth 1985), belonging to J. Macbeth, he tries to correlate between the character traits of the ones who prefer voyage and their lifestyle. Macbeth aims to reach a conclusion as to the educational and cultural level and personal development features of the ones preferring sea. Under the title “Building between sea and land.” (Hoffman 1991), PB. Hoffman associates naval and terrestrial structures. In his article “Roots and Routes: Exploring the relationship between place attachment and mobility.” (Gustafson 2001), P. Gustafson examines the ground dependence and independence and gives information about the sense of belonging. In the study “Does space matter? Travel Mode Scripts in Daily Activity Travel.” (2008), belonging to E. Hannes, D. Janssens and G. Wets, they research about how space factor affects person’s mental map during the travel. Using the term “Travel Behavior”, this article contributes to the expressions supporting different places can affect individual’s space perception and behaviors. Nevertheless, there are not any current sources that deal with user’s factor, expectations, needs and satisfaction altogether in the sense of space in yacht design. In the article “Casting off: An exploration of cruise ship space, group tour behavior, and social interaction.” (2005), C. M. Yarnal and D. Kerstetter mention about the user’s behavior and social interaction in the passenger ships. In the study “Habitability and Personal Space in Seakeeping Behaviour” (2006), belonging to J. M. Riola and M. Garcia de Arboleya, they draw attention to the individual space design in large ships with touristic purpose. According to the authors’ hypothesis, these kinds of ships generally promote group behavior and individual space design becomes of secondary importance. Therefore, it causes stress to the ones who don’t spend enough time in the individual space.

It is suggested that the fact that marine spaces affect the perception in human psychology should be taken into consideration and the comfort on sea will be made by minimizing wrong decisions about the space during the pre-design stage (Stadler, 1941). The matter about human factor in yacht deals with only minimizing the mistakes caused by a person during the work or whether the habitability condition is carried out or not. Therefore, they contain only minimum requirements for the one who works on ergonomics and comfort criteria. Even, it is accepted that there are still some gaps in numeral calculation based on specified square meter and comfort (ABS 2008). It is seen that in those studies, only the workers are considered as the users. They are not accepted as the studies at the level of post-occupancy evaluation. Therefore, they cannot be associated with user’s comfort in the space and spatial satisfaction com-
plectly. Also, it is observed that in these guides, some articles as to comfort remain as only generalizations and do not have a clear explanation. One of the aims is to close the gap of user comfort and satisfaction in yacht design literature of the study.

HYPOTHESES OF THE STUDY

Within the scope of the study, it is aimed to examine the relationship between human-environment and the link between human's space perception and physical architectural elements in consideration of the datum obtained from the users experiencing the place within the scope of yachts, to define spatial requirements and to enhance the user satisfaction. Therefore, the main hypothesis is the fact that physical design elements affect different user group's satisfaction, space perception and comfort in the spaces that are dynamic and different from floating spaces. In the evaluations as to the users; different status, which yacht owner, guest, captain and crew create, among different user groups reflects spatial expectations, as well. The fact that to what extent the groups' expectations are met in yachts is investigated. While the satisfaction level is low due to insufficient space, social activity, thermal comfort conditions especially in the sense of crew, overall satisfaction level is expected to be higher with the analysis of the yacht owner and the field size in the area the guest uses, social activity, thermal and visual comfort conditions.

METHOD

For the sake of developing the hypothesis determined above, the POE method based on observation and survey is used in this study. Observations are done by an observer in order to observe user's behavior and activities at the hours when the places are used most. And surveys are evaluated by users in order for the physical characteristics of places to be reviewed. The datum acquired as a result of systematic observation and survey in the workspace is converted into a table in Microsoft Office Excel program. The evaluations stating correlation are analyzed by using statistical analysis program SPSS 17. Descriptive statistical information such as frequency distributions for categorical variables, average for numeric variables and standard deviation are analyzed. When it is required more than one group be analyzed altogether, the correlation is shown in cross tables. In addition, in terms of the psychological factors affecting the space satisfaction of both areas, whether it differs statistically or not is measured with t-test for numerical variables, k-square test for categorical variables. In addition, for numeric variables (e.g. psychological factors affecting the space satisfaction), whether the averages differ statistically in two areas or not is measured with t-test. Research findings, observation and survey results are discussed in two categories.

Observation

Systematic observation study was carried out in July and August 2011 in Cesme Marine. It was gone to the space for two hours twice every weekday and twice a weekend. The observation was made between 10 -12 am on weekday and between 5 - 7 pm at the weekend. Users in the locality were observed individually in the marine area which yachts moor to. Behaviors and activities of users of yacht when yachts are in the marine were noted as individual or group behaviors. Data collected via observation contributes to the observation and interpretation of users’ behaviors naturally not only indoors but also outdoors and surroundings of the spaces. Data about the behaviors of users of yacht in daily life, relations with other users, their choices of spaces and activities when the yacht is in the marine were collected.

Survey

A survey study was made to analysis their habits of use and conception of the space. The survey was applied to the users of yacht consisting of owner, quests, crew and captain of the yachts whose heights vary from 16m to 50m in the marines of Cesme, Bodrum, Antalya, Marmaris and Istanbul. 5 types of data were collected in the survey: (1) Individual properties of the user and connections to the yacht (age, gender, education and the state of being owner, quest, crew or captain of the yacht). (2) The space’s properties of use (purposes of users to come to the yacht, how often they come, which spaces they spend time etc.). (3) Evaluation of physical properties of the spaces by the user (the most and least favorite properties, field size, noise, thermal comfort, material etc.). (4) User’s satisfaction in terms of psychological effects of the space (to what extent the space provides with privacy according to the user and it meets the need for individualization, how much it is vivacious, tidy and restful etc.). (5) User’s evaluation of the space in general terms (whether the user likes the space in general terms or not).

At the end of the survey, 176 surveys were collected. However, 42 of these surveys because of yacht heights’ being below limits, 10 of them because of being thought not to provide with impartiality, 12 of them because of answers’ being insufficient were deactivated. As a result, 117 surveys were received for consideration. 60% of 117 surveys applied to the users of yacht whose heights
vary from 16m to 50m (Mean: 27, 69; SD: 8,527) in Cesme, Bodrum, Antalya and Istanbul was achieved by interviewing personally. 40% of them were completed with conveying to users of yacht through Cesme Marine Authorities and through pollster support. Surveys were applied in June-July-August 2011. In applied surveys, it was stated that there was no right or wrong answer thus it was asked users to be sincere and candid when answering questions.

**FINDINGS**

Yacht users participating in the survey (N=117) consist of the owner, guest, captain and crew of the yacht. Data intended to identify individual properties of users was classified under titles such as gender, age, education, user type, the state of having yacht experience before. According to it, 27,4% of users answering the survey are owner, 19,7% of them are guest, 39,3% of them are captain and 13,7% of them are crew of the yacht. Educational status of users whose average of age is 41.04

**Table 1. Spended time of open and closed spaces in a day according to user type.**

<table>
<thead>
<tr>
<th></th>
<th>Crew</th>
<th>Captain</th>
<th>Guest</th>
<th>Owner</th>
</tr>
</thead>
<tbody>
<tr>
<td>Open</td>
<td>9.63</td>
<td>10.62</td>
<td>8.95</td>
<td>6.91</td>
</tr>
<tr>
<td>Closed</td>
<td>12.76</td>
<td>11.79</td>
<td>9.25</td>
<td>6.91</td>
</tr>
</tbody>
</table>

**Table 2. Physical comfort factors and user type relation.**

Factors affecting satisfaction from the space were tested according to user type considering criteria for physical comport such as lightening, ventilation, noise, inner esthetics, field size, material etc. As a result of backcrosses made to evaluate the satisfaction from the space in the context of physical comfort, satisfaction levels that vary by user type are stated in Table 2.

