Towards a Sustainable Neighborhood:

The Role of Open Spaces

Khalid S. Al-Hagla

Dept. of Architecture, Faculty of Engineering, Alexandria University, Alexandria, Egypt
Faculty of Architectural Engineering, Beirut Arab University, Beirut, Lebanon

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Christopher Alexander

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Albert Einstein

PAPER NO.

5

ABSTRACTS

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Abstract

The neighborhood is a basic planning entity in modern residential planning theories. However open spaces as a vital constituent of the neighborhood's physical structure, have an important role to play. They are the arena of both, neighbors' outdoor interactions–consequently building the neighborhood's sense of community- and the micro ecological sphere – setting its parameters and configuring its fundamentals.

The paper aims to investigate the roles and responsibilities that open spaces -in neighborhoods- have to take to achieve sustainability goals and objectives. However it follows an approach based on both the social and ecological neighborhood's ability to tackle sustainability issues. It focuses on the typical open space structure of the neighborhood as the media of different social and ecological interactions. Regarding this concern the paper differentiates between two main categories of the neighborhood's open space; "greenspace" and "greyspace". Moreover, the paper develops a three dimension matrix that sets the interrelations between different types of neighborhood open space and sustainability goals and objectives that have to be achieved within the community. It uses this matrix to assess the sustainability performance of different typologies of open space; moreover it determines the priorities of sustainability parameters that have to be applied to an assigned open space. Finally, the paper applies its findings to two different typologies of open spaces in Lebanon; Beirut Pine 'Horsh Beirut' as a greenspace, and the historical market, and pedestrian streets in Byblos as a greyspace. The application comes to show the validity of conceptual application of the proposed matrix.

Keywords: Sustainable development, neighborhood, open space, Beirut Pine, Byblos

Towards a Sustainable Neighborhood: The Role of Open Spaces

إستدامة المجاورة السكنية: دور الفراغات المفتوحة

د/ خالد السيد محمد الحجلة

قسم الهندسة المعمارية – كلية الهندسة – جامعة الإسكندرية – الإسكندرية – مصر
كلية الهندسة المعمارية – جامعة بيروت العربية – بيروت – لبنان

الملخص

تعتمد نظريات تخطيط التجمعات السكنية - بصفة اساسية- علي مبادئ المجاورة السكنية كوحدة البناء الأولي لهذه التجمعات، وتلعب الفراغات المفتوحة - كأحد عناصر التكوين الأساسية لهذه المجاورات- دوراً بارزاً في هذا التخطيط بإعتبارها ساحة التفاعلات الخارجية لجميع عناصر المجاورة السكنية مؤدية في هذا دوراً مزدوجاً؛ فهي من جهة أساس تكوين الإحساس بمجتمع المجاورة (أحد القيم الأساسية الغير ملموسة في تكوين التجمعات السكنية)، ومن جهة أخري فهي مجال تكوين الوعاء الإيكولوجي الدقيق للمجاورة السكنية بما تتحكم فيه من محددات ترسم فيه ابعادها الأساسية.

يهدف البحث الي دراسة الدور والمسؤوليات المنوط بها الفراغات المفتوحة بالمجاورات السكنية لتحقيق أهداف الإستدامة بها علي كلٍ من المدي القريب والبعيد ، ولتحقيق هذا الهدف يتَّبع البحث مدخلاً يعتمد علي دراسة الخصائص الإجتماعية والإيكولوجية للمجاورات السكنية في مواجهة قضايا الإستدامة. يركز البحث في هذا علي البناء الفراغي النمطي للمجاورات السكنية كمجال للتفاعلات الإجتماعية والإيكولوجية المختلفة بها. يستخدم البحث في هذا تصنيفاً يعتمد علي تقسيم الفراغات المفتوحة الي شريحتين أساسيين "الفراغات الخضراء" 'Greenspaces' و "الفراغات الرمادية" 'Greyspaces'. يقوم البحث بتطوير مصفوفة ثلاثية الأبعاد لتحدد العلاقات المتبادلة بين الأنواع المختلفة للفراغات المفتوحة بالمجاورات السكنية من جهة وبين أهداف الإستدامة المأمول تحقيقها علي المديين القريب والبعيد من جهة أخري كما يستخدم هذه المصفوفة لتقييم أداء الإستدامة الخاص بمختلف أنماط الفراغات الحضرية محدداً أولوية تحقيق هذه الأهداف بالنسبة لأي من انماط هذه الفراغات. في النهاية يقوم البحث بتطبيق ما توصل اليه من منهجية الي نمطين مختلفين من الفراغات المفتوحة في لبنان هما منطقة "حرش بيروت" كأحد نماذج الفراغات الخضراء و منطقة الأسواق التاريخية ومسارات المشاة بمدينة جبيل كفراغات تصنف علي انها رمادية. يأتي هذا التطبيق لتوضيح مدي الإمكانات التطبيقية العملية لما طوره البحث من مصفوفة نظرية.

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The neighborhood is a basic planning entity in modern residential planning theories. However open spaces as a vital constituent of the neighborhood's physical structure, have an important role to play. They are the arena of both, neighbors' outdoor interactions–consequently building the neighborhood's sense of community- and the micro ecological sphere – setting its parameters and configuring its fundamentals. The paper aims to investigate the roles and responsibilities that open spaces -in neighborhoods- have to take to achieve sustainability goals and objectives. However it follows an approach based on both the social and ecological neighborhood's ability to

tackle sustainability issues. It focuses on the typical open space structure of the neighborhood as the media of different social and ecological interactions. Regarding this concern the paper differentiates between two main categories of the neighborhood's open space; "greenspace" and "greyspace". Moreover, the paper develops a three dimension matrix that sets the interrelations between different types of neighborhood open space and sustainability goals and objectives that have to be achieved within the community. It uses this matrix to assess the sustainability performance of different typologies of open space; moreover it determines the priorities of sustainability parameters that have to be applied to an assigned open space. Finally, the paper applies its findings to two different typologies of open spaces in Lebanon; Beirut Pine 'Horsh Beirut' as a greenspace, and the historical market, and pedestrian streets in Byblos as a greyspace. The application comes to show the validity of conceptual application of the proposed matrix.

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1. Introduction

The rapid growth of towns and cities in the nineteenth century led to calls for parks to be provided for the health of factory workers and consequently it benefited society as well. This could be seen as an early precedent to highlight the role of open spaces in supporting what we now call sustainable development. This achieved a wide range of benefits to the economy (healthier, happier, and therefore more productive workers), social life (people relaxing and meeting in the parks) and the environment (as open spaces were created amongst the streets, mines and factories). (Shirley, 2005).

Nowadays, open spaces take up more than one third of total neighborhood areas. They are playing a dual role in the structure of neighborhoods. The first is 'social': that come out of understanding the neighborhood as a 'community'. Meanwhile, the second is 'ecological': that see the 'ecological perspective' is much more appropriate to be applied to a neighborhood regarding its unique site qualities. Each of these two approaches covers a different perspective of sustainability application to neighborhood scale. However, the paper develops an integrated approach that appreciates the fact that social and environmental goals are often mutually reinforcing, thus providing a broad constituency of support for policy. Moreover, they come to the heart of the role that open spaces play.

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* Corresponding author.
  E-mail address: khalid@pylon-group.com

2. Sustainable Neighborhood.

There are different approaches that tackle the application of sustainability to neighborhoods. Among these approaches, stands both social and ecological as two different but integrated perspectives. Regarding the social perspective, the overlapping area of both the terms 'neighborhood' and 'community' could be used to understand the definition that the Egan Review (2004) report 'Skills for Sustainable Communities', develops. It highlights sustainable communities as those which "meet the diverse needs of existing and future residents, their children and other users, contribute to a high quality of life and provide opportunity and choice. They achieve this in ways that make effective use of natural resources, enhance the environment, promote social cohesion and inclusion and strengthen economic prosperity". (Review, 2004:1) It concludes that there are seven components of sustainable communities drawn from this definition; governance; transport and connectivity; services; environment; economy; housing and the built environment; sociology and culture.

From another stand point, Hugh Barton (1996) gives a different approach based on the 'Ecological Perspective'. He asserts that "One way of approaching the problem of sustainable design is to see each development as an organism or a mini ecosystem in its own right". (Barton et al, 1996) Regarding this point of view, a neighborhood is an ecosystem in the sense that it provides the essential local habitat for humans, creating its own microclimatic conditions, and should provide as far as possible for their comfort and sustenance.
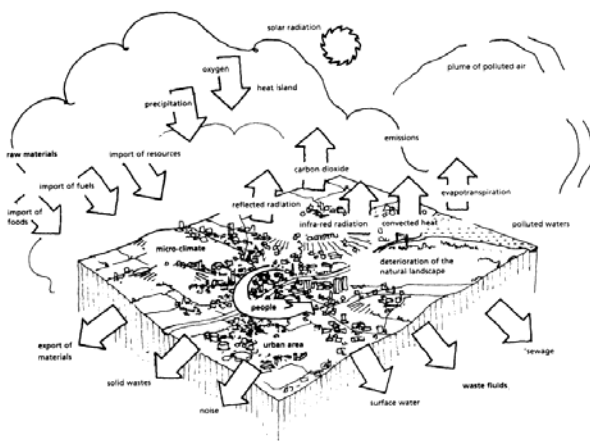

Figure 1: Neighborhood as an Eco-system. Source: (Barton et. al, 1996)

2.1. Sustainability dimensions, goals, and objectives applied to neighborhoods

The application of wide-scope conceptual sustainability dimensions to neighborhoods needs them to be interpreted practically into goals and objectives. However, the following table (table 1) sets the sustainability goals and objectives that have to be achieved at neighborhood level. They are driven from the sustainability dimensions applied to the neighborhoods (Figure 2)
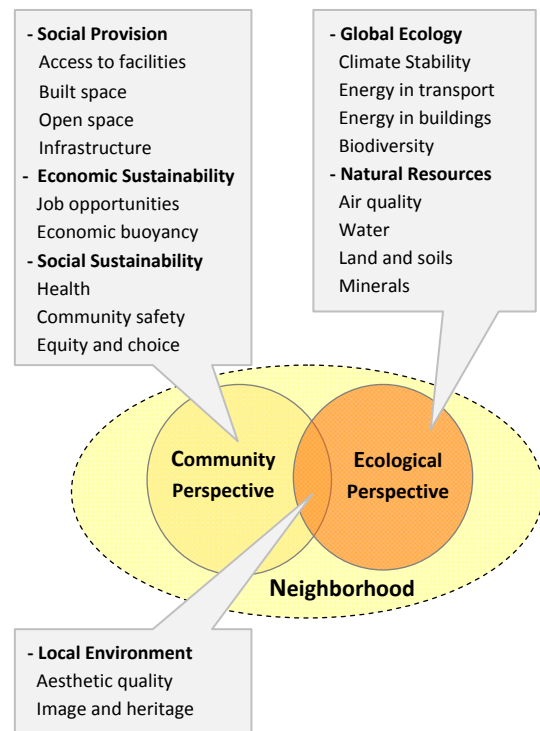

Figure 2: Sustainability dimensions, applied to neighborhoods. Source: Author based on (Shirley, 2005).

Dim.	Goals	Objectives
Global Ecology	Cutting greenhouse gas emissions and energy	- Reduce the need to travel - Reduce car reliance - Increase energy efficiency in buildings
Global Ecology	Closing local resource loops	- Reduce demand for non-renewable resources - Reuse and recycling of resources locally - Local water sourcing, treatment and aquifer recharge - Local low-input food production
Natural Resources	Enhancing local environmental quality	- Promote local distinctiveness and heritage - Create an attractive public realm - Enhance local habitat diversity
Local Environment	Creating a healthy environment	- Improve local air quality - Promote an active life-style (especially walking) - Encourage consumption of fresh fruit and vegetables
Social Sustainability	Increasing street safety Equity and social inclusion Increasing local self-determination	- Reduce the chance of vehicle/pedestrian accidents - Reduce the fear of violence - Choice of facilities within easy walking distance - Viability of public transport - Increase user/citizen control - Management of decentralized systems
Social Provision	Increasing accessibility and freedom of choice	- Choice of transport mode for trips - More facilities accessible locally - Facilitate accessible social networks - Promote mental health
Eco. Sus.	Local work opportunities	- Accessible jobs for those tied to the locality - Reduce transport emissions

Table 1: Sustainability Dimensions, Goals and Objectives. Source: the Author based on Shirley, 2005), and (Barton, 2002a)

3. Open Space Morphology of Neighborhoods

Open spaces in neighborhoods are defined as 'any unbuilt land within the boundary or designated envelope of a neighborhood which provides, or has the potential to provide, environmental, social and/or economic benefits to communities, whether direct or indirect.' (Campbell, 2001) They could be classified according to a number of criteria, however this paper differentiates vegetated from nonvegetated areas and this leads to the following typological classification:

- *Greenspace:* a sub-set of open space, consisting of any vegetated land or structure, water or geological feature within urban areas.

- *Greyspace (sometimes referred to as "civic space"):* a sub-set of open space, consisting of urban squares, market places and other paved or hard landscaped areas with a civic function. Moreover; seven distinct sub-sets of publicly accessible greenspace, could be realized each with a specific and distinct primary function (Campbell, 2001):

■ *Parks and gardens:* areas of land, normally enclosed, designed, constructed, managed and maintained as a public park or garden. They can be either urban parks or country parks depending primarily on their location. They often incorporate other types of greenspace, such as children's play areas and sports facilities, but their primary function is for informal activity or relaxation, social and community purposes, and horticultural or arboricultural displays. Some parks and gardens may also be designed landscapes of historical importance, where they are of national significance.

■ *Amenity greenspace:* Managed and maintained landscaped areas with no designated specific use by people, but providing visual amenity or separating different buildings or land uses for environmental, visual or safety reasons. They may also be used, incidentally, as wildlife habitats.

■ *Children's play areas:* Designated and maintained areas providing safe and accessible opportunities for children's play, usually linked to housing areas and therefore normally set within a wider green environment of amenity open space. The primary function of these areas is to provide safe facilities for children to play, usually close to home and under informal supervision from nearby houses.

■ *Sports facilities:* Designed, constructed, managed and maintained large and generally (although not always) flat areas of grassland or specially-designed artificial surfaces, used primarily for designated sports. The primary function of these areas is to accommodate practice, training and competition for recognized outdoor sports.

■ Green corridors: Routes linking different areas within a town or city as part of a designated and managed network and used for walking, cycling or horse riding or linking towns and cities to their surrounding countryside or country parks. The primary function of green corridors is to allow safe, environment-friendly movement within urban areas. Moreover, they support wildlife colonization and therefore habitat creation.

■ *Natural/ semi- naturalgreenspaces:* undeveloped land with little or only limited maintenance which have been planted with wild flowers or colonized by vegetation and wildlife. They also include woodland, railway embankments, river and canal banks and derelict land, which may in some cases be thought of as temporary natural greenspace. The primary function of natural greenspaces is to promote biodiversity and nature conservation.

■ *Other functional greenspaces:* Essentially allotments, the yards of religious buildings and cemeteries. Some classifications may wish to add an eighth type of greenspace – school grounds. However, regarding the approach of this paper, they could be included within the above typology, even if they normally include more than one type of greenspace. There are also various types of Greyspace (civic space), including:

■ *Civic squares and plazas:* often containing statues or fountains and primarily paved, sometimes providing a setting for important public buildings.

■ *Market places:* usually with historic connotations.

■ *Pedestrian streets:* usually former roads which have been paved over and provided with seats and planters.

■ *Promenades and sea fronts:* usually used for recreational activities. They have special value when located at historical areas.

4. The Role of Open Space in Achieving Sustainable Neighborhood

The role that is assigned to open spaces to play within the neighborhood structure, to achieve sustainability goals and objectives, is formulated in three key issues; space management, space function (circulation of people and permeability), and the role of objects within space (sustainable landscape). (Campbell, 2001, Ironside, 1999, Birkeland 2004) The detailed study for these issues sets the sustainability checklist applied to open spaces. These details are as follows:

■ **First:** Space Management is a key issue to be taken into consideration. As in open space terms, sustainability is a function of the interrelationship between design and management. This includes: (Campbell, 2001) (Ironside, 1999)
- encouraging sustainable lifestyles, for example by providing paths and cycle routes
- making maximum use of existing features and assets
- strengthening the sense of place
- incorporating local or recycled materials
- encouraging community participation and involvement
- reducing inputs of non-renewable resources during construction and subsequent maintenance

- eliminating or reducing the use of herbicides and resources that affect other ecosystems
- encouraging habitat creation and native planting
- managing resources carefully

■ **Second:** space function (circulation of people and permeability), while most modern development planning uses the road network as the key structural element, a sustainable design takes the circulation of people on foot and bike and the effectiveness of public transport as starting points (Barton, 1996). However, creating neighborhoods where walking is the natural and pleasurable means of access between activities achieves much of sustainability goals and objectives (quality of life-health economics of communities, and community participation) (National Neighborhood Coalition, 2005). Moreover, it becomes a social activity in its own right. Thus the number of people on the streets and paths itself provides security. On the other hand, Smart Growth, New Urbanism and Neotraditional Development trends highlight the importance of developing 'mixed land use' strategies to promote walking activities. They assert that "Communities can support walking and cycling if they are developed with meaningful destinations in close proximity to each other, such as shopping, school and employment". (National Neighborhood Coalition, 2005) These movements strive for well-designed communities that provide safe and abundant opportunities for routine physical activity. The objectives are to:
- reduce the level of car reliance,
- reduce the need to travel - with the social benefits of increasing transport choice for all groups in the population,
- enhancing local security and community

■ **Third:** the role of objects within space (sustainable landscape). Landscaping elements are the basic constituent of any open space's structure. They have to be utilized to achieve sustainability goals at the micro level. Janis Birkeland (2004) draws a framework for sustainable landscaping elements as they should:
- Return to original sources of inspiration, whether nature or culture. (Papnek, 1984).
- Respond to the site, designing in harmony with its distinctive character to enable the unfolding of the landscape's ecological potential over time. This involves:
  • creating connections and themes (functional and perceptual as well as spatial) within and across sites while defining and delineating boundaries;
  • transforming site constraints into environmental opportunities;
  • minimizing negative environmental impacts (including sensory as well as physical pollution);
  • maximizing positive impacts, off-site as well as internally.
- Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources.
- Maximize resilience and dynamic stability in the landscape in such a way that each element fulfils

several functions and each function is undertaken by several elements.
  • maximizing the diversity of landscape elements and the diversity of relationships between elements;
  • creating opportunities for the emergence of self-sustaining and self-regulating systems in the landscape.
- Create 'place' as distinct from merely manipulating space, in such a way that the design maximizes the potential for user interaction with the environment.
- Make systems visible, which means making environmental processes apparent and celebrating them.
- Minimize maintenance and maintain to enable full expression of design, acknowledging that ongoing management is itself an aspect of design, to ensure the continuity of sustainable outcomes.

On the other hand, Ironside (2005) gives a detailed definition to sustainable residential greenspace as: "Greenspace fit for its purpose, responsive to evolving needs and changes over an extended period of time, not requiring an excessive input of resources." In addition to the previously mentioned key issues, this definition dictates that; for a Greenspace –as a division of open space- to be sustainable it should:

- meet the varied recreation and leisure needs of users and
- involve local communities

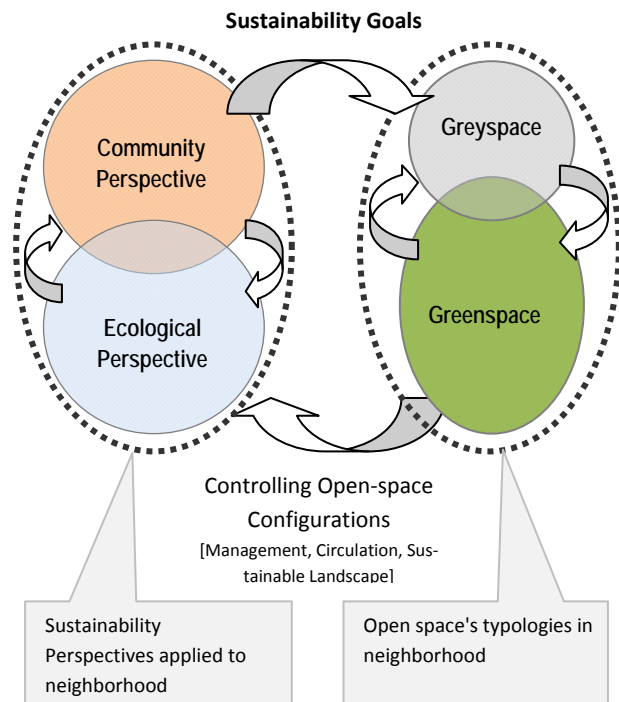## 5. Open space's sustainability parameters

Figure 3: Neighborhood's Sustainability Mechanism. Source: Author.

Based on the above-mentioned discussion, this paper proposes a three dimensional matrix that consists of two main parts. The first is a two dimensional matrix that investigates the relationship between the sustainability goals and objectives, and the different types of open spaces in a neighborhood. This matrix indicates the roles and responsibilities that each of these types has to play –divided mainly into categories of 'greenspaces' and 'greyspaces'. The second, is a two dimensional matrix that correlates the assigned sustainability parameters (checklist) –driven out of three main sustainability issues, management, circulation, and sustainable landscape– with the open spaces categories of neighborhoods, 'greenspaces' and 'greyspaces'.
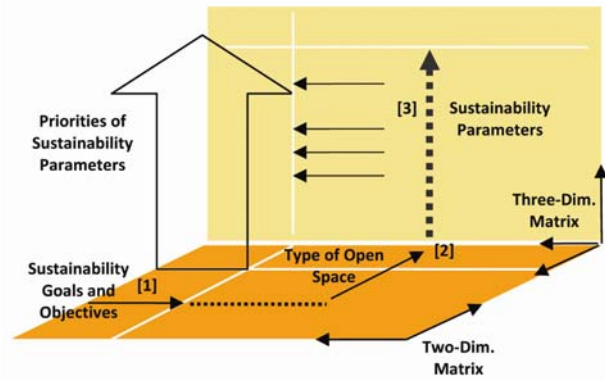
However, it draws space responsibilities that have to be achieved to support sustainability practices in neighborhoods. That clearly depends on spaces' integrated dimensions: physical and non-physical. Moreover, it shows the overlapping area of practices that these types have to play all together to fulfill their sustainability responsibilities.

The first two-dimensional matrix answers the question about 'What' are the goals and objectives that the open spaces in a neighborhood have to achieve. And the second is about 'How' these goals and objectives could be achieved. The overlapping answers of these two questions draw the dimensions of the developed three dimensional matrix. However this matrix could be used to develop a further checklist for evaluating the open spaces performance in neighborhoods.

Figure 4: Three dimension matrixes correlates types of open space to sustainability attributes.
Source: Author.

This could be achieved in three consequent steps as follows [numerically indicated in figure 4].

- The first, is to determine which type of open space the study wants to investigate

- The second, is to determine the sustainability goals and objectives that are assigned to this type of open space and have to be achieved in the neighborhood. [table 1]

- The third, is to develop a checklist of the sustainability parameters assigned to this type of open space. [table 2]

Sustainability Goals	Sustainability Objectives	Parks and gardens	Amenity greenspace	Children's play areas	Sports facilities	Green corridors	Natural/semi-natural greenspaces	Other functional greenspaces	Civic squares	Market places	Pedestrian streets	Promenades and sea fronts
Cutting greenhouse gas emissions Energy	Reduce the need to travel			□	□					□	□	
	Reduce car reliance						□			□	■	□
	Increase energy efficiency in buildings			■				□				
Closing local resource loops	Reduce demand for non-renewable resources	■		□			□				□	
	Reuse and recycling of resources locally	□										
	Local water sourcing, treatment and aquifer recharge	□				□	□	□				
	Local low-input food production	□					□	□				□
Enhancing local environmental quality	Promote local distinctiveness and heritage	■	■	□			□	□	■	■	■	■
	Create an attractive public realm	■	■	■	■	■	■	■	■	■	■	■
	Enhance local habitat diversity	■	□				■	■			□	□
Creating a healthy environment	Improve local air quality	■	□			□	□	■	■	□	□	□
	Promote an active life-style (especially walking)	□		□	■		■			□	■	■
	Encourage consumption of fresh fruit and vegetables						□					
Increasing street safety	Reduce the chance of vehicle/pedestrian accidents							■		■	■	□
	Reduce the fear of violence		□	□	■				□	□	□	□
Increasing accessibility and freedom of choice	Choice of transport mode for trips											
	More facilities accessible locally					■	■		□	□		□
Equity and social inclusion	Choice of facilities within easy walking distance					■	□		□	□		
	Viability of public transport											■
Local work opportunities	Accessible jobs for those tied to the locality			□					□			
	Reduce transport emissions	■	■				■	□	□	□	■	□
Value of local community	Facilitate accessible social networks	■			■	□	□	□	□		□	□
	Promote mental health	■	□	■	■	■	■	□	■		□	□
Increasing local self-determination	Increase user/citizen control			□	□				□		■	
	Management of decentralized systems									□		□

Table 2: Sustainability Matrix (correlating sustainable development with open spaces typologies ■ Direct influence □ Indirect influence). Source: Author.

|	Sustainability Parameters	Green Space							Grey Space			
		Parks and gardens	Amenity greenspace	Children's play areas	Sports facilities	Green corridors	Natural/semi-natural greenspaces	Other functional greenspaces	Civic squares	Market places	Pedestrian streets	Promenades and sea fronts
Space Management	• encouraging sustainable lifestyles, for example by providing paths and cycle routes	□			□	■	□		□		■	■
	• making maximum use of existing features and assets	□	□	□		■	□				□	■
	• strengthening the sense of place	■	□	■		□	□		■	□	■	■
	• incorporating local or recycled materials			□		□		□		□	□	■
	• encouraging community participation and involvement		■	■	■		□		■	□		
	• reducing inputs of non-renewable resources during construction and maintenance	□	□	□				□	■	■	□	□
	• eliminating or reducing the use of resources that affect other ecosystems	□		□		□	□	□	■			□
	• encouraging habitat creation and native planting	■	■			■	■	□			□	□
	• managing resources carefully	□				□	□	□				■
Circulation	• reduce the level of car reliance					□				□	■	□
	• the effectiveness of public transport											□
	• reduce the need to travel	□		□	□					□	■	
	• social benefits of increasing transport choice for all groups population					□			□		□	□
	• enhancing local security and community	□	□		■				□	■	■	□
Quality Greenspace	• Return to original sources of inspiration	■	□	□		□		□		□	■	■
	Respond to the site — • creating connections and themes within and across sites	□				■	■	□				■
	• transforming site constraints into environmental opportunities	□	■		□	□	□	□		□	□	□
	• minimizing negative environmental impacts	□	□			■	□	□				□
	• maximizing positive impacts, off-site as well as internally	□		□		□	■		□		□	
	• Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources	□				■	□	□	□	□	□	□
	Maximize resilience — • maximizing the diversity [landscape elements and the diversity of relationships]	■	□			■	□	□	□		□	□
	• creating opportunities for the emergence of self-sustaining and self-regulating systems	□				■	□	□				
	• Create 'place' as distinct from merely manipulating space	■		□		□			■	■	■	□
	• Make systems visible, which means making environmental processes apparent and celebrating them	□				□	□	□				□
	• Minimize maintenance	□	□	□					■	■	■	□
	• meet the varied recreation and leisure needs of users	■			■	□						
	• involve local communities					■	■	■				

Table 3. Sustainability Matrix (correlating sustainable development 'Parameters' with open spaces typologies ■ Direct influence □ Indirect influence). Source: Author.

6. Using the matrix in evaluating open spaces sustainability performance

The paper applies its findings to two different types of open spaces. The first is the Beirut Pine 'Horsh Beirut' that is located at the southern portion of the city, at the heart of a number of residential neighborhoods. It is classified as a 'Greenspace' serving number of functions –parks and gardens, children playgrounds, and sports facilities. The second is the pedestrian open spaces at Byblos. They are classified as 'Greyspaces', however they function as: market places and pedestrian streets.

Figure 5: Different activities practiced in the Beirut Pine 'Horsh Beirut', [park and gardens, children's play area, and sports facilities] Source: Author.
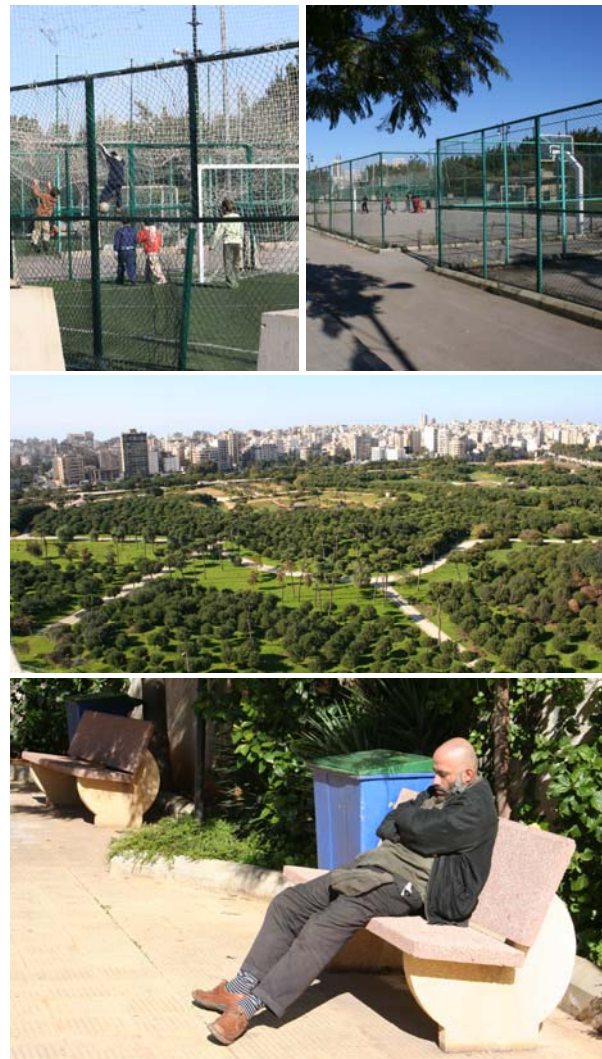
6.1. Evaluating the sustainability performance of Beirut Pine 'Horsh Beirut'

Using the proposed matrixes (tables 2 and 3), the paper builds up the following tables that focus on the functions that the Beirut Pine 'Horsh Beirut' serves.

The application of the proposed matrix to Beirut Pine 'Horsh Beirut' is divided into two succession stages; the first is to determine the sustainability objectives - and their priorities- that have to be achieved while using this greenspace and the second is to define the parameters used to evaluate its sustainability performance.

The sustainability performance of Beirut Pine 'Horsh Beirut' is seen as complex as the multi functions that this greenspace is utilized for. Table (4) shows 'Horsh Beirut' as a composite of three different greenspace typologies; parks and gardens, children's play areas, and sports facilities.

However, to determine the priorities of sustainability goals and objectives that have to be achieved through this multi functional greenspace, the paper assigns a relative weight equivalent to the type of influence that each space typology affects sustainability performance (2 to direct influence, 1 to indirect influence, and 0 to no influence). Reading table (4), and according to the shown relative scale, sustainability goals and objectives, could be re-arranged regarding their importance (indicated at the last column).

Table (4) shows that: for Beirut Pine 'Horsh Beirut' –in its composite greenspace typology-, the sustainability goals that have the first priority to be achieved are to: enhance local environmental quality and to increase the value of local community. Moreover, the sustainability objectives are to: Create an attractive public realm, to Promote mental health, and to Facilitate accessible social networks.

		Beirut Pine 'Horsh Beirut'			
Sustainability Goals	**Sustainability Objectives**	Parks and gardens	Children's play areas	Sports facilities	Assigned Weight
Cutting greenhouse gas emissions Energy	• Reduce the need to travel		◘	◘	2
	• Reduce car reliance				0
	• Increase energy efficiency in buildings				0
Closing local resource loops	• Reduce demand for non-renewable resources	■	◘		3
	• Reuse and recycling of resources locally	◘			1
	• Local water sourcing, treatment and aquifer recharge	◘			1
	• Local low-input food production	◘			1
Enhancing local environmental quality	• Promote local distinctiveness and heritage	■	◘		3
	• Create an attractive public realm	■	■	■	6
	• Enhance local habitat diversity	■			2
Creating a healthy environment	• Improve local air quality	■		◘	3
	• Promote an active life-style (especially walking)	◘	◘	■	4
	• Encourage consumption of fresh fruit and vegetables				0
Increasing street safety	• Reduce the chance of vehicle/pedestrian accidents				0
	• Reduce the fear of violence		◘	■	3
Increasing accessibility and freedom of choice	• Choice of transport mode for trips				0
	• More facilities accessible locally		■	■	4
Equity and social inclusion	• Choice of facilities within easy walking distance		■	◘	3
	• Viability of public transport				0
Local work opportunities	• Accessible jobs for those tied to the locality		◘		1
	• Reduce transport emissions	■			2
Value of local community	• Facilitate accessible social networks	■	■	◘	5
	• Promote mental health	■	■	■	6
Increasing local self-determination	• Increase user/citizen control		◘		1
	• Management of decentralized systems				0

Table 4: Applying Sustainability Matrix to the Beirut Pine 'Horsh Beirut' greenspace. [section A]
   The matrix correlates different sustainability goals and objectives to the composite typology of   the Beirut Pine 'Horsh Beirut' greenspace. (■ Direct influence ◘ Indirect influence). Source: Author.