**Table 3. Levels of satisfaction in context of adjectives according to user type.**

(Median: 41.00; SD: 9.792) is like that: 53% university, 28% high school, 11% secondary school. While 70,9% of participants consist of those who went to sea and stayed in yacht, 20,1 % of them consist of those who chose the yacht as an alternative vacation. 36,8 % of participants are women and 63,2 % of them are men. Users spend averagely 110 days (mean: 110,69; median: 60; SD: 108.965) in yachts. The number of spent days annually varies by user type (F=41,408; df=3; p=0.000). In a year, the crew spends time mostly (mean: 209,64; St:1,171) and guests spend time least (mean:28,53; St:7,624). Spent time in open spaces in a day varies by user type (F= 14.672; df=3; p=0.000). Accordingly, while the user group who spends mostly time in open spaces is guests, the one who spends time least is the crew. Spent time in closed spaces also varies by user type (F= 8.775; df=3; p=0.000). Accordingly, user type that spends mostly time in closed spaces of the yacht is the crew (Table 1).

Evaluation of the space in the context of adjectives was made according to data collected from four user groups under titles such as suitability, spacious, lively, innovating, comfort, light and headway. Table 3 states satisfaction levels that vary by user groups.

Evaluation of the space in the context of physical comfort, satisfaction levels that vary by user type are stated in Table 2.

Satisfaction levels from the spaces in yachts were found by backcrosses user groups and titles such as open social space, closed social space, closed private space, crew space, service area,
RESULTS

As assumed in the hypothesis of the study, it has been observed that physical design features affect distinctively different user groups' satisfaction in environments being dynamic and independent from ground such as floating spaces. It has been observed that there are differences in satisfaction levels especially in closed spaces between user groups. While the group who satisfies with closed social spaces most is yachtsman; guests and captains follow it. In fact, it can be concluded that satisfaction level of the crew who spends mostly time in closed space is low. Spatial definitions (size of spaces, lack of ventilation, storage and furnishing etc.) in Table 4 for physical comfort according to the evaluations of spaces by user groups one-to-one are listed as reasons for unsatisfaction in yachts. Crew compartments, service areas, wet spaces, circulation areas which are not satisfying in terms of especially being under-size of space, odor problem, under-storage space and esthetic become least favorite spaces in yachts.

However, it becomes prominent that there is no social space for the crew. That the crew works under stress in long sailings may lead them to not only make technical mistakes but also decrease their performance in ways which will affect the comfort of guests and yachtsmen. Size of spaces becoming prominent as one of the most unfavorable features in yachts according to users has been seen as a problem in general because of not meeting rising needs.

When taken specifically to spaces, kitchen spaces whose satisfaction level is below average draw attention. Ventilation and odor problems besides of lack of space and equipment in kitchen spaces are stated. Reasons for unsatisfaction in wet spaces are about narrowness of the space and ventilation. Crew spaces placed near to kitchen and engine room in designing expose to the problems of odor, ventilation and acoustics. Lightening problem which is lack in inner spaces of orlop is not a matter in upper deck. It has been stated that satisfaction levels belonging to open spaces are high. It has been reached the opinion that satisfaction levels in open spaces do not vary by user type and it meets expectations in general. A lot of social spaces, sun spaces, food & beverage, activity and party spaces in open spaces of the boat appear as factors which increase satisfaction level of users. Thus, it is observed that outgoing activities are focused in yachts. Odor problem which affects negatively satisfaction level in closed spaces does not appear as problem in open spaces. Saloons and cabins following upper deck are reflections of centroids of the design to results. Conception of design which is outgoing, sea oriented and included in open space appears as a factor which increases satisfaction in main hall including an outgoing space sided with windows largely and even lobby.

CONCLUSION

Primary mission of disciplines of architecture and interior architecture is to create comfortable and livable spaces for “human”. Floating spaces are also spaces whose rates of preferability by individuals increase more and more as an alternative vacation and living space near to nature. Even though it involves common grounds with accommodation building, that yachts are evaluated in themselves has approved that they are classified as especial living spaces in the eyes of users and identified in minds. Thus, it has been stated that there is need for especial probes in regulations related to these spaces. It has been found that factors resulted from being surrounded sea which will affect the spatial evaluations of users should be considered. So, the importance of these factors’ effects on a subject which designer has limited information and experience is major. Findings about any public or private architecture should not be applied to yacht space. Hierarchical design conception becoming prominent in design of yachts has reflected to evaluations of spaces according to user type. It has been observed that satisfaction levels of yachts which have high satisfaction levels by individuals in general averages decrease in spaces itself and areal analysis. It has been observed that spatial satisfaction levels apart from size of spaces are adequate because relationships of captains with owners has reflected to space standards even though they are included in worker group. Another implication is
that there is a difference in satisfaction levels of user groups especially in private spaces in closed spaces of the yacht. Even though that crew is seen in position of worker of yacht leads him not to keep up his expectation level, his needs should not be ignored because difficulties in working in floating spaces can cause first physical fatigue of the crew and after psychologically stress in daily life even though they has not been experienced before. Since the performance of crew is directly correlated with potential of working and rest spaces, primary and secondary spaces in yacht designing should be taken equally. According to new regulations, when calculated mathematically identified minimum spaces for crew cabins, aforementioned psycho-social requirements should also be considered. Thus, it is emphasized that especially life standards of crew should be raised. Moreover, social space and activities for crew should be increased in closed spaces which they spend time mostly. Considering spaces providing with opportunities such as socialization and activity besides basic needs for crew which spends most of his time during the day in closed spaces is necessary.

In this study, interior spaces of yacht have been architecturally discussed as a marine structure afloat. Unlike terrestrial structures which directions are discussed in settlement of functional units in a stable way, design decisions of concept of directions which always changes in a floating-dynamic structure raises its importance in interior spaces. During the study, some difficulties have been experienced due to both insufficient academic basis and user’s design awareness which has not been imbedded yet. Especially in yachts which have design process consisting of several disciplines, it has been tried to create an interlanguage for people in the field of both architecture and marine engineering to benefit from the study. The study of Post Occupancy Evaluation performed is the first to be spatial evaluation made in this field and it has provided with statistical data about matters to be considered in literature design. It is recommended to make evaluations on differences of spatial use in a cross-cultural and more large-scale way for future studies. Especially serious lacks related to forming standard in interior spaces have been found. These standards are recommended to be presented by making physical and psycho-social measurements in a scientific work system. Experiences in marine designs indicate that these methods present important information and potential of development for owners and operators as well as industry of yacht design and production (Joiner, 2007). In that point, to understand differences which design features of floating space creates besides user’ expectations’ effect on spatial decisions and to recommend solutions about it are highly important.

**NOTE:** This paper is based on my doctoral thesis named “Effects of Physical Elements on Spatial Cognition of Floating Spaces: Relation with Environment and Human Behavior” at the Dokuz Eylul University, Izmir, Turkey.

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VALUE COMPONENTS OF HISTORIC RESIDENTIAL PROPERTIES EVIDENCE FROM BUDAPEST REAL ESTATE MARKET

David Kutasi

Abstract
There are plenty of historic buildings bearing different stylistics in Budapest and many of them have residential function. In the city center of Pest, most of the properties are historic buildings constructed between the period of the Austro-Hungarian Compromise in 1876 and the World War II, but Buda also has some residential dwellings with historic value. Estimation of the value of the Budapest residential housing is an important issue for owners, real estate developers and investors, nevertheless not many studies have focused on the value components of those buildings in Central Eastern Europe or Hungary.

In this paper the value components of Budapest residential flats were identified using the hedonic regression method. On a sample of more than 1800 residential properties of Budapest the differences between historic, panel and other buildings were compared. The conclusion can be drawn that altering aspects are relevant for each segment. Even the categories determine large differences between panel buildings and non-panel buildings regarding the value. For the historic properties, the existence of balcony, the up-to-date type of heating, the good condition of the flat, the unique panorama, the location in Pest City, the vicinity of parks and the distance from noisy facilities are the most important factors. Meanwhile for panels the allocation on lower floors, the better heating system, the good condition, the location in Buda and the vicinity of market are the factors that have the major positive effect on the value. For the non-historic and non-panel buildings the balcony, the up-to-date heating system, the good condition, the luxurious Buda district location, vicinity of parks and remoteness of noisy facilities are the most important components of value.

Keywords: Hedonic Pricing Method, Budapest, Historic Buildings, Residential Property, Value Components.

INTRODUCTION

Due to the long history of Buda and Pest, the Hungarian capital is full of historic monuments with architectural value. Since those buildings have a special character that is diverse from the modern properties, it is reasonable to observe if the factors on value are also different or not. In this paper the identification and quantification of the value components of Budapest residential flats using the hedonic regression method was done on a sample of 1806 residential properties of Budapest. The differences among the historic, panel and other buildings were compared and the main differences were highlighted.

RELATED LITERATURE REVIEW

It is perceptible that the historic buildings emit a special atmosphere. Heritage protection in many areas focuses on the possible ways to protect the buildings in the same condition as they were constructed. However the importance of these buildings is acknowledged, few studies deal with the extra economic value.

One of the first studies dealing with the economic aspect of Hungarian monuments was the article of Kutasi and Vidovszky. The study focused on the costs by comparing the case of regular maintenance to the case of rare renovations. In the pilot six typical historic buildings were observed, finding economic facts beside the aesthetic and cultural arguments, to conclude that it is worth preserving our built heritage in good condition. (Kutasi-Vidovszky 2010) Beyond the facility management considerations of monuments, according to the knowledge of the author, no study has focused on the additional value of the historic buildings in Hungary and none of the studies have collected the main characteristics influencing the historic housing values.

However there are few local studies in the CEE region, in other countries abundant studies and reports have been made and several aspects of the topic have been analyzed. Some studies focused on historic districts and not on individual property attributes. Ford studied local historic districts in Baltimore, Maryland and came to the conclusion that similar properties have higher transaction prices if they are located in historic districts. (Ford 1989)

Another group of researches, such as
Deodhar, focused on the heritage listings and not on the historic districts. In his study a hedonic price function was used to estimate the market price difference between regular unlisted and heritage listed houses in Sydney. The level of heritage significance was also found to have a positive effect on the market value. It has been detected that there is a price premium of 12 percent of listed over unlisted houses. (Deodhar 2004)

Schaeffer and Millerick revealed that the effect of historic designation was beneficial for properties in a sample from Chicago. They also mention that the impact depends on the restrictions imposed by preservation measures. (Schaeffer-Millerick 1991)

Noonan showed using a repeat-sales approach that landmark designation effects property value. The article shows that the external effects of designation are stronger when more heritage buildings get designated. The repeat-sales approach is an appropriate method to value this, because it follows neighborhoods through time. The conclusion of the study is that designated landmarks sell for a 10.6 percent premium over comparable properties, while properties located in landmark districts receive only 3 to 5 percent premium. (Noonan 2007)

The study of Leichenko, Coulson and Listokin expands upon previous work by examining the effects of designation on property values across a larger set of cities. They estimated the effect of historic designation on house prices in nine different Texas cities. The premium of historic designation upon undesignated property varies between 5 and 20 percent of total property value. (Leichenko et al. 2001)

The paper of Asabere and his colleagues examines the sales effects of local historic preservation. Using the hedonic framework it is show that small historic apartment buildings experienced a 24 percent reduction in price compared to non-locally certified properties. (Asabere et al. 1994)

The evaluation of architectural quality is another way in which several hedonic studies try to estimate cultural heritage effects. These studies focus on different measurable aspects of architectural quality in a city, for example on architectural style, number of façades with a historic or architectural quality.

Hough and Kratz conducted one of the first studies with regard to cultural heritage. Their study investigated the way the office market of downtown Chicago values “good” architecture. The results indicate that a considerable rent premium is paid for “good” new architecture but not for “good” old architecture. (Hough-Kratz 1983)

In another study, Moorhouse and Smith presented a hedonic price index to estimate the purchase price with relevant architectural characteristics through visual inspections of houses which were built between 1850 and 1873. Variables were included for architectural styles, such as Renaissance Revival, Neo-grec, Victorian gothic, Flemish revival, Greek revival. The included variables resulted 0.88 for R-squared value. (Moorhouse-Smith 1994)

Vandell and Lane use amenity data from a set of class “A” office buildings in Boston and Cambridge to measure the contribution of architectural quality to the value of a building. The results of their study confirm a strong relation between design quality and rental fees, but a weak relation between design quality and vacancy behavior. (Vandell-Lane 1989)

Asabere and his colleagues detected partial effects due to architecture on home value. The empirical results show that premium prices are associated with the historic architectural styles like Colonial, Federal, Garrison and Victorian. A second objective to detect potential impacts of historic zoning, however, does not show conclusively that the historic district of Newburyport has positive external effects. (Asabere et al. 1989)

The first hedonic price study in the Netherlands to estimate the economic value of cultural heritage was written by Ruijgrok. The study values housing comfort in the old Hanseatic town of Tiel and Culembergenwaard areas. Using hedonic pricing method, Ruijgrok assessed the impact of preserving cultural heritage on housing comfort value. In this respect, he included in the regression a number of variables to express the historic and cultural value of the building such as: monumental status (national, municipal, potential or none), year of construction, architectural style (24 sub-styles), authenticity (original, partially adapted or totally adapted) and the number of historic façade elements. On the basis of a sample of 591 houses, Ruijgrok estimated that there is a 15 percent premium for houses which are part of ‘heritage’. (Ruijgrok 2006)

Another Dutch study of Lazorak and his colleagues applied the spatial autoregressive model to investigate the impact of cultural heritages. First, the effect of listed buildings on its market price (additional 26.9%) was estimated, secondly the value that listed heritage has on nearby properties (additional 0.28% in 50-m radius) and finally the effect of historic-cultural sites on real estate prices (additional 26.4%) was quantified. (Lazrak et al. 2014)

The value of historic buildings can be observed not just through the architectural characteristics, but also through the taxation system. As stated by Narwold, Sandy and Tu, a possible draw-
DATA AND METHOD

The theoretical foundation for the hedonic pricing method was introduced by the paper of Rosen. From that time, many articles identified the price components of the value of real estate. Contrary to the international popularity of this method, regarding the Hungarian real estate market, just few studies exist. (Rosen 1974)

In this study the hedonic method was used. Not only the technical parameters of the real estate, but location specific variables were also included from certain urban facilities, such as distances from parks, train stations or markets. As the location is one of the main characteristic of properties, these variables should be involved in the models to have a better understanding of the real estate prices. The semi-logarithmic function that was used in the regression can be described with the following equation: where,

$$P: \text{the asking price reduced with the bargaining potential}$$

$$x_i: \text{continuous variables}$$

$$z_i: \text{nominal variables}$$

To avoid heteroscedasticicity among the error terms the estimation using White heteroskedasticity-consistent standard errors and covariance was implemented.