Moreover, **Table (5)** shows that: the most important sustainability indicators are as follows:

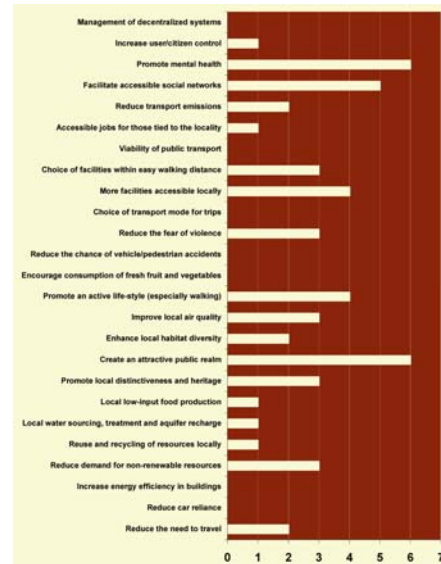■ **Does the Beirut Pine 'Horsh Beirut' ...... ?**
  - Strengthening the sense of place?
  - Encourage community participation and involvement?
  - Meet the varied recreation and leisure needs of users?

Comes to the second priority the following

■ **Does the Beirut Pine 'Horsh Beirut' ...... ?**
  - Reduce the need to travel?
  - Enhance local security and community?
  - Return to original sources of inspiration?
  - Create 'place' as distinct from merely manipulating space?

The sustainability performance of Beirut Pine 'Horsh Beirut' is tightly linked to the answer of the previously mentioned questions.

		Grey Space			
	Sustainability Parameters	**Parks and gardens**	**Children's play areas**	**Sports facilities**	**Assigned Weight**
Space Management	• encouraging sustainable lifestyles, for example by providing paths and cycle routes	◻		◻	2
	• making maximum use of existing features and assets	◻	◻		2
	• strengthening the sense of place	■	■		4
	• incorporating local or recycled materials		◻		1
	• encouraging community participation and involvement		■	■	4
	• reducing inputs of non-renewable resources during construction and maintenance	◻	◻		2
	• eliminating or reducing the use of resources that affect other ecosystems	◻	◻		2
	• encouraging habitat creation and native planting	■			2
	• managing resources carefully	◻			1
Circulation	• reduce the level of car reliance				0
	• the effectiveness of public transport				0
	• reduce the need to travel	◻	◻	◻	3
	• social benefits of increasing transport choice for all groups population				0
	• enhancing local security and community	◻		■	3
Quality Greenspace	• Return to original sources of inspiration	■	◻		3
	Respond to the site • creating connections and themes within and across sites	◻			1
	• transforming site constraints into environmental opportunities	◻		◻	2
	• minimizing negative environmental impacts	◻			1
	• maximizing positive impacts, off-site as well as internally	◻	◻		2
	• Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources	◻			1
	Maximize resilience • maximizing the diversity [landscape elements and the diversity of relationships]	■			2
	• creating opportunities for the emergence of self- sustaining and self-regulating systems	◻			1
	• Create 'place' as distinct from merely manipulating space	■	◻		3
	• Make systems visible, which means making environmental processes apparent and celebrating them	◻			1
	• Minimize maintenance	◻	◻		2
	• meet the varied recreation and leisure needs of users	■		■	4
	• involve local communities		■	■	4

Table 5: Applying Sustainability Matrix to the Beirut Pine 'Horsh Beirut' greenspace. [section **B**]
    The matrix correlates different sustainability *'Parameters'* to the composite typology of   the Beirut Pine 'Horsh Beirut' greenspace. (■ Direct influence ◻ Indirect influence). Source: Author.
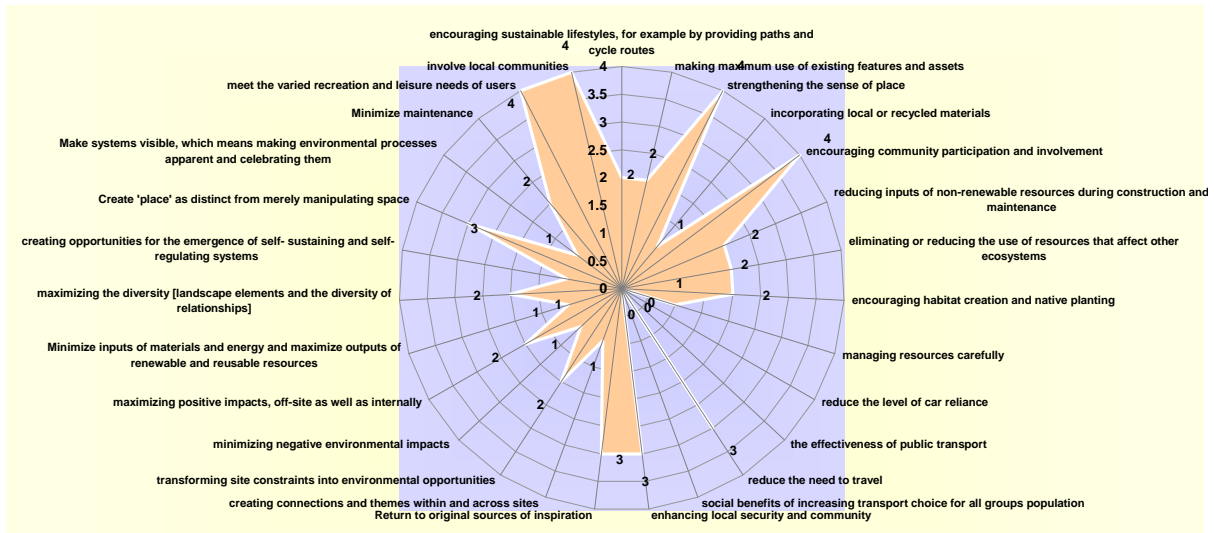
Figure 6: The priorities of sustainability parameters that have to be applied to Beirut Pine. Source: Author.

6.2. Evaluating the sustainability performance of pedestrian streets and historical marketplace at Byblos

Figure 7: Aerial view and different architectural and urban features of Byblos spatial expression. [the open spaces function as; historical market place and pedestrian streets] Source: Author.

The sustainability performance of the pedestrian open spaces at Byblos is seen as complex as the multi functions that these greyspace are used for. The table (6) shows streets of Byblos as a composite of two different greyspace typologies; historical market spaces, and pedestrian streets.

However, reading table (6), -according to the shown relative scale-, sustainability goals and objectives, could be re-arranged regarding their importance (indicated at the last column).

Table (7) shows that: for the pedestrian open spaces at Byblos, the sustainability goals that have the first priority to be achieved are to: Enhancing local environmental quality, Increasing both the value of local community and street safety. Moreover, the sustainability objectives are to: Promote local distinctiveness and heritage, Facilitate accessible social networks, Reduce car reliance, Create an attractive public realm, Reduce the fear of violence, and to Promote an active life-style (especially walking)

Moreover, **Table (7)** shows that: the most important sustainability indicators are as follows:
Do the greyspaces at Byblos ...... ?
- Enhancing local security and community?
- Create 'place' as distinct from merely manipulating space?

Comes to the second priority the following
Do the greyspaces at Byblos ...... ?
- Return to original sources of inspiration?
- Strengthening the sense of place?
- Reducing inputs of non-renewable resources during construction and maintenance?
- Reduce the level of car reliance?
- Reduce the need to travel?

The sustainability performance of historical market place and the pedestrian streets at Byblos is tightly linked to the answer of the previously mentioned questions.

Sustainability Goals	Sustainability Objectives	Market places	Pedestrian streets	Assigned Weight
Cutting greenhouse gas emissions Energy	• Reduce the need to travel	◘	◘	2
	• Reduce car reliance	◘	■	3
	• Increase energy efficiency in buildings			0
Closing local resource loops	• Reduce demand for non-renewable resources		◘	1
	• Reuse and recycling of resources locally			0
	• Local water sourcing, treatment and aquifer recharge			0
	• Local low-input food production			0
Enhancing local environmental quality	• Promote local distinctiveness and heritage	■	■	4
	• Create an attractive public realm	◘	■	3
	• Enhance local habitat diversity		◘	1
Creating a healthy environment	• Improve local air quality		◘	1
	• Promote an active life-style (especially walking)	◘	■	3
	• Encourage consumption of fresh fruit and vegetables			0
Increasing street safety	• Reduce the chance of vehicle/pedestrian accidents		■	2
	• Reduce the fear of violence	◘	◘	2
Increasing accessibility and freedom of choice	• Choice of transport mode for trips			0
	• More facilities accessible locally	◘		1
Equity and social inclusion	• Choice of facilities within easy walking distance	◘	◘	2
	• Viability of public transport			0
Local work opportunities	• Accessible jobs for those tied to the locality	◘		1
	• Reduce transport emissions		■	2
Value of local community	• Facilitate accessible social networks	■	■	4
	• Promote mental health		◘	1
Increasing local self-determination	• Increase user/citizen control		■	2
	• Management of decentralized systems	◘		1

Table 6: Applying Sustainability Matrix to Byblos greenspace. **[section A]**
The matrix correlates different sustainability goals and objectives to the composite typology of Byblos greenspace. (■ Direct influence ◘ Indirect influence). Source: Author.

Sustainability Strategies		Market spaces at Byblos		
		Market places	Pedestrian streets	Assigned Weight
Space Management	• encouraging sustainable lifestyles, for example by providing paths and cycle routes		■	2
	• making maximum use of existing features and assets		□	1
	• strengthening the sense of place	□	■	3
	• incorporating local or recycled materials	□	□	2
	• encouraging community participation and involvement	□		1
	• reducing inputs of non-renewable resources during construction and maintenance	■	□	3
	• eliminating or reducing the use of resources that affect other ecosystems			0
	• encouraging habitat creation and native planting		□	1
	• managing resources carefully			0
Circulation	• reduce the level of car reliance	□	■	3
	• the effectiveness of public transport			0
	• reduce the need to travel	□	■	3
	• social benefits of increasing transport choice for all groups population		□	1
	• enhancing local security and community	■	■	4
Quality Greenspace — *Respond to the site*	• Return to original sources of inspiration	□	■	3
	• creating connections and themes within and across sites			0
	• transforming site constraints into environmental opportunities	□	□	2
	• minimizing negative environmental impacts			0
	• maximizing positive impacts, off-site as well as internally	□		0
	• Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources	□	□	2
Maximize resilience	• maximizing the diversity [landscape elements and the diversity of relationships]	□		1
	• creating opportunities for the emergence of self-sustaining and self-regulating systems			0
	• Create 'place' as distinct from merely manipulating space	■	■	4
	• Make systems visible, which means making environmental processes apparent and celebrating them			0
	• Minimize maintenance	■	■	4
	• meet the varied recreation and leisure needs of users			0
	• involve local communities			0

Table 7: Applying Sustainability Matrix to Byblos greyspaces. **[section B]**
The matrix correlates different sustainability *'Parameters'* to the composite typology of Byblos greyspaces.
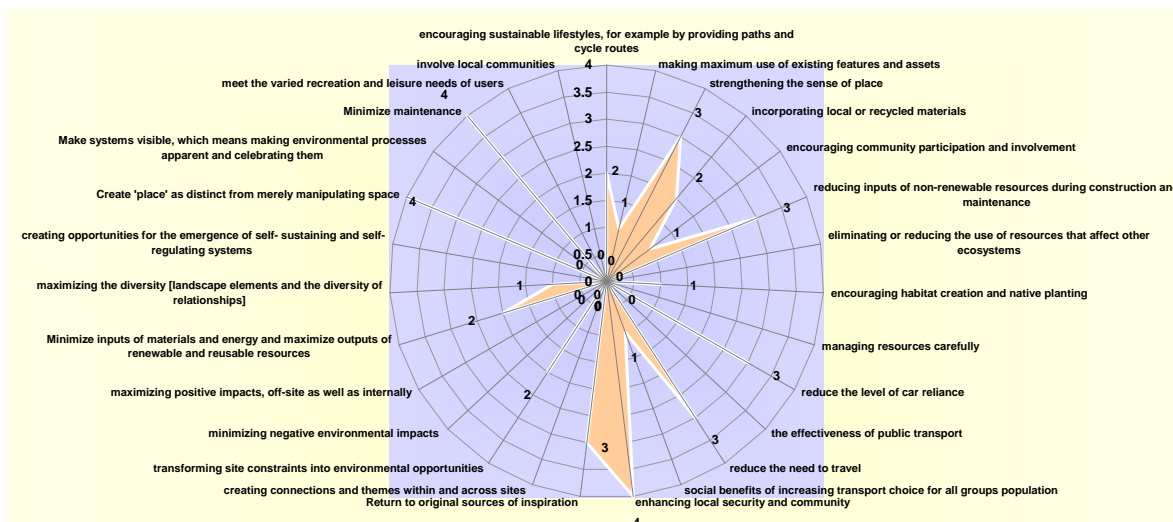(■ Direct influence □ Indirect influence). Source: Author.

Figure 8: The priorities of sustainability parameters that have to be applied to Byblos. Source: Author.

7. Conclusion

This paper proposed an approach based on the intersecting area of both social and ecological approaches to investigate the potential of open space to achieve sustainability goals and objectives in neighborhoods. Such an approach is chiefly based on the dual role that open spaces play in articulating the character of neighborhoods. They are the domain for different social interactions and shared community activities, and the field of micro-ecological features to express their personality.

In its review of literature on neighborhood open spaces, the paper utilized a classification that would be appropriate to its approach. It differentiated between 'greenspace' and 'greyspace' as the main categories involved in open spaces. It placed special emphasis on 'greenspace' as more relevant to achieving sustainability prospects at the neighborhood level.

As well, the paper discussed different types of 'greenspace' and their role in the neighborhood; parks and gardens, amenity greenspace, children play areas, sports facilities, green corridors, natural/semi-natural greenspaces, and other functional greenspaces. Moreover, the paper highlighted different types of 'greyspace'; civic squares and plazas, market places, pedestrian streets, and promenades and sea fronts.

Three main sustainability attributes of neighborhood's open spaces were discussed; space management, space function (circulation of people and permeability), and the role of objects within space (sustainable landscape). Consequently, the paper concluded a set of parameters that could be used as an indicator of sustainability performance at the neighborhood level. These parameters were utilized to develop a three dimensional matrix correlating: different typologies of open spaces, sustainability goals and objectives, and sustainability parameters. Such a matrix was applied to two different space typologies in Lebanon; Beirut Pine 'Horsh Beirut' as a greenspace, and the historical market, and pedestrian streets in Byblos as a greyspace. The application comes to determine the priorities of both sustainability goals and objectives, and sustainability parameters that have to be evaluated at each area. Regarding the Beirut Pine 'Horsh Beirut', the paper concludes that: to enhance local environmental quality and to increase the value of local community are the main goals. Meanwhile, to create an attractive public realm, to promote mental health, and to facilitate accessible social networks are the main sustainability objectives.

Regarding the historical market, and pedestrian streets in Byblos, the paper concludes that: to enhance local environmental quality, to increase both the value of local community and street safety are the main goals. Meanwhile, to promote local distinctiveness and heritage, facilitate accessible social networks, reduce vehicular movements, create an attractive public realm, reduce the fear of violence, and to promote

an active life-style (especially walking) are the main sustainability objectives.

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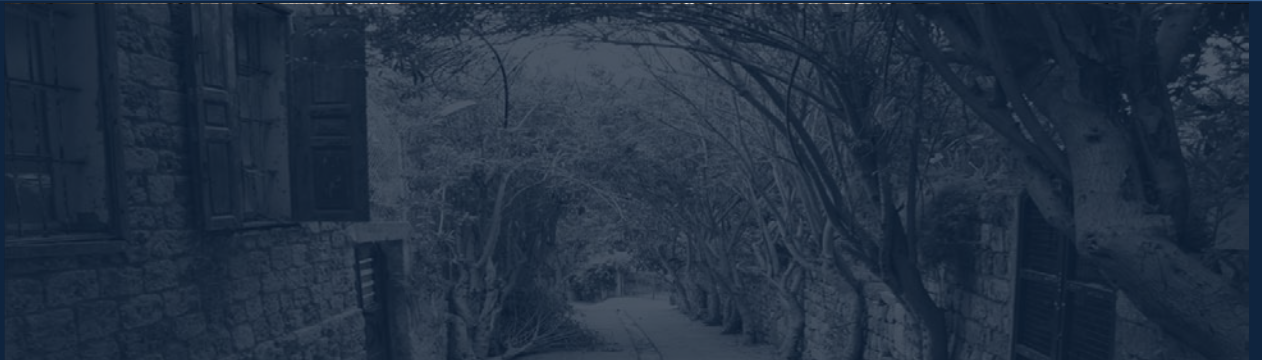
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Ashraf Salama
IJAR@MIT.EDU

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EDITORIAL: MULTIPLE VOICES IN ARCHITECTURE AND URBANISM

Ashraf M. Salama

In this fifth issue (Volume 2-Issue 2) Archnet-IJAR continues to raise issues of concern to the worldwide community of architects, designers, and urbanists. A considerable number of voices are accommodated. They offer diverse issues on a wide spectrum of issues that range from the interior spatial environment level to building and city levels. In fact, Archnet-IJAR maintains its presence as a platform for debating issues of interest to academics, professionals, and graduate students. And so, important pressing topical areas are presented in the refereed papers included in this issue. These include architectural education and design pedagogy, human-environment interactions, universal design, professional practice, sustainable cities, and identity.

The first three papers address issues that pertain to architectural education at different levels. At the global level, Ann Forsyth outlines the struggle of architectural programs and schools to position themselves on the map of distinction. Forsyth argues that since there are multiple ways in which architecture can be practiced, there have to be diverse paths to prominence. However, she emphasizes the fact that current

ranking schemes reflect only a narrow range of practice. Advocating the need for new measures, Forsyth states that alternative assessments need to be created such as in the multiple performance measure approach—an approach that allows comparisons among schools but based on multiple dimensions.

The papers of Hesham Eissa and Ji-Hyun Lee and Tasoulla Hadjiyanni introduce cases on how to approach design teaching. Eissa and Lee suggest an adaptive Web-based educational model and platform for the architectural design course that supports the main phases of the design process. In essence, they introduce an online version of an architectural design course. Hadjiyanni however argues for the need that university education should balance teaching students the skills and intricacies of their field while enabling them to discover their authenticity and place in the world. She adopts the view that conceptual design as one of the design phases can be the forum in which students explore who they are and what they aspire to be. Hadjyanni presents three cases from her interior design studio, which articulates how this view can be accommodated through

different design activities undertaken by the students.

In another domain, three papers address issues that pertain to person-environment interactions. Those are of Ashraf Salama, Wolf Preiser, and Ahmad Hashim and Zaiton Rahim. The three papers offer insights on issues that continue to pose themselves on the map of contemporary interests. Ashraf Salama presents an assessment of the outdoor spaces in Qatar University Campus based on a multilayered methodology that involves direct observation, walking tour evaluation, survey questionnaire, and mapping use patterns and activities. He sheds light on the gap that prolongs in architectural practices; the design intentions the statements that architects make while their designs are still on paper and the actual use of the built environment when these designs are implemented.

In his article on Universal Design Wolf Preiser offers a research agenda for the development of universal design performance assessment. His review involves defining the term at the professional level while outlining a conceptual framework for universal design evaluations. Preiser offers Some cultural, legislative and professional issues, including relevant disciplines and subfields of universal design. As well, he capsulates select worldwide practices, publications and current events. Ahmad Hashim and Zaiton Rahim report on behavioral norms and territoriality as part of behavioral and environmental mechanisms used to regulate privacy. They build their case based on exploring privacy regulation in urban Malay families living in terrace housing. Based on in-depth interviews their findings indicate that while most of the behavioral norms employed to regulate privacy

are consistent with Malay cultural norms and religious belief, there are a few which are not consistent due to the constraints mandated by the terrace housing design.

On professional practice related issues, Richard Barrett presents the results of a survey carried out amongst a group of registered New Zealand architects in order to establish their knowledge and experience in using core-daylighting systems and methods. The survey was carried out using a questionnaire. His findings reveal a clear indication that the respondents were not especially experienced or knowledgeable, and a majority felt this to be an area of their skill base in need of development. Barrett draws on both quantitative and qualitative data as an insight into several areas, including the attitudes of respondents towards their clients when making decisions about designing buildings for natural daylighting.

Sustainability appears to be of major concern in three papers by Aydin Özdemir, Metin Başal, Ahmet Benliay; Khaled Al Hagla, and Mustapha Ben-Hamouche. It is addressed at different layers from the micro to meso to macro levels. The paper of Aydin Özdemir, Metin Başal, Ahmet Benliay addresses sustainability at the micro level. This is evident in their intervention strategies employed in the landscape design project of an office park in Amman, Jordan. Their paper defines the role of preliminary analysis and landscape design process with emphasis on site grading, planting design, and stormwater management, with a hope that future designs should be ecological and sustainable, assessing and using resources efficiently.

The work of Khaled Al Hagla takes sustainability

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at a larger scale and introduces issues that pertain to roles open spaces can play in the neighbourhood planning and design. His work follows an approach based on both the social and ecological neighborhood's ability to tackle sustainability issues. Thus, the main focus is on the typical open space structure of the neighborhood as the media of different social and ecological interactions. The work establishes a sustainable design matrix to explore two different typologies of open spaces in Lebanon; Beirut Pine 'Horsh Beirut' as a greenspace, and the historical market, and pedestrian streets in Byblos as a greyspace. The application comes to show the validity of conceptual application of the established matrix. The macro level of sustainability is evident in the work of Ben-Hamouche. His study concerns itself with analyzing some old cities that are located in the hot and hot-arid regions, according to the available documents, and extracting urban indicators that help measuring and applying compactness in planning and design.

Alain Thierstein and Elisabeth Schein introduce the preliminary results of an ongoing investigation of urban space in the knowledge economy context. They argue that networks of the growing knowledge economy significantly influence spatial development on different scales. Their work proposes a framework for analyzing the impact of global knowledge economy networks on the rapidly developing urban space of emerging cities on the Arabian Peninsula, and vice versa. Second, the empirical methodology of the research project is a newly defined method triangulation, setting an example for systematic analysis of local urban development in a global context. Thierstein and Schein introduce a method triangulation which combines three different

research angles: a knowledge economy firm perspective, an on-site observation perspective and a planner perspective. Initial results from applying the research methodology in the city of Dubai give a first indication, that emerging cities on the Arabian Peninsula play a significant role in the global and regional knowledge economy networks. Locally developed urban spaces reflect and influence the significance of cities in the global knowledge economy context.

The work of Mashary Al-Naim analyzes the notion of identity within different transformations in Saudi contemporary architecture. Since the main aim of this work is to understand the general reactions of people towards change over time, the main emphasis is on the ways that people have used to adopt new forms in their home environment. Within this analysis, identity is defined as a social system as Al-Naim argues that unless we view it from this perspective we cannot understand how people realize it in their home environment.

In the reviews and trigger articles section, four interventions are included. The work of the late Muhammad al Najib Brimah addresses the future of African cities from an African perspective rather than a Western one. However, Kashef introduces futuristic discussions on two skyscraper visions: Tokyo's Sky City and the Shimizu Mega-City Pyramid. While the two articles may seem to introduce contradicting messages, their presence in one issue reflects the fact that Archnet-IJAR maintain its interest in accommodating multiple voices, thoughts, and ideas.

Reviews in this issue include reflections from Nicola Giacomo A.G. Linza, William Gay and

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Anna Grasso-Gay on the important series of lectures of Nikos A. Salingaros entitled "Algorithmic Sustainable Design: the Future of Architectural Theory." This review demonstrates a dramatic departure from typical discussions on sustainability. In essence, issues, thoughts and ideas encompassed in these 12 lectures offer panacea for the ills of contemporary world architecture and urbanism. Another review is offered in the form of a call for translation, that is of "After Amnesia: Learning from the Islamic Mediterranean Urban Fabric, 2007" by Attilio Petruccioli. A manuscript that comes after years of efforts he has undertaken in articulating the need for understanding the city, its structure, fabric, and the essence behind the physical manifestation of the Islamic/Mediterranean Urbanism.

While both the refereed papers and the trigger and review articles presented in this issue address many issues, it is important to note that they also address many contexts from the United States to New Zealand and from the Middle East and the Arabian Peninsula to Malaysia. This reflects the true essence of Archnet-IJAR of being an international forum for discoursing the design and the actual use of built environments and the context within which they are created.

Ashraf Salama
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A Note on the Cover Image

The the rehabilitation of Shibam, Yemen, one of the projects that received the Aga Khan Award for Architecture (2007. After over twenty years of restoration work, the Yemeni city of Shibam gained a new face. The project involved restoration of approximately 200 vernacular high rise buildings with the aspiration of creating responsive viable socio-economic alternatives as well as the preservation of the architectural heritage and urban fabric of the city. In the words of the Master Jury, "the project has approached the city as a living community rather than a historical artifact frozen in time."

Ashraf M. Salama

Ashraf Salama holds B.Sc., M.Sc. and Ph.D. degrees in Architecture. He is Professor of Architecture currently teaching at Qatar University, was Associate Professor at KFUPM (2004-06), and was the Director of Consulting at Adams Group Architects in Charlotte, North Carolina, USA (2001-04). He is licensed architect in Egypt received his training at Al Azhar University in Egypt and North Carolina State University, Raleigh, USA. Salama chaired the Department of Architecture, Misr International University in Cairo (1996-01). He has published numerous papers and authored and co-edited five books on Architectural Education: Designing the Design Studio (USA), Human Factors in Environmental Design (Egypt), Architectural Education Today: Cross Cultural Perspectives (Switzerland), Architecture as Language of Peace (Italy), and recently, Design Studio Pedagogy: Horizons for the Future (United Kingdom). He is member of the scientific boards of several intl. journals including Open House International, Time Based Architecture International, and the Chief Editor of "Archnet-IJAR." He can be reached by email at asalama@gmail.com or ijar@mit.edu.

GREAT PROGRAMS IN ARCHITECTURE:
RANKINGS, PERFORMANCE ASSESSMENTS, AND DIVERSE PATHS TO PROMINENCE

Ann Forsyth

Abstract

What makes a great program in architecture? This paper grapples with a key dilemma faced by architecture programs seeking to be recognized on campus and among their peers. How do schools position themselves to be perceived as programs valued by their universities, faculties, and students, distinguished in ways that represent important dimensions of architecture? The paper first explains how success or performance is currently measured in various ranking and assessment exercises: via reputational surveys; employer reviews; publication and citation counts; complex assessment rankings; and multiple, uncombined performance measures. It then outlines diverse paths or definitions of what it means to be a top or prominent program: elite design; practical readiness; technological sophistication; other substantive or pedagogical niches; and research.

This paper argues there are multiple ways in which architecture can be practiced and thus diverse paths to prominence but at present ranking schemes reflect only a narrow range of practice. To take advantage of current rankings schemes, or provide real alternatives, requires institutional activity, however. Individual schools already promote their interests on their web sites and in academic guidebooks but such self representations do not have the appeal to students and university administrators that comparative rankings present. Alternative assessments need to be created such as in the multiple performance measure approach—an approach that allows comparisons among schools but on many dimensions. Merely creating indicators of achievement does not create or improve excellence, of course. However, such measures could provide students with better information for selecting programs, help programs argue for both their worth and their need for resources, and, most importantly, enlarge debates about architectural excellence and the future of the profession.

Keywords:
Education; architecture; ranking.

Great Programs in Architecture:
Rankings, Performance Assessments, and Diverse Paths to Prominence

What makes a great program in architecture? As higher education becomes more expensive, it is increasingly coming under scrutiny from students, legislatures, professional groups, and donors. In the struggle for students, funding, faculty, and attention, successful programs are rewarded by their universities, but those that are not successful in terms of campus norms or the

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needs for professional workers risk cutbacks and may even be eliminated. This paper grapples with a key dilemma faced by architecture programs seeking to be recognized on campus and among their peers. How do schools position themselves to be perceived as programs valued by their universities, faculties, and students, distinguished in ways that represent important dimensions of architecture?

The paper first explains how success or performance is currently measured in various ranking and assessment exercises: via reputational surveys; employer reviews; publication and citation counts; complex assessment rankings; and multiple, uncombined performance measures. It then outlines diverse paths or definitions of what it means to be a top or prominent program: elite design; practical readiness; technological sophistication; other substantive or pedagogical niches such as sustainability or community design; and research. Several problems prevent schools from becoming leading programs, from a lack of critical mass to a sense that elite design is the only possible path. This paper argues there are multiple ways in which architecture can be practiced and thus diverse paths to prominence but at present ranking schemes reflect only a narrow range of practice. Alternative assessment and performance measures could provide students with better information for selecting programs, help programs argue for both their worth and their need for resources, and, most importantly, enlarge debates about architectural excellence and the future of the profession.

Measures of Success

In the market for students, faculty, and funding, rankings count, and a number of methods have emerged to deal with this demand for assessment and measurement of program quality and character. Energy for assessments has generally come from organizations outside of the academy; it is those organizations that have determined ranking format. In the U.S. this has been dominated by private publications like Design Intelligence (2007). In much of the rest of the world where universities are publicly funded, governments have taken the lead in demanding assessments of university program productivity and quality with systems in place in countries as diverse as Australia, Canada, Belgium, Hong Kong, Ireland, New Zealand, the Netherlands, Poland, Slovakia, Taiwan, and the United Kingdom (Geuna and Martin, 2003; von Tunzelman and Mbula, 2003; Stiftel et al., 2008). International rankings of universities such as those by the Times Higher Education Supplement (2008) and the Institute of Higher Education at Shanghai Jiao Tong University (2008) provide comparisons without the fine grain of program assessments but with a wider geography. While academics may not like rankings, such comparative measures are responding to demand by students, universities, funding bodies, and employers.

With the growth of the internet, such rankings have not diminished in numbers; indeed most are products of the internet age. Certainly schools can use their own web sites to promote their programs more directly and students turn to chat rooms to exchange commentary. Organizations such as the U.S.-based Association of Collegiate Schools of Architecture periodically

produce guidebooks although as of 2008 the most recent version was five years old (ACSA, 2003). However, rankings provide an important, if flawed, ability to compare programs. Schools that do well in such rankings promote them on their web sites and students discuss them in their online conversations. University administrators turn to them when comparing architecture with other disciplines. Such rankings, and related performance measurement systems, are unavoidable. The following section outlines the current approaches to undertaking them (see also table 1).

Type	Example	Strengths	Weaknesses
Reputational surveys	U.S. News and World Report; Design Intelligence Deans and Directors survey	Akin to faculty advice	Favor institutional prestige over program achievements; can favor faculty prominence rather than program excellence
Employer assessments	Design Intelligence main ranking; New Urban News employer survey	Reflects experience of a key constituency	Tends to focus on particular sub-sets of employers e.g. large firms; may be based on experience with relatively few students
Publication and citation counts	Rarely used (Von Tunzelman and MBula (2003) cite Flanders as an example	Easily quantifiable using existing databases	Does not reflect many of the core outputs of architecture academics
Complex ranking measures	Research Assessment Exercise in the United Kingdom includes panel assessment of research quality as well as other measures; Guardian university guide scores	Multi-faceted and in many cases linked to disciplinary priorities	Cumbersome and expensive; if done across fields, architecture can seem less productive than some of the sciences
Uncombined performance measures	Proposed planning performance measures in the United States	Allows schools to find data that can tell their specific story e.g. of teaching excellence, community outreach, or a need for more funds	Less likely to be done by the private sector— needs a sponsor. May not satisfy demand for ranking

Table 1: Comparison of Ranking and Performance Assessment Approaches. (Sources: see the following sections).

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Reputational rankings: When U.S. News and World Report provided rankings of architecture programs in the 1990s, they did so based on a survey of academics about program reputations. The recent survey of deans and directors printed on one page of the Design Intelligence employer survey report, is a return to this method (Design Intelligence, 2007: 11). The Planetizen ranking of planning programs, started in 2006, uses a reputational survey as a major component of their assessment (Urban Insight, 2006). This is an important type of measure, but research in the social sciences has found that it tends to provide outdated results that favor institutions with strong reputations irrespective of departmental achievement (Lowry and Silver, 1996; Keith et al, 1998; Cary, 2006). Lombardi et al., authors of a research ranking based on quantitative indicators, provide a critique of such approaches:

Prestige is a form of name-brand recognition derived from historical visibility, from promotional campaigns that project institutional identity, and from the halo effect of real accomplishments.... Prestige, or reputation, also reflects past behavior and publicity more than current performance, and its unreliability severely limits the validity of rankings that use reputation as an indicator. (Lombardi et al., 2001: 20)

While many are critical of reputational surveys, they are related to the common practice of faculty advising students about program choices. Of course, many faculty members are giving advice about which programs might fit student interests in, for example, community design. Reputational rankings can also take this form, ranking programs within specialties and niches.

Employer surveys: Design Intelligence, produced by the Design Futures Council, produces the most prominent ranking of architecture programs in the United States. Based on a survey of employer experiences with graduates it focuses on how well programs are preparing graduates for professional practice (Design Intelligence, 2006: 3; 2007). The rankings report lists the employers participating in the survey and these respondents include major mainstream firms from throughout the U.S. but not, for example, the major new urbanist firm of Duany Plater Zyberk or important nonprofit design firms such as those that belong to the Association for Community Design. New Urban News has recently followed this trend, creating its own ranking of new urbanist-oriented programs (Steuteville, 2006). In the market for students, this was a savvy move by the new urbanists. However, few other specialties have followed.

Publications and citation counts: Publications data are easy to collect through computerized databases but in design such data are often incomplete and do not distinguish journal quality. For example, a critique of a proposed urban planning ranking based on the international Institute of Scientific Information (ISI) database pointed out that as well as not including books, a major form of publication in design, the database had very uneven coverage of design periodicals:

The database includes the glossy coffee table magazine Architectural Digest and the professional Landscape Architecture magazine but not the more scholarly Journal of Urban Design or Landscape Research. At a more scholarly level, it includes the Journal of Architectural Education, the journal of the Association of Collegiate Schools of Architecture, but not the Council on Education in Landscape Architecture's equivalent, Landscape Journal. (Forsyth, 2004, 24).