Using asking prices is not a common method, but in specific cases it was already implemented (Falzon-Lanzon 2013). Due to the underdeveloped property registration system there is no official dataset including sufficient information to perform analysis on the Budapest real estate market. To reach the most relevant data for the Budapest housing market a dataset was used based on the asking price from real estate agencies, modified with the assumed difference between the supply and the transaction price.1 The data of the most relevant on-line real estate portal (www.ingatlan.com) was used, having more than 3500 advertised flats in April, 2012 from agencies and individuals. To avoid outstanding figures and misleading numbers, the dataset was filtered, excluding data errors, missing data and luxurious properties regarding both size and value. The properties with perpetual lease were also omitted. The dataset was supplemented with additional explanatory variables. New technical and geographical variables were added manually. From the advertisements’ descriptions additional garage and a balcony variable were added. Furthermore, geographical analyses were implemented with the Microsoft Mappoint and the MP MileCharter software. The distances were calculated between the residential properties and the specific important places (such as park, markets, train stations, etc.) to generate location specific variables.

Additionally a historic building dummy variable was created from the descriptions. In many cases it was explicitly stated that the house is a historic building. In some others the location and the specific characteristic of the flat indicated that the property is a historic one. If the building was constructed before the Second World War or the description referred to special characteristics, such as classical style or civilian housing with high ceiling height, the dwelling was classified to the historic category. In case of lack of evidence in the description, the flat was reckoned to be not historic. 15 explanatory variable groups turned out to be significant out of 8 are technical and 7 are geographical variables. The dependent variable was the logarithm of the modified supply price of the real estate. The description and the descriptive statistics

Table 1. Description of variables.
of the dependent, the non-location specific and the location specific variables are presented in Table 1-2.

The total sample (1806 observations) was divided into three sub-segments without overlaps. The 392 historic buildings created the first group, the 285 panel dwellings (constructed after the 1960s) consisted the second group, while the 1129 other flats the third group. The differences of the variables in the sub-segments were in the main focus of this study.

RESULTS

In the hedonic regression of the total sample with 1806 elements 15 variable groups turned out to be significant, including 6 location specific variables and 1 other referring to the district or zone, where it is located. (Table 3.)

It can be concluded from the analyses of the total sample that from three properties with entirely identical features from the three sub-segments the panel has the least value (coefficient: base) and there is no difference in price whether the house is historic or in the third sub-segment (coefficient: 0.006).

The floor number was just significant in case of panel buildings. It is not a surprising result if it is taken into consideration that the 70 percent of the non-panel flats are located in the first three floors, while for panel building there is an equal distribution between the floors from the 1st to the 10th floor. The coefficient shows, that on the higher floor the flat is, the less valuable it is for the customers (coefficient: -0.009). The reason is the higher floor, the more uncomfortable mounting stairs. The additional added value due to the better panorama is handled in the panorama variable. Furthermore the top floors are not resistant against the climate; the thermal isolation and waterproofing are often not satisfactory, the top floors get really warm during the summer period.

Having a balcony means an added value mainly for historic buildings (coefficient for historic: 0.102; for total sample: 0.087). As in the sample just 30 percent of the historic properties had a balcony, (while for the non-historic buildings it is above 55 percent) it is understandable that a balcony has more added value for the historic property owners due to the rarity.

Regarding the heating the fan-coil system...
means an outstanding added value, but in general where this type of heating occurs, the property is luxurious and equipped with many extras, such as sauna, Jacuzzi that were not included as variables in the regression. Convector-, electric- , Hera- and district-heating are obviously the worse, and circular-heating and central-heating is preferred. For the historic buildings the district heating is not deemed that bad as convector or Hera, since in some historic part of Pest this is the general heating method. It should be mentioned here that many of the historic properties’ heating system was renewed and even fan-coil system was evolved in the sample.

The result for the properties’ condition was in line with the previous expectations. The better the condition the higher the value is. Obviously the historic and panel buildings cannot be new, (as the historic were constructed before 1945, and the panel buildings in the 1960s and 1970s), so the base variable in these categories were the very good condition.

The panorama variables were not relevant for panels, as their location do not permit significant differences between the outlooks. The highest value regarding this aspect was with historic monument. (coefficient: 0,167 for historic and 0,130 for total sample).

Concerning the locations (zones) the hedonic model resulted that historic buildings in Buda are not as valuable as they are in Pest. The most valuable historic buildings are those that are located in the historic Pest, in the city center (coefficient: 0,254). The reason behind is that historic properties located in Buda Castle were omitted where just perpetual lease is possible, as this value is not comparable with the ownership value. Within the other historic buildings Buda is not as exclusive location as Pest. (For historic buildings due to the lack of data 3 categories were included: All buda; Pest city; Other Pest)

The last group of variables was the distance specific variables. The effect in every category was the same for all of them, just the significance varied. Vicinity of the airport (0,197), cemetery (0,117), stadium (0,046) or train station (0,048) has a negative added value, while the proximity of a park (-0,047) or market (-0,017) has positive added value. On the total sample, the distance from the market was important for the panel owners (-0,032), but not for the others. Contrary the vicinity of stadium, train station or airport is not important for panel owners, while these variables are significant for the others. The price of historic monuments is higher if the environment is silent and relaxed, far from train station or stadiums and close to parks.

The hedonic model with the above mentioned variables explained the price with 81,5 percent R-squared value, while it is 85,1 percent for the total sample and just 61,5 percent for the panels. The difference is due to the sample size and the number of variables included. Furthermore the panel prices are more homogeneous, thus even the model for panels gives a good estimation for the value, R-squared is relatively low.

CONCLUSION

In a Budapest asking price sample the conclusion can be drawn that not the same aspects are relevant for the residential properties if they are historic buildings, constructed from panels or non-panel and non-historic buildings. Even the categories determine large differences between panels and non-panels in the value.

For the historic properties, the existence of balcony, the good type of heating, the good condition of the flat, the unique panorama, the location in Pest City, the nearness of parks and the distance from noisy facilities are the most important components. Meanwhile for panels the lower floor number, the better heating system, the good condition, the Buda location and the proximity to market are the aspects that have the major positive influence on the value. For the non-historic and non-panel buildings having a balcony, a good heating system, being in good condition, being located in the luxurious Buda districts, being close to parks and far from noisy facilities are the most important components of value.

These results and similar studies can be applicable for real estate experts in practice. The model and the result can help appraisers to identify the value of a huge dataset for mortgage collaterals or for portfolio valuation. Furthermore if the comparable method is applied by the appraiser the model could help to identify the differences in value. For real estate developers the result could support in the development of the architectural program or choosing the location, so the investment could fit better to client needs. Using the results of this article by developers for historic building renewals, the development can be better adjusted to the customer needs.