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Publications are also not a key output for design faculty in architecture programs whose work may be better measured through awards and honors. However, such publications data are available and do present important measures of productivity and impact and are much used by university administrators. In addition, there have been significant methodological advances in using these information sources (Stiftel et al., 2004).

Complex assessment measures resulting in a ranking: A number of countries have created complex ranking measures. Stiftel et al. describe the British Research Assessment Exercise for planning, which creates a single overall score that determines funding:

The system undergoes revision in each 5-7 year cycle. In the most recent RAE cycle in 2001, units were graded on a 6-point scale (1-5, and 5) based on papers published, grants awarded, number of staff ("faculty" in U.S. usage) and of research students, the unit's research strategy, and measures of esteem including prizes, research roles, and advisory posts.... Most important among the measures is the proportion of papers written by staff whose work is judged to be of "international or national quality" by a disciplinary peer panel who read up to four papers by each staff member at each school... (Stiftel et al., 2005, 5).*

In the British RAE exercise of 2001 architectural research was judged by different assessment panels—including built environment and history of art, architecture and design—and received much criticism (Rendell, 2004). In built environment Loughborough University and the University of Salford scored 5*, the top score (HERO, 2001). In history of art, architecture, and design only Courtauld Institute of Art scored 5*. Obviously, however, such assessment measures are very time consuming—the next RAE is in

2008 after a full seven years. However, because they involve a panel assessment they can be tailored toward the scholarly products of different fields.

The RAE is not the only such combined score in the U.K. The Guardian (2008) creates a ranking of university programs, including architecture, from seven components: a•teacher score related to seniority and qualifications (15%), entry qualifications of students (20%), spending per student (10%), staff (faculty)/student ratio (20%), value-added measured through the proportion of honors degrees (10%), student destinations in terms of employment or graduate study (17%), and inclusiveness or student diversity in terms of disability, age, and ethnicity (8%). This is certainly complicated and open to debate, and lacks the nuance of the panel-based RAE, but at least the method is clearly stated on the web site.

Multiple uncombined performance measures: In the United States, the National Research Council's ranking of Ph.D. programs ranked fields with more than 50 doctoral programs using 29 variables related to reputation, students, and faculty (Goldberger et al., 2005). Such ranking schemes can include important measures of design excellence, such as awards. In addition, in its newest stage the NRC, is moving toward multiple measures reported by quartiles rather than a ranking (Stiftel, 2006).

Closer to architecture, the field of urban planning in the United States has attempted, with some controversy, to create a set of 30 performance indicators of dimensions ranging from student diversity to faculty projects, without integrating them into an overall ranking system (Stiftel et al.,

2004, 2005, 2008; Myers, 2004). This allows schools to monitor and advertise their performance on the subset of indicators that reflects their values—for example, student professional registration, community engagement activities, or research publications. These kinds of systems do not create an overall ranking but rather many comparisons and are a way of valuing schools that have different missions such as practical preparation or research output.

Paths to Prominence

Although architecture program faculty members sometimes complain about rankings and performance assessments, such assessments of quality have been present as long as faculty and practitioners have been recommending particular programs to prospective students. At a university-level administrators use such assessments to distribute funding—using them to assess quality and identify areas needing investment. A fairly qualitative evaluation of rankings and evaluative talk about programs reveals five different dimensions on which schools tend to be ranked or rated (although one of these dimensions is actually a range of niches).

The first two dimensions are currently the most visible and dominate discussions.

Elite design: In architectural practice, particularly in high style areas, who you know matters. Some schools have built up elite connections—their faculties include significant numbers of well-known practitioners as well as many energetic designers in adjunct and limited-term appointments. The stars in these schools are mostly from practice; although these schools

may also have famous traditional academics in areas such as history and theory. Many of the practice stars in such programs lead smaller and mid-sized firms, where academic salaries and contacts can make most difference, although the schools as a whole may prepare students for a variety of practice types, from large corporate offices to solo practice.

In these schools, departments and individual faculty (or their firms) employ public relations companies to manage their image and communications and regularly appear in major newspapers such as the New York Times. In addition, many departments benefit from the halo effect of the larger institution of which they are a part. The typical academic outputs of much of the science side of a university— refereed journal articles—are largely irrelevant to the missions of these schools. In fact a number of the most prominent of these programs are not in universities at all.

This is the kind of program that does well in such reputational rankings as the U.S. News and World Report. The exemplar is Harvard, top ranked in both architecture and landscape architecture in the 2007 Design Intelligence survey of deans and directors.

Practical readiness: Schools doing well in this dimension shine in surveys of employers. Their faculty members are deeply committed to teaching. With fewer practice or research stars, they have a well oiled machine of adjuncts, limited-term faculty, and permanent faculty who are energetic teachers and coordinators. Even though the difficult relationship between architectural practitioners and academics has been well documented, some schools manage to break through this with significant internship

or cooperative education programs (Stevens 1998). These programs are the "surprise" stars of the Design Intelligence rankings. The exemplar is the University of Cincinnati, that year after year is in the top handful of programs in the Design Intelligence survey of employers.

Three more paths to prominence are important but are not currently as visible in mainstream rankings in architecture. However, they have represent approaches to practice that are potentially innovative and important.

Technological sophistication: While technology subjects are taught in all architecture programs, what distinguishes these departments is an emphasis on innovative approaches to using technologies in digital representation, construction techniques, materials, and fabrication. However, because technology is taught in all programs of architecture it is not a niche, as in the next category of excellence, but rather an emphasis. This is an area where architecture faculty and students typically collaborate with engineers and others and play an important role in application and, translation. In the United States, Design Intelligence creates top five lists for computer applications and construction methods. The exemplar is MIT. In 2006 and 2007 Design Intelligence ranked MIT number one for computer applications; in 2006 it was number two (behind Cincinnati and tied with Cal Poly St. Louis Obispo) in construction methods.

Niches: Some schools shine in terms of substantive or pedagogical niches or specialties such as new urbanism, community design, environment and behavior, project management, historic preservation, medical facilities, or history and theory. Significant, established, well-integrated joint degree opportunities with fields such as business, planning, and landscape architecture fit this category. These schools appear on specialized lists of where to train in specific areas and emphasize topics that are not taught at all schools.

For example, New Urban News created a ranking of new urbanist architecture programs based on a survey of 50 employers, with "best schools" including "Miami, Notre Dame, Maryland, Michigan, California/Berkeley, and Andrews and University of Pennsylvania (tie for sixth)" (Steuteville, 2006). While only Pennsylvania appears on both this new urbanist top five and the top five of either the bachelors or masters degrees in the Design Intelligence rankings (see below), these schools are the programs of choice for students interested in these niche areas.

However, in comparison with other fields, it is surprising how few architecture programs are known for a specialty and how few interest groups have created any kind of list. Unlike the related area of urban planning that tends to have a handful of specialties in each school, or even landscape architecture that has a range of specialties at different scales and approaches, architecture programs tend to be more generalist (Crewe and Forsyth, 2003). However, there are models for such reviews such as the National Survey of Student Engagement (2007) that surveys over 200,000 students to create with benchmarks including active learning and student-faculty interactions.

Overall, there are numerous important areas of potential architectural innovation from

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sustainable design to community process and adaptive reuse. These are specialties that could provide important solutions to crucial global concerns. While rankings may rankle, a lack of surveys or comparative data makes these key areas less visible to potential students and university administrators. The area that has managed to achieve visibility is new urbanism and within this niche the University of Miami is an exemplar.

Research: Although not very common for architecture programs, it is possible for schools to do well in research, particularly those schools emphasizing history, technology, or other "support" areas (Forsyth and Crewe, 2006). However, this kind of research ranking is largely of interest in universities and is not much valued by the profession of architecture. Independent sociologist Garry Stevens has ranked school research productivity by (roughly) publications per academic, with improved methods in 2007 (Stevens, 2007). Columbia, Princeton, Cooper Union, Harvard, Penn, Berkeley, Rice, and Yale come out at the top using this approach. Design Intelligence also ranks a top five schools on research and theory as judged by employers. The British RAE exercise and related programs in other countries are further examples.

As universities value research more, and as architecture struggles to be more relevant in issues beyond general design, there may be increasing pressure for architecture programs to have at least some of their faculty performing well in research. Research collaborations in the broad areas of health, sustainability, and urban issues seem particularly promising for architecture programs and for the larger profession (Forsyth, 2007a; 2007b).

Schools that do well on one of these dimensions may also do well on another. The following table lists in alphabetical order the schools with the top five graduate and undergraduate programs in the Design Intelligence ranking in 2006 and 2007. (Because of some movement in the rankings, 15 schools are listed.) It classifies them into the five dimensions. As the table shows, some programs have more than one specialty—for example, schools that do well in technology and also in elite design. However, the Design Intelligence ranking reflects a bias toward practical readiness and elite schools, with few on the list below reflecting niche areas or even technology. This is a problem with current rankings that tend to ask major firms (Design Intelligence) or general groups of academics (the old U.S. News and World Report ranking or the new Design Intelligence deans and director survey) about general preparation. Research assessments have different biases. There is a real need for students to be able to find information leading them to schools excellent at training in specialized areas such as participatory design or sustainable building materials, and there is little guidance.

Cal Poly San Luis Obispo	Practical
Columbia University	Elite
Kansas State University	Practical
University of Pennsylvania	Elite
University of Texas at Austin	Elite/practical
Cornell University	Elite
Harvard University	Elite
MIT	Elite/ technology
Rhode Island School of Design	Elite/niche
Rice	Elite
Syracuse	------------
University of Cincinnati	Practical

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University of Virginia	Elite/ technology
Virginia Tech	Practical/ technology
Yale	Elite

Conclusions

Architecture programs are under external pressure to perform better—in research, teaching, and in overall reputation in the field—but there are many barriers. Although there are several paths to distinction, some schools don't succeed or achieve visibility at any one of them--even a niche area. Why? There seem to be two sets of answers, some to do with school performance and others to do with the ways schools perceive the field.

In terms of performance in the current key areas of rankings in the United States—elite prestige, practical training, and technology--both internal and external reasons can prevent schools standing out. These include a lack of critical mass of energetic faculty, real issues of workload, problems with funding, and nepotism due to a reliance on local practitioners as adjuncts. A few programs mistake harmony for excellence. Reputational surveys privilege schools with a strong past or visible current leadership. Certainly some of these barriers are real and difficult to overcome, and others more malleable.

However, for those able to generate a critical mass, there are many opportunities to create great programs that provide real options in architectural education. Perhaps the biggest conceptual barrier in the U.S. is seeing elite design, and perhaps general practical training,

as the only paths to excellence. In Britain, research could well become an important factor due to the situation that the RAE links funding to performance, although this is going against the grain of architectural education. If schools could try to position themselves in niche areas of practice, technology, or research, however, architectural education could be enriched and students would have more options. In fact the current mainstream "best schools" in the U.S. are really niches of a particular kind--elite design or practical preparation for large firms. There is surely more to architecture than this.

To provide viable options in the face of the current rankings schemes requires institutional activity, however. Individual schools already promote their interests on their web sites and in academic guidebooks but such self representations do not have the appeal to students and university administrators of rankings. While reputational rankings and employer surveys are unlikely to go away, alternative approaches to comparison need to be created such as in the multiple performance measure approach. This measurement approach allows schools to be compared on many dimensions, not just a few. One could imagine data collection efforts focused on numbers of low-income housing units designed and built in architecture programs, students graduating from dual degrees, awards for sustainable design projects, or student diversity. A survey along the lines of the National Survey of Student Engagement could compare schools in terms of active learning, enriching experiences, and campus environment (NSSE, 2007). One can imagine dozens of measures from student placements to faculty research that could reflect a growing appreciation of the diversity of architectural education and practice.

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Developing such indicators could draw on the growing international experience in academic performance measurement—in terms of the strengths and weaknesses of current approaches. What kinds of information are useful in improving program quality? How can such measurements be used to highlight less visible design specialties such as affordable housing or low-cost construction techniques? Which assessment approaches actually help programs and which focus attention on unimportant issues while creating a reporting burden to schools and the profession? Performance measurement is a growth industry and too little attention has been focused on it from the perspective of design—much more needs to be known.

Of course, merely creating indicators of achievement does not create or improve excellence. However, such measures could provide students with better information for selecting programs, help programs argue for both their worth and their need for resources, and enlarge debates about architectural excellence and the future of the profession.

Overall, there are many niche areas where there will be increasing demand for designers—from energy efficient architecture to socially-responsive design. There are many areas where architects can make a contribution to society and also make a living. The current group of rankings focuses on only a few of these areas with negative implications for schools outside those areas of elite design and practical readiness. If schools can highlight and achieve excellence in a wider number of specialty fields they will be able to both distinguish themselves on campuses and among students and make a contribution to practice.

Notes

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Ann Forsyth

Ann Forsyth is professor of city and regional planning at Cornell University with research and practice examining how to create sustainable and healthy urban places, focusing on some of the trickiest issues: affordable housing, social diversity, green space, and walkability. She has held tenured positions in architecture and landscape architecture. Trained in planning and architecture, Ann Forsyth's work focuses on the social aspects of physical planning and urban development. The big question behind her research and practice is how to make more sustainable and healthy cities. She was director of the Metropolitan Design Center at the University of Minnesota and professor of urban design with appointments in both the architecture and landscape architecture departments. Forsyth is author of three books: Reforming Suburbia: The Planned Communities of Irvine, Columbia, and The Woodlands (2005, University of California Press); Designing Small Parks: A Manual Addressing Social and Ecological Concerns (2005, Wiley, with Laura Musacchio); and Constructing Suburbs: Competing Voices in a Debate Over Urban Growth (1999, Routledge/Gordon and Breach). Ann can be contacted by email at af16@cornell.edu

DYNAMIC ADAPTIVE WEB-BASED MODEL FOR ARCHITECTURAL DESIGN EDUCATION (DAAD)
An e-Learning Environment for An Architectural Design Course

Hesham T. Eissa and Ji-Hyun Lee

Abstract

With the advent of the World Wide Web, the Internet has evolved into a user-interactive medium capable of delivering on demand information in high speed. Research into the various methodologies of Web educational applications has been a topic of great interest in the architectural education field. As a course delivery medium, the Web provides the means for creating an integrated, interdisciplinary repository of knowledge available at reasonable cost at anytime, anywhere and to anyone. One of the criteria of an ideal system for facilitating Web-based teaching and learning is to be adaptive. In this paper, we suggest an adaptive Web-based educational model and platform for the architectural design course that supports the main phases of the design process. In particular, the development of the online version of an architectural design course is used as a case study and illustrates the usability of the suggested model.

Keywords:

Architectural design education; web-based learning; information technology.

Introduction

As the scope of the World Wide Web (WWW) expands to include an ever-larger number of applications, education becomes one of them. With the advent of the WWW, the Internet has evolved into a user-interactive medium capable of delivering on demand information in high speed. Research into the various methodologies of Web educational applications has been a topic of great interest in the architectural education field.

In architectural education, the architectural design course, a group of successive studios, is considered as a core course that has significant focus and importance. Many other courses and scientific tracks are employed to serve and enhance the architectural product within the architectural design. This forum of learning is usually considered as the medium of generating creative solutions for given design problems. Therefore, design is often identified as a "problem-solving process". The task of problem-solving can encompass different methods to achieve the best solution of the problem in hand.

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The WWW presents some unique advantages as a course delivery medium. One advantage is location transparency. The Web is the distributed file system so that any file on a Web server can be used as though it existed on a local machine. A second advantage of the Web is its availability. Despite rare and irregular service failure, information on the Web is accessible any time. Finally, the Web is a multimedia presentation tool offering text, sound, video, and interactive services. The most significant limiting factor is the bandwidth of the network.

One of the criteria of an ideal system for facilitating Web-based learning is to be adaptive. An adaptive system can dynamically generate course content based on explicit and implicit student feedback. However, there are very few researches for the adaptive Web-based architectural education, especially for the architectural design course. (HOUSING@21. EU, Madrazo and Massey, 2005 - and WINDS, Specht, M. et al. 2002).

Therefore, in this paper, we suggest an adaptive Web-based educational model and platform for the architectural preliminary design courses that supports the main phases of the design process. The model would be flexible and extendable as any other educational tool to cover complex-functions and advanced architectural projects in final years. The suggested system can be a comprehensive tool for design students in adaptive way. In other words, the paths which students take through the course should vary depending on their needs, and the system should actively assist in the identification of the correct path. In particular, the development of the online version of architectural design studio is used as a case study and illustrates the usability of the suggested model.

Background

In this chapter we will go through the main theories and literature review regarding web-based pedagogical theories and models as follows: 2.1) cognitive theory of web-based teaching and learning, 2.2) general web-based educational model, 2.3) adaptive and intelligent web-based educational system. The background knowledge and literature review will be adopted in our model methodology (chapter 3) and then in the model implementation in (chapter 4). Part 2.4 is looking over some case studies of recent researches and the drawbacks noticed in the recent models.

Cognitive Theory of Web-based Teaching and Learning

There are many researches regarding web-based teaching and learning dominion. Among them, we summarize four issues that would be related and applied to the architectural design course as follows:

Self-Directed Learning: Knowles (1975) defines self-directed learning as a process "... in which individuals take the initiative, with or without the help of others, in diagnosing their learning needs, formulating learning goals, identifying human and material resources for learning, choosing and implementing appropriate learning strategies, and evaluating learning outcomes". Facilitating self-directed learning is also described by Spear and Mocker (1984) as they derived patterns from qualitative research on adult learning that can serve as a basis

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for organizing the circumstances that affect learning activities.

Brookfield (1986) mentioned the learning contract as a method to facilitate self-directed learning. That would require file management such as uploading and downloading, checking learning process of the students and schedule management functions; in addition to asynchronous communication tools such as e-mailing, discussion groups or chatting room services are necessary as well. Thus it is suggested to apply those tools that facilitate Web-based self-directed learning in our model.

Cognitive Flexibility Theory: Spiro et al. (1992) offer a constructivist theory of learning and instruction that emphasizes the need to treat complex, ill-structured knowledge domains differently from simple well-structured domains. For such ill-structured problems (as in Design) a learning strategy is introduced by that research called the "random access instruction" method that helps the learner to have efficient and flexible cognitive structure and processing to cope with multiple contexts or perspectives.

Spiro et al. (1991) introduced a model for Cognitive Flexibility Hypertext which has many advantages to Web-based education: a) multiple knowledge representations; b) visualizing revision; c) random access instruction; d) supplementary guidance. That would be considerable for architectural design learning as the design is an ill-structured problem and the mentioned theory would support the problem definition stage effectively.

The Goal-Based Scenario: Goal-based scenarios are used as a framework for our learning environment and provide both the scenario

context which models real-world applications as well as the scenario structure which settles the features of an adaptive learning environment. Given enough information resources the student should be able to solve the tasks (Schank, 1994). In the anatomy of a goal-based scenario there are four parts: cover story, mission, focus and operations.

To support such a goal-based scenario approach in Web, the concept engagement simulation is useful to build educational environments. We offer several principles to support the concept: 1) simulation-based, learning by doing to obtain authentic skills; 2) adaptive personal mentoring to help students individually; 3) distributed time-independent access to the course knowledge base.

Project-Based Learning: To support the project-based learning approach in Web, we suggest several issues as follows: 1) learning by exploring with an extensible course knowledge base to refer precedents as well as to provide ample and various contents; 2) learning by reflection to get new insights; 3) case-based education to represent knowledge in a realistic and concrete manner; 4) incidental learning to achieve diversity; 5) team-based education to increase learning efficiency and working capabilities.

General Web-based Educational Model

Based on Gagne et al. (2005), we reorganize and develop the procedures and components of a Web-based teaching and learning model.

We define six procedures, each of which has components for the phase in detail, of the Web-based educational model: 1) defining performance objectives; 2) analysis of a learning

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task; 3) designing instructional sequences; 4) the events of instruction; 5) deciding instructional strategies and delivery methods; 6) assessing student performance (Tables 1, 2, & 3).

Defining Performance Objectives: In general, the instructor defines the learning objectives. There are five components guiding the instructor through performance objectives. The five components are: situation, learned capability, object, action, and tools and constraints.

Analysis of a Learning Task: There are five types of learning outcomes, they are: intellectual skill, cognitive strategies, verbal information, attitudes, and motor skills. The purpose of this five task classification is to provide a basis for designing the conditions necessary for effective instruction.

Designing Instructional Sequences: The instructor decides the sequencing of curriculum or course. The common sequence follows the order of simple to complex skills, the latter of which take a longer time to accomplish. To solve the problems in the design domain, in most of the cases, the design processes are suggested to be followed. Therefore, in design education, the instructor also adopts an educational method that best fits the educational goals.

The Events of Instruction: There are several events that make up instruction for learning outcomes as they may occur within a lesson. Table 2 shows the events of instruction and their relation to processes of learning.

Type of Learning Outcome	Essential Prerequisites	Supportive Prerequisites
Intellectual Skill	Simpler component intellectual skills (rules, concepts, discrimination	Attitudes, cognitive strategies, verbal information
Cognitive Strategies	Specific intellectual skills	Intellectual skill, attitudes, verbal information
Verbal Information	Meaningfully organized sets of information	Language skills, cognitive strategies, attitudes
Attitudes	(Intellectual skills (sometimes (Verbal information (sometimes	Other attitudes, verbal information
Motor Skills	(Part skills (sometimes (Procedural rules (sometimes	Attitudes

Table 1: Essential and Supportive Prerequisites for Five Kinds of Learning Outcomes. (Source: Authors).

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Deciding Instructional Strategies and Delivery Methods: Instructional designers and teachers should choose instructional strategies that are most effective for accomplishing a particular learning objective. Instructional delivery strategies can be decided based on different targets (e.g. individual, small group or large group) and learning methods (e.g. lecture, discussion, self-directed, etc).

Instructional delivery methods are the actual mechanisms for delivering instruction. Felder and Silverman developed The Index of Learning Style (ILS) that has four dimensions: Active vs. Reflective; Sensory vs. Intuitive; Visual vs. Verbal; Sequential vs. Global. Table 3 is a reorganization of the relationship between ILS, instructional strategies, and instructional delivery methods as described by Blouin (2003).

Assessing Student Performance: There are basically two types of evaluation: criterion-referenced evaluation and normative-referenced evaluation. In criterion-referenced evaluation the standard for performance is set before assessment, for example 90 percent = A. That is, the standard for acceptable performance can be given to the student ahead of time, and if all students in a class reach the standard we can say the instruction has been successful. The standard in normative-referenced evaluation is set after assessment as a function of the classes' performance. This is generally interpreted as a distribution around the mean or average score on the test. The purpose of normative evaluation is to compare students based on their performance within a specific group.

Instructional Event	Relation to Learning Process
Gaining attention	Reception of patterns of neural impulses
Informing the learner of the objective	Activating a process of executive control
Stimulating recall of prerequisite learned capabilities	Retrieval of prior learning to working memory
Presenting the stimulus material	Emphasizing features for selective perception
Providing learning guidance	Semantic encoding; cues for retrieval
Eliciting performance	Activating response organization
Providing feedback about performance correctness	Establishing reinforcement
Assessing the performance	Activating retrieval; making reinforcement possible
Enhancing retention and transfer	Providing cues and strategies for retrieval

Table 2: Events of Instruction and their Relation to Processes of Learning. (Source: Authors).

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Learning Styles	Instructional Strategies	Instructional Delivery Methods
Active	Study in a group in which the members take turns explaining different topics. Work with others to guess what you will be asked on the test and figure out how you will answer.	Discussion, and debate Group work
Reflective	Don't simply read or memorize the material; stop periodically to review what you have read and think about questions or applications. Write short summaries of readings or class notes in your own words.	Time for reflection, journals
Sensory	Ask your instructor for specific examples of concepts and procedures, and find out how the concepts apply in practice. If the teacher does not provide enough specific, try to find some in your course text or other references or by brainstorming with friends.	Real-world applications Hands-on activities
Intuitive	Ask instructor for interpretations, or theories that link the facts. Or try to find the connections yourself.	Connections: concept maps Open-ended, speculative assignments
Visual	Find visual representations of course material. Prepare a concept map by listing key points, enclosing them in boxes or circles. Color code notes with a highlighter.	Diagrams, charts, movies Demonstrations
Verbal	Write summaries or outlines of course material in your own words. Work in groups.	Discussions, oral reports Writing projects
Sequential	Outline lecture material for yourself in a logical manner if the teacher does not do it for you. Strengthen global thinking skills by relating new topics to things you already know.	Outlines, stepwise presentations
Global	Before you begin studying, skin the first section of the text to get an overview. Relate subjects to things you already know.	Topic overviews Connections to other material

Table 3: The Relationship between ILS (Index of Learning Styles), Instructional Strategies and Methods. (Source: Authors).

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Adaptive and Intelligent Web-based Educational System

Adaptive and intelligent web-based educational systems (AIWBES, Brusilovsky, 1999) provide an alternative to the traditional "one-size-fits-all" approach in the development of educational courseware. The systems build a model of the goals, preferences and knowledge of each individual user, and use this model throughout the interaction with the user in order to adapt to the needs of that user (Brusilovsky, 2001). Historically, almost all Web-based educational systems (WBES) are inherited from two earlier systems of WBES: intelligent tutoring systems and adaptive hypermedia systems (Figure 1).
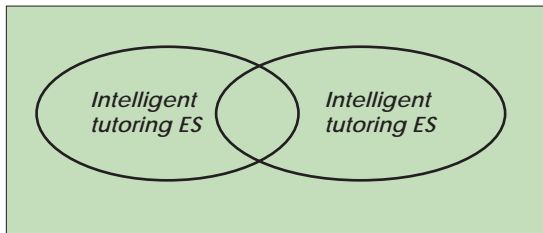
Figure 1: The Relationship between Adaptive and Intelligent Educational Systems.
(Source: Brusilovsky and Peylo, 2003).

Intelligent Tutoring Systems: Intelligent tutoring systems (ITS) apply techniques from the field of Artificial Intelligence (AI) to provide broader and better support for the users of Web-based educational systems (Brusilovsky and Peylo, 2003). The goal of ITS is to use the knowledge about the domain, the learner, and about teaching strategies to support flexible individualized learning and tutoring (Brusilovsky, 1999).

The following is a summary of three major ITS technologies, curriculum sequencing, intelligent solution analysis and problem solving support, as described by Brusilovsky (1999).

Curriculum sequencing
It helps the learner to find an "optimal path" through the learning material by providing the learner with the most suitable individually planned sequence of knowledge (questions, examples, problems, etc).

Intelligent solution analysis
Intelligent analyzers can decide whether the solution is correct or not, find out what exactly is wrong or incomplete, and possibly identify which missing or incorrect knowledge may be responsible for the error.

Problem solving support
It provides the learner with intelligent help on each step of problem solving. The level of help can vary from signaling about a wrong step, to giving a hint, to executing the next step for the learner.

Adaptive Hypermedia Systems: Adaptive hypermedia systems are all hypertext and hypermedia systems that reflect some features of the user in the user model and apply this model to adapt various visible aspects of the system to the user (Brusilovsky, 1996b).

An adaptive hypermedia system collects information about users. On base of these individual characteristics, it adapts its content and navigational possibilities to the particular user.

Adaptive hypermedia systems need data for making assumptions about the user. User's

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knowledge, goals, preferences, background, and experience would be considered as well. There are two major technologies in adaptive hypermedia: 1) adaptive presentation that adapts the content of a hypermedia page to the learner goals, knowledge, and other information stored in the user model) and 2) adaptive navigation support that assists the learner in hyperspace orientation and navigation by changing the appearance of visible links).

Case Studies of Recent Research

The pioneer adaptive and intelligent Web-based educational systems were developed in 1995-1996 by Brusilovsky et al. (1996), Brusilovsky (1996a), De Bra et al. (1998), Nakabayashi et al. (1995), Okazaki et al. (1996). We list several sample systems in recent five years: KBS-Hyperbook (Henze, 2000), ActiveMath (Melis et al., 2001), ELM-ART (Weber and Brusilovsky, 2001) and SQL-Tutor (Mitrovic, 2003). There are two adaptive Web-based systems in architectural design domain. They are: HOUSING@21. EU (Madrazo and Massey, 2005) and WINDS (Specht, M. et al. 2002).

ActiveMath: ActiveMath (Melis et al., 2001) is a generic Web-based learning system that dynamically generates mathematical courses adapted to the learner's goals, preferences, experience, and knowledge. For each learner, the suitable content is retrieved from a knowledge base and the course is generated individually according to pedagogic rules. However, ActiveMath does not offer the communication tools (e.g., discussion lists, chat rooms) so that the learner is not able to ask questions and discuss with another learners on the platform.

ELM-ART: ELM-ART (Weber and Brusilovsky, 2001) is Web-based tutoring systems. ELM-ART II was designed for learning programming in LISP and integrates a LISP compiler. ELM-ART provides adaptive navigation support, course sequencing, individualized diagnosis of student solutions, and example-based problem-solving support. However, the course structure in ELM-ART is predefined so that it is not flexible to support students' individual situation and give appropriate feedbacks.

KBS hyperbook: The goal of the KBS hyperbook (Henze, 2000) is to build a framework for designing and maintaining open, adaptive hypermedia systems in the Internet. The system compares the user's actual knowledge state with knowledge he should have after finishing the book which is considered an advanced step. KBS supports explicitly goal-based learning. Users can define their own learning goals or can request the next learning goal from the system. KBS also adapts to the different learning speeds of the users by supporting this kind of goal oriented learning. However, KBS hyperbook system does not take account of other adaptive criteria such as learner's preferences.

SQL-Tutor: SQL-Tutor (Mitrovic, 2003) is a Web-enabled intelligent system for teaching SQL database language. The system observes learners' actions and adapts to their knowledge and learning abilities. SQL-Tutor system has good adaptability and has a valuable learning assessment. However, the SQL-Tutor lacks interaction and help guidance. If learners meet problems, they would not easily find help to solve such problems.

HOUSING@21.EU: HOUSING@21.EU (Madrazo and Massey, 2005) is a pedagogic research

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group. The purpose of the research is to study the emergent forms of housing and living in 21st century Europe. There are two pedagogic goals: one is dealing with architectural content by proposing adequate forms of dwelling for contemporary European societies; the other is dealing with pedagogy by integrating teaching methods and information technologies. However, this Web site lacks interface for exchanging information. It is not convenient for learners to discuss and communicate each other.

WINDS (Web-based Intelligent Design and Tutoring System): Web-based INtelligent Design tutoring System (WINDS) (Specht, M. et al. 2002) is a research project that aims to build a comprehensive virtual university for architectural and engineering design. The researchers developed the ALE (Adaptive Learning Environment) system to integrate the functionality of a complex e-Learning system with adaptive educational hypermedia on the Web. The ALE system produces individualized courseware for students depending on their current state of knowledge, their preferences and learning styles. Therefore, WINDS aims to provide a framework related to curricula design and the production, delivery, and evaluation of educational material in a virtual school for design.

Methodology

Architectural Design Course – Common Problem Solving Methodology.
By adopting conventional and general methods of design processes we can define six main phases that are typically employed

in architectural design as a problem solving process:

1) Understanding and analyzing the given project program and main requirements and constraints, which is called "problem definition".
2) Analysis phase: Site analysis, environmental studies, study of precedents, socio-cultural context analysis and functional relationships of spaces; that phase usually enhance the problem definition and explore the problem constrains.
3) Synthesis process that involves the physical architectural solution generation; that is usually the most challenging part and has many approaches to achieve a preliminary ideas.
4) Developing a number of alternatives of design concepts.
5) Assessment of alternatives to select the most appropriate solution with regard to the design requirements and predefined criteria; that is usually achieved through assessment for the alternatives based on predefined criteria.
6) Finally, the communication phase, which is the presentation of the solution in a complete set of conventional drawings.

The notion of the suggested model is to provide an educational tool that covers those stages in an adaptive web-based environment.

Overview of General Web-based Educational Model
In Figure 2, we illustrate all the procedures of Web-based teaching and learning in parallel and identify the components of each phase.

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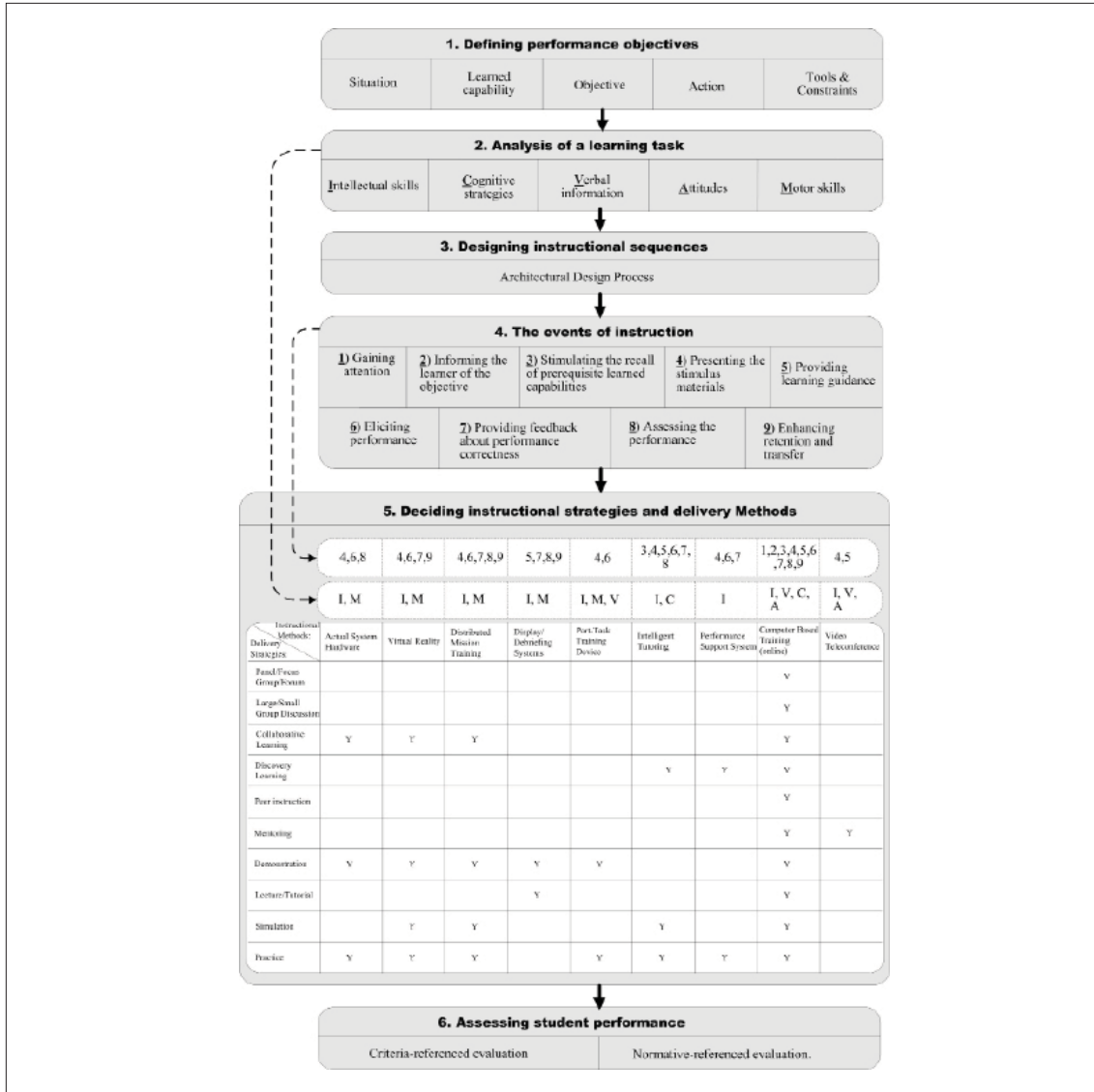
Figure 2: The Procedures and Components of Web-based Educational Model. (Source: Authors).

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Adaptive and Intelligent Web-based System for Architectural Design Course

Based on our introduction of the adaptive and intelligent Web-based systems major strategies in the architectural design education are identified and mapped with the adaptive and intelligent system technologies.

Integrating Architectural Design Course and Adaptive Web-based Education Model

As a result, the suggested conceptual framework for adaptive and intelligent Web-based educational model is shown in Figure 3.

The topmost part presents the sequence of the educational process in architectural design course. Each phase is identified and explained by its content and mapped with our educational framework for adaptive and intelligent Web-based model.

Our conceptual framework is consisted of two parts: 1) major strategies in architectural design; 2) adaptive and intelligent Web technologies including curriculum sequencing, intelligent solution analysis, problem solving support, adaptive presentation and adaptive navigation support.

The framework is also supported by three parts of general educational components:

1. Instructional **S**trategies including: **a)** Panel/ Focus Group/Forum, **b)** Large/Small Group Discussion, **c)** Collaborative Learning, d) Peer instruction, **e)** Mentoring, **f)** Demonstration, g) Lecture/Tutorial, **h)** Simulation, i) Practice;
2. Analysis of a Learning **T**ask including **I**ntellectual skill, **C**ognitive strategies, **V**erbal information, **A**ttitudes and **M**otor skills;
3. The **E**vents of instruction including: **1.** gaining attention, **2.** information the learner of the objective, **3.** stimulating recall of prerequisite learned capabilities, **4.** presenting the stimulus material, **5.** providing learning guidance, **6.** eliciting performance, **7.** providing feedback about performance correctness, **8.** assessing the performance, **9.** enhancing retention and transfer.

The bold faces are represented in Figure 3.

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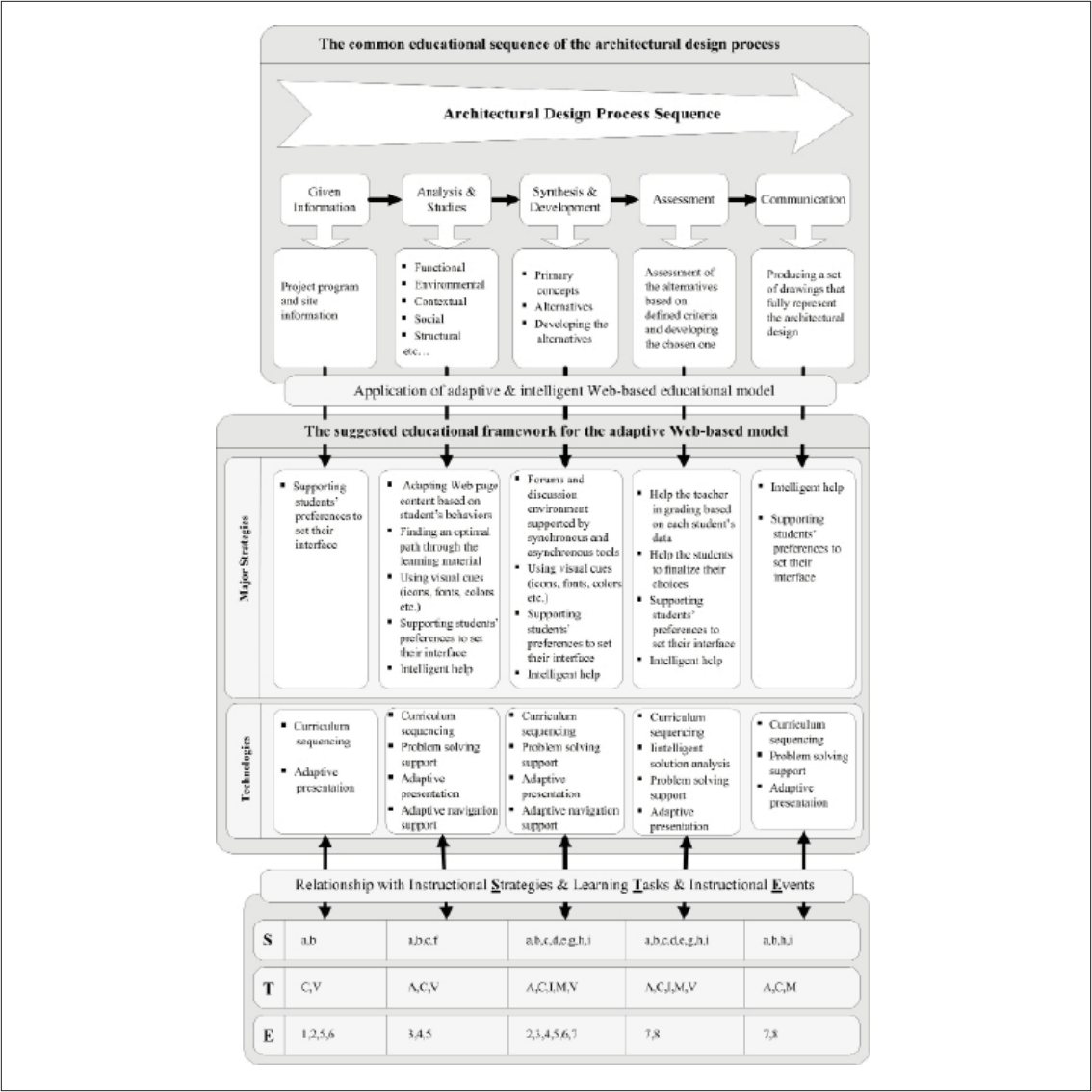
Figure 3: The Learning Process of the Web-based Architectural Design Course. (Source: Authors).

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System Implementation

System Architecture

In this project, we build a Dynamic Adaptive web-based model for Architectural Design e-learning environment (DAAD) system to be used as a case study and illustrate the usability of the suggested model. Figure 4 shows the system architecture of the first implementation.

The DAAD system is an on-going project to be implemented by several technologies: PHP scripting language; MySQL, a relational database; Apache web server; HTML; and XML (eXtensible Markup language) technologies. PHP is a scripting language that is especially suited for Web development and can be embedded into HTML, which provides an easy way to build dynamic content. PHP also serves as maintaining sessions (learner browsing behaviors and history) between Web pages and knowledge based stored in the user model. XML allows Web content to be separated from the presentation, where XML is used to store the content.

Prototype Implementation

In Figure 5 through 8, we show several interfaces of our first prototype and illustrate how they work. Figure 5 shows the main interface of DAAD system. The interface of the system can be divided into three main parts: (A) navigation area; (B) tool bar; and (C) content area.
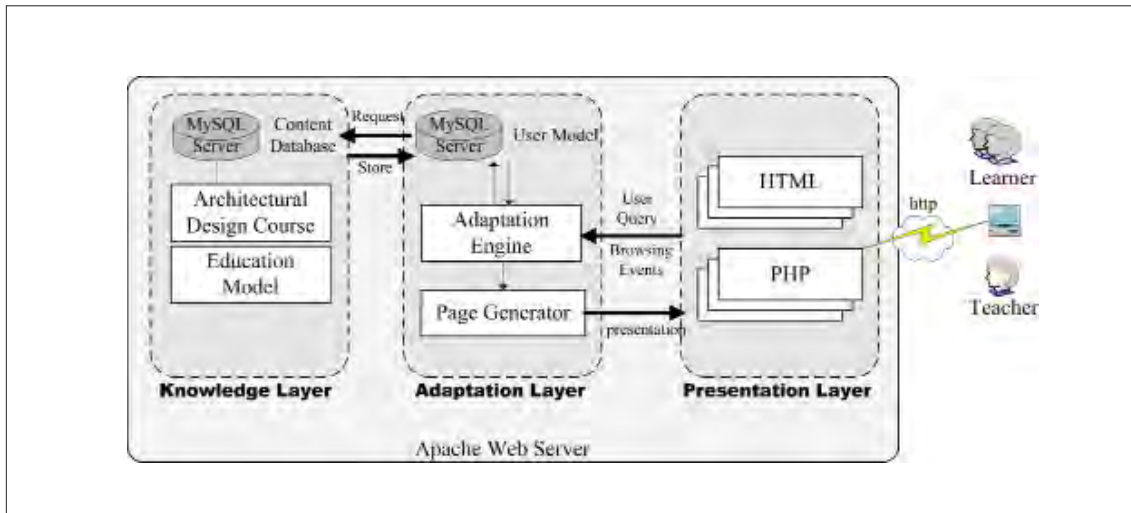
Figure 4: DAAD- System Architecture. (Source: Authors).

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Figure 5: Interface of DAAD- System. (Source: Authors).

The interface as mentioned is explained below in more details:

(A) Navigation Area: this area shows the course structure according to the user's goal. Each process is used by visual cues such as colors and icons to show different types of tasks or user progress. The icon is expandable to be shown or hidden to control the information.

(B) Tool Bar: this area includes several modules:

"My Model" module contains the user's information to find an optimal path through the precedents and knowledge base; "Preferences" module lets the user choose and adapt his/her own graphical user interface (GUI) (Figure 6); "Communication" module supports embedded synchronous or asynchronous communication tools such as e-mail, video conferencing, shared whiteboard, etc. for users to discuss their ideas (Figure 7); "Mark" module is similar to the bookmark function. If the user marks objects

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or contents, the system keeps and shows the information to the user when logging in again; "Highlighting" module allows the text on the pages to be highlighted.

(C) Content Area: this area shows the Web course content according to students' behaviors. In other words, each student can see his/her adapted and customized Web pages based on his/her areas of interest or interactions such as searching, bookmarking or setting preferences. The system can also assist the student in navigation by adaptive sort. For example, the Figure 5 shows Frank Lloyd Wright's Fallingwater as one of the topmost frequent visiting cases by students.

A teacher can login as administrator so that he or she is able to see all students' assignments, tasks and their learning progress. The teacher can use the adaptive grading table to give them appropriate feedback based on different assessment criteria (Figure 8). The different assessment criteria would also be useful to students to finalize their decisions.

Figure 7: Communication Module (videoconference & white board). (Source: Authors).

Figure 8: Adaptive Grading Table for Teacher to Different Grading Parameters. (Source: Authors).

Figure 6: Adapting GUI based to Learner Preferences. (Source: Authors).

Discussions and Conclusion

The suggested model is an ongoing project that has a prototype implementation. The implementation achieved the previously stated goals so far, the model has been designed to

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cover as much as possible the gaps found in the recently used models (2.5), the goals and achievements of the suggested model are discussed below:

Finding optimal path: When a user sets up the model, the system finds an optimal path through the precedents and knowledge base. In other words, the system can suggest the next design task node based on user's goal stored in the user model. That was possible trough scripting language PHP embedded into HTML, which provides an easy way to build dynamic content and maintain sessions (learner browsing behaviors and history) between Web pages and knowledge stored in the user model.

Link adaptation and recommendation: Each student is able to have his or her unique Web pages according to browsing behaviors and interactions such as searching, bookmarking or highlighting. The system can also assist the student in navigation by adaptive sorting and ranking, or recommend similar examples or links by using the history recording.

Adaptive annotation: The system uses visual cues (colors, icons, fonts) to show different types of tasks or user progress. A checkbox is also useful to verify the tasks completion.

Communication tools support: For an architectural design course, group discussion is essential. The system supports embedded synchronous or asynchronous communication tools, such as: e-mail, chat rooms, video-conferencing, digital whiteboard, virtual gallery, etc. for users to discuss and share their ideas.

Adaptive assessment: A teacher can login as administrator and use the adaptive grading

table to give students appropriate feedback based on different assessment criteria. The different assessment criteria would also be useful to students to finalize their decisions.

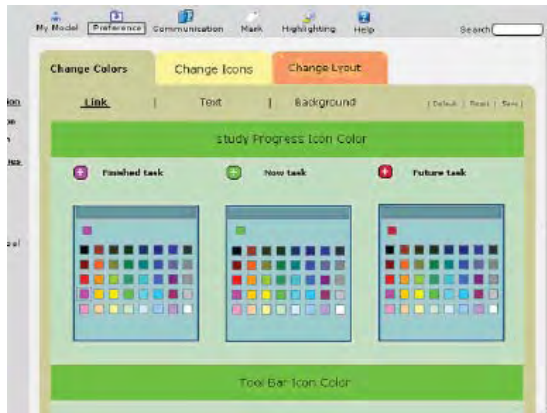For future work, the notion is to test our preliminary implementation by applying an empirical study in the preliminary architectural design studio (2 and 3) to test and analyze the efficiency and usability of the suggested model.

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Hesham T. Eissa
Hesham Eissa is an Assistant Professor in the department of Civil and Architectural Engineering, College of Engineering, Sultan Qaboos University (SQU) Sultanate of Oman since 2005. Before joining SQU he worked as an assistant professor in Dept. of Architecture, College of Engineering, Benha University, Egypt from 2001-2004 (now on leave). He received his Ph.D. from the School of Architecture (Building Performance and Diagnostics) at Carnegie Mellon University in 2001 and received his M.S. and B.S. from the Department of Architecture, College of Engineering at Zagazig University (Benha Branch) at in 1990 and 1983, respectively. His research interests are the lighting design, simulation tools, cognitive process and problem solving, Architectural conservation techniques. He can be contacted at eissa@squ.edu.om

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Ji-Hyun Lee
Ji-Hyun Lee is an Associate Professor of the Graduate School of Culture Technology at Korea Advanced Institute of Science & Technology (KAIST). She is also participating professor of KI for Entertainment Engineering. Before joining KAIST, she was an Assistant Professor of the Department of Digital Media Design and Graduate School of Computational Design at National Yunlin University of Science & Technology (NYUST) from 2002-2007. She received her Ph.D. from the School of Architecture (Computational Design) at Carnegie Mellon University in 2002 and received her M.S. and B.S. from the Department of Housing & Interior Design at Yonsei University in 1993 and 1991, respectively. Her research interests are the agent-based design systems, computer-supported collaborative design, creative design, evolutionary systems in design, formal models of design process, representation and reasoning in design and visualization for design information. She can be contacted at jihyunlee@kaist.ac.kr

BEYOND CONCEPTS - A STUDIO PEDAGOGY FOR PREPARING TOMORROW'S DESIGNERS

Tasoulla Hadjiyanni

Abstract

In an increasingly complex world, university education should balance teaching students the skills and intricacies of their field while enabling them to discover their authenticity and place in the world. The questions are: "How can design education respond to this challenge?" and "Where in the curriculum?" This paper supports that the conceptual design phase can be the forum in which students explore who they are and what they aspire to be. Developed and communicated with both written and visual elaborations, concepts can spark a dialogue around the opportunities that arise when conceptual design enables students to make a difference.

Keywords:

Conceptual design; creativity; design education; socio-cultural design; pedagogy.

Introduction

University education should balance teaching students the skills and intricacies of their field while enabling them to discover their authenticity and place in the world. It is in this balancing act that a university professor can make a difference. In the design disciplines, students are trained to be the professionals of tomorrow, who will venture into fields struggling with responding to the often conflicting needs of users, clients, and the public; policies that don't work; and government agencies overburdened by limited funding. Being able to critically evaluate a situation; using inquiry and research to find solutions and direction; persuasively describing their ideas to others; knowing the limits in what can be done; and having the confidence to take a stand, tomorrow's designers can be better prepared to tackle these issues effectively (Nicol, D., & Pilling, S., 2000).

Much of their success is dependent on an education that enables them to discover who they are and what they believe in. This generation of students is growing up and is

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expected to function in a complex world that faces unprecedented security, environmental, and social justice concerns. Since 9/11, principles typically taken for granted like safety, permanence, and stability came tumbling down. Moreover, American youth are now presented with seemingly conflicting choices: on the one hand, they live in a consumer society where money, power, and status count while on the other hand, they are witnesses to the transformation of people like Bill Gates (one of the world's wealthiest men), Bono (a musician), and Al Gore (a politician) into champions for social and environmental justice. Defining who they are, what it is they care about, and what difference they can make is now more difficult for a student than ever before.

Operating within this framework, if design education is to continue to be relevant to current public and political debates, it must actively re-adjust its focus to give students opportunities to learn more about both their discipline and themselves. The questions are: "How can design education respond to this challenge?" and "Where in the curriculum?" With answers to these questions and guidance into these uncharted waters, educators can help students make sense of their work as well as define their space in the world.

This paper supports that concept development can be the forum in which students explore both who they are and what they aspire to be. Design educators can in turn be the mediators in students' quest for understanding of the world around them and the role that, as designers, they can play in it. Such a teaching of concept development constitutes learning that is transformational, in that it implies a

change in consciousness that will have lasting effects on the students' self-definition (Clark, 1993). I therefore labeled this pedagogy transformative concept development. Refined over seven years of design studio teaching at the University of Minnesota, the proposed pedagogical method expands the currently limited literature and approaches to concept development and sets the stage for a dialogue around conceptual design.

The discussion begins with reference to concept development as addressed in the design literature and continues with outlining what transformative concepts entail and the actual pedagogical process followed during studio teaching. Three examples serve as illustrations of the potential behind transformative concepts and their presentation precedes the closing comments, which highlight the challenges and opportunities tied to this methodology and call for future research.

Concept Development – A Brief Background

According to the dictionary, a concept is "something conceived in the mind" and/or "an abstract or generic idea generalized from particular instances." A synonym to the word concept is the word idea (www.w-m.com). In the design fields, concepts are also defined as ideas that have both abstract and physical qualities (Hyde, 1989). Typically the backbone of projects for their entire development, concepts are implemented through various architectural elements such as size, shape, form, structure, lighting levels, color, material choices, etc (Aspelund, 2006).

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Being one of the most creative parts of the design process, conceptual design is also one of the most difficult to navigate. Questions like: "How can we go about developing concepts?" and "How do we elaborate and convey them?" still confuse educators, students, and practitioners. Historically, concepts have been linked to a search for inspiration (Aspelund, 2006), with designers searching and finding inspiration in areas such as nature (Victor Horta), geometry (Charles Rennie Mackintosh), history (John Adams), the site (Frank Lloyd Wright), the project's use/mission (Norman Foster), etc. In the latter part of the 20th century, art and theory have also guided the design ideas of architects like Steven Hall and Peter Eiseman.

Although designers have long used conceptual design as a purposive act that exposes their beliefs through a social commentary, like Frank Gehry's attempt to promote recycling through his cardboard chairs and Philippe Starck's gun lamps that speak of war and peace, little has been written about conceptual design from this perspective. Two opposing viewpoints prevail around the idea of designing for what one stands for. On the one hand, students and practitioners are discouraged from using design to "externalize internal feelings" (Tate & Smith, 1986). On the other hand though, in Concepts: The architecture of hope, Sanford Kwinter (2003/2004:4) supports that "concepts were then, and remain today, the primary walking sticks with which we navigate new space and reshape ourselves." It is from this premise that this paper hopes to build on—the idea of concepts as vehicles through which students can re-shape themselves, transforming themselves in the process.

Complicating the matter further is the variability in opinions on what constitutes a concept; how it can be generated; and the extent to which a design should be based on the concept (Moore, 1995; Lum, 2003/2004; Aspelund, 2006). For instance, designs that emulate conceptual art and focus on form making bring to the foreground concerns such as the disregard of crucial architectural properties like complying with construction techniques and meeting the social and cultural needs of clients/users (Fernando, 2006). Concept development is thereby subject to disciplinary definition and an area where the design fields are differentiated from the arts, where artists are free to make a statement about issues and can actively participate in current debates.

Amidst all this questioning, it becomes difficult for faculty to find and adopt pedagogies on how to teach concept and to coordinate with other faculty so as to teach concept in a coherent manner. With few resources to draw from about the teaching of conceptual design, they are left without much direction on how to teach concept or how to inspire students. Tackling this difficult stage of the design process alone implies pedagogical efforts that are mostly individualized and uncoordinated with each faculty typically teaching concept in their own way. Similarly, curricula are rarely developed from the standpoint of conceptual development and the differences between how to teach concept to lower level versus upper level students for example, have yet to be thoroughly explored (Hyde, 1989). Part of the difficulty is that communicating, describing, and analyzing a creative process such as concept development can be cumbersome and hard to define.

Expanding those pedagogies that cater to conceptual exploration becomes even more adamant at a time when the student body is so diverse, including students of varying abilities, backgrounds, and learning styles. Often one of the hardest hurdles to overcome, concepts are areas where students are more tempted to plagiarize and 'borrow' ideas from other artists or designers to base their work on. The uncontrolled access to information, through sources like the internet, and time pressures, accentuate the problem. Too much information and too little time to reflect on what is important, puts at stake students' ability to clearly define their own positions and takes on the issues they encounter.

Further constraints relate to the increased complexity of the built environment. The parameters that have to be taken into account in both practice and education are often overwhelming, ranging from site requirements to programmatic needs, structural considerations, and code regulations. As a result, design schools cannot devote much time to concept development while in practice projects are often carried out with teams of designers or consultants, enhancing the likelihood that the concept and its translation can fall through the cracks.

Exacerbating the difficulties involved in teaching concept development is a mistrust in concepts that is tied to the notion that often concepts are simple extensions of a designers' ego or so theoretical that they have little relevance to the project or the issues they are about. In Design Juries on Trial, Kathryn Anthony laments on how detrimental it can be during a design jury when a student justifies his/her design with the response

"That's the way I like it." Anthony proposes that students use research, like the study of precedents as well as environment-behavior studies, to base their solutions, particularly on the programmatic level. Noting the importance of both generating and communicating one's ideas, she calls for presentation styles that clearly reflect what one is aiming to do in verbal, written, and visual manners. As we will see later, this paper's proposed methodology accounts for Anthony's concerns and recommendations.

Overall, there is an overarching agreement among design educators that conceptual design can push designs further as well as help establish a discipline as a creative and artistic one (Moore, 1995). Adding to these dialogues the opportunities afforded during this stage of the design process for students to explore who they are, what they want to become, and the type of world they want to live in can only strengthen the outcomes and better prepare future designers for fulfilling lives and professional careers. Drawing from other educators whose efforts have focused on uncovering and positioning design pedagogy as a process, where both the end product and the process itself are valuable teaching components (Salama, 2005), the following analysis delves into defining a process by which concept development can be taken to the next level, a transformative level.

Reframing Conceptual Design

Transformative concept development is a pedagogical method that I have been refining for over seven years—while teaching in the Department of Architecture and now the Interior Design program of the University

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of Minnesota. This pedagogy differs from prior approaches based on two standings: First, that the concept is non-architectural. Instead, transformative concepts tell a story that relates to something beyond the built environment and speak to concerns relevant to today's world, making for example a social commentary. And second, in between the concept and its architectural translation comes a visual, a visual that synthesizes the conceptual idea into a non-architectural form. Following is an elaboration on these differences and the pedagogy's propositions.

This approach perceives the concept as an idea derived after a thorough research of issues surrounding the project on hand. As an idea, the concept is larger than the actual design manifestation for that particular project. That is, it can be used to guide any form of artistic inquiry, such as by a painter, a filmmaker, or a sculptor to make a statement that speaks to the same idea through his/her artistic venue. The concept is therefore the outcome of a complete understanding and the means by which a designer takes a stand and gives his/her interpretation of the project's role in society.

Given the complexity of present-day buildings and the societies in which they belong, strong concepts must also be complex. The more complex a concept is, the greater the potential for the student to experience a transformative experience and for an exciting, creative, and holistic design solution that expands into directions that would otherwise remain unexplored. Strong and complex concepts have two primary characteristics: 1) they account for variability, that is, they are inclusive of variable answers, responses, and viewpoints,

and 2) they are dynamic, that is, they refer to change and evolution instead of being static. Concept evaluation is largely dependent on the successful embodiment of these two characteristics.

Three descriptors are used to develop and communicate complex concepts: a title, a statement, and a visual. With multiple ways to tell the story behind the concept, it becomes easier to convey the idea to others and to illustrate its relevance to the project and the proposed solution.

a) The title: The title captures the essence of the concept in a few words, preferably fewer than three words. This helps narrow the students' explorations and eases the task of conveying the idea to others. Verbs that call for 'action' are best, as they can dictate a possible to the underlying concerns raised in the concept, although other descriptors, like adjectives and nouns have also proven to be effective.

b) A statement: The concept statement elaborates on the idea behind the concept, building on what the title alluded to. In a brief paragraph, the concept statement becomes a written testimonial of what the concept is about and what the student stands for.

c) A visual: The visual can be a sketch, a diagram, a model, or any other visual manifestation a student chooses—it can also be a series of many visuals, a clear way to show process or change. The visual helps students organize and synthesize their thoughts and research findings in something with fewer prerequisites than a building—the sketch for example, does not have to meet codes or programmatic guidelines. The visual thereby acts as a stepping stone between

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the concept and the architectural translation that follows (see figure 1).

Having translated their concept in a visual reveals to students the many possibilities embedded in the concept, inspiring them to fully explore their creative potential in the building scheme, where the number of parameters that must be met can be overwhelming. Illustrating the conceptual idea in a visual form is also very practical in a visual field like design and with access to a visual representation both students and others can better understand what the concept is about.
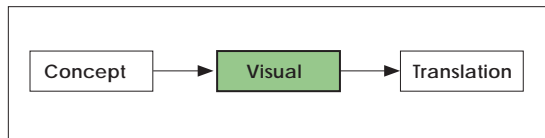
Figure 1: Visual's Role in the Design Process (Source:Author).

Process and Teaching Techniques

A typical semester has two phases: The Pre-Design phase involves the research that will generate the knowledge needed for the development of the concept as well as the project's programmatic guidelines while the Design Phase encompasses schematic design all the way to construction documents. Concept development marks the beginning of the schematic phase and takes about two to three weeks. Below is a more detailed reference to those steps in the process and the teaching techniques used that relate to concept development and conceptual design.

Pre-Design Phase

Instrumental to the success of this pedagogy is the grounding of concept development in thorough research that expands "the boundaries of knowledge beyond the basic solution of local problems" (Roberts, 2007:17)—transformative concepts cannot simply be an extension of a student's ego. Therefore, studios begin with the first three to four weeks being devoted to researching the social, cultural, religious, political, environmental, technological, and economic parameters that impact the project's potential to support the needs of the community it belongs. Readings in academic journals, books, and lay articles build students' knowledge and guide their quest for a conceptual idea that brings to the foreground the story behind these complex issues and the many forms this story can take. Comprehending and defining the various angles from which a problem can be approached to be solved, students are challenged to see the bigger picture and to consider the broader impact of their work on the world at large. With a grasp of the research findings, students can then concentrate on how to eloquently describe them.

Design Phase

The Design Phase involves several steps. It should be noted that some students move through the process in a linear manner, taking each step in the order presented here. There are students though, who must retrace the steps and move through the process in a circular manner. In such instances, students in the class might be at different stages of the process—some can be at the translation stage while others are still defining their concepts. Flexibility on the part of the instructor is key to the success of this methodology.

Concept Charette: With the research findings on hand, students zoom in on determining what

they care about and what their design should say. Decoding the findings down to this level is probably the most difficult and overwhelming step in the process as the research brings to light a multitude of issues that are all worthwhile. As a way to overcome this hurdle and speed up the process, we hold a 'concept charette' day. Because of the level of difficulty in synthesizing the research findings and generating a conceptual idea, this part of the process is best attempted in pairs. With a classmate to bounce off ideas to, students' awareness and level of understanding sharpens, enabling them to delve deeper into the issues as they progress. On charette day then, students form teams and brainstorm answers to questions that relate to the project they are dealing with. In the culturally sensitive housing example described later, these questions included: "What does it mean to be Ojibwe?" and "What does it mean to be a member of a marginalized group?" More general questions, like "What about the research findings did you find intriguing and was touched by?" can also help students' brainstorming. Together with their partner, students select words and sketch drawings that capture the feelings and ideas they wish to bring to the foreground. At the end of the class session, we share these preliminary concepts with each other and discuss their effectiveness in conveying what the students intended as well as whether they are variable and dynamic. Before we leave for the day, I present previous examples of strong and complex concepts as well as their translations.

Desk Crits: For the following couple of class sessions, in weeks five and six, I engage in desk crits of concept proposals. My objective is to give feedback on all three descriptors: the title,

the statement, and the visual. The challenge here is helping narrow the students' quest to one idea while ensuring that the particular idea is developed broadly and deeply enough to account for variability and be dynamic. With typical 3-hour studios having anywhere from 16 to 20 students, pairing students to work on the concept provides the additional advantage of enough critique time to delve deeper into exploring diverse concept proposals and their manifestations.

Class Sharing: Then, at the end of week six, students are asked to come to class with as many alternatives as they wish, each presented with a concept title, statement, and visual all on one page. They post their proposals on a wall and are asked to review everyone else's work and give each other feedback—along with the students, I also provide written feedback. This way, students receive feedback from a variety of sources, which has been linked to gains in critical and independent thinking (Bose, Pennypacker, & Yahner, 2006). Each of us answers two questions for each concept we review: "What did you learn?" and "What would you have done differently and how?" I then distribute all the written feedback for students to consider in revising their concept proposals. Areas of criticism often revolve around issues such as whether the ideas behind the concept are understood, whether the words and the visual increase comprehension, and whether the concept can be strengthened by increasing its complexity. Class sharing is a very effective way to mobilize and inspire students— the energy levels in the class are high on this day and students take classmates' insights very seriously.

Concept Evaluation: After students had a

chance to respond to their classmates' and my written feedback, concept proposals are turned in for an evaluation. Criteria used include: Is the concept complex? Does it account for variability and change? How creative is the proposed concept and its visual manifestation? Is the concept clearly communicated in all levels, written and visual?

Conceptual Translation: Upon finalizing their concepts, students move to the conceptual translation stage where they think abstractly about how to translate their concept architecturally. Although a detailed reference to this aspect of the process is beyond the scope of this paper, it should be noted that for a successful architectural translation, the space/design itself should speak of the concept. That is, the architectural translation should not only depend on activities carried in the space for the concept to come through. At the same time, the translation should not be done in separate/isolated elements – instead, a holistic approach must be taken, that is, all elements together speaking of the concept. The translation should be in both dimensions: 2-D (like plans and elevations) and 3-D (like sections, perspectives, axonometrics, models) and for as many parts of the design as possible, i.e. from the whole plan down to details, like ceiling and lighting design, and material choices, like colors and finishes. Conceptual translation should take a variety of forms and different parts of the design should be telling different aspects of the concept's story.

Conceptual Translation's Evaluation: Lastly and close to the end of the semester, the conceptual translation into a building is evaluated using criteria similar to those used for the concept's evaluation: How creative is the design solution?

Does creativity extend to all elements of the project, from 2-D to 3-D? Is each part addressed thoroughly and in enough depth to foster understanding? Does the overall presentation speak to the concept and the project's mission or is it generic? How well does the design balance creativity and meeting programmatic needs? This last criterion is crucial as the overall aim is to achieve designs where creativity and functionality work hand-in-hand. The overall quality of the proposal is also evaluated with respect to where the overall proposal stands in terms of expectations.

Three Examples

Transformative concept development can be applied in all types of projects, from residential environments to cultural institutions. Following are three examples from interior design studio classes that illustrate the possibilities.

Culturally Sensitive Housing

Culturally sensitive housing is housing that supports various ways of living. In my residential design studios, students use the literature as well as my research findings from in-home interviews with members of new immigrant and minority groups to propose environments that integrate that group's cultural needs with those of the mainstream (Hadjiyanni, 2006 & 2007).

On the conceptual level, students are asked to respond to questions like: 'What does it mean to be an Ojibwe?' and 'What does it mean to be a member of a marginalized culture?' They can also choose to base their concept on celebrating difference and the opportunities that are tied to cross-cultural encounters, through questions like: 'What about the Ojibwe

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inspires you and you want your design to speak about?'