ACKNOWLEDGEMENT

This paper could not be created without the help of Milán Badics and Balázs Pintér who gave support during the creation of the database.
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ASSESSING THE ECONOMIC CONTRIBUTION OF ECOLOGICAL ARCHITECTURE CASE STUDY: KAYSERİ KADİR HAS STADIUM.

Z. Ozlem Parlak Bıcer

Abstract
Ecological architecture consciousness has started spreading out with the idea that the limited resources that remain on the world in 21st century due to the damage caused by humans should be used economically. Energy saving consciousness should be executed in all stages from the design of the building to its construction and use. The number of buildings in the world that have been built with this consciousness continues to increase. Many technological applications have been put forth in order to ensure that a building supplies its own energy. This new situation contributes to the decreasing of the energy need of the building while also making significant savings in the Gross National Income of developing countries such as Turkey which are dependent to other countries for energy. When the contribution of ecologic designs to the country economy is considered, it is expected that the government and local administrations increase incentives especially for government buildings thereby leading the way. The objective of this study is to examine the energy consumption of Kadir Has City Stadium built in the city of Kayseri and to question the contribution of the local administration in terms of ecologic approach. It is expected that the study will make a contribution so that the local administrations will support all the stages of government buildings from the design to construction.

Keywords: Ecologic architecture, Kadir Has City Stadium, Economy.

INTRODUCTION
Ecology is the branch of science that studies the interaction of all living things with their environment, from a single cell organism to humans. Any damage done in any relation in the ecology has a domino effect on all relations. It causes the balance of the Earth to shift. These relations sometimes shift due to chopping trees for any reason, sometimes due to the energy need in cold weather, and sometimes due to thoughtless damage the consumer cultures brings. These damages cause the icebergs in the Polar Regions to melt, decreasing of water resources, energy drought and global warming. As it can be seen, humans are the biggest cause of disruption of the ecosystem. Humans have caused the disruption of the balance with its mind and consciousness, and now it must strive to maintain the continuity of the order for future species (Utkutuğ, 2007: 116–119).

The need for shelter has been one of the most important needs for humankind since its existence. Humans are entwined with the ecosystem to fulfill their needs for shelter, from the construction phase to finishing the usage. The relationship with the ecosystem cause the term “ecological architecture” to emerge. Ecological architecture is an understanding that should be present in everyone, from the contractor to the end user, to prevent a building harming the environment, and to create an environmentally friendly environment. Ecological architecture requires an active use of energy from the construction stage to the demolition stage (Koçlar Oral, 2008: 114). Lately, governments and institutes are working on solving this problem due to decreasing energy resources and increasing consumption. The Energy Performance in Buildings Directive (2002/91/EC) which began to be carried out in January 4 2003 aims to bring standards into buildings that exist and will be built and to conduct better audits. As a result of this directive, 22% savings on energy by the year 2010 is aimed. (CAT Chamber of Architects of Turkey, 2006). With this scope, may certificate training programs have begun to be carried out in order to measure and assess the energy efficiency of buildings worldwide. The most well-known program in our country is the LEED certificate program that has been developed by US Green Building Council. (Turkish Green Building Council, 2014). Other important certificate systems besides LEED are BREEAM, DGNB, and GREEN STAR. For green building certification systems that are in compliance with Turkish conditions, National Green Building Certification System ‘SEE-B-TR’ was developed by the Building Application and Research Center.
These certification systems have had an encouraging approach to ecological approaches. In our country, it is seen that work related to this area falls under the “Program Creating for Energy Legislation Outside of Energy Domestic Market” heading under the National Program, and the subheading of “Creating Compliance for National Legislation in Energy Efficiency” (CAT Chamber of Architects of Turkey, 2006). The work done in Turkey is mostly related with complying with “Ordinance for Heat Insulation in Buildings”. Also “EU Twinning Projects for Improving Energy Efficiency” applications have begun to be carried out to have the applications carried out across Turkey and to quicken the EU adaptation process. (CAT Chamber of Architects of Turkey, 2006). It is hoped that the studies related with energy conservation will not end here and various arrangements on a micro and macro scale.

METHODS OF OBTAINING ECOLOGICAL ARCHITECTURE IN BUILDINGS

Ecological architecture emerges in every step of constructing a building, from the design to the demolition stage, in terms of efficient energy use. A building consumes energy in production, transport and distribution, construction, demolition and reuse throughout its life cycle. (Koçlar Oral, 2008: 114) When it is desired to create an ecological architectural structure, factors such as assessing meteorological data correctly, choosing natural and ecological materials, keeping track of technological developments, the energy consumed during construction, conserving materials, recycling/reusing wastes, giving awareness to the user gain importance. Energy savings are achieved primarily with the architectural design (Yılmaz, 2009:46–48).

ECOLOGICAL ARCHITECTURE EXAMPLES IN THE WORLD

As ecological architecture began attracting interest worldwide, architects and customers began working on such products. As a result of these studies and expectations, examples in this field can be seen in developed countries. In this part, two examples from ecological architecture that uses wind, solar and other active energy sources to use for explanations.

The first of these designs is COR Tower, which was completed between 2009-2011 by Oppenheim Architecture + Design. It’s located in Miami, Florida, designed for commercial, office, fitness and residential purposes, and has an area of 480,000 m². The total length of the building is 121 m (Lee, 2014). The renewable energy of the building is maintained by wind turbines that are integrated to the design criteria by the winds coming from the ocean. COR Tower is the most important example in considering ecological approaches such as wind energy and photovoltaic cells during the design stage, rather than integrating them later.

Another building that uses active energy systems is Pearl River Office Tower, and it has gained importance with its zero energy consumption. The office building that was designed by Skidmore, Owings & Merill (SOM) and Arup for the Chinese National Tobacco Company has the property of consuming zero energy. The building which is in the Guangzhou district covers an area of 480,000 m² and has a height of 303m (Şev, Başaran, 2011: 1507–1508). To produce electricity, 4 small sized wind turbines of 10 000 kWh/y were used. (Şev, Başaran, 2011: 1507–1508). The building also uses integrated solar cells and fuel cells using natural gas, and generates the required energy on its own. It meets its need for warm water by solar collectors, and grey water can be recovered. The building’s water needs are met by storing rainwater. State of the art technology active energy is used in as well as passive methods for...
energy conservation. The double façade technology contributes in decreasing the cooling load for mechanical systems, thus decreasing energy consumption (Şev, Başarır, 2011: 1507–1508).

KAYSERİ KADİR HAS STADIUM AND ECOLOGICAL ARCHITECTURE

Some studies in Kayseri related to ecological architecture has begun in terms of residential buildings. However, these studies did not go further than an empty sales pitch. The current heat insulation systems are being carried out by inexperienced firms that have no concern for energy conservation. Therefore, the notion of ecological architecture could not go beyond a building’s heat insulation. With the developing building technologies, Olympic stadiums began to be symbols of cities after the 1970’s. A need for a stadium in Kayseri was addressed in the 2000’s. As a result, a symbolic structure that was 7km to the centrum was aimed (Bahadır Kul Architecture, 2014).

Kayseri Kadir Has Stadium design was done by Bahadır Kul Architecture in 2006. The construction lasted approximately 3 years and the stadium was open for use in 2009. The stadium’s capacity is 33,000 people, the building plot has an area of 150,000 m², the total construction area is of 80,000 m² and the green space is 27,000 m² (Bahadır Kul Architecture, 2014).