In this example from Fall 2006, Amanda Zanski and Allison Landers wanted to shed light on the possibilities that arise when two cultures learn from each other. Amanda grew up close to an Indian Reservation in Northern Wisconsin and attended a high school where half of the students were Native Americans. This experience sensitized her to the obstacles that must be overcome to bridge cultural differences. Allison on the other hand, came to the same realization after the class visited the Mille Lacs Reservation and after familiarizing herself with my research with Ojibwe families that revealed the struggles of many Ojibwe to reclaim their past and reestablish their cultural identity definition.

While at the Mille Lacs Indian Museum, both students, who have strong artistic backgrounds, were intrigued by videos featuring Indian dancing and drums playing as signs of cultural expression. They therefore, chose to use drums and music making as a way to express the idea of 'difference' and they relied on a heart as a universal symbol that conveys the willingness it takes for two cultures to learn to 'listen to each other's song' and come closer together (Figure 2).

In their words:
"We chose to symbolize the mainstream American and the Ojibwe cultures with their typical drums. Conceptually speaking, these drums speak their individual beats that make their own cultural identities. Even though these identities are unique, they have one commonality between them: a beat. We have then translated this commonality into a human heart beat where, we believe, it is by listening to the beat of another culture that we can learn. However, we understand the process of listening to another culture is harsh, chaotic, and sometimes lost altogether. Because of this, we like to speak not of understanding or unifying, but rather of recognizing. If people can start to hear just a few beats of another culture maybe they will be able to still retain their identity, but have a few new 'songs' to take with them."

Figure 2: Speak, Listen, and Recognize. (Source: Author).

This process of speaking, listening, and recognizing was translated architecturally in their

design solution of a duplex. The two different cultures are represented with units made up with different materials and geometries whereas the gap between them takes the form of a glass void between the two units. The change that comes with recognizing is illustrated through the various levels of the home. Both the plan and exterior elevation show the first floor as the place where each culture is separate, playing its own distinct

song—warm versus cool materials, geometric versus organic forms, etc. Once moving into the 'heart,' the staircase connecting the two floors, materials and forms begin to relate to one another in a 'give and take' manner that results in a new, enriched, and unconventional composition (Figures 3, 4 & 5).

Figure 3: Cultural Uniqueness as Shown on the First Floor. (Source: Author).
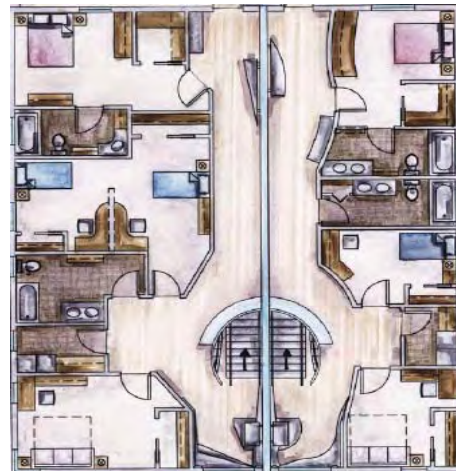
Figure 4: Cultural Interaction Enriches the Design of the Second Floor. (Source: Author).

Figure 5: The Front Elevation Shows the 'Give-and-Take' between Cultures. (Source: Author).

Universal Design

Third year students implement universal design criteria to the design of a residential kitchen. In the Fall 2005, the aftermath of hurricane Katrina was very recent. Disturbed by newscasts that spoke of people in wheelchairs not being evacuated due to lack of adequate transportation and inspired by stories of disabled people who strive for a life of normalcy, Sarah Morissette wanted to explore the relationship between 'ability' and 'disability.' Her concept "Empathy builds support" speaks of the connections and the gap between the two states of being:

"Any person can become disabled or be born disabled. Society tends to marginalize those with disabilities, yet a disabled person can perceive him/herself as functioning normally or wholly, contributing to society. One way to build more support for the disabled is for non-disabled people to empathize and understand disabilities better."

Her conceptual drawing represents a non-disabled person as 'fully' connected and a disabled person as 'disconnected' due to the lack of control of certain bodily functions. Both share the same platform which is held together with a bracing support. Arrows illustrate the interchangeable perceptions as well as the possibility that one's status can be altered at any time (Figure 6).

In the translation, on the programmatic level, students were required to design for 'all', that is for people of varying abilities and not necessarily for people with a disability or wheelchair users. Solutions include counters of varying heights, easy to reach and grasp handles on cabinets, and spaces to store heavy appliances. Conceptually, the kitchen's interior highlights the variable support disabled people can gain from society—the large column that seemingly holds the ceiling speaks of policies and major institutions that cater to those with special needs whereas the small column under the island speaks to the small things that brighten life, like a smile or lending a helping hand. The 'disconnects' become various gaps, like the opening behind the sink, the stained-glass window designs on the back wall, the island, and the ceiling design. Some of these gaps can easily be bridged, like the opening that connects two rooms or the windows that blend the inside and the outside, while others are harder to mitigate (Figure 7).
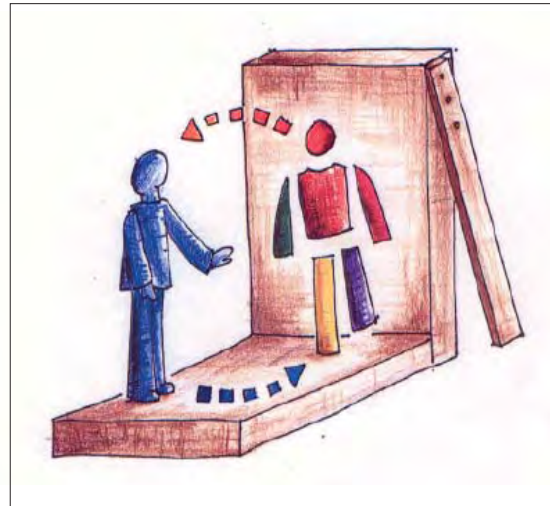
Figure 6: Empathy Builds Support. (Source: Author).

Figure 7: The Kitchen Design Highlights the Varying Levels of Support. (Source: Author).

Goldstein Museum of Design

In the Spring of 2006, fourth year interior design students at the University of Minnesota were asked to re-design an existing natural history museum into the new home of the Goldstein Museum of Design. Founded by the Goldstein sisters, the Goldstein museum is a University Museum that promotes the appreciation and interpretation of design within its social, cultural, aesthetic and historic contexts through exhibitions, research, preservation, and education.

Emily Brown was touched by Goldstein's objective to celebrate the region's cultural diversity. As her research revealed the limited connections newcomers to the area felt, she recognized that "the challenge we face in designing a building that houses such a wealth

of diversity is simultaneously fostering a sense of identity, connection, and community for every visitor who walks through the door." With the goal that everyone feels included, she elaborated on why:

"We are a family, and like all families we are full of unique individuals, tied together by a common bond, the bond of humanity. We need to celebrate our differences while we cultivate our human connection. We must walk in community, offering continued support and connection as we each, in turn weave among the many others in our lives."

Emily chose to represent the similarities and differences among members of a community with the thumbprint:

"The thumbprint is an intriguing entity – a mark that simultaneously unites us as human beings and distinguishes us as individuals. Culture can be viewed in much the same way. The Goldstein Museum fosters this tie, this human bond, by encouraging its visitors to stop passively observing other cultures, and begin actively connecting with them." (Figure 8)

Her translation juxtaposed the thumbprint's dynamic curves within a grid to allude to the connections among different individuals and community groups (Figure 9).
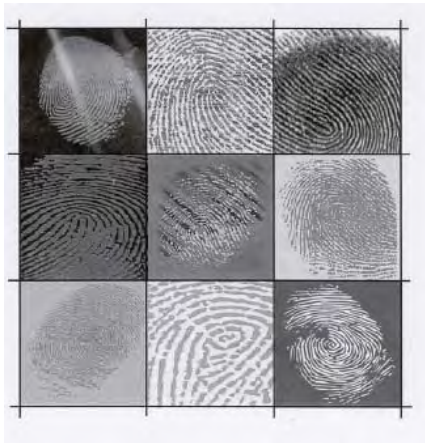
Figure 8: Connecting. (Source: Author).
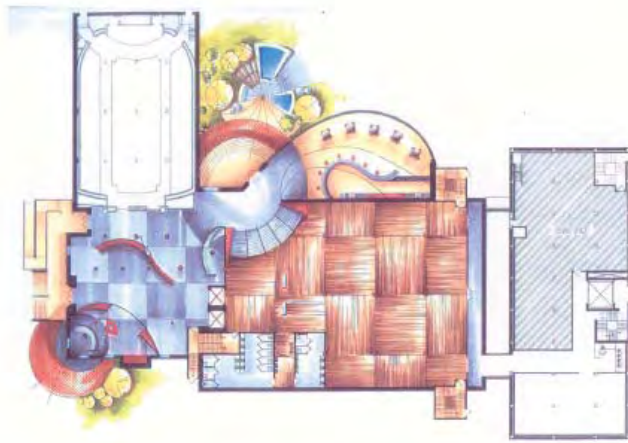
Figure 9: Intersecting and Juxtaposed Geometries Speak to the Opportunities Tied to Community Connections in the Museum's Lobby and Gallery.(Source: Author).

Closing Comments - Challenges and Opportunities

Transformative concept development conceives of concepts as identity mediums, as means through which students can learn both the intricacies of their field and more about themselves. There are many challenges in teaching this pedagogical method. Among these is the challenge of allowing enough time in the curriculum for transformative concepts to take effect, at least when students are first introduced to this methodology. Time needs to be allotted for research; synthesis of that research's findings; and reflection and digestion of the information. Once students become familiar with the process, I found that moving through the steps is much faster, almost like learning to ride a bike.

Another time-related challenge is the immense time commitment required by the instructor who in addition to teaching the course requirements now guides students' quest for understanding the world around them and taking a stand. As the process of self-discovery is rarely a linear one, students can be all over the place when struggling to define what they want to talk about, what is it that interests them, or what is it they believe in and want to focus their design on. Because of that, the instructor must be able and willing to connect with the student on a level beyond that of teaching the material, to that of a mentor, and help channel the students' ideas into a creative concept proposal. Timing then can be an issue especially as adequate time for desk crits might be hard to come by in 3-hr class sessions with 20 students.

Faculty must also be cautious of the fact that in addition to being a long and lengthy process, transformative concepts can sometimes be painful as well. Like in any self-reflection, there is always the possibility that issues might come up that are a painful aspect of a student's past or present. For example, in designing for people with special needs, it was not uncommon for students to share personal experiences such as struggling with depression, anxiety, and eating disorders. Is handling such circumstances too much to ask of faculty? What role can/should educators play in this process? And, is it ethical for someone without special training to handle such instances? Although the studio environment can be a healing place for these students, it is best for instructors to direct students to the appropriate university channels if they feel it is necessary.

Lastly, another challenge is pushing the concepts all the way into the translation. After devoting so much energy and effort in developing strong and complex concepts, expectations for a strong conceptual translation rise. When architectural translations become too literal and the proposed building looks just like the concept's visual, problems can appear like: poor space planning, dysfunctional rooms, disregard for programmatic requirements, and inadequate care for codes and clearances. Similarly, when the concept is not fully taken into account for the architectural translation, the proposed solution can lack creativity and originality. Faculty must balance pushing the concept's translation without losing the project's architectural integrity and concern for human needs.

Aside from the challenges though, after teaching transformative concept development for seven years, I am fully committed to the opportunities that it presents. Witnessing students take a stand for what they believe in as well as finding direction in pushing their designs

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to the next level are benefits that outweigh the challenges. There is an excitement and a level of engagement in the air during this time of the design process that is hard to describe. Apart from helping students develop as individuals and as designers, this pedagogy pushes students' critical thinking skills; gives them the confidence they need to take a stand; and sharpens their communication skills, be those verbal, written, and visual—it always amazes me to see the number of dictionaries that show up in studio during the search for words for the title and the writing of conceptual statements.

My next step would be to explore how early in the curriculum this teaching pedagogy can be taught—having only applied this technique in upper level studios (3rd and 4th year), I am not certain of how it would work for lower level students. One possibility is to build-up on the level of complexity as a student moves through a program. This implies a curriculum that accounts for transformative concept development. The question that surfaces then is whether transformative concept development can be taught in one course or whether a cumulative effect is more powerful. Developing a curriculum around this educational aspect would require coordinated efforts among design faculty that concentrate on how concept is taught throughout a students' education. Time then should be allotted by administrators to develop curricula that teach concept coherently and in a synchronized manner.

As conceptual design is a severely under-researched area, I would like to close by calling on design educators to devote more efforts into understanding this exciting aspect of the design process. Can the same pedagogies work as effectively for male as well as female students? What about students from diverse cultural backgrounds? How can differing learning styles be accommodated? And the list goes on and on……..One thing is certain though: that conceptual design is about ideas. Transformative concept development makes a social commentary of those ideas, opening up avenues and presenting opportunities for students to make sense of their work as well as help define their space in the world.

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Tasoulla Hadjiyanni

Tasoulla Hadjiyanni is an Assistant Professor in the Interior Design program of the University of Minnesota. She holds a Bachelor of Architecture and a Master of Science degree in Urban Development and Management from Carnegie Mellon University as well as a Ph.D. in Housing Studies from the University of Minnesota. Her book "The Making of a Refugee: Children Adopting Refugee Identity in Cyprus" (Praeger, 2002) grounded her interest in the discourse between design, culture, and identity under conditions of displacement. She is now continuing that work by investigating the role of domestic spaces in cultural identity construction among five of Minnesota's new immigrant and minority groups: Hmong, Somali, Mexicans, African-Americans, and American-Indians. Integrating her research into her teaching and outreach agendas, she exposes students to cultural aspects of space, developing new pedagogies by which to teach culture to students of design as well as create culturally sensitive housing proposals that instigate change at the policy level. Because of their interdisciplinary nature, her research and teaching have been presented at conferences like the Environmental Design Research Association, Interior Design Educator's Council, and the American Anthropological Association and published in a variety of journals. She can be reached by email at thadjiya@umn.edu

WHEN GOOD DESIGN INTENTIONS DO NOT MEET USERS EXPECTATIONS: EXPLORING QATAR UNIVERSITY CAMPUS OUTDOOR SPACES

Ashraf M. Salama

Abstract

Investigating the description of the Architect of Qatar University Campus reveals that one of the initial intentions in the design of the campus was to introduce a series of open public spaces and partially covered courtyards, displaying gardens and fountains to create small oases throughout the university. These spaces intended to encourage intellectual and social atmosphere and to provide agreeable surroundings for informal gathering and activities. However, preliminary observations of these spaces show that the original purpose for which they were created seems to be un-satisfied. Strikingly, no attempt has been made to systematically evaluate the performance of these spaces with respect to the use of the university community. Thus, this paper engulfs the issue of design intention versus users' reactions by conducting a post occupancy evaluation study. It introduces an assessment of the performance of Qatar University-QU campus outdoor spaces from users' perspective after it has been used and occupied for over 20 years. The assessment aims at understanding the mutual interaction process between the built environment exemplified by the physical characteristics of campus outdoor spaces and the needs of the university community exemplified by students, faculty, and staff. Therefore, the paper argues for the value of evaluating current campus outdoor spaces from users' perspective. It aims at defining problematic areas related to the utilization of current spaces—that are contrasted with the architect's design philosophy and intentions—in order to develop a framework for possible future improvements. The methodology adopted is multi-layered in nature and incorporates a wide variety of assessment techniques, including walk-through evaluation, observation, behavioral mapping, and questionnaires. The investigation reveals a number of problems that may hinder the performance of different types of QU campus users. The paper concludes that by recognizing how well university campus outdoor spaces respond to the needs of faculty, students, and staff, one can recommend ways of improving the outdoor environment necessary to facilitate the work and learning experiences of different users within the campus and the desired student-faculty interaction.

Introduction: When Good Design Intentions Do Not Meet Users' Expectations

To explain their work to others, architects typically develop statements that clarify their design philosophy, intentions, and the imperatives by which they pursued their design tasks. In many

cases however, these statements fail to reflect or address a major component—that is people or users. They are basically written—and the project is still on paper—to highlight the merits of the design while illustrating the skills of the designer or the design team as manifested in the final articulation of the building(s), the built form. In generic terms, architects in these statements emphasize their complete awareness of cultural, environmental, and perhaps economic constraints, but users are always in the shadow, and are simply taking a back seat. If they are addressed, the norm is that they are mentioned in a superficial manner. As this argument may be seen by some architects and designers as arbitrary or too general, I reflect here on Qatar University Campus in terms of what were the design philosophy and intentions as stated by its architect and how users comprehend it, see it, and actually use it.

With the participation of UNESCO a preliminary study was launched in the early seventies to explore the establishment and creation of a higher education system and supporting facilities for the state of Qatar. It resulted in a core project representing the first phase of the academic buildings in the now completed Qatar University campus. The late Kamal El-Kafrawi, the then Paris based Egyptian architect was the prime design architect of the master plan and all campus buildings. Ove Arups and Partners were the consultants undertaking structural, infrastructural and engineering services. Inaugurated in 1985 with less than 1000 students, the students' population in 2008 reached a little less than 10,000.

Since its inauguration, the project has received considerable coverage in both printed and online media and was described and analyzed in international and regional publications. Strikingly, most publications portrayed the project in a manner that goes along with what the architect has actually mentioned in his statement about the campus planning. They all articulate the project in a praising realm while illustrating various successful design aspects. This is clearly evident in the writings of Brice Taylor (1984) and those of Kultermann (1984; 1999; and 2002). As well, an assessment study of the campus by Romi Khosla (1992) praise the project utilizing the statement and philosophy El-Kafrawi has outlined. Now, the question would be, where the users are, do they have something to say about the project,? Have the design intentions mentioned in the architect's statement met users' expectations? These questions are in essence the core of my argument. It is my firm belief that these writings contribute to superficial judgments about the project while placing high value on the formal aesthetics of the campus, but discussing its occupants and how they use it is oversimplified.

On the contrary, Post Occupancy Evaluation-POE- studies have proven tremendously successful to the clients and owners of various building types (Preiser & Nasar, 2008). At the international level, many studies have addressed the problems associated with educational facilities (Lackney, 1994; Sanoff, 1994 & 2003, Nasar, Preiser and Fisher, 2007). However, very little is known about the performance of university campuses and in particular the performance of outdoor spaces within. At the regional level, three notable studies were conducted by Mahgoub (1998), Abu-Ghazzeh (1999), and Gabr (2002), they all addressed issues that pertain to the quality of educational

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and support spaces but with little attention to outdoor spaces. In all cases, these POE studies offer likely objective results that continuously indicate the need to fully understand users' comprehension, perspective, behavior, and perception of the learning environment and the associated physical spaces.

Thus, this paper engulfs the issue of design intention versus users' expectations by conducting a POE study. The paper introduces an assessment of the performance of Qatar University-QU campus outdoor spaces from users' perspective after it has been used and occupied for over 20 years. The assessment aims at understanding the mutual interaction process between the built environment exemplified by the physical characteristics of campus outdoor spaces and the needs of the university community exemplified by students, faculty, and staff. Therefore, the paper argues for the value of evaluating current campus outdoor spaces from users' perspective. It aims at defining problematic areas related to the utilization of current spaces—that are contrasted with the architect's design philosophy and intentions—in order to develop a framework for possible future improvements. The methodology adopted is multi-layered in nature and incorporates a wide variety of assessment techniques, including walk-through evaluation, observation, behavioral mapping, and questionnaires. The investigation reveals a number of problems that may hinder the performance of different types of QU campus users. The paper concludes that by recognizing how well university campus outdoor spaces respond to the needs of faculty, students, and staff, one can recommend ways of improving the outdoor environment necessary to facilitate the work and learning experiences of different users within the campus and the desired student-faculty interaction.

University Campus Outdoor Spaces: A Literature Account

In their classical work titled People Places: Design Guidelines for Urban Open Space, Marcus and Francis (1998) argue that "a search for the published literature on how campus open spaces are used (or indeed how campus buildings are used) proved to be a thankless task." Their criticism lies in the fact that at the time many books on campus planning and building were written, designers apparently felt that innovative buildings must be approached via monumental sets of stairs or across vast, empty plazas. However, there was little recognition of the need for pleasing, casual gathering places at building all-important, but the eye-level, day-to-day experience of passing through and using the spaces between buildings was seemingly of little consequence (Marcus and Francis, 1998). Therefore, it is argued that the literature on campus planning (as opposed to individual building design) is somewhat richer in number of volumes and intellectual content. Several books, case studies, and conference proceedings appeared in the 1960s, paralleling the increase in college enrollment and campus construction. But there is little in these texts to aid the designer of campus open spaces. Not unexpectedly, their focus is on fiscal issues, educational policy, and large-scale planning (Marcus and Francis, 1998).

In many of the books on campus planning, the approach is to discuss buildings rather than outdoor areas for gathering (Crookstone,

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1975; Dober, 1992 & 2000; Patterson, 1966; Schmertz, 1972). The approach is nevertheless architectural, focusing on outdoor spaces as form-giving elements appraised for their historic symbolism and aesthetic qualities, with minimal reference to how these spaces might be perceived, valued, and used by actual human beings who make up the population of a campus environment.

The lack of concern for outdoor spaces in the literature on campus design is regrettable. For most campus users, the campus landscape is critical in providing an imageable milieu for campus life. Compare, for example, the hard, concrete, urban image of Laney College in Oakland, California, to the rural, tree-studded expanse of the University of California's Santa Cruz campus (Fisher and Nasar, 1992 a & b.). The contrast is not so much one of building design but the size, design, and detailing of the spaces between buildings (Nasar, Presier, and Fisher, 2007). It should be noted that some of the deficiencies in the literature on campus outdoor space use are beginning to be filled by studies written by students and faculty at schools where post-occupancy evaluation is part of the curriculum (Sanoff, 2003).

The preceding critical analysis of the literature fosters the premises upon which this research is based. While it outlines the need for and the value of Post Occupancy Evaluation Studies, it signals the lack of studies and interest in campus outdoor spaces. As well, it sheds light on the issue of how it looks versus how it works, an issue that continued to be ignored in architectural and design practices of campus facilities for several decades.

Qatar University Campus:
Design Features, Architect's Statements, and Preliminary Observations

A brief analysis of the project (on paper) reveals the core concepts and the design intentions of the architect. Academic buildings are planned within a ring road with sports and ancillary facilities to the outside (Figure 1 a. & B.). The concept for high quality concrete buildings in a modular low-rise has allowed the use of repetitive pre-cast elements for both clad and structural walls. The layout of academic buildings is based on grid forms, an octagon 8 4 m in width and a square with sides of 3 5 m. The octagons are adjacent and connected with squares to form the modular pattern. Each octagonal classroom module is linked to at least two "lobbies". One lobby can be used either as an entrance and a transition space between classrooms or an additional but secluded classroom space, the second lobby as a source of natural light and a meeting place (Figures, 2, 3).
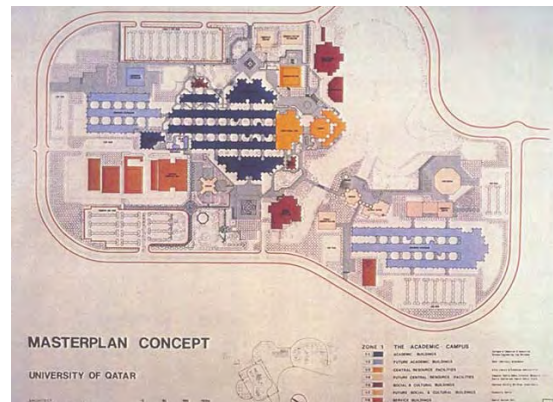
Figure 1.a: The Master Planning Concept of Qatar University Campus: Enclosing Academic Buildings in a Ring Road. (Source: Archnet).

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Figure 1.b: Aerial View of Qatar University Campus: Early Stages of Implementation. (Source: Archnet).

Figure 2: The Use of Repetitive Pre-cast Elements for Both Cladding and Structural Walls, A Major Design Feature that Characterizes the Design of All Educational Buildings. (Source: Author).

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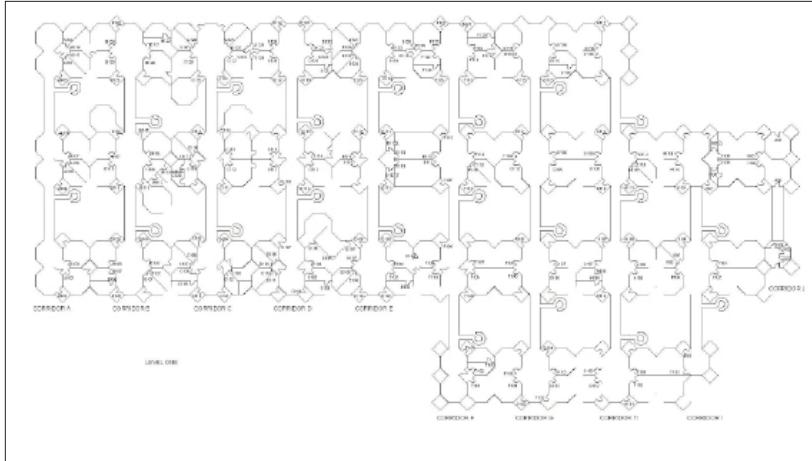
Figure 3: Diagrammatic Plan of Modular Pattern Utilized in the Design of the Academic Buildings. (Source: Qatar University Facility Management Department).

The octagonal units are surmounted by wind-tower structures to provide cool air and reduce humidity. Towers of light are also introduced and are intended to control the harsh sunlight, and abundant use of mashrabiyas and some stained glass also serve to mediate the environment. Open and partially covered courtyards, planted and often with fountains, are plentiful throughout the site. The architect put strong emphasis on natural ventilation, one of the many links in which he relates to traditional architecture of the region. As specific models he used the few still existing wind-tower houses in Doha and modernized the basic principles (Figures 4 & 5).

By investigating some of El-Kafrawi's statements one can confirm that they correspond to the description of the project (on paper) (El Kafrawi, 1992: http://archnet.org/library/files/one-file.jsp?file_id=708). He states that:

The octagonal room plan has been employed for several reasons. A convenient support for the square wind towers and towers of light, the octagonal form also minimizes heat absorption by shortening the period of time the sun shines on any given side.

Not only are the Tower of Winds a substitute for mechanical ventilation and air conditioning in case of power failure, but they also characterize the outline of the University buildings and relate to the cultural environment.

Architecture is a tangible expression of a civilization, the product of the intellectual, social, economic and political activity of a whole people; construction technology is simply the tool with which to give form to this expression. One has therefore closely to analyze the environment of villages, towns and cities in the Arab world, to determine the effects of Western contemporary Architecture. Since the technology has been applied without the philosophy which underlies it, the modern buildings are foreign to the area, which shows how far Arab architecture has lost direction, and the profound effect this has in the individual and his environment. One has to

reconcile the immediate need for the import of modern technology with the needs also to adapt it for use in the local environment. This implies considerable study of the needs and aspirations of the individual.

As philosophical principle in the design of the university, I posed this problem of the conflict between local culture and imported technology to experts in various disciplines. I would suggest that education in the effects of the conflict should be a principal aim of the new University of the State of Qatar.

I am to extend the way in which traditional values and lives are expressed architecturally, so as to strengthen the psychological link with the Qatar character, and ensure a sense of continuity in the modern environment.

Figure 4.a: Utilization of Wind Towers in Main Administration Building of Qatar University. (Source: Author).

Figure 4.b: Emphasizing Natural Ventilation by Using Wind-Towers in the Education Technology Center. (Source: Author).

Figure 5: Views of Different Outdoor Spaces: Open and Partially Covered Courtyards within the Educational Buildings. (Source: Author).

What do these statements tell us? They basically convey that El-Kafrawi had a number of good intentions in terms of trying to react to climatic conditions, mandates of architectural expressions while attempting to address the dialectic relationship between modern technology and local character. However, while the human component (users/ people) is relatively visible in these statements, it appears that it is superficially addressed. In essence, users' expectations have not been met, especially when relating these statements to current reality; one can confidently indicate that there is a dramatic gap between the two. Simple observation suggests that a number of shortcomings exist. The site is confusing where many faculty and students have difficulty reaching their destinations although some have been on campus for several years; classrooms are entirely dark and rely completely on artificial lighting; wooden mashrabiya windows are affected by the weather condition and the ferocious sun rays and now cannot be opened— despite the continuous maintenance; the air conditioning system is used almost throughout the year because wind towers are not utilized

any more. This was based on a decision of the university administration to close them all due to the amount of dust entering all the spaces through them. The list of shortcomings is endless and obviously good design intentions were not enough.

In the context of exploring the campus of Qatar University, I focus on the outdoor spaces. These spaces were intended to encourage intellectual and social atmosphere and to provide agreeable surroundings for informal gathering and activities. However, preliminary observations of these spaces show that the original purpose for which they were created seems to be un-satisfied. Strikingly, no attempt has been made to systematically evaluate their performance with respect to the use of the university community. On this basis, the current assessment study is undertaken to objectively some reliable results on how campus users perceive, comprehend, and actually use these outdoor spaces.

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A Multilayered Methodology for Investigating Qatar University Campus Outdoor Spaces

A multilayered methodology is utilized in this research to develop reliable results. It includes direct impressionistic observation, walkthrough evaluation, survey questionnaire, and behavioral mapping studies of key spaces. It is recognized that there is a high value of utilizing a comprehensive multi-layered methodology with multiple feedback mechanisms. Such a value can be exemplified by the avoidance of any shortcomings of using a singular method and thereby reaching more reliable results.

Direct Impressionistic Observation

Direct observation is undertaken for two reasons; the first is to identify key issues to be explored by using other methods and tools, while the second is to verify the responses received. Direct observation in this research involved touring the outdoor spaces several times within the older part of the campus while documenting the tour by photographing key spaces, key positive aspects, and demerits found in the spaces. This is conducted as perception of failures and successes of various aspects changes based on familiarity and in-depth understanding of those aspects. While this step is conducted as prelude for the implementation of other procedures, it is presented at the end of the analysis and discussion for verification purposes. It is noted that this procedure would result in a series of photographs named "Image Dialogue" where the most important issues are highlighted.

Walkthrough Evaluation

A total number of 24 aspects are identified and categorized under three sets of issues that are believed to have direct relation with the quality of the outdoor spaces. They included contextual and massing, interface and visual appearance, and way-finding aspects. Each category includes a number of questions/checklists that are scored in terms of their degree of appropriateness using a five point scale, where (1) represents the lowest degree of appropriateness (highly inappropriate), and (5) represents the highest degree of appropriateness (highly appropriate). Notably, some of the underlying issues of a category of checklists overlap with issues under another category. For example, some aspects underlying the visual appearance may overlap with similar aspects underlying massing. Also, some aspects underlying contextual aspects may overlap with similar aspects underlying way-finding. The definition of each category is outlined as follows:

• Contextual and Massing Aspects

Buildings are usually located in a context. The context is exemplified by several visual attributes such as character, size, visual features, materials, and relationship of one or groups of buildings building to the surrounding physical environment. The context is simply the building's setting. On the other hand, buildings are typically organized in form into some type of massing. Massing of the parts always gives the building's form a meaning and variety while meeting users needs.

• Interface and Visual Appearance Aspects

A building is essentially an enclosure that separates an interior private space from the exterior public space. The interface is the crucial meeting place where the inside of the building connects with the outside (Sanoff, 1991). Visual aspects include issues that pertain to the relationship between

the function of the building and the expression of those functions as they look from outside and as perceived by the users.

• *Way-finding Aspects*

Way-finding is the ability for people to discern routes, traffic patterns or passageways in and around the building. It is the ability of people to know their whereabouts in and around the building. Sign design, signage system, and environmental graphics are important aspects that contribute to a successful way-finding mechanism. In this respect, legibility is a concept that is introduced here which questions whether the environment is legible, easy to read; that is appropriate for directing people to their destinations.

The walkthrough evaluation checklist was given to 64 students to rate the issues according to their experience of the campus. However, they were requested to concentrate only on the outdoor spaces within educational buildings in the old campus area, as well as the walkways and spaces connecting the educational buildings with other support buildings. These included the colleges of Art and Sciences, Education, and Engineering. Participating students were randomly selected, but the majority of participants were enrolled in classes I have taught during the fall and spring semesters of the academic year 2006-2007. The total number of responses received was from 58 students. It should be noted that I as a researcher and user have conducted this evaluation procedure in an attempt to relate to and to verify the ratings students have made.

Survey Questionnaire

A survey questionnaire was devised to assess the qualities of the outdoor spaces throughout the campus. The survey included attitudinal scales as well as selection from options. The questionnaire involves issues that pertain to the overall design quality; best outdoor spaces as perceived by the students; best design features available in those spaces; signs and signage systems; lights and lighting systems; seating arrangements; shading devices and safety. As part of the assignments of the class of Engineering Skills and Ethics of Spring 2007, students were required to distribute and collect the questionnaires among their colleagues of the college of engineering and of other colleges. Therefore, a considerable number of responses were received from students. However, another round of questionnaire distribution was undertaken early in the Fall semester of 2007. The total number of valid responses to the questionnaire received was from 123 students.

Behavioral Mapping

Behavioral mapping is a systematic way of recording peoples' locations, such as where they sit, stand, or where they spend their time. In this research a combined unobtrusive mapping technique is used which integrates "place-centered" mapping and "individual-centered" mapping. Place centered mapping aims at observing actions in a particular setting which are recorded on plans or diagrams. Individual centered mapping aims at recording the tasks, activities, and movements of people throughout the space. It represents a systematic learning about a particular group of individuals whose activities are distributed throughout a specific period of time.

Four key outdoor spaces within Qatar University campus were selected purposively as shown in Figure (6). Spaces 1 and 2 are associated with

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the Dean of Engineering and the Associate Deans' offices together with their secretaries. The assumption is that there will be an intensity of movement and use in these spaces where faculty, students, and staff communicate regularly with these offices. Space 3 was selected based on its location in close proximity to the faculty parking and at the same time leading to Engineering admin offices. Space 4 was selected as a representative space along the central pedestrian spine within the academic buildings.

Since the purpose is to investigate the usability of the outdoor spaces, each of the four spaces was observed 6 times with an overlapping period including the beginning and ending of classes and the break time in-between. It is noted that the observation of each space is carried out over a period of two days within the week as breaks between classes differ.

Major Findings and Discussion

This section is structured under four headings that include the results of the walkthrough evaluation, the survey questionnaire, the behavioral mapping studies of the four key spaces, and the
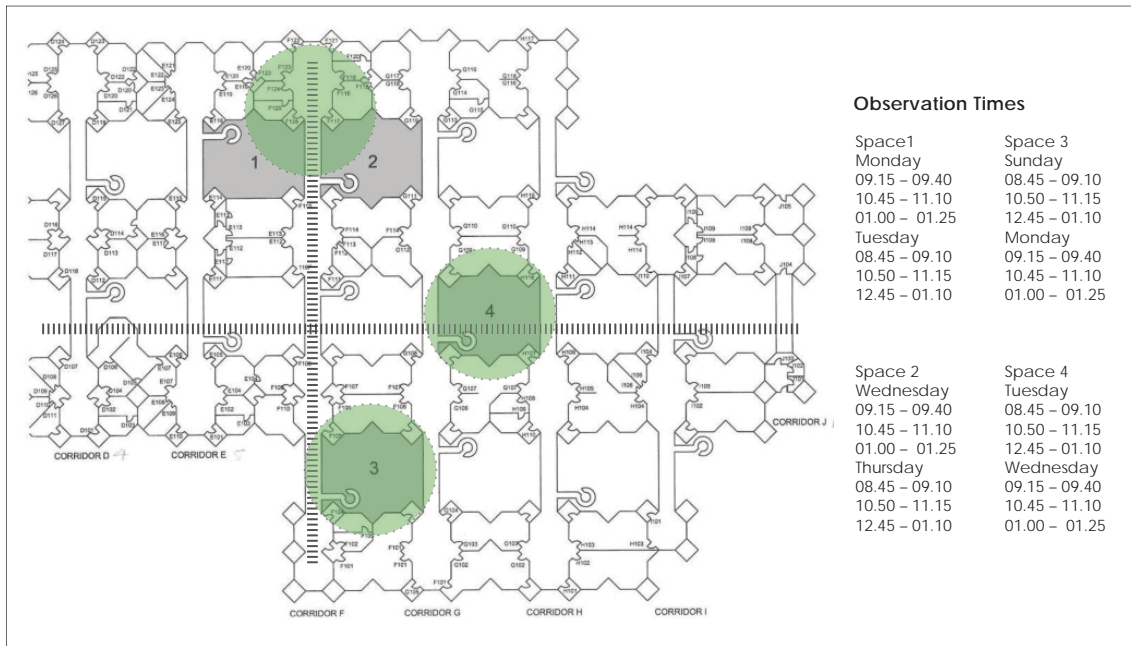
Figure 6: Four Key Outdoor Spaces within Qatar University Campus, Selected to Conduct the Systematic Behavioral Mapping. (Source: Author).

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direct impressionistic observation.

Walkthrough Evaluation Results

The results of conducting the walkthrough evaluation reveal some alarming scores. Issues underlying contextual and massing category are generally in the middle zone between highly inappropriate and highly appropriate where the total average score is (3.125) on a five point scale (Table 1). In the majority of the issues, similar scores are found. However, it is noted that two related aspects appear to be seen by the majority of students as inappropriate. The first issue relates to the physical appearance in relation to ease of functional identification for a typical user (2.25), and the second issue relates to meaning and finding destination for a visitor (1.75).

Issues underlying interface and visual appearance appear to be a little less than average in terms of appropriateness (2.96). However, there was no similar distribution among those issues (Table 2). This is evident in the scores given by the students to different issues: the effectiveness of the exterior in reflecting the interior functions; the appropriateness and functionality of the connection between the inside and outside; the accessibility of

	Contextual and Massing Aspects	
	Score: highly inappropriate - 1 2 3 4 5 - highly appropriate	
	Average Score of 58 Respondents	*Checklist: Questions*
1	03.75	How does the scale of the building suit the site it sits upon?
2	03.75	How does the building suit the pattern of the surrounding streets?
3	03.25	Concentrate on the subdivision of the building's parts as viewed from the outside. Do the parts integrate well with each other and form an effective and pleasing appearance?
4	02.25	Do the subdivided parts of the building appear to have a specific function? Is the function of each part easy to identify?
5	01.75	Is it clear what various subdivisions of the building might mean to visitors? Would a visitor know where to go on entering the building?
6	03.75	Are the various parts of the building planned carefully in relation to one another and to the characteristics of the site?
7	03.50	Is there sufficient relationship between the parts of the building for it to appear as one unified structure?
8	03.00	Does enough variation exist in the structural parts and massing to provide interest and variety?
	03.125	**Total Average Score**

Table 1: Contextual and Massing Aspects as Perceived by the Respondents. (Source: Author).

Interface and Visual Appearance Aspects		
Score: highly inappropriate - 1 2 3 4 5 - highly appropriate		
	Average Score of 58 Respondents	*Checklist: Questions*
1	02.75	How clearly or effectively does the exterior of the building indicate its interior function(s)?
2	02.25	How effectively does the inside of the building connect with the outside of the building? Are the connections appropriate and functional?
3	02.75	Are the exits and entrances easily accessible?
4	04.00	Are the various openings related to thoughtful planning of the interior? (Consider entry of light, view, privacy, noise, heat, glare, atmosphere, etc.)
5	03.00	Are the exits appropriate from a safety point of view?
6	02.50	When you move from the exterior of the building to the interior by means of the main entrance, is the experience pleasant, interesting, or special in any way?
7	03.50	Are the clues to what is public and what is private space clear to the visitor?
8	03.00	Does the appearance of the building fit in well with the type of buildings surrounding it?
02.960		**Total Average Score**

Table 2: Interface and Visual Appearance Aspects as Perceived by the Respondents. (Source: Author).

entrances/exits; and the moving experience were scored (2.75); (2.25); (2.75); and (2.50) respectively. While all these underlying issues are below average in terms of appropriateness, other issues were scored as more appropriate including the relationship of the openings to the interior space functions; the clarity of public-private relationship; and the overall fit with the surrounding buildings; these were scored (4.00); (3.50); (3.00) respectively.

Way-finding aspects appear to be inappropriate where the overall average score is (2.062). The only underlying issue that appears to be appropriate as seen by the respondents is (4.00). All other issues seem to be unsatisfied

and were scored (2.50) and less (Table 3). These include effectiveness of routes, traffic patterns around the buildings; outdoor meeting points; convenience and comprehend-ability; visitors' orientation; markings and signs; and the overall signage system.

Survey Questionnaire Results

The 123 responses received from students are analyzed by question in an attempt to articulate how different qualities are perceived by the respondents based on frequencies of responses to options, selections, or scale value. Similar to the walking tour, the emphasis here was only on the old campus.

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Way-finding Aspects		
Score: highly inappropriate - 1 2 3 4 5 - highly appropriate		
	Average Score of 58 Respondents	*Checklist: Questions*
1	02.50	Do the public and private areas relate well to one another?
2	04.00	Are sufficient routes, pathways, streets and passageways provided to and around the building?
3	02.25	How effectively do the routes link the building to the surrounding building or structures?
4	01.50	What are the flow patterns of traffic or people? Are there busy periods, quiet periods, one-way flows, regular movement patterns, traffic jams? Are the routes arranged to consider these factors?
5	02.25	How effective are the nodes (meeting points) for traffic around the building and what happens there?
6	01.50	Do all the routes make sense? Are they understandable and convenient?
7	01.00	Are all the circulation routes within the building easily understood by newcomers, visitors, service people?
8	01.50	How well are the interior circulation routes marked? Are the markings clear and easily understood?
	02.062	Total Average Score

Table 3: Way-finding Aspects as Perceived by the Respondents. (Source: Author).

Rating the Overall Outdoor Spaces within QU Campus

Respondents rated the overall quality of outdoor spaces as fair (25%), good (27.5%), and bad (40%). Only 7.5% of the respondents rated the overall quality as excellent. It is noted that the majority (89%) of those who rated the overall quality as bad gave one or more of the following reasons:
• *"The designer did not do a good job in designing the shading system because they are not enough*
• *The system of routes and pathways is designed without any concern for the students comfort*
•*Not enough green or trees."*

The Best Outdoor Space

Students stated their interest in the best outdoor space in terms of green space, enough shading devices, nice seating, and good meeting spots. An outdoor space that has more green and trees was selected by 34% of the students as the best space, while the one which has enough shading was selected by 28% of the students. On the other hand, a space which has nice seating arrangements was selected by 25%, while only 6% selected a space which is a good meeting spot. It should be noted that 7% of the students have not responded. Answering this question, few students reported that the best

outdoor space as a good meeting spot is not important anymore as they have used to go to the recreational center to meet irrespective of the walking distance they make.

The Best Design Feature Available in the Outdoor Spaces

The three design features offered for selection by the students were Main Pedestrian Spines and Walkways, Outdoor Space Seating, and Presence of Green Spaces, Trees, and Flower Beds. 40% selected main spines and walkways as the best design feature, 22.5% selected outdoor space seating, and 12% selected the presence of green spaces, trees and flower beds. Notably, 25.5% of the students have not responded to this question. While this result may seem to be contradicting with the scores of the way-finding aspects, it should be seen within the context of the choices given to the students.

Way-finding around the Campus and Within the Outdoor Spaces

Asking the students on how easy or how difficult they find their way around the campus and in between the educational buildings, 70% of the respondents stated that it is difficult, while 18% stated easy and 10% stated it is very easy. While this result supports the general assumption of this work, at the same time they correspond to the scores given under different categories of the walkthrough evaluation. The majority of those who stated the there is difficulty to find or discern routes and reach destination in a timely manner wrote one or more of these reasons: "bad signage system", "corridors and buildings all look alike", or "difficult to distinguish between different colleges."

Signage and Sign Design

40% of the students rated the quality of signage and sign design as bad, while 32% stated fair, 21% stated good, and 4% stated excellent. Only 3% of the students have not responded to the question. The majority of those who rated the signage and sign design as bad stated one or more of the following reasons:
- "Signs are very old, broken and need maintenance
- Some signs are just not clear at all
- Signs are only available in the main walkways
- Signs are not obvious, difficult to read from a distance"

Lights and Lighting Design

Responding students appear to be satisfied with the lights and lighting system in the outdoor spaces. 92% of the students rated lights and lighting system design as excellent (20%), and good (52%), and fair (20%). However, 6.5% do not feel that the system is good enough. In their responses, those who feel the lights are excellent, good or fair stated one or more of these reasons: "enough lights are available anywhere you go in the campus, the light system matches the design of the outdoor spaces, or the lighting system is so nice and organized."

Seating Arrangement in the Outdoor Spaces

50% of the respondents believe that the seating arrangement is bad, 32% believe it is fair, 11% believe it is good, while 2.5% believe it is excellent. 4.5% of the students have not responded to the question. Those who are not satisfied with seating and its arrangements throughout the outdoor spaces stated one or more of the following reasons: "seats are really uncomfortable cause back pain, seats are never clean-impossible to set on them without getting some dirt on your clothing, while seats look nice in the outdoor spaces they are not shaded enough."

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Shading Systems in the Outdoor Spaces

A striking observation is that the result of rating the shading systems in the outdoor spaces corresponds with the result of rating the signage and sign design. 40% of the students rated the quality of seating within the campus outdoor spaces as bad, while 32% stated fair, 21% stated good, 4% stated excellent, and 3% of the students have not responded to this question. Those who do not seem to be satisfied with the shading system reported one or more of these reasons: "the design of shading devices does not allow for enough protection from sunrays, shades are not enough in the majority of the spaces, most of the outdoor walkways are not shaded at all, and by the time we reach the places we want to-we become tired due to continuous exposure to the sunrays."

Overall Safety in the Outdoor Spaces

There appears to be a general satisfaction with the overall safety throughout the outdoor spaces where 70% value the safety aspect as excellent (12.5%), good (35.5%), and fair (32%). While 12% rated safety as bad, 18% of the students have not responded to the questions. The majority of those who stated fair or bad reported one or more of the following reasons: "we have not seen any fire alarm systems of fire equipment in the covered walkways, we never see a security staff walking around the campus and in between the outdoor spaces, the continuous exposure to the sun due to lack of shading may impact our health; the tiling of walking ways is rough and does not make us feel comfortable while walking." On the other hand, a few of those who are satisfied with the safety aspect mentioned: "the campus offers a homey close community style."

Mapping Users Activities in Four Key Outdoor Spaces

A series of maps were drawn for each of the four key outdoor spaces. Observation of the four spaces took place according to the times shown in Table (1), and then combined maps behavioral maps are drawn to reflect the total use of each space by different user types (Figure 7).

The most striking observation is that none of the four spaces is used as intended. No gathering or social interaction among students or among faculty and employees, or between students and faculty take place. Seats in the four spaces are not used at all by any user type during the observation times. This is due to lack or insufficiency of shades or the presence of dust and dirt over the seats. All the four spaces are typically used as circulation spaces either in transitional movement between different sections within the educational buildings, or in direct movement across the educational buildings or colleges.

While spaces 1 and 2 differ in terms of their physical features including trees and seating arrangements, it is noticed that they have similar types of users. In space 1, the number of faculty 9, students 32, employees 21, while in space 2 the number of faculty 8, students 30, and employees 17. However, the number of laborers varies as it is 31 in space and 12 in space 2. These total numbers of laborers appear odd when compared to faculty, students of employees. The only difference between space 1 and 2 is that a total number of five students are observed using their mobile phones in the space standing in the space but in close proximity to its access.

While space 3 was selected because of its close

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proximity to the faculty parking and its location along one of the major spines leading to the Dean of Engineering and other College admin offices, it was expected to observe higher number of faculty and employees. However, it is noticed that the combined number of employees in space 3 is 2 while that of faculty is 6. On the other hand, the total number of students combined over six break periods in different days is 55, while 13 for laborers.

The combined behavioral maps of space 4 which was selected as a representative space along the main central pedestrian spine show a different pattern of user types. The number of faculty is 12, which is double that of space 3, the number of students is reduced to 44, while employees' number is 1, and that of laborers is 9. Notably, the presence of laborers in the four spaces needs special attention.

Space 1 combined behavioral map

Space 2 combined behavioral map

Space 3 combined behavioral map

Space 4 combined behavioral map

Key map of educational buildings shoowing the locations of the selected four key spaces.
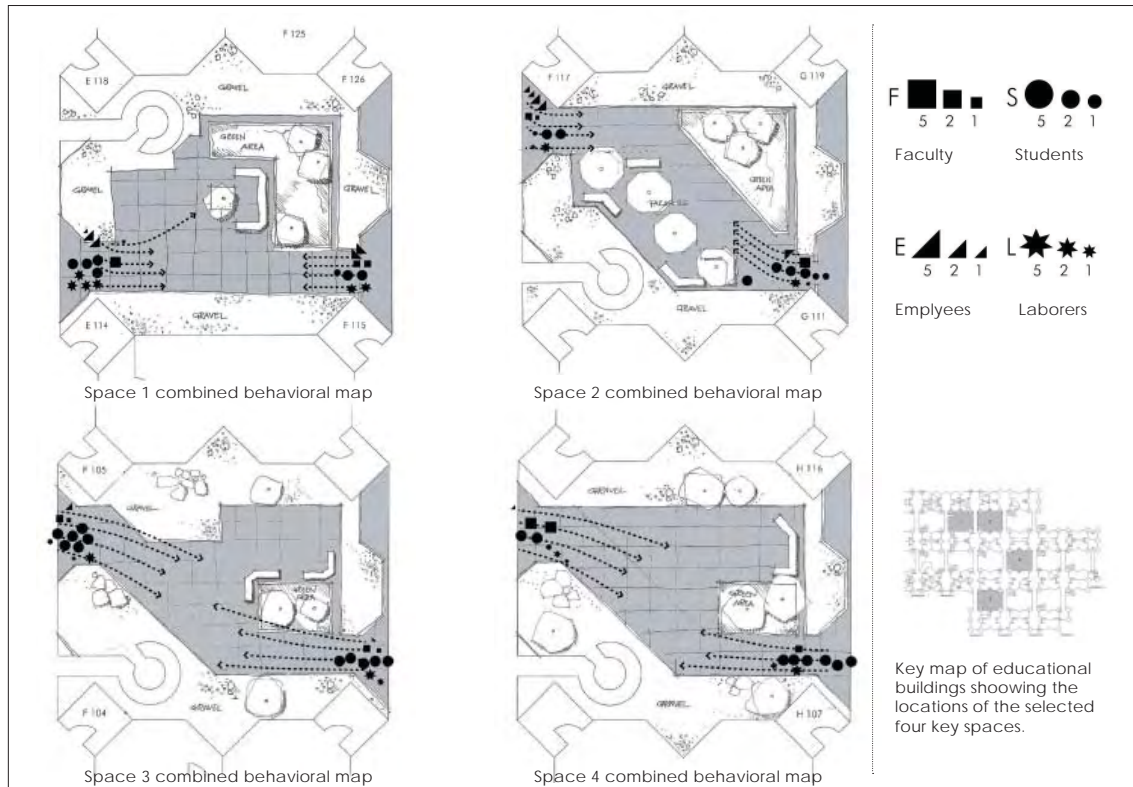
Figure 7: User Types and Activities in the Four Key Outdoor Spaces. (Source: Author).

Direct Impressionistic Observation

The direct impressionistic observation resulted in a series of photographs named "Image Dialogue" where the most important issues are highlighted to reflect and verify the results of the walkthrough evaluation and the analysis of the survey questionnaire. Figures (8) illustrates one of the image dialogues resulted from direct observation.

Image Dialogue 1: Vast Spaces ... Minimal Green and Shading
A series of images representing a considerable number of spaces that do no have greenery, trees, grass, or natural or artificial shading devices. While this represents a safety hazards due to direct exposure of pedestrians to sun rays, it also slows down the movement of students and faculty from one place to another to avoid such an exposure.

The space connecting the north uncovered parking lot with the educational buildings ١··accessing spine	The space connecting the north uncovered parking lot with the back side of the library building	The space representing a plaza in front of the University Mosque, connecting it with the educational buildings
The large space connecting the educational buildings and the Information Technology Center	The large space connecting the back side of the educational buildings and the University Administration building	The large space connecting the covered parking and the back side of the educational buildings

Figure 8: One of the Image Dialogues Resulted from Direct Observation. (Source: Author).

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Conclusion: A Framework for Improving Qatar University Campus Outdoor Spaces

This paper presented a Post Occupancy Evaluation study of the performance of Qatar University campus public spaces from the users' perspective. The assessment aimed at understanding the mutual interaction process between the built environment exemplified by campus outdoor spaces and the needs of the university community exemplified by students, faculty, and staff. An argument on the value of evaluating outdoor spaces from the users' perspective is developed in order to contextualize the research activity presented. On this basis, defining problematic areas related to the utilization of current public spaces was envisioned in order to develop a framework for possible future improvements. The methodology adopted to achieve the project objectives was multi-layered and involved a wide variety of assessment techniques, including walkthrough evaluation, observation, behavioral mapping, and questionnaires. The investigation revealed a number of problems that may hinder the performance of different types of QU campus users.

It is noted that the walkthrough evaluation and the scoring of several underlying issues reveals inappropriateness in two sets of aspects: interface and visual appearance, and way-finding. As seen by a sample of 58 students, finding solutions to this inappropriateness is important. As well, the fact that many respondents to the questionnaire have expressed their concerns for way-finding issues, seating and shading in the majority of the outdoor spaces, and the overall experience in those spaces reflect the need for certain actions to be taken. On the other hand, the behavioral mapping observation

study illustrates lack of efficiency of the four key spaces examined. Such spaces are used in cross and direct circulation by all user' types but are not used as intended for gathering and social interaction. This was due to one or more reasons that are simply reflected in the results of the walkthrough evaluation and the survey questionnaire.

While this work uncovers a considerable number of problems either at the physical level or at the human level, it is important to note that these problems can be encountered by prioritizing a number of recommended actions that can be exemplified as follows:

Immediate Actions

- Develop a new strategy for the signage system and sign design in order to create an outdoor environment amenable to achieving a responsive learning process. This could be undertaken by installing a new signage system through out the outdoor spaces within the educational buildings.
- Perform regular and periodical maintenance while considering safety aspects. This includes repairing all the uneven tiling and edges of walkways, and the electrical outlets. While maintenance programs might be already in place, the results of this study convey the opposite.

Short-Term Actions

- Develop a new strategy for introducing a series of shading devices which allow for an efficient utilization of the outdoor spaces within educational buildings.
- Develop a new strategy for the treatment of the surfaces of fixed seats within the outdoor spaces. This could be achieved by introducing

new materials on the top surface of those seats that are easily cleaned and so encourage students, faculty, and staff to use these spaces.

- As the main spines and walkways leading to the education buildings from the parking lots are completely uncovered and un-shaded, a new strategy for developing a series of shading devices in these walkways is urgently needed.

- Foster the utilization of outdoor spaces by organizing regular educational/social events that attract students, faculty, and staff to use the spaces. This could be achieved either at the administrative level of different colleges or at the faculty level in their teaching practices.

Long-Term Actions

- Seeking new forms of pedagogy that integrate learning inside the classrooms with outdoor learning so that current campus outdoor spaces are efficiently utilized.

- Perform space inventory and space utilization and reallocation studies in order to explore possible physical connections between the indoor environment in the ground floors and the outdoor spaces.

- Introduce more softscape elements and trees that maximize shades in the outdoor spaces and thereby enhancing the experience of pedestrians across these spaces while attracting different user types to use the spaces.

The overall analysis of the results shows a dramatic difference between the statements made by the architects and user\s expectations. In essence, a huge gap between design intentions and the parameters examined does exist. Therefore, I argued that by assessing the success and failure of current outdoor spaces of Qatar University campus. Thus, this research offered valuable insights into fostering the educational experience for the campus users. It is anticipated and hoped that the findings will be in direct use by the University administration and are utilized toward conceiving scenarios of actions that ultimately benefit the educational process while at the same time increasing the sense of belonging to the university's physical environment from the users' side. Concomitantly, I assert that the findings pave the way toward the implementation of an articulated framework that facilitates the improvement of the physical condition of the campus outdoor spaces, which in turn would have a positive impact on the educational process. It should be emphasized that the university administration can use the findings of this research in the planning and decision making that pertain to introducing new spaces or the remodeling of existing ones. As well, some of the conclusions can be significantly applied to other campuses on a local or regional scale which may have similar deficiencies in their outdoor spaces.

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Ashraf M. Salama

Ashraf Salama holds B.Sc., M.Sc. and Ph.D. degrees in Architecture. He is Professor of Architecture currently teaching at Qatar University, was Associate Professor at KFUPM (2004-06), and was the Director of Consulting at Adams Group Architects in Charlotte, North Carolina, USA (2001-04). He is licensed architect in Egypt received his training at Al Azhar University in Egypt and North Carolina State University, Raleigh, USA. Salama chaired the Department of Architecture, Misr International University in Cairo (1996-01). He has published numerous papers and authored and co-edited five books on Architectural Education: Designing the Design Studio (USA), Human Factors in Environmental Design (Egypt), Architectural Education Today: Cross Cultural Perspectives (Switzerland), Architecture as Language of Peace (Italy), and recently, Design Studio Pedagogy: Horizons for the Future (United Kingdom). He is member of the scientific boards of several intl. journals including Open House International, Time Based Architecture International, and the Chief Editor of "Archnet-IJAR." He can be reached by email at asalama@gmail.com or ijar@mit.edu.

UNIVERSAL DESIGN:
FROM POLICY TO ASSESSMENT RESEARCH AND PRACTICE

Wolfgang F.E. Preiser

Abstract

The ultimate purpose of this article is to delineate a much needed research agenda for the development of universal design performance assessments. A professional definition of univesal design is given, and a conceptual framework for universal design evaluations is outlined. The history of universal design research and practice is chronicled, and examples of critical research issues are cited. Some cultural, legislative and professional issues are presented, including relevant disciplines and subfields of universal design. Select worldwide practices, publications and current events are listed. Finally, as the basis for the creation of a universal design research agenda major issues and needed assessment methodologies are highlighted.

Keywords:

Introduction: Universal Design Assessments - Professional Definition and Theories

A common definition for universal design can be found in the Universal Design Handbook (Preiser and Ostroff, 2001). Universal design attempts to make products, equipment, building interiors and exteriors, transportation systems, urban areas, as well as information technology, accessible to and usable by all without regard to gender, ethnicity, health or disability, or other factors that may be pertinent. While a comprehensive theory on universal design does not yet exist, different theoretical points of view are contained in the Universal Design Handbook section on "Premises and Perspectives in Universal Design." For example, there are chapters on "An Integrated Approach to Universal Design: Toward the Inclusion of All Ages, Cultures and Diversity" (Sandhu, 2001), or "Designing Our Future Selves." (Coleman, 2001).

It can be said that the origins of universal design go back to the period after World War II when hundreds of thousands of veterans returned

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from the war and required rehabilitation and education in order to resume their normal lives. For those who were wounded in action, this resulted in the beginning of the movement, which led to the early establishment of rehabilitation centers at universities, for instance, at the University of Illinois. It was then when campuses of universities were first made accessible for wheelchair users and people with other disabilities. Eventually, these efforts resulted in a movement called Barrier-Free Design, and the development of accessibility guidelines on a state-by-state basis. They, in turn, formed the foundation for what are now the ADAAG, i.e., the guidelines for the implementation of the Americans with Disabilities Act (ADA, 1990).

From the outset of this article and discussion, it should be noted that universal design transcends the ADA in many significant ways, in that it goes beyond minimum dimensional and other requirements of the built environment, and is pertinent to the entire life space of populations. During its short gestation period, since about 1985, universal design has established itself as a potent factor in improving the quality of life for everybody, and on a global basis. In other words, universal design is not just for those who can afford it, or the industrialized countries, but it is also making inroads in developing countries, such as India (Balaram, 2001). Universal design has been called the "Design Paradigm of the 21st Century" (Ostroff, 2001; Preiser, 2006), which amounts to a laudable vision, but appears not to have been achieved by any means, and certainly not on a global basis. Some of the most advanced countries in regards to universal design are Japan, the United States and Canada, and certain countries in the European Union. In fact, Norway is considered

to be most advanced in implementing universal design education and policies in community planning in that country (Christophersen, 2002; Vavik, 2008).

The United States Federal Government has had a sustained effort in creating research centers through the National Institute of Disability Rehabilitation Research (NIDRR) and its funding mechanisms. These centers have focused on topics ranging from housing to transportation, from wheelchair design to information technology, and the media, to name just a few (IDEA Center, 2007). Only one of these centers had been tasked with developing assessment methodologies (NC State Center for Universal Design, in collaboration with Jon Sanford at the Atlanta VAMC) over the past 10 years. Sanford (2007) stated, "To my knowledge, no one is working on this (effort). The closest would be (Edward) Steinfeld, who is reworking the UD Principles, and is doing a crosswalk to the ICF. Personally, my problem with the assessment based on the UD Principles is that they are not validated in the first place. I always argued that instead of using the Principles to determine if a design is universal, we should use the design to determine if the Principles are valid." In other words, due to discontinuation of funding support, only limited results in terms of applying and assessing evaluation instruments have been produced so far. The only other effort in this regard known to the author was undertaken in Belo Horizonte, Brazil. An attempt was made by Guimaraes (2001) to develop rating scales for the assessment of universal design, based on his dissertation research at the Center for Universal Design at North Carolina State University.

A conceptual framework for universal design

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evaluation was outlined by the author (Preiser, 2001) in the Universal Design Handbook. It represented an extrapolation from the building performance evaluation framework first developed and presented in Time-Saver Standards: Architectural Design Data (Preiser and Schramm, 1997), and was based in part on the author's post-occupancy evaluation projects of medical facilities and workshops for clients like Duke Medical Center, Kaiser-Permanente, and the Department of Veterans Affairs.

History of Research and Practice

Just like the field of universal design itself, its history of research and practice is rather short and consists primarily of case study evaluations of built projects or developed products, as well as use of expert judgments and direct, verbal user feedback. Due to the lack of a systematic and comprehensive toolkit of evaluation methodologies, the case studies use primarily field-based evidence, which is often anecdotal and observational in nature. For example, in a three-day post-occupancy evaluation workshop at Kaiser-Permanente's medical office building in Mission Viejo, California (Preiser, 1996), a number of issues surfaced which the designers of the facility should not have overlooked (see Box 1).

Overall, with the medical office building being located next to Leisureland, a planned community intended primarily for elderly persons, the planners/designers had overlooked the physical and psychological needs of that segment of the population.

• Parking for people with disabilities was too far from the main entrance.

• Patients waiting for transportation had no protective shelter shielding them from the elements at curbside.

• The main entrance had two confusing entry doors, kitty corner from each other, thus causing enormous wind drafts in inclement weather.

• The visual building directory lacked clarity as to how to get to the various departments/treatment areas. Its lettering was too small for persons with vision problems, and it had uncomfortable glare, reflecting a skylight located overhead.

• There was only one elevator, thus making the second storey inaccessible for people with disabilities in wheelchairs when the elevator was out of order.

• The patient waiting area was arranged in such a way that it did not permit eye contact between waiting patients and the staff behind the registration counter, thus causing unnecessary psychological discomfort.

• The counter and low window for transactions by persons in wheelchairs was blocked by a credit card machine, thus making it unusable.

• There was no play area for patients with accompanying children.

• There was no provision for additional seating during seasonal overflow of patients; e.g., during the flu season.

• The unisex toilets, while accommodating male, female and disabled patients in wheelchairs, became a bottleneck on multiple occasions.

Box 1: Issues in Universal Design Performance of a Medical Office Building. (Source: Author).

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Assessment Methods

As indicated above, no comprehensive toolkit for assessing universal design exists to this date. Evaluations or assessments link evaluation methods with the appropriate criteria according to which a product or design is judged. Traditionally, such criteria existed in codified format, such as building codes, life safety codes, American National Standards Institute (ANSI) standards, Time-Saver Standards, as well as agency-specific standards and guidelines, which have evolved over time. In some cases, and due to intellectual property protection, such standards are not accessible to the public. They are guarded heavily by user agencies, such as the military, chip making corporations like Intel, or global consumer goods manufacturers, such as Procter & Gamble. Since universal design primarily addresses the human dimension of designed products and environments, it makes sense to create an evaluation framework according to the scale of the item being evaluated (see Table 1).

Scale of UD Item	Examples of UD Features	Assessment Methods	Assessment Measures
Fiskars scissors	Left-handed use	Time/motion study	Ease of manipulation/ cutting speed
Appliances; e.g., washer/dryer	Left or right mounts	Observation Time/motion study Verbal feedback	Ease of use
Interior Architecture	Hard floors	Time/motion study Observation	Abrasion Ease of movement
Buildings	Wayfinding system	Tracking of building users	Ease of orientation/ speed of wayfinding
Urban environment	Mixed-use vertical integration	Transportation hub method Time-lapse video/ observation/still photography	Ease of movement Different conditions of crowding
Information technology	Global access to services via the Internet	User feedback Questionnaire survey	Satisfaction Speed of access Efficiency of services

Table 1: Universal Design Assessment Framework (Source: Author).

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For example, the "Mr. Good Grips" line of kitchen utensils by OXO has been tested, first in the laboratory and then in thousands of kitchens. Feedback on their performance can be obtained using consumer suggestions and focus groups. Similarly, at the scale of an automobile, the Japanese have made the most progress when it comes to universal design features. These can include ramps which allow a wheelchair user to roll directly into the back of a van, or a driver's seat which swivels and allows the driver to enter and exit the vehicle easier, especially when he or she has limited use of the legs.

The above framework serves to illustrate the pervasive nature of universal design as it reaches into virtually every aspect of our life space: at home, at work or during travel to near and distant destinations. Field based research using real world settings and actual users of UD items and features will generate the basis for knowledge building in universal design performance. A case in point is the controversy surrounding the use of segways by disabled people in indoor public spaces (Watters, 2007a and b).

At this time the only guideposts for universal design assessments are the so-called Seven Principles of Universal Design (Story, 2001). The Principles (see Box 2) were created by the Center of Universal Design at North Carolina State University, and its consultants from throughout the United States.

The Principles constitute lofty ideals, accompanied by subsets of guidelines and design recommendations, which are rather general in nature and not quantified at all. Thus, they are helpful in pointing the designer into the right direction, but not adequate to let him or her know what to do in a specific situation.

1. Equitable use – the design is useful and marketable to people with diverse abilities.

2. Flexibility in use – the design accommodates a wide range of individual preferences and abilities.

3. Simple and intuitive use – use of the design is easy to understand, regardless of the user's experience, knowledge, language skills, or concentration level.

4. Perceptible information – the design communicates necessary information effectively to the user, regardless of ambient conditions or of the user's sensory abilities.

5. Tolerance of error – the design minimizes hazards and adverse consequences of accidental or unintended actions.

6. Low physical effort – the design can be used efficiently and comfortably and with minimal fatigue.

7. Size and space for approach and use – appropriate size and space are provided for approach, reach, manipulation and use, regardless of user's size, posture, or mobility.

Box 2: The Seven Principles of Universal Design. (Source: Author).

The challenge is to operationalize the Seven Principles and to align them with the type of performance criteria standards and guidelines which designers and planners are accustomed to. For example, fire codes clearly spell out the maximum distance from an occupied space to the legal fire egress location. In staying with

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this example, various factors play a role in the establishment of such criteria, such as type of occupancy, construction type, space sizes, and general layout considerations (e.g., open vs. closed/compartmentalized spaces), not to mention any hazardous conditions, such as seismic or biohazards. In summary, the still-emerging field of universal design has a long way to go before it can consider itself established, as far as building performance criteria and assessments are concerned.