Kayseri Kadir Has Stadium is located on the main road connects the centrum with the bus terminal, and on the north is the old bypass, and on the southeast is the rail system that maintains transportation of the city’s north-west direction. The stadium can be reached via trams, buses and cars. Reaching the stadium via train has an ecological contribution. Arriving at the stadium by car is by using the bypass and the tram route up north. The stadium has a parking lot of 52,317 m² and 1785 cars in total (Bahadır Kul Architecture, 2014).

The stadium shell is covered with aluminum roofing material that completely covers the bleachers. The main parts of the building were of concrete and the roof was made of steel to provide openings to pass through. Local material was not a factor in choosing materials. For maintaining functionality during the stadium construction, the designer had to use steel. Field illumination, sound systems, and infrared heaters for the bleachers were designed under the roof shell. (Bahadır Kul Architecture, 2014)
FIFA and UEFA criteria played a huge part in planning the stadium. Criteria related to number of WC’s, number of parking lots, camera locations and access for the disabled are some of the determining calculations among many. Meeting certain criteria in stadiums that have a complex structure is important in increasing consumer comfort. Kayseri Kadir Has Stadium obtain 4 stars from UEFA, and UEFA and FIFA tournaments can be played here.

The construction of the stadium began with an initial contract fee of 56,938,000 YTL, however the final total expenses reached 63,000,000 TL when it was completed. When it is considered that stadiums of high initial costs have a life of 50 years, using current technology is a must.

The usage spending data was obtained as a result of an interview with the stadium manager. It is seen that the activity of Spor Inc. which is a company of the Metropolitan Municipality causes a difference in comparison to other stadiums. The total natural gas spending of December-January-February is 100,000 TL.

The information that the three month energy consumption being 350,000 TL was obtained. The main reason of this high cost is the grass not benefiting from the sunlight due to the roofing, therefore having to use artificial sunlight units, especially in winter. Many stadiums that were designed in the last century face this problem. One of the precautions taken in Kadir Has Stadium was using transparent areas between the roofing. However, it was insufficient. Playing football in this stadium, which is the main goal, had become impossible. On the other hand, integrating photovoltaic cells on the roofing would be a logical solution. However, no study related to this topic could be obtained. IN this context, benefiting from the sunlight as much as possible should be a priority.

It was found that the Kadir Has Stadium spends 125 tons of water in a tournament, which is a two hour span, and when the fact that water sources are decreasing rapidly, this stresses the need for ecological architecture. Aside from the mentioned consumption, the grass field that has the dimensions of 68x105 m requires watering. While funding was planned to extract water from underground springs during the design, a solution was sought during the usage stage. 1/5 of the rain water was managed to be collected from the roof, and a portion of the rainwater was used to irrigate the grass (Picture 10, 11).

RESULT

The most important issue in the design stage of the Kadir Has Stadium that is being built by the Kayseri Metropolitan Municipality is compliance with FIFA and UEFA, and having these organizations’ tournaments played in Kayseri. Ecological architecture is in the background. In the stadium design, it is seen that the rain water cannot be collected and that there has been studies about storing a portion of the rainwater. While this precaution can easily be integrated into the facility after the construction, due to reasons such as uninformed employees and insufficient funding from the government, this was not considered during design process. If investing in the environment, the economy and future is desired, this can be done by increasing examples of ecological architecture. In government buildings are done within the standards of ecological architecture, from the design to the usage, it will contribute in energy savings, especially in large scale projects such as stadiums that are used in certain periods, and therefore will contribute to the domestic economy. It is expected that this study will provide an example for future design and usage of government buildings.
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PEDESTRIANIZATION AND WALKABILITY IN A FAST DEVELOPING UNESCO WORLD HERITAGE CITY

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Abstract
A walkability friendly environment is crucial in historical towns and cities built with minimal number of motor vehicles. This research aims to assess physical attributes of pedestrianization in Georgetown, Penang, a UNESCO World Heritage Site regarding walkability. A structured interview was conducted among 170 respondents at six different streets to examine citizens' satisfaction on the pedestrian facilities using six walkability features including a) pathway, b) zebra crossing, c) signage, d) personal safety, e) traffic flow and, f) aesthetics & amenities. Relative Importance Index (RII) analysis show that existing pathways do not meet acceptable standards in promoting a walkable environment. Aesthetic and amenities scores the lowest in satisfactory level and zebra crossing scores the highest in unsatisfactory level. The level of walkability in the World Heritage Site in Georgetown, Penang are found inadequate. Provision of physical walking and built heritage features without providing sufficient activities along the streets do not yield high walkability.

Keywords: Walkability, Built Heritage, Pedestrian, Relative Importance Index (RII)

1. INTRODUCTION
Walkability refers to the quality of walking conditions (Villanueva et al., 2014). It takes into account the quality of pedestrian features including pathway conditions, lighting, continuity, security, traffic speed, comfort and convenience (Azmi et al., 2013). Nevertheless, some scholars may even include social space, motivation, and activities particularly in cities with heritage built such as Talinn Old Town, Stonehenge and King Street, Charleston (Litvin, 2005; McManus, 1998). A walkability friendly environment is crucial in historical towns and cities built with minimal number of motor vehicles (Sutikno et al. 2013). Due to conservation and preservation guidelines, any new alteration to the current building structures and surroundings are prohibited. With an increasing number of vehicles, some historical towns and cities may not be able to sustain further (Amistad & Regidor, 2005).

Physical attributes of a working environment influence walking (Leslie et al., 2005). Pedestrian physical environment needs a facelift to attract more people to walk. In developed countries, walkability is seen as shifting transportation mode from motorized vehicles to non-motorized vehicles with short trips (Krambeck, 2006). This means less pollution, less usage of fuel for motor vehicles, and a more sociable community. However in developing countries, walkability is not yet considered essential, and private vehicles are still seen as a symbol of wealthy status, thus congestions in cities are inevitable. More highways were built and pedestrian pathways were sacrificed to make way for street widening to alleviate this kind of situation. As a result, cities in developing countries are losing their aesthetic value and original image (Krambeck, 2006).

Improved walkability can entice consumers to purchase more local goods and promote greater economic resilience. A wide pedestrian pathway constitutes a high quality walkability. An acceptable width should give a sufficient and comfort social space to pedestrians. As practiced in Malaysia, a minimum width of a pedestrian pathway is 1.5 meters. However, this width only meets the minimum requirement (McManus, 1998), and an acceptable social space is about 3 meters. Continuity and connectivity also constitute a good walkability (Al-kheder et al., 2009; Ozbil et al., 2011). Moving from one destination to another on foot should be continuous without obstacles. The said obstacles include lamp posts, trees, dust bins, and other cities' fabric. The streets' fabric should be erected or put at a road side which protect pedestrians from snatch thieves or being hit by motor vehicles. The pedestrian pathways should be provided with street safety measures such as zebra crossing, light flashing, sufficient street lighting and traffic calming. Furthermore, the speed limit for
motorized vehicles should be limited to a maximum of 30km/hour. The five sensory features in appreciating urban aesthetic, namely: visual, smell, noise, feel, and taste are the motivation features that drive more pedestrians to use the pedestrian pathways (Williams, 1954). For example, if a person is walking on the pedestrian walkway in Istanbul, he/she cannot avoid the visual element of built heritage of Istanbul University, the smell aroma and taste of a fresh kebab, and street vendors’ hawking to attract tourists’ attention into buying their products. Pedestrian pathways should be well maintained as to provide a smooth and comfortable walking experience along the chosen route. Any broken tiles should be mended immediately to avoid causing grievances to pathway users. In addition, shades should also be provided. It is not necessary to build a manmade shade but a correct type of trees should provide sufficient shade to pedestrians (Williams, 1954). All related stakeholders namely; urban planners, local authority, non-governmental organizations (NGOs), community associations, and tourism organizations should take action in realizing a walkable environment in their vicinities especially those areas that possess built heritage sites as valuable assets.