Examples of Critical Research Issues

Universal design clearly relates to the basic human senses and spatial behavior (see Table 2).

It is the intent of universal design to provide all people with as much of an experiential richness as possible. Thus, ambience with appropriate sights, sounds and smells is a relevant concern. Furthermore, this means the aesthetic dimension of products and places is also very important, as is basic health, safety and security, functionality and efficiency.

Over the years, human factors engineering research has produced invaluable knowledge and performance data on human senses and perception, especially when it comes to military equipment, airplanes, etc. Harvesting the lessons learned in this research would be a priority in a future research agenda on universal design assessments.

An example of how multiple sensory modes can play a pivotal role in the functioning of students/patients is the Jerusalem Center for Multi-Handicapped Blind Children (Preiser, 2006a). While the official name of that Center would

Sensory Mode	UD Implications	UD Examples
Vision/Sight	A majority of information about the environment is communicated through vision	Tactile and auditory guidance devices. Display modes Maps, computer displays Audiotapes, etc.
Audio/Hearing	Emergency alarms in hotels and other facilities	Visual displays Strobe lights, warning signs Airplane guidance systems pointing passengers to exits
Olfactory/Smell	Imperceptible carbon dioxide	Sound alarm systems
Tactile/Touch	Surface characteristics	Tactile maps and rubber tiles in pavement
Gustatory/Taste	Food safety	Food warning labels
Radiation	Health hazard	Warning signs and devices

Table 2: Universal Design and Human Senses (Source: Author).
Disabilities can pertain to one or more of these senses, sometimes in the same person.

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be considered politically incorrect in the United States today ("persons with disabilities" instead of "handicapped" is the preferred terminology), it is nevertheless considered to be a role model for how to treat children in that very complex situation. The Center, sponsored by the Keren-Or (Ray of Light) Foundation in New York City, has a unique approach of highly individualized therapies for the various children, who can range from two months to 18 years of age. The same child may have several disabilities in addition to being autistic, for example. Most of the children (40) are permanent residents in the facility, while the rest (about 20) are brought to the Center by their parents every morning, and are then picked up at the end of the day.

Political determinants weighed heavily in the site selection. The site, adjacent to a future city park in the suburb of Ramot, Jerusalem, is very steep and definitely not ideal. It means that the children, many of whom cannot walk by themselves, have to be transported by the elevator from the top residential floor, down to the ground floor where the playground is situated. As the author discovered in European centers for this type of population, the so-called "cottage concept" would have been much better, whereby a counselor lives with five to seven patients in an apartment-like setting on a single level, thus permitting direct access to the outside. The case study referred to above and the planning and design guidelines which resulted from it are being articulated for another paper to be published this year.

As with many special populations, there is a paucity of research literature on how to design for persons with visual impairments. Thus, universal design assessments are the next best

solution to guide the designer.

Another critical dimension in universal design is human spatial behavior, with its universal design implications (see Table 3). It is clearly part of the human evolution and must not be ignored. Moreover, it has definite cultural relativity and dimensions.

Spatial UD Concept	Human Behavior Concept In Universal Design
1. Territorial Space	Dominance Hierarchy; Status Expansion
2. Personal Space	Privacy; Maintenance of Integrity of Individuals
3. Space Boundaries	Territorial Defense; Social Order; Security
4. Proxemic Space	Communication; Access to Valued Resources
5. Spatial Density	Crowding; Distribution of Resources
6. Spatial Scale	Functionality in Relationship to Task; Anonymity; e.g., in high rises
7. Sociofugal vs. Sociopetal Space	Control; Dispersion or Attraction/ Concentration of People

Table 3: Universal Design and Human Spatial Behavior. (Source: Author).

For example, the concept of privacy means different things in the Western culture, in Japan or in the Navajo Indian culture, at least in their traditional ways. While in the Western culture privacy means physical separation, both visually

and in the auditory sense, in the traditional Japanese culture the auditory separation did not take place. Paper screens did not exactly provide too much visual privacy either. Then, in the Navajo culture and their traditional dwelling, the Hogan, no privacy in the Western sense exists, since it is one space with no partitions, and everything that goes on can be heard, seen and smelled.

There is a general lack of understanding of how processes like way finding occur, not just for persons with disabilities, but for all users of a facility like Children's Hospital in Cincinnati. It features a signage system which Robert Probst developed using color coding.

In considering a modern day situation, such as density and crowding in offices, the space standards for Japanese offices provide for about 65 square feet per worker; i.e., half of the Western standard. Similarly, standards among Western countries pertaining to lighting, for example, vary considerably for the same situations and tasks. Thinking about thermal standards, people in the United States are used to overheating and overcooling spaces, depending on the season, while in some Scandinavian countries people just dress to the occasion.

Some Cultural, Legislative and Professional Issues

Cultural differences in which people with disabilities are viewed differently in different cultures and parts of the world (Balaram 2001), and even sub-groups within the United States. Another example is the concept of "Visitability", which connotes the ability for a person with disabilities to enter a place, but not necessarily to live in it (Nasar & Evans-Cowley, 2007).

Unfortunately, acceptance of universal design concepts in the design and building professions is progressing only slowly. The new magazine Ultimate Home Design is an attempt to bridge the gap between universal design and the building professions by presenting built examples of new and remodeled existing homes that integrate universal design features from the outset (Preiser 2006b). Furthermore, the perception of added costs of universal design features needs to be eliminated through good exemplars and tested prototypes.

Due to the lack of operational performance criteria, codification of universal design assessments has not progressed enough, as was noted elsewhere in this article. Ideally, UD assessments should relate to regulatory devices like building codes, and they should transcend the minimum requirements of the ADA.

There are ethical dilemmas and potential conflicts of interest and litigation in cases where universal design and its potential are not achieved, for example, in senior living communities. Segways (Watters, 2007a &b) can aid disabled persons in navigating through neighborhoods, shopping centers, and establishments like Barnes & Noble bookstores, but they can also create controversy in the business world for safety reasons and fear of litigation.

Some tourist destinations and cruise lines improve accessibility for disabled persons (Creager, 2007); for example: The Rocky Mountaineer Railtour from Vancouver, BC, to Calgary, Alberta, provides spectacular vistas of the Canadian Rockies. It features an elevator to lift wheelchair users to the top level of rail cars; near Newport,

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OR, at Yaquina Head Outstanding Natural Area, wheelchair users can roll on paths around the tide pools at low tide; or, at Fantastic Caverns near Springfield, MO, a tram "follows an ancient riverbed and gives visitors a great look at some of the magnificent stalactite and stalagmite formations" (Harrington, 2007).

Relevant Disciplines and Subfields

A great number of disciplines are affected by universal design and its implications. These range from planners and designers to facility managers and groups that utilize facilities, especially in the health field, rehabilitation, as well as groups dealing with all sorts of disabilities. Therapists and people studying human behavior and interactions are involved, and so are administrators/managers of communities and facilities that cater to seniors. Disciplines, which are relevant to UD, are listed in Table 4.

Then there is the building industry, especially housing, which is beginning to take note of universal design by creating and building prototypes of universally designed houses, such as the Lifewise Home built by the National Association of Home Builders (NAHB) (2002) near Washington, DC, and a similar demonstration home by the IDEA Center by the University at Buffalo. The question arises whether assessments of these universally designed homes have been done in a thorough manner, if at all, and whether the lessons learned have been or will be applied to future generations of such homes.

Discipline	Examples of Universal Design Applications
Industrial Design	See 3 sub-fields below
Product Design	Utensils, tools, furniture, equipment
Graphic Design	Directories and guidance systems
Fashion Design	Clothing for various disabilities
Interior Design	Accessible design of dwellings, offices and other spaces and places
Architecture	Equal access and circulation for all user groups and levels of disabilities
Urban Design and Planning	Accessible design of transportation facilities, university campuses and communities in general
Information Technology	Access to services and Internet commerce
Health Facility Planners	Accessible hospital, rehabilitation and care facilities
Administrators	Enlightened governance regarding accessibility in organizations
Facility Managers	Operation and maintenance in line with accessibility requirements
Environmental Psychologists	Research in support of constituencies with disabilities

Table 4: Universal Design- Relevant Disciplines. (Source: Author).

Information technology is a particularly fertile ground for exploring universal design concepts. Just consider how the VISA card, perhaps the most universal of all universal designs, has

revolutionized the business world by permitting customers to carry out transactions in several hundred countries with different banking systems and currencies. The VISA card provides true universal access to merchants and services on a global basis (Hock, 2005).

In Europe, a number of social and other services (Sandhu & Leibert, 2001) have been experimented with through on-line access, thus permitting anybody, and not just the disabled, to do business and transactions from their home computer, instead of having to travel to various locations in their cities, thus wasting time and energy. With the Internet, even the remotest spot on Earth can access services that are provided that way. It is clearly a revolution, the end of which we have not seen yet.

Select Worldwide Universal Design Practices, Publications and Events

The following vignettes by no means convey a complete picture of UD efforts in the countries that are listed.

• Japan – there is widespread acceptance of universal design as a way of enhancing the usability of products, transportation and built environments. It is also pertinent to a growing sector of the aging society, and thus, an important part of the economy. The second International Congress of and Expo on Universal Design (IAUD 2007) info@iaud.net was held in Kyoto in October of 2006. It drew over 13,000 registrants and major industries were represented, such as automotive, computer and product design. The proceedings were edited by Satoshi Kose (2007).

• Norway – In this forward-looking country, oil

money is being invested for the future, and there is not only a great concern for preserving the quality of the environment, but also for making cities, buildings and parks universally accessible (Asmervik, 2002). In fact, curricula in all design and planning schools must teach universal design, and community planners use universal design as their guiding principle. Already mentioned above was the book edited by Jon Christophersen (2002). A new compendium entitled Inclusive Buildings, Products and Services: Challenges in Universal Design is being edited by Tom Vavik (2008), and is expected to be released later this year.

• Germany – The "Internationales Design Zentrum" (IDZ) www.idz.de in Berlin is presently creating an exhibit on universal design, to be opened in November of this year. In 2009 and 2010 it is scheduled to travel to conferences, expos and design centers around Europe.

• France – A much acclaimed handbook by Louis-Pierre Grosbois (2007), Handicap et Construction, appeared in its seventh edition last year. It addresses accessibility of public buildings, housing developments and freestanding homes, historic places, transportation facilities, as well as urban design.

• Ireland – The National Disability Authority nda@nda.ie [Agency's} established a new Center for Excellence in Universal Design is the lead state agency on disability issues, providing independent expert advice to Government on policy and practice. It sponsored a conference with international participation in October of 2007, and it offers an "Excellence Through Accessibility Award".

• Belgium – Two publications of note are:

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Froyen, H., Asaert, C., Dujardin, M. and Herssens, J. (2006) Ontwerpen for Iedereen, integraal en inclusief (Universal Design Kit). Brussel: Ministerie van de Vlaamse Gemeenschap, Gelijke Kansen in Vlanderen. The second one is: Devlieger, P., Renders, F., Froyen, H., and Wildiers, K. (2006). Blindness and the Multi-Sensorial City. Antwerpen/Apeldoorn: Garant.

• Canada – in September of 2008, the International Federation on Aging (IFA) is holding its 9th Global Conference called "Aging Design Montreal" , which is accompanied by an Expo info@vdm-adm.ca.

• Brazil – Several international congresses on universal design have been held in recent years, with presentations from throughout the world. Educational programs at the university level are expanding, theses are being written (e.g., on changing codes to make urban housing more accessible as the population ages) and attempts at developing universal design assessment tools have been made (Guimaraes, 2001). Recently, a book was published on techniques for architects and urbanists to incorporate universal design into real world projects (Cambiaghi, 2007). Presently, at the University of Sao Paulo, a new edited book is in preparation entitled Universal Design: Pathways to Accessibility In Brazil (Prado, Lopes and Ornstein 2009).

• United Kingdom – The Royal College of Art hhc@rca.ac.uk in London sponsors bi-annual 'INCLUDE' conferences with participants from around the globe. The next conference is scheduled for April 5-9, 2009.

• Italy – The International Council for Building Research and Innovation (CIB), Working Commission W 084, is headquartered in Rome www.roma.itc.it. Together with Georgia Institute of Technology and the National Research Council, Italy (CNR), it organized this year's meeting on "Building Comfortable and Livable Environments for All" in Atlanta, GA on May 15-16, 2008.

• United States – a global online electronic newsletter is edited by Elaine Ostroff, Director, Global Universal Design Educator's Network. It can be accessed at http://www. universaldesign.net. The IDEA Center, University at Buffalo can be considered the best research center focusing on universal design, with many and often multi-disciplinary research initiatives. Their very informative E-Newsletter can be accessed at this address: http://www. ap.buffalo.edu/idea/e-Newsletter/index.htm . The Eighth Annual Conference on 'Multiple Perspectives on Access, Inclusion & Disability: Looking Back & Thinking Ahead' was held at The Ohio State University (ADA-OSU@osu. edu) in April of 2008. Last year's conference proceedings are included in the references (Nasar and Evans-Crowley 2007). A bi-annual event, the International Conference on Universal Design is organized by Adaptive Environments in Boston www.adaptiveenvironments.org at venues both inside and outside the United States. In May of this year, the American Institute of Architects celebrates its 150th birthday with a publication Architecture: Celebrating the Past, Designing the Future @ http://www. aia.org/bookstore. By including a sidebar on universal design in the book, the profession of architecture takes notice of this evolving field and area of concern. Of great importance is the recently created Global Universal Design Commission (GUDC) rercud-enewsletter-list@ listserv.buffalo.edu , which has the purpose

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of promoting universal design. One of the first initiatives will be the development of voluntary design standards. Lighthouse International, which primarily serves the visually impaired, publishes a web based monthly newsletter called "At-A-Glance". The reader can find more information at lighthouse@webletter.lighthouse. org. Interestingly, the just appointed Governor of New York State, David A. Paterson, has been legally blind since boyhood.

Major Issues and Needed Assessment Methods - Creating a Research Agenda

The goals of creating a universal design assessment research agenda are two-fold: (1) To collaborate with colleagues in the emerging field of universal design (called 'design for all' in Europe), in an effort to create a research agenda which will advance it to the next level of pragmatic application in the real world; and, (2) More specifically, this means developing a toolkit of methodologies (for a basic overview, see Table 5).

It is hoped that this will allow universal design solutions to be evaluated in a systematic manner; and further, the creation of performance criteria which relate to regulatory mechanisms such as zoning and health and safety codes; functional requirements, as documented in design guides for different building and space types; and, psychological and cultural needs of the users of universal design.

To reiterate, the approach to be taken sees universal design defined as making products, spaces and buildings, urban infrastructure, as well as information technology accessible to and usable by (almost) all people. Significant

strides have been made in Europe, the United States and Japan in creating and developing this field, which, in its true spirit, aims to transcend government issued minimum standards, such as the ADAAG guidelines which have emanated from The Americans with Disabilities Act (ADA).

Going back to the 1970s, the author has had a longstanding commitment to and experience in universal design research, consulting, lecturing and scholarly works. For example, in February 2007, he was contacted by Hubert Froyen, member of a Belgian research consortium, which published the book, and CD on Ontwerpen voor Iedereen – Integraal & Inclusif (Asaert, Dujardin & Herssens, 2006), intended to increase public awareness about universal design in Belgium. An exchange of universal design research ideas and priorities ensued. This, in turn, resulted in the consideration of further collaboration in the future.

The following are outcomes/elements of the expected development of a research agenda for universal design assessments:

• Conceptual basis for UD evaluation process, using excerpts from the Universal Design Handbook (Preiser, 2001; chapter 9).
• Outline of tasks, time-line, deliverables and literature review.
• On-site activities could include:

1) Workshop to raise public awareness of UD, also with professional associations; 2) Lecture presentation(s) and Colloquia with students; 3) Research focus groups with representatives of the disability community; 4) Site visits of exemplary UD solutions, select UD evaluation case studies; 5) Carry out UD case study evaluations;

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6) Liaison with relevant organizations; e.g., the International Association for Universal Design (IAUD) in Yokohama, Japan; the CIB Committee W064 in Rome, Italy; the Design for All Foundation in Barcelona, Spain; the bi-annual INCLUDE conferences organized by the Royal College of Art in London, UK; and,

the Designing for the 21st Century conferences held jointly by the Center for Universal Design at North Carolina State University in Raleigh and Adaptive Environments, Inc. in Boston.

Overview of Data Gathering Methods and Measures	
1. Behavioral Observations	Behavior Inventory and Taxonomy
2. Mechanical Recordings	Occupant and Environment Patterns
3. Visual Recordings	Occupant and Environment Change
4. Physical Measurements	Physical Measures
5. Verbal Response Measurement	Perceived Performance Measures
6. Expert Judgment	Point Ratings
Data Gathering Methods and Measures	
1. Behavioral Observations	**Behavior Inventory and Taxonomy**
Direct Observation	- Behavioral Identification/Classification - Behavioral Mapping - Occupant Tracing
Participant Observation	- Interaction Patterns/Dynamics - Social Dynamics - Utilization of Resources
2. Mechanical Recordings	**Occupant and Environment Patterns**
- Counting - Event Recording - Light Sensor Gate/Contact Switch Plates - Location Mapping	- Frequency of Events - Space Use - Location of Occupants
	- Use of Preferred Spaces/Resources
3. Visual Recordings	**Occupant and Environment Change**
Still Photography	- Space Inventory - Archival Records/Photo Annotation - Ambient Environment Quality (Color, Light)
Video Recording	- Maco and Micro Behavior - Occupant Movement - Conflict Identification

Continue

Time-Lapse Photography	- Behavior Sequences - Occupant Speed/Tracking - Individual vs. Group Interaction
5. Verbal Response Measurement	**Perceived Performance Measures**
Occupant Interviews	- Generic/Open-Ended Questions - Forced Choice Questions
Occupant Surveys	- Numeric Ratings - Generic/Open-Ended Questions - Forced Choice Questions
Expert Judgments	- Esthetic Quality Comparisons - Point Rating Systems
6. Physical Measurements	**Physical Measures**
- Gauge - Chemical Test Kit - Scale - Light Meter - Sound Meter - Inclino-Meter	- Temperature - Humidity - Air Velocity - Light - Chemical Agents - Abrasion - Elasticity - Live-loads - Decibels - Light Levels

Table 5: An Overview of Data Gathering Methods and Measures. (Source: Author).

Summary

This article is conceptual in nature and intended to point to future directions in universal design assessment. Before universal design will enter the mainstream of society and be embraced by the planning, design and building professions, its basic underlying philosophy needs to be understood and accepted. Following the democratic principle of equality, it will be important for these professions to make a serious commitment to making products and the built environment accessible to and usable by all. This is particularly important in a period of demographic change to where a significant segment of the population tends to live much longer, and thus, will require a complete range of services and support systems. Such support used to be provided by the nuclear and extended family. However, with greater job mobility, such support is no longer available and families are spread over wide geographic areas. This article has attempted to demonstrate the viability of universal design, as well as its relevance to many aspects of people's life space.

Assessing universal design performance is critical and needs to be developed in due course. Some examples of assessment methods and measures were given, and some cases where universal design has made significant progress were cited. This is particularly true in the residential sector, at the scale of individual dwellings, in the design of higher-density developments

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with pedestrian access to amenities, as well as multi-modal transportation hubs, an example of which are the Japan Rail Towers at Nagoya Station in Japan.

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Wolfgang F.E. Preiser

Wolfgang F.E. Preiser is a Professor Emeritus of Architecture at the University of Cincinnati, USA. He holds a Ph.D. from the Pennsylvania State University (1973), Masters degrees in architecture from Virginia Polytechnic Institute and State University and the Technical University of Karlsruhe, Germany, as well as the First State Exam from the Technical University in Vienna, Austria. On a global level, he has lectured at 109 universities and organizations, in addition to many conferences. As a researcher and international building consultant, he has worked on topics ranging from universal design, to facility programming, building performance assessments, health care facilities, and intercultural design in general. He is widely published, with 16 books and 125 chapters, articles and papers in conference proceedings to his credit. Most recent books are Designing for Designers: Learning from Schools of Architecture (2007, with Jack Nasar and Tom Fisher), Assessing Building Performance (2005, with Jacqueline Vischer), Improving Building Performance (2003) and, Universal Design Handbook (2001, with Elaine Ostroff), which was translated into Japanese. He serves on the editorial boards of major journals. Preiser has received many honors, awards and fellowships, including the Progressive Architecture Applied Research Award and Citation, Professional Fellowships from the National Endowment for the Arts, the EDRA Career and Lifetime Achievement Awards , and the Fulbright Fellowship. He can be contacted at PREISEWG@ucmail.uc.edu

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THE INFLUENCE OF PRIVACY REGULATION ON URBAN MALAY FAMILIES LIVING IN TERRACE HOUSING

Ahmad Hariza Hashim and Zaiton Abdul Rahim

Abstract

This paper reports on behavioral norms and territoriality as part of behavioral and environmental mechanisms used to regulate privacy among urban Malay families living in terrace housing. In-depth interview was employed involving 11 case studies of Malay families living in three-bedroom two-storey terrace housings in the urban areas. Findings indicate that while most of the behavioral norms employed to regulate privacy are consistent with Malay cultural norms and religious belief, there are a few which are not consistent due to the constraint of terrace housing. Defined territory and the need to respect the neighbors' privacy are found to indirectly affect community intimacy among Malay families living in terrace housings.

Keywords:

Privacy; regulating mechanisms; cultural norms; terrace housing, Malaysia

Introduction

Privacy is a two-way process involving the permeability of boundaries between oneself and others. It is an on-going process which involves the process of regulation. Successful regulation is important in the process of achieving privacy. Two types of privacy regulating mechanisms as posited by Altman (1977) are behavioral and environmental mechanisms. Behavioral mechanisms include verbal and non-verbal behavior and are influenced by socio-cultural factors. People in all cultures engaged in the regulation of social interaction through behavioral mechanisms by which accessibility is controlled and are probably unique to the particular physical, psychological and social circumstances of a culture.

Altman (1977) described three environmental mechanisms, namely, territoriality, clothing and personal space. There are three types of territory depending to how central a territory is to a person or group or how close it is to their everyday lives namely primary, secondary, and public territories. Primary territories are owned and used exclusively by individuals or groups,

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are clearly identified as theirs by others, are controlled on a relatively permanent basis, and are central to the day-to-day lives of the occupants. The exclusivity of primary territory is emphasized by Brower (1965) who refers to primary territory as personal territory. In terms of Altman's framework, primary territories are powerful privacy regulation mechanisms.

Privacy regulation mechanisms do not always involve environmental manipulation, but often depend on general styles of behaviour. Social and cultural norms are more often than not used to regulate privacy. Some cultures may appear to have little privacy by Western standards. Canter & Canter (1971) argue that this is probably due to a traditional view of privacy as solely a physical-environment process and not a complex behavioural system that draws on many levels of functioning. The need for privacy is universal and occurs in all cultures, but the regulating mechanisms utilized can vary considerably across cultures (Altman, 1977; Altman & Chemers, 1980; Gauvain, Altman & Fahim, 1983; Fahey, 1995). Privacy can be regulated through behavioural mechanisms such as behavioural patterns such as rules, manners and hierarchies, psychological means such as internal withdrawal and depersonalisation, and behavioural cues by structuring activities in time, spatial separation and the act of using physical elements (Gifford, 1997).

Abu-Gazzeh (1996) stated that the use of space is not isomorphic among cultures; each culture has specific variables that influence its use of space. The housing design in Malaysia especially in the urban area has changed significantly from late 1960s with the introduction of mass housing in the form of terrace housing

which is influenced by the British housing design and typology, where to some extent there are houses built with a chimney. One of the weaknesses in the housing design introduced is the lack of social and cultural considerations including privacy. Also, as pointed out by Salama (2006) when he discusses the issues in relation to providing affordable housing in Saudi Arabia. He stated that Saudi environmental and socio-cultural contexts demand that affordable housing should not aim at merely providing affordable shelters, it should also offer design solutions that are sensitive to the local contexts such as privacy, social cohesion, and perceptions on residential density, preferences, and the lifestyles of the target populations. Therefore this paper examines the Malaysian housing experience especially on the privacy regulating mechanisms among urban Malay families living in terrace housing and also to examine the influence of privacy regulation on community intimacy among Malay families living in terrace housing

Background

In the traditional Malay society, behavioural norms are important privacy regulating mechanisms. The traditional values of budi (etiquette) and bahasa (language) regulate the behaviour in the close-knit traditional Malay society. The term budi bahasa sum up the kind of proper behaviour an individual should display both in the privacy of family life and in public such as not prying into the private matters of others, giving the salutation and asking for permission before one enters other people's house, not looking into other people's houses, the rules on clothing and interaction. The observation of accepted behavioural patterns

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indirectly provides privacy to the community at large. These norms are much in line with morality in Islamic teachings and to this extent, the Malay customs and Islam are in complete agreement (Zainal, 1995). Privacy is very important in Islam and the right to privacy is one of the most precious freedoms, the most comprehensive of rights and the most valued by Islam (Berween, 2002). In the Holy Qur'an, it is stated very clearly that one's privacy is one's own right and no one should intervene in it without one's permission.

In Islam, privacy and good manners in public contribute to the highest virtues, and are part of a Muslim's duties. The subject of sex ethics and manners is the determining factor in the segregation of males and females in the Islamic society. Therefore, the concept of privacy is introduced, perceived, and judged accordingly. In physical terms, privacy refers to the personal clothing and the private domain of the house (Hakim, 1986). In the context of housing, providing visual privacy and family intimacy is required. Privacy in the house is needed for the concealment of inter-family life from strangers, separation between men and women in sitting arrangements during social interaction but not for those of the same family, separate sleeping areas for male and female family members, for parents and children, and for normal functioning of daily activities. The architectural, social, and psychological dimensions of privacy are fundamental to the daily life of a Muslim. To control privacy in the built environment, architectural and behavioural variables must operate in tandem in order to satisfy the psychological needs of its residents (Abu-Gazzeh, 1996).

Privacy in the Muslim house is directed towards the insulation of the household from outside and non-kin exposure (Tentokali and Howell, 1988). However, the translation of this principal varies between the Muslim's societies. The traditional Malay society emphasizes more on community intimacy than individual privacy. The territory of the traditional Malay house is not strictly defined and external spaces are shared and trespassing is allowed. Territory is loosely defined by trees and hedges and there is no strict rule on trespassing (see figure 1, showing the division of domains in the traditional Malay house and figure 2, showing the external environment of then Malay traditional house). Sharing of external spaces encourages interaction among the communities as these spaces act as the social place for meeting and interaction among the people which eventually strengthens the community bond. Within the accessibility and permeability of the traditional Malay house and setting, privacy of the family is provided within the individual house supported by accepted privacy behaviour. The lack of defined territory should not be seen as a lack of privacy as privacy in the traditional Malay society is not bounded by physical environment, but more importantly shared societal values that govern privacy behaviour among the homogeneous society.

The National Economic Policy (NEP), introduced in 1971 to solve economic, ethnic and regional imbalances among the multiracial Malaysians, resulted in rural-urban migration among the Malays. By the late 1970s, the Malays formed the majority (68.3%) of the urban migrants (Malaysia, 1979). Urbanization has resulted in changes in the way of life of the Malays and their housing environment. The housing design in the urban areas in Malaysia changed significantly from

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the 1960s to cater the increasing population with the introduction of mass housing in the form of terrace housing, a direct influence from the British.
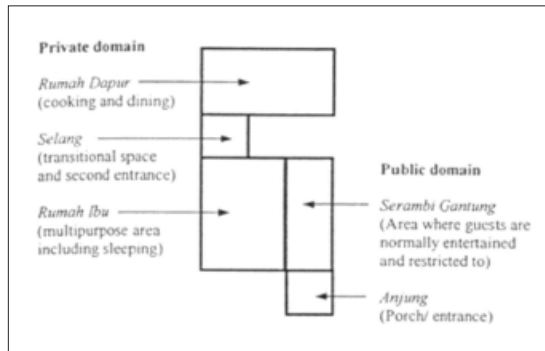

Figure 1: The Division of Domains in the Malay Traditional House. (Source: Authors).

Terrace housing was developed based on the 'efficient' use of set-backs and building-to-building distances for the purpose of natural lighting, wind flow, fire breaks and sanitary services, without much consideration to the local culture (Mohamad Tajuddin, 2003). By the 1970s, terrace housing had become a common sight in the urban areas made up of rows and rows of identical terrace houses along the rigid lines of the gridiron. The terrace housing units vary in floor area, design, and price which made it affordable to people from different income groups. Unlike the traditional Malay houses which are located randomly and spaced between each other, the terrace housing units are densely located in mirror image arrangement with defined boundaries. The housing design of the units in a housing development is monotonous. It is arranged next to each other in rows to maximize the number of units per acre.

In high density housing developments, most of the units are intermediate units facing other units (figure 3 shows a typical layout of terrace housing which can be found in the urban area in Malaysia). In terms of design perspective, these arrangements affect the visual privacy of the family due to direct visual exposure between fronting neighbouring units (see figures 4 and 5, showing the front and back alley of a typical terrace housing in Malaysia). A review of the two-storey housing indicates variation in floor area, design, and price. Available records and information from the authorities, developers, and field visits indicate that the lot size varies from 14' x 55' to 20' x 70'. The older housing units appear to be bigger in floor area than the new housing units.

The concept of life in a community as an extension of the family prevalent in the traditional Malay society gives way to the anonymous living of housing estates, which has persisted until now. Given the changes in the way of life and housing environment, privacy regulation is expected to influence some of the cultural norms among the Malay families living in terrace housing in the urban areas.

Methodology

This study adopted an in-depth interview because of the exploratory nature that allows the researcher to observe how people become conscious of, giving meaning to, and relate to the built environment particularly their housing and its surrounding (Tipple and Willis, 1991). An in-depth interview is particularly useful as it allows fluid interaction between people and the built environment and interprets the built environment as a symbol of cultural values and
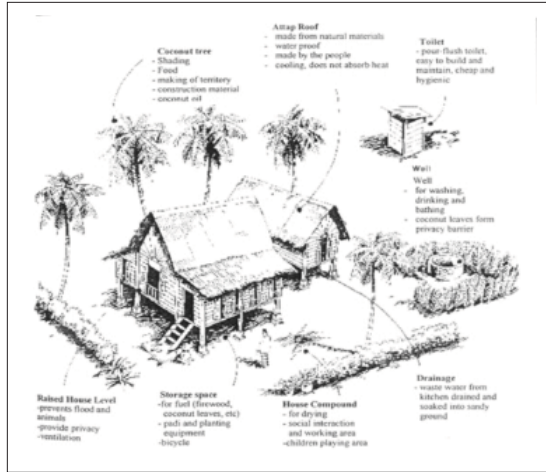
Figure 2: The External Environment of the Malay Traditional House (Source: Lim, 1987: p. 92).

Figure 3: A Typical Layout of Terrace Housing in Urban Area, Malaysia. (Source: Authors).

social order of the inhabitants. It also allows the study to examine the specifics of the design attributes and their effects on the privacy of the respondents and their family members. Therefore in this research, 11 respondents living in terrace housings in three locations in Selangor, the most urbanized and populous state in Malaysia were interviewed. The selection of respondents was based on their willingness to participate in the study. Each of the interviews lasted between 40 to 60 minutes. The interview was unstructured but based on a list of questions.

Results and Discussion

Results from the in-depth interview indicates that behavioural norms according to culture and religious belief of the Malays remain to be important behavioural mechanisms in regulating privacy among Malay families living in terrace housings which provide privacy to the family and community at large. Some of the behavioural norms appear to be common among the respondents and are more important in ensuring privacy to the community such as:

i. Respecting the neighbours' privacy by controlling noise in one's house;
ii. Avoiding looking into the neighbour's house particularly when the house is directly facing another house;
iii. Restricting interaction with the neighbours during certain period of time; and,
iv. Tolerating occasional intrusion within the neighbourhood

The following verbatim responses illustrate the use of behavioural pattern and expected norms used to regulate privacy at home among

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Malay families living in terrace housings:

"The only people passing in front of our house are neighbours. I don't think they would be looking into our house when they passed by. We don't do that (looking into the neighbour's house)".

"My house faces another terrace housing unit. We would not look into my neighbour's house. As much as we respect their privacy, we feel that our neighbours have the same feeling too. It would be embarrassing if we accidentally see our neighbours in their house when they are inappropriately clothed".

"The children normally play in front of the house in the evening. We come to accept the noise as part of living in terrace housing. They are not an intrusion of privacy".

My neighbours would not interact with us when the family sits together at the terrace in the evening. They understand that given the time that we have

nowadays, there are times when we want to limit our interactions with each other".

The results also indicate that there are privacy behaviours that are not consistent with the cultural norms and religious belief of the Malays due to the constraint of terrace housing environment pertaining to receiving and accommodating guests, and community intimacy. A number of respondents indicated that the privacy of the family is affected if they have relatives spending the night in their houses or having male guests in the house. To maintain privacy, the families seldom accommodate their relatives. In a number of cases, male guests especially neighbours and friends are entertained in the porch areas. Findings also indicate that the majority of the respondents have minimal interaction with their neighbours partly due to the minimal time for interaction

Figure 4: Frontal Image of a Terrace Housing Project.. (Source: Authors).

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due to work and family commitment and the need to respect the neighbours' privacy when they are at home. The space between the boundary of the housing units and the road are found to be a common socialization place among male residents.

Territoriality is found to be an important environmental mechanism in terrace housing mainly to limit unwanted interaction and intrusion by unknown outsiders particularly salesmen and unknown strangers. The fence around the housing unit defined the territory of the housing unit. In all the case studies, the respondents indicated it is necessary to close and lock the gate for both privacy and safety. The defined territory also discourages interaction with the neighbors.