Promoting walkability is seen to be most appropriate in solving tourists' mobility issues in historical areas. However, walkability is only possible if there is a provision for pedestrian pathways (Riley et al., 2013). Studies have shown that physical attributes influence the walkability (Gallimore et al., 2011; Leslie et al., 2007; Leslie et al., 2005; Coffee et al., 2013; Owen et al., 2007). These attributes include availability of pathways, acceptable width, levelling, continuity, safety measures, shades, and obstacles. Tourists may want to walk more to appreciate urban aesthetics of built heritage (Litvin, 2005). Promoting heritage trail with concerted effort will make the trail exciting and memorable. This research aims to assess physical attributes of pedestrianization regarding walkability in Georgetown, Penang, which has been designated as one of the United Nations Educational, Scientific and Cultural Organization (UNESCO) World Heritage Sites in 2008.

2. WALKABILITY, PEDESTRIANIZATION AND BUILT HERITAGE

Walkability has always been associated with heritage values integrated with the tourism sector. Many scholars argue that a walkable environment enables not only the tourists but also the local residents to appreciate historical reflections of the past in detail (Litvin, 2005; McManus, 1998; Moscardo, 1996). Studies have also shown that walkability has enormous benefits in economy (Litman, 2003), health (Frank et al., 2006; Gauvin et al., 2005; Zhu & Lee, 2008), and environment (Litman, 2003).

2.1 Walkability

Walkability also termed as proximity, accessibility, or suitability refers to the quality of walking condition including: the quality of pedestrian physical features, social space, motivation, comfort, continuity, convenience, smell, sound, and the environment (Christiansen et al., 2014). These factors are important in the quality of walking trips, the literature would indicate that accessibility-based factors such as destinations for travel, land use and population characteristics are more indicative of walkability and have a stronger pull on walking behavior (Ewing & Cervero, 2010). Azmi & Karim (2012) highlights the implication of walkability towards promoting sustainable urban neighbourhood. The main modes of transportation even in the neighbourhood area are the private cars because it is the norm of urbanites to use the motorized vehicles rather than to walk. This shows that the planning and design of the neighbourhood itself can influence the walkability of the housing area. Urbanization and industrialization is the main cause of the climate change phenomena all around the world. One of the main problems of urbanization is the increase in growing dependence on automobiles.

Gilderbloom et al. (2015) examined 170 neighborhoods in a medium-sized city to see whether walkability influences neighborhood sustainability. Until 2008, there had not been a reliable measure of the social, health, and economic impact of walkable neighborhoods. This dramatically changed when Gilderbloom et al. (2015) were able to quantify walkability with tools such as Walkscore™; which measures how accessible daily living activities are by foot. Gilderbloom et al. (2015) investigated how walkability impacts the quality and sustainability of a neighborhood and developed models that evaluated the correlation between an area’s Walkscore™ and four broad measures of urban sustainability: neighborhood housing valuation; foreclosures; and crime. Gilderbloom et al. (2015) provided policy opportunities for planners and citizen groups to pursue strategies to encourage the development of more walkable and sustainable neighborhoods. Provision of community facilities may influence the walkability level of residents in urban neighbourhood area. Walkability can be measured through accessibility of urban residents to retail and community facilities provided. Azmi ET AL. (2013) studied the percep-
tions of residents accessibility to community facilities provided using a questionnaire survey and Kruskal Wallis test. The total number of 381 respondents who live in Precinct 8 and Precinct 9 in Putrajaya Malaysia agreed that the qualities of resident’s perception on accessibility affect the level of walkability in neighborhood area.

Sutikno et al. (2013) studied walkability and pedestrian perceptions in Malang city. Sukarno-Hatta street corridor is forecasted to be one of Malang City business corridors. However, the condition of its pedestrian facilities is not suitable for pedestrian. The rapid activities along the Sukarno-Hatta street corridor are not in accordance with the services of its pedestrian facilities so it is necessary to plan a walkable street corridor that accommodates pedestrian perceptions. The level of walkability of Sukarno-Hatta street corridor is 52.49%, which means the walkability level is medium. The improvements of pedestrian way based on pedestrian perception are: improvement and addition of pedestrian ways that are not continuous, planting plants that can reduce air pollution, availability of crossings, the addition of shade trees, traffic management to reduce vehicle congestion and parking designs. Villanueva et al. (2014) explored the impact of neighborhood walkability on young adults, early-middle adults, middle-aged adults, and older adults walking across different neighborhood buffers. Using the Western Australian Health and Wellbeing Surveillance System Survey, Villanueva et al. (2014) allocated a neighborhood walkability score at 200 m, 400 m, 800 m, and 1600 m around their home and found little difference in strength of associations across neighborhood size buffers for all life stages. They conclude that neighborhood walkability supports more walking regardless of adult life stage and is relevant for small and larger neighborhood buffers.

2.3 Pedestrianization and Built Heritage

Built heritage sites are popular destinations to tourists worldwide. However, creating a balance between a historic city, a place to live and a place to visit is not easily achieved (Litvin, 2005). It often contradicts between conserving the heritage assets and at the same time the desire to follow the current trend in development (Li, 2003). It is not easy to persuade owners to keep their built heritage structure under a conservation program since it requires an enormous amount of funding (Garrod & Fyall, 2000). Issues like who should provide the funding and how much should be charged for entry are of main concerns in managing these built heritage sites. Moscardo (1996) argues that an effective interpretation at built heritage sites will not only create "mindful visitors" but also lead to conservation of these areas. These visitors or tourists have greater appreciation and understanding of the conserved sites. Moreover, the use of these conserved built heritage sites may take adaptive reuse approach in which they might be someone’s houses in the past, but now being turned into hotels and handicraft merchandisers. Turning these heritage sites into merchandisers’ business venues will attract tourists. Tourists and local residents share common shopping venues. Snepenger et al. (2003) have identified four types of shoppers who are willing to shop at a traditional shopping district, namely: tourist heavy user, a tourist light user, a heavy local user, and a light local user. It has been identified that the first type of user is the most abundant of the whole consumer groups (Snepenger et al., 2003). In addition, built heritage sites which have been reused for hotels have high demands among the tourists (Dincer & Erugal, 2003). Road transport is by far the major source of environmental degradation in urban centres. Hence, transport schemes like pedestrianization can have significant impacts on local environmental conditions, by provoking changes in the characteristics of traffic flows and on the patterns of traffic emissions. Chiquetto (1997) analyses the extent to which the implementation of a pedestrianization scheme in Chester, a medium-sized historic city situated in northwest England, can influence the total vehicle exhaust emissions and local levels of air pollution concentration and noise from traffic. Shladover (1977) demonstrates why automated guideway transit (AGT) circulation systems should only be installed in those activity centers which are extensive enough that a large proportion of their internal trips will be too long to be covered on foot, even when pedestrian amenities are provided. Following a brief review of the essential characteristics of the various types of AGT, the significance of walking as a mode of transportation within compact activity centers is discussed, with emphasis on the competition walking can offer to AGT circulation systems. An analysis which compares the distributions of trip times for walking and AGT trips between the same set of activity center origins and destinations is then described and some of the implications of its results for the planning of activity center circulation systems are explained.