Conclusion

Privacy behaviors according to cultural norms and religious belief are important regulating mechanisms among Malay families living in terrace housing. However, some of the behavioural norms are not consistent with the traditional cultural values and religious belief due to the constraints of terrace housing and housing environment. The inclusion of a porch as a place for guests and interaction and the provision of external shared spaces can provide both privacy and promoting community ties among neighbours.

The incorporation of privacy rules within the terrace housing environment in space planning and designs which accommodate communal socialization can enhance the role of housing design in providing a more secure residential environment in terrace housing. The study

also shows that the meaning, the needs, and regulations are influenced by socio-religious and cultural norms of the society. Therefore, a larger scale study on the privacy meanings, needs, and practices of the Malays and also other ethnic groups, the Chinese and Indians which have a different set of cultural norms need to be done in order to help generate a more conclusive housing designs ideas and solutions which can accepted by all. A longitudinal research on the privacy needs and adopting other methods of research could be done, where the findings would allow for conclusive guidelines and criteria which are sensitive to the differences and changes in privacy needs and their influence in housing modification.

People, especially those who lived in the urban area, are actually competing for space because space as a commodity is becoming expensive every day. With this limitation and in trying to come with affordable housing for the people and with all the complexities of socio-psychological elements, it is a challenge to the designers, policy makers, and also developers to come out with conducive living arrangements and designs which could fulfil borrowing Abu-Gazzeh's terms, "the cultural schemata of the people".

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Ahmad Hariza Hashim

Ahmad Hariza Hashim was born on the 16th of November, 1962 in Seremban, Negeri Sembilan in Malaysia. He received his primary education in King George Primary School and secondary education in King George the Fifth Secondary School in Seremban and completed his Malaysian Certificate of Education equivalent to O level in 1979. A year later he pursued his Bachelor Science in Human Development degree from Agriculture University Malaysia (now known as University Putra Malaysia) (UPM) and graduated in 1985. Later he joint UPM as Tutor in 1986. One year later he pursued for Master of Philosophy in Urban and Regional Studies from the University of Birmingham, United Kingdom and graduated in 1989 and proceeded for a Doctoral Degree in 1990 at the University of Birmingham in Housing Studies and graduated in the year 1994. Currently he is a Lecturer and Associate Professor in the Faculty of Human Ecology teaching Housing and Environmental Psychology. His current interest is in person environment relationship and was involved in many research projects in this area. He can be contacted at ahariza@putra.upm.edu.my.

Zaiton Abdul Rahim

Zaiton Abdul Rahim was born on 9th October, 1965 in Sungai Petani, Kedah, Malaysia. She received her primary and secondary education at St. Nicholas Convent, Alor Star and completed the Sijil Pelajaran Malaysia (equivalent to O-Level) in 1982. A year

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later she went to pursue Bachelor of Architecture at Montana State University, U.S.A. and graduated in 1989. Upon her return she worked in private architectural firms and joined International Islamic University as an assistant lecturer in 1997, in the Faculty of Architecture. Two years later, she pursued a Master of Science and graduated in 2000 and proceeded for her Doctoral Degree program at the Faculty of Human Ecology, University Putra Malaysia (UPM). She graduated in the early year of 2008 and currently she is an Assistant Professor .in the Islamic International University, Malaysia. She can be contacted at zaiton@iiu.edu.my.

NATURAL LIGHTING OF DEEP ARCHITECTURAL SPACE: THE PERCEPTION OF NEW ZEALAND ARCHITECTS

Richard Barrett

Abstract

The paper considers aspects of a survey carried out amongst a group of registered New Zealand architects in order to establish their knowledge and experience in using core-daylighting systems and methods (Barrett, 2003). Core-daylighting comprises systems and methods for bringing natural light into deep architectural space where conventional methods (such as windows and skylights) cannot readily be used. Examples of these methods are: atria (Matusiak, 1998), sun tracking heliostats, sun and light pipes, light scoops, Fresnel lenses, anidolic zenithal systems, prismatic daylight systems, light shelves, tapping mirrors, light reflectors and louvres (Littlefair, 1991, 1996 & 2000), lightwells, internal courts (Lam, 1986), fibre optic cable (Kay,1999), and other systems for light re-direction.

The survey was carried out using a questionnaire as described below (Survey Methods). The findings were analysed, resulting in a clear indication that the respondents were not especially experienced or knowledgeable, and a majority felt this to be an area of their skill base in need of development. Whilst the survey was strictly intended to gather quantitative material, respondents were invited to comment freely as they progressed through to completion of the questionnaire. This paper draws on this qualitative data as an insight into several areas, including the attitudes of respondents towards their clients when making decisions about designing buildings for natural daylighting.

Introduction

The architectural profession worldwide seems ambivalent on making best use of daylight in buildings. Encouragingly, however, the matter is increasingly brought forward for discussion by and amongst architects, with some authors such as Cook (1997) suggesting that gaining knowledge about innovative daylighting design could become a matter of professional survival. Writing in the influential RIBA Journal, Cook suggests that practitioners who fail to keep themselves informed on the issue may eventually find themselves unable to offer the full range of services and expertise expected by their clients.

Other authors take a less pedantic view as to how 'expert' the architect must be, and Evans (1981) cites Louis Khan's Kimbell Art Museum

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as an example of the use of daylighting for mood rather than utility. This approach also characterises the work of the contemporary American architect, Steven Holl, where the creation of an ambience seems more important than achieving starkly correct levels of illumination.

This is one side of the debate. The architect taking an exclusively 'poetic' approach to the use of daylight. The other side takes a more pragmatic view, in which the optimising of daylight is seen as a practical means to improving conditions within a building. Ander (1995) sums this up succinctly in a statement which neatly contains the whole raison d'être for core-daylighting:

"Because low-angle daylight can be better utilized, the use of this (core-daylighting) equipment is able to extend the hours within a day, as well as the months within a year, so that natural light can effectively replace or complement electric lighting".

This paper is not a catalogue of systems and methods for achieving core-daylighting, and in much the same way that the survey respondents were given no visual clues, but rather were forced to call upon their own empirical knowledge and experience, so it applies to the current reader. The reader wishing to delve more into the systems and methods may wish to refer to an earlier paper by the author (Barrett, 2007). Though possibly the most comprehensive catalogues of actual systems and methods for achieving core-daylighting (and other innovative natural lighting ideas) are those published by the United Kingdom's Building Research Establishment (Littlefair, 1996 & 2000).

Survey Methods

The survey group comprised approximately 33% of all practising architects accredited in 2002 by the New Zealand Architects Education and Registration Board, a total of 493 respondents (399 males and 94 females). Of the 493 architects approached, a total of 215 chose to take part in the survey (166 males and 49 females).

The collection of data from participants used two methods via a questionnaire, and these were specific to each of the questions. Questions 1 and 2 were ordinal (on a scale from '0 to 10'), and questions 2 to 6 were categoric ('yes/no', or specific nominations from listed possibilities). In addition, respondents were invited to make comments to each question, and it is this qualitative commentary that provides the substance for this paper. The original survey set out with the intention of noting any 'gender' and/or 'age' influences on responses, and whilst not being hugely influential, there are some points of interest as will be seen.

The Questions

The importance of natural lighting towards human health, wellbeing, behaviour and performance, is generally accepted by the scientific and medical (including behavioural psychology) communities (Gallagher, 1994 & 1999; Day, 1990; Cherulink, 1993), and, as indicated by the survey outcomes (Barrett, 2003), is not disputed by the respondent group of architects. For example, in question 1 of the survey (Do you believe the health and wellbeing of a building's occupants is influenced by the presence of daylight within the building?), 96% of respondents marked at the very high end of the 1 to 10 scale (8 or higher). However, as if to

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set the scene for the qualitative aspect of the survey, and to acknowledge the importance of being allowed to make general comments, a number of respondents made qualifying comments relating to this survey question, to the effect that other aspects were equally or more important than natural lighting – aspects such as outlook to the exterior (views) and ventilation.

Do you believe the health and wellbeing of a building's occupants is influenced by the presence of daylight within the building?
Not at all   1 2 3 4 5 6 7 8 9 10 **Significantly**

The responses were recorded on a scale of 1 to 10 as shown above. All female respondents indicated 6 or higher on the scale, with 63.3% of the group indicating 10. The figures were similar for males, with 57.2% nominating 10, and only 2 of the 166 respondents dropping below the 6 line (both indicated 3 on the scale).

The survey indicates that the majority of architects taking part (97.9% of females, and 95.8% of males) selected at the 'significantly' (8 - 9 - 10) end of the scale. Of the 215 combined total of both male and female respondents, only 8 architects (3.7% of the total) selected lower than 8 on the scale.

Younger architects of both genders in the 20-29 age group tended to be more categorical than others in selecting the highest number on the scale, though being a group relatively low in number the significance is unlikely to be truly indicative. In evaluating the responses to this question, with 96.3% of combined respondents indicating 8 or higher on the scale, the belief appears to be very strongly

held amongst the architects surveyed that the health and wellbeing of a building's occupants is significantly influenced by the presence of daylight within the building. This conclusion, however, needs to be considered alongside a range of comments made by respondents as discussed below. There were 18 comments to this question by male respondents, and 10 by female. The comments fell into four main categories:

Contact with the exterior
In considering the wellbeing of the occupants, 5 males and 4 females mentioned the equal importance of factors such as a view to the outside, and a general awareness of exterior conditions such as the weather. One male respondent suggested that an 'awareness of daylight' (as opposed to having direct access to daylight) was very important. Three respondents (2 male, 1 female) believed sunlight to be as important as daylight for the wellbeing of occupants.

One of the female participants summarised her response in general to question 1 as follows:

Absolutely - but it's not just 'light' that affects people; it's being able to see the sky and the weather that is important where people are living or working.

With another female respondent further reinforcing that aspect:
Outlook (and view) is more important.

And a male respondent suggesting that daylight is just one part of a more holistic combination:

Emotional wellbeing is based on a number of factors. Daylighting and the visual link with nature is very much part of it.

The use of the building or space

This category attracted only one direct comment from the female respondents, but figured more highly amongst the males with 9 comments being made. The comments made the point that the use the space is put to had a strong bearing on whether the absence or presence of daylight was an issue. In this, a distinction became apparent between (a) buildings or spaces in which daylight is not essential (some recreational spaces, utility and service type rooms), and (b) those in which daylight should be positively excluded (nightclubs, cinemas, darkrooms). One male respondent considered that multi-purpose rooms such as auditoriums could be compromised if daylight was over-abundant:

Dependant on occupancy, e.g. multipurpose auditorium spaces can suffer flexibility with too much natural light.

At the time of conducting the survey (2002), it was relatively common practice in New Zealand to design residential apartments with no direct natural lighting to the bedrooms, with borrowed light across other living spaces being utilised. This practice was criticised by one respondent, and alluded to by others. (The New Zealand Building Code has since been modified to circumvent this practice; NZBC, 2004).

Duration of occupancy (time spent in non-daylit space)

One female and two males commented that the length of time spent in a non-daylit space was a consideration. One of these respondents specifically quantified this, by suggesting (based on his observations) in a workplace situation, that stress would ensue when more than two hours was spent deprived of natural light. This situation is acknowledged, for example in Berlin, Germany, where statutory regulations prohibit daytime occupancy of workplaces for more than 3 hours where daylight is absent (personal discussion with Werner Osterhaus, Head of School of Architecture, Victoria University of Wellington, 5 November 2001).

Sole use of artificial light is acceptable

Three male respondents commented that artificial light is always an acceptable substitute for daylight. None of the three qualified this statement by suggesting that 'in some instances' it might be. One male respondent considered that 'artificial light can be designed better' (sic):

I have no information that suggests that artificial light is not a suitable substitute. Sunlight, however is beneficial.

Although it has been shown that the majority of respondents considered the presence of daylight to be crucial towards ensuring the health and wellbeing of building users, clearly there are also various mediating factors to be taken into account. The professional responsibility of the architect in this matter is therefore quite complex, requiring considered decision making, taking into account widely diverging issues such as duration of occupancy, and the use to which the building is put. This leads into the next survey question, in which the extent of client consultation is examined. Clearly, if on the one hand the presence of daylight is agreed to be important, whereas on the other the issue is seen to be complicated by a range of other considerations, then the architect's role, and his/her working relationship with the client also needs to be critically evaluated.

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When you prepare designs for clients do you consult them on which spaces require natural daylight?
The responses were recorded on the following scale of 1 to 10

Never   1 2 3 4 5 6 7 8 9 10   **Always**

There was a broader spread of nomination across the scale for this second question, although as for question 1 the majority (though smaller) indicated at the higher end. Of the combined total of 215 respondents 18.1% selected below 5 on the scale, with 81.9% above that figure. Of the female respondents, 67.3% selected at the 'always' (8 - 9 - 10) end of the scale, with 69.3% of the males doing the same. However, both male and female respondents were less categorical in selecting 10 than they had been for the first question (46.4% for males, and 48.9% for females).

As with the first question, architects of both genders in the younger age groups (20-29 and 30-34) tended towards the higher end of the scale, though once again their relatively low numbers make the findings somewhat unreliable.

In marked contrast to the first question, however, nominations at the lower (1 - 4) end of the scale were higher, with 12.2% of females and 15.1% of the male architects suggesting they would not as a general rule consult with their clients on the issue. To balance this, however, the written comments made by respondents are particularly revealing as to why consultation was not considered to be a high priority.

There were 40 written comments to this question by male respondents, and 17 by female, and the comments fell into three main categories, with more one-off statements being made than for question 1. The first category was nominated by the largest number of respondents:

As the architect I make the decision for my client
The precise wording of the respondents' comments were not always stated in quite this way, with a brusque "I know better" being one example, and "normally intuitive" being another. In general terms, however, the message was given by 25 of the male, and 11 of the female respondents, that they believed themselves to be professionally capable of making the decision without reference to their client:

I see it primarily as my decision as a designer. Consultation specifically about daylight only occurs if I feel I need to do something out of the ordinary to achieve the daylighting I require in a space.

Several respondents (5 male and 3 female) qualified their responses by suggesting that they were more likely to discuss spaces with their clients where daylight was not, or could not be provided, or where it was specifically not required.

Two male respondents stated that they would discuss the issue 'obliquely', or as part of general discussion about the effect they were aiming for in the overall design, or of the various benefits and possibilities:

Assuming you are referring to habitable space. I take for granted that most spaces will have access to daylight. I always consult where this is not possible; i.e. about how I propose to deal with spaces that have limited or no access to daylight.

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I see it primarily as my decision as a designer.

Consultation specifically about daylight only occurs if I feel I need to do something out of the ordinary to achieve the daylighting I require in a space.

Type of Clientele

Several respondents made the distinction between commercial/corporate clients, and those for domestic residential projects. Two male respondents pointed out that corporate clients, who tended not to be the end users of the building, were especially difficult to engage on the subject of daylighting and building design. This was compounded by the fact that for this type of commission it was usually quite difficult for the architect to gain access to the actual occupants/users to obtain information and to discuss design options. This communication was usually carried out at owner or management level:

There is always a great difficulty with corporate clients who do not use the spaces themselves.

Use of the Space

A distinction was drawn by 1 female and 2 male respondents between habitable and non-habitable spaces, believing that consultation on daylight provision was generally not required for spaces where people neither lived nor worked. Amongst such spaces were listed stores, plantrooms, service rooms, utility spaces, toilets and corridors.

The fact that some activities specifically demanded the exclusion of daylight from rooms was mentioned by 1 female and 5 male respondents. Examples included archives, sensitive storage, darkrooms, and some heritage spaces.

Other Comments

One male respondent made the distinction between 'sunlight' (in which the direct rays of the sun penetrated to the interior spaces), and 'daylight' (in which natural light, but not the direct rays of the sun, penetrated to the interior spaces). He pointed out that the former was more commonly discussed as an issue with his client.

The amount of time spent in the space was considered by one male respondent to be a factor in determining the extent of consultation with the client:

I try to provide natural daylight to most occupiable rooms where people are in there for 15 min or more at a time.

Consideration of the nature and quality of daylight was mentioned as an important consideration by two respondents:

Always in commercial work. Don't ask so much in residential as answers are more standard, but quality of light questioned; i.e. am, midday, pm.

The quality (orientation) source of daylight is also important. Low amenity apartments becoming people warehouses and worth your study.

Many of the participating architects were quite adamant it was their responsibility to decide whether or not specific rooms would by naturally lit. Some believed this to be part of the expertise they were able to offer clients. On balance this is probably not an unreasonable attitude, particularly when tempered by caution when in doubt.

Significantly, a number of architects stated that the overall aim of the design (what they hoped to achieve) was indeed a matter for consultation

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with the client, but that the daylight question was only one of a number of contributing factors towards that end result.

The distinction drawn by respondents between habitable and non-habitable space seems on the surface a reasonable one, however there is potential for bad design decision making unless careful evaluation of even the most utilitarian spaces is carried out. The role of daylighting should always be considered, if for no other reason than energy conservation and economics. Those spaces identified by respondents as having specific reasons for the exclusion of daylight (archives, etc) clearly have issues which go well beyond the preferred method of illumination, and which encompass the whole spectrum of environmental design (temperature and humidity control, etc.).

Possibly the most central issue raised is that of failure to design for natural light where it is clearly an expectation of the client, and a few respondents stated they would consult with their clients when such a situation arose. Though not stated by a large number of the participants, it is perhaps not an unreasonable expectation that all architects would consult in this situation:

Don't always consult with clients, but they are always made aware if natural daylight is unavailable or difficult to provide in whichever room is affected.

This, and the dilemma posed by the inability to provide natural light in crucial areas leads on to the next question, which examines the levels of usage and knowledge of core-daylighting methods.

Question 3: On Core Daylighting Systems
Which of the following core-daylighting systems have you (a) used, or are (b) knowledgeable about?

The first two questions were intended as a 'warm-up' to the topic of daylighting in architecture before going on to address the main issue underlying the research project, to gauge levels of knowledge and understanding of the various core-daylighting and light redirection systems and methods. In question 3, therefore, the architects were asked to tick those systems they either had used or were knowledgeable about. The systems were simply listed as follows, with no accompanying illustrations, which might otherwise have triggered an empirical understanding of the system where no prior knowledge had formerly existed.

The following list of 18 core-daylighting 'systems' was presented to the respondents, and they were asked to identify the extent of both use and knowledge of each.

- light pipe (e.g. 'Solar Tube')
- built up rooflight
- roof window (opening)
- skylight (non-opening)
- atrium
- lightwell
- internal courtyard
- light reflection from exterior
- light shelf
- light reflector
- louvres
- heliostat (solar tracking mirror)
- fresnel lenses
- anidolic zenithal system
- prismatic daylighting system
- optical daylighting system

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- light guiding glass system
- other daylight redirection systems - please specify

The subsequent analysis of responses has indicated a clear dividing line within the list, based on whether respondents see a system as being of a conventional nature (well known amongst the respondent group), or of an unconventional nature (less well known amongst the group). Systems from 'light pipe (e.g. 'Solar Tube') to 'louvres' fall into the more well known category, with those from 'heliostat' to 'light guiding glass systems' being less so. This is borne out in written comments, with a suggestion by some respondents that the latter systems were more 'hi-tech' than the former. In analysing the responses, therefore, those systems listed down to 'louvres' are recorded as conventional, and from 'heliostats' to 'light guiding glass systems' as unconventional. Analysis of the questionnaire was broken down as follows:

1) Systems Used (Conventional)
2) Systems Used (Unconventional)
3) Systems Known (Conventional)
4) Systems Known (Unconventional)

The list started with systems that were ticked by around 93% of respondents (roof lights, light pipes, lightwells, internal courts), through to those where very few of the architects indicated any knowledge (heliostats, fresnel lenses, fibre optics for daylight transmission, special light guiding glazings and films, optical daylight systems, etc). In spite of this lack of knowledge, it was encouraging to receive comments from several respondents indicating their own use of innovative light re-direction methods, including the use of pooled water on flat roofs for reflecting

light, photo-electric/polarised light shutters, and glass blocks in floor constructions. Of the 'conventional' systems, skylights, rooflights and roof windows were by far the most commonly used, with 97% of males and 89.8% of females having used skylights, for example. The least used systems in this category were 'light shelves' and 'light reflectors', with 16.3% of male respondents, and only 6.1% of females having used 'reflectors'. The extent to which this latter system was known to respondents, however, was much higher, at 40.4% for the males and 34.7% for the females. These two systems are the possible exceptions within this grouping, being more unconventional in their nature than the others.

In the 'unconventional' category, the indicated level of usage was extremely low, with 'prismatic daylighting system' attracting the highest figure for males, where 4.8% indicated they had used this method. The female architects scored very low in the 'unconventional' category, with not a single respondent indicating they had used any of the listed systems. In all, only 28 of the 166 male architects had used systems from this category, and it is here that the only really apparent age group variation seems to have occurred in the responses to this question. Of the 28 male respondents a total of 11 were in the age group 40-44. The indicated level of knowledge in the 'unconventional' category was somewhat more encouraging, with, for example, 27.7% of the males saying they had knowledge of 'heliostats', and 11.4% of them indicating 'fresnel lenses'. The females registered 4% for both of these systems.

There were four written comments by the female respondents, and 11 by males, and there were

three main issues raised:

Other Systems Used

This category, in which respondents offered 'other' core-daylighting systems which they had themselves used, attracted the highest number of comments for this question, with 7 males and 1 female responding.

A number of interesting systems were nominated, including the reflection of light using pooled water on flat roofs, glass blocks used in floor construction, photo-electric/polarised light shutters, and fibre optics. The latter is perhaps the most intriguing, particularly when considered alongside international endeavours, where the general consensus is that fibre optics systems are both exceedingly costly and of limited practical application (Kay, 1999). The limitation imposed by an anonymous questionnaire is very apparent in this instance, where the opportunity to follow up with the respondent could have proved of considerable interest. It should also be noted that the respondent did not clarify whether he was nominating 'use of' or 'knowledge of' fibre optics as a core-daylighting system.

More conventional methods are also included by respondents, and these are also very important being somewhat less costly, and capable of being readily included within normal construction and budgetary requirements. These include the simple device of carefully selected colour schemes to enhance light reflection, and the incorporation of 'borrowed lights':

Internal glazing / clearstorey glazing.

Sidelights / borrowed lights.

Internal wall treatment especially colour schemes.

Budgetary Considerations

One male respondent stated that he had specified the use of light shelves in a project, but that post-tender cost cutting had seen them removed.

Two similar remarks were made under 'Further Comments' (at the end of the questionnaire), where one respondent stated she had often wished to incorporate systems for more active sun control, but again had always been limited by the budget. The other pointed out the fact that cost is always a big determinant in the making of design decisions:

I have often wanted to use more active sun control techniques, but have always had them removed from the developed design stage as an unnecessary cost. This is even with the client acknowledging sun control would make a beneficial difference. So many problems in our industry boil down to cost.

Three respondents (2 female and 1 male) made specific comment regarding their lack of knowledge, especially in the more unconventional areas. Perhaps the most intriguing response was from a female architect who, although she was unsure as to the nature of some of the more unconventional systems, thought it was possible she may have used them:

I have limited knowledge about some core-daylighting systems but not enough to be confident designing them.

Not sure what the last 6 are (may have used them?).

Other Comments

As with most of the questions, several respondents made comments which could equally have been made in response to one or more of the

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other questions. An illustration of this occurred in this case where an issue commented widely upon in question 1 was again raised. A female respondent mentioned outlook and awareness of exterior conditions, and commented that 'workrooms' could be quite adequately lit using artificial means, and that occupant dissatisfaction was usually caused by factors other than lack of daylight, such as "isolation, detachment ... and lack of sky view".

It's not just 'light' that affects people; it's being able to see the sky and the weather that is important where people are living or working.

Workrooms can be lit perfectly adequately by artificial light. When you ask workers for comments they don't necessarily talk about light levels – they may talk about isolation, detachment, not being valued by management, and when further questioned they identify lack of sky view as a core part of their dissatisfaction. Therefore hi tech indirect lighting methods such as bracketed in Q3 (respondent bracketed all systems from 'light shelf' down to 'other') would not meet that sort of client comment/brief.

In retrospect the questionnaire has limitations when it comes to evaluating the actual depth of knowledge amongst the respondents. For example, an indication of knowledge of 'heliostats' could at one extreme mean the respondent has complete understanding of the principles involved and may have seen examples of heliostats in use, to the other extreme where the respondent has a vague recollection of reading about heliostats at some time in the past.

The observation was made by several respondents at various points in the questionnaire that the survey was somewhat remiss in the

lack of explanation for some of the less well known core-daylighting systems. Given that the aim of the survey was to establish the extent of awareness, however, then this is perhaps a defensible approach.

Having established some idea of the extent of awareness of core-daylighting systems amongst architects, the next question asks participants to make a series of judgements on 'difficult' projects regarding the use of artificial light in-lieu of daylight.

Imagine a difficult project where you are forced to use artificial lighting as the sole means of illumination for some of the interior spaces - tick those spaces where this would be acceptable.

This question was divided into two categories, residential or non-residential.

Residential
• dining area
• living area
• bedroom
• bathroom
• kitchen
• hallway
• other residential – please specify:

Non-residential
• individual office
• open-plan office space
• restaurant
• wine bar
• retail shop
• reception area to company office
• airport terminal
• factory floor

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- hospital ward
- theatre
- public swimming pool
- church
- classroom
- gymnasium
- art gallery (exhibition room)
- other non-residential – please specify

In considering sole use of artificial light in residential spaces, respondents were very clear in nominating two areas above all others where this would be acceptable, and these were 'bathrooms' and 'hallways'. For bathrooms 81.6% of the female respondents and 80.1% of the males, and for hallways 85.7% of females and 87.4% of the males, were comfortable in using solely artificial lighting.

The 'living area' was clearly at the opposite end of the acceptability spectrum, with only 4.1% of female architects and 3% of their male counterparts prepared to use solely artificial lighting. The 'dining area' was somewhat more acceptable to respondents, with 26.5% of the females and 34.9% of the males nominating this space. The 'bedroom' figured somewhere in between, with 14.3% of females and 12.7% of the males indicating them as being acceptable.

'Other residential' attracted an average of 34.5% of respondents, and this category included such respondent nominated areas as utility rooms, stores, garages, and games and entertainment rooms.

In the non-residential category the nominations were somewhat more evenly spread, and there were more spaces which respondents felt could be solely artificially lit. Around 8 of the listed space types fell at the high end of acceptability, with 2 at the low end. As might have been anticipated, areas such as 'theatres' and 'art galleries' were acceptable to the highest numbers. For theatres the figures were 81.6% for females and 83.7% for males, and for art galleries, 81.6% and 77.1% respectively.

Other spaces at the high end included 'retail shops', with nominations from 77.6% of the females and 78.9% of the males, 'wine bars', with 73.5% of the females and 78.3% of the males, and 'restaurants', with 59.2% of the females and 68.7% of the males.

Two spaces in particular were identified at the low end of acceptability. The 'hospital ward' attracted 8.2% of the female respondents and 12.7% of males, with the figures for the 'classroom' being 10.2% and 10.8% respectively. Some respondents qualified their nomination for 'classroom', referring to rooms such as lecture theatres as being artificially lit by preference or choice.

Respondents identified a number of spaces in the 'other non-residential' category, which came in overall at the low end of acceptability, with nomination by an average of 7.4% of the respondents. The list of those spaces where lack of daylight was considered acceptable included libraries, meeting rooms, prison cells, archives spaces, warehouses, service rooms and toilet areas. Also, several respondents identified a range of spaces such as nightclubs, casinos and other spaces which are used predominantly at night.

For this question there were 11 written comments by the female respondents, and 39 by males, and there were three main categories of comment:

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Other Residential

This category, in which respondents offered 'other residential' spaces in which absence of daylight was acceptable, resulted in the nomination of more traditional spaces such as laundries, utility rooms and garages, though a sign of the times was apparent in the nomination of wine cellars, home entertainment rooms, home theatres and home gymnasia by several respondents. Also acceptable to one male respondent was a room used exclusively for formal dining.

Other Non-Residential

In the 'non-residential' category a range of spaces was nominated as listed above. In addition to this, considerations such as the duration of occupancy were raised in the comments. One respondent identified 'transitional spaces', in which little time was spent, with another suggesting that internally focussed temporarily used rooms were in the range of acceptability. The same respondent also considered it unusual for situations to arise in which total reliance on artificial lighting was necessary. Another respondent who commented on the duration of occupancy factor, also added that "time of day" and "opportunities for relief" should be taken into account.

Transitional space where no-one has to spend their working day.

For internally focussed temporarily used spaces it is more acceptable. It is rarely necessary to totally rely on artificial lighting

Indicative, perhaps, of traditionally persisting attitudes towards incarceration, two male respondents considered it quite acceptable to totally exclude daylight from prison cells.

The identification of spaces used exclusively at night was made by a number of the respondents, and in addition to the more obvious choices such as nightclubs and casinos, other spaces requiring "fantasy and special effects" were also nominated.

Commercial kitchens were considered to be within the range of acceptability by one male respondent, and other nominations included libraries, and specialised medical areas, such as operating theatres and x-ray suites, where it was clearly necessary to positively exclude daylight.

Clarification Comments

There were frequent instances in which respondents felt it necessary to clarify or qualify aspects of their nominations on the questionnaire form. In one case, for example, the respondent had indicated that it was acceptable to have non-daylit 'art galleries', but he also wrote a qualifying comment indicating that this was dependent on the nature of the exhibits. In another case the respondent indicated that whilst 'classrooms' should be naturally lit, the same was not true for 'lecture theatres'. Another respondent felt that "some types" of classroom could be solely artificially lit.

Reluctant or conditional acceptance was occasionally indicated by respondents. For example, one female architect would accept no daylighting to 'retail shops', 'reception areas', 'dining areas', 'individual offices' and 'gymnasia', but only reluctantly.

'Restaurants' and 'wine bars' were acceptable to another respondent, but only if they operated at night.

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Other Comments

There were a number of one-off comments, with one respondent suggesting he would resign the commission if a client requested exclusion of daylight in any residential situation:

If they wanted (only) artificial light in the above (residential) would tell them to get another architect.

There was a comment alluding to the generality of the questionnaire, with the respondent stating that "some spaces in the list would be acceptable, but too general a question".

One female respondent made a somewhat derogatory (though possibly quite telling) remark about Frank Lloyd Wright's attitude towards building users and occupants, suggesting that he paid no heed to the importance of view to the exterior when he designed the Johnson Wax Building. The same respondent included a range of other issues that should be taken into account in evaluating the choice of illumination method. These included (i) the level of involvement in an activity being experienced by the occupants, as for example with theatre-goers, shoppers and diners, (ii) time of the day, and (iii) duration of occupancy:

Artificial illumination only' would be acceptable in a space where – people are strongly focussed on other things (eating, shopping, theatre) - it's night outside (restaurant etc) - people are not spending hours every day there (shop, gallery, etc) (pity the staff though - hopefully they have a view out from the staffroom or workroom) - where the floor plan is very large, e.g. factory floor, so that the sense of outside would be very remote. But F L Wright managed to get daylight into the Johnson Wax Building and the staff loved it, so he said (he wouldn't let them have a view because windows didn't conform with his overall aesthetic: so much for valuing staff).

Judging by the number of written comments to this question, respondents clearly felt the need to do more than simply nominate individual spaces which they felt could be non-daylit. There were a few spaces on which the majority were in agreement, such as 'theatres' at the high end of acceptability, and 'hospital wards' at the low end. There were other spaces, however, where the architects felt it was important to qualify their nomination, and to list some of the mediating factors to be considered. One frequently mentioned factor, for example, being length of time spent in the space.

Possibly the most unexpected nomination in the residential area, given the contemporary focus on the 'kitchen' as a social, entertaining and gathering place within the home, was the relatively high number nominating this as being acceptable without natural light. For female respondents the figure was 26.5%, and for males 27.7%. Again, however, the occasional generality of the questionnaire needs to be taken into account when evaluating responses. It may well be, for example, that the respondents were basing their judgement on the contrasting lifestyles of young professional couples or singles living in inner city apartments, as compared with that of more traditional family groups in larger suburban family dwellings.

The 'unexpected' equivalent in the non-residential category was the 'church', which was nominated at a relatively high level of acceptability with more than one in four of the respondent architects believing it was acceptable for churches to be non-daylit (26.5% of the female respondents, and 25.3% of the males). This challenges a long established tradition of religious building design in which

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natural light has been considered absolutely central to fulfilment of the building's purpose. Examples include Le Corbusier's chapel at Ronchamp, and several of Louis Kahn's religious buildings. Also of more recent vintage would be the Chapel of St Ignatius by American architect Steven Holl. Each example being testimony to its architect's philosophy that daylight is as much a material as the glass, wood, steel and concrete of the building's fabric.

With four questions completed, and the general level of respondent awareness and attitude towards the issues of daylight and core-daylighting having been established, the final two questions aim to gauge firstly how respondents feel about the state of the art amongst their colleagues, and secondly how keen they are as individuals to be more knowledgeable about the subject.

Do you believe New Zealand architects are as knowledgeable as they might be in the use of core-daylighting systems?

Respondents were simply asked to indicate 'yes', 'no', or 'don't know'.

Although a majority of the architects answered 'no', there was a substantial gender variation which was far more noticeable than with any of the other five questions. Of the females, 83.7% felt that the levels of knowledge were not what they might be, with 68.1% of the males agreeing (a 15.6% gender variation). Allowing for the 7.2% of males who were unsure, a total of 24.7% of their group believed the profession to be knowledgeable. In comparison, 14.3% of the females felt this way.

There were 22 written comments to this question,

6 from females and 16 from the males, and the comments generally fell into 4 main categories as outlined below:

Don't Know / Not Sure
Of the total of 22 comments, 10 were in this category, with respondents indicating they were simply unable to answer the question. One male architect possibly summed