Pedestrianizing areas that are generally in the old part of town has been widely used in recent years in both developed and developing countries as a way to improve urban quality in cities traditionally designed for intensive vehicle use. Castilho-Manzano et al. (2014) applied discrete demand models to examine the satisfaction of citizens or frequent visitors with these schemes in two streets that are not part of the urban center of the city of Seville,
Spain and the conclusions that are drawn can be easily extrapolated to other cities, irrespective of the country that they are in. These two pedestrianizations outside the traditional inner city are clearly positively valued by citizens, especially by people living in the vicinity of the pedestrianized streets and by the collectives that have more available free time or more flexible schedules. They have also been especially welcomed by citizens who are more aware of the need for environmental protection and calling for a more a more sustainable city. Castillo-Manzano et al. (2014) found that both pedestrianizations resulted in significant changes in citizens' shopping and consumption habits in establishments located in the pedestrian zones, which have been turned into open air malls with improvements to their lively ambience. These findings are repeated in countries at different levels of development. Castillo-Manzano et al. (2014) shows the importance of the time variable, as the more time that has passed since the works were finalized, the better the variables that measure satisfaction with the pedestrianizations have become, and the less negative the perception of the negative externalities associated with the road works.

3. RESEARCH METHODS AND APPROACH

A structured interview survey with 170 respondents was conducted in Georgetown, Penang, Malaysia. The sample covered both local residents and visitors. Site observation was carried out to validate the findings of the survey. This study was conducted within the buffer and core zones of the World Heritage Site, Georgetown, Penang. Respondents rated their satisfaction level on walkability features at five main streets in the studied area. The streets include: a) Jalan Masjid Kapitan Keling, b) Jalan Penang, c) Lebuh Chulia, Lebuh Light–Padang Kota Lama, d) Lebuh Pantai, and e) Pangkalan Weld, as shown in the map of Georgetown, Penang, the World Heritage Site in Figure 1.

The questionnaire form consists of two sections. The first section deals with the respondents profiles and the second section focuses on the evaluation of the walkability of the streets. The rating based on a 7-scale system. Table 1 shows the measures of walkability in the questionnaire contents. Statistical tests including crosstab and relative importance index (RII) were employed for analysis.

Respondents were interviewed at the targeting streets where they were located. There were 58.2% respondents between 13-30 years old and only 3.6% more than 60 years old. The remaining 38.2% were between 31 to 60 years old. Most of the respondents are local residents (41.2%), followed by domestic visitors (36.5%) and international visitors (22.4%). Table 2 shows the types of respondents according to their age groups.

Most visitors in the street "Jalan Penang" falls within the age group of 19-24 (46.4%), followed by 37-42 years old (10.7%). Similarly the street "Pangkalan Weld" has a high number of visitors who belong to 19-24 years old (60%) followed by 49-54 years old (16%). About 80% respondents who visited "Jalan Chulia" belong to the age group of 13–30, followed by the age group of 55-60 (10%). The journey from "Lebuh Light" to Padang Kota Lama attracts youngsters aged 13-18 (36.7%) and 31-36 (20%). Table 3 shows the detail of the age groups and street locations of the survey.
4. RESULTS AND DISCUSSION

Most of the respondents use the target streets to go to work (23.1%). They are mainly domestic visitors (26.2%) and the local residents (25.8%). Vacations and leisure/recreation are the purposes of the international visitors (42.1% and 28.9% respectively). In addition, domestic visitors chose education as their reason in using the streets. Table 5 shows the details of the purpose to use the streets according to the types of respondents.

4.1 Pedestrian Evaluation

Six features of walkability were employed to evaluate the six streets in the study area. The six features include a) pathway, b) zebra crossing, c) signage, d) personal safety, e) traffic flow and, f) aesthetics & amenities. Firstly, an overall measurement of the six features was conducted through relative importance index (RII) to analyze all the satisfaction level rated by the respondents. In overall, aesthetic and amenities scored 0.6767 as the lowest, and both zebra crossing and personal safety scored at 0.7017 as the highest RII value among the six walkability features. Table 6 shows the detail of the overall scores of RII of the six features calculated for the six selected streets.

4.2 Evaluation on Unsatisfactory Level

In evaluating the unsatisfactory level of walkability features as shown in Table 8, zebra crossing (0.4950) scores the highest in relative importance index (RII) and aesthetic & amenities (0.3517) scores the least.

Table 3. Composition of respondents according to age and site locations.

Table 4. Composition of respondents according to streets.

Table 5. Main purposes of using target streets according to the types of respondents.

Table 6. Overall RII scores of satisfaction level on walkability features.

Table 7. Overall RII scores of satisfaction level on walkability features.

Table 8. Overall RII scores of satisfaction level on walkability features.

Table 9. Overall RII unsatisfactory level of walkability features according to each street.

Table 10. Overall RII unsatisfactory level of walkability features according to each street.
4.3 Discussion on Findings

Good quality in walkability can only be achieved if pedestrians are satisfied with its features. This study revealed that the level of walkability in the World Heritage Site in Georgetown, Penang are generally inadequate with a mean value at 0.67 in relative importance index (RII) for satisfactory level, and a mean value at 0.35 for unsatisfactory level. Aesthetic and amenities scores the lowest in satisfactory level and zebra crossing scores the highest in unsatisfactory level, which indicates that further enhancements need to be implemented to increase the aesthetic and amenities value and zebra crossing facilities along the streets within the World Heritage Site.

Among the six studied streets, only "Jalan Pantai" receives both the highest satisfaction level and the lowest unsatisfactory level, which means there is a high quality in walkability along this street and the pedestrians are comfortable for walking on foot. Although the walkability in "Jalan Masjid Kapitan", "Lebuh Chulia", "Jalan Penang", and "Lebuh Light–Padang Kota" score highly in their satisfactory level, they also score highly in unsatisfactory level, which shows the walkability along these streets has some space for further enhancements. The Walkability in "Jalan Pangkalan Weld" is obviously poor with the lowest satisfactory level and the highest unsatisfactory level in almost all walkability features. On the other hand, the historical heritage in this area needs to be preserved for tourism and cultural values as supported by Coffee et al. (2013) and Owen et al. (2007). All walkability features need to be enhanced in order to promote people to walk more than to drive (Gallimore et al., 2011; Leslie et al., 2007; Leslie et al., 2005). Provision for high quality walkability should not be limited to those areas merely to attract tourists, but also for local consumptions. Local residents are encouraged to walk more as walking is the best mode of transportation which is able to reduce carbon footprint and fossil energy consumption. Furthermore, walking is doable by all levels of society and it has an economic value supported by a saying “the more you walk the more you see and the more you buy” (Litman, 2003).

6. CONCLUSIONS

Walkability is essential in providing a low carbon society and environment. The level of walkability in the World Heritage Site in Georgetown, Penang was evaluated as inadequate. Aesthetic and amenities scores the lowest in satisfactory level and zebra crossing scores the highest in unsatisfactory level. As the world is facing global climate change issues, increasing the number of walkable areas especially in heritage cities will further help reduce carbon footprint. High walkability are able to encourage people to walk more and to enjoy their walking. Provision of physical walking and built heritage features without providing sufficient activities along the streets could not yield high walkability. Therefore, a holistic view of walkability should be considered in providing walkable environment, which is highly expected and recommended in future study.
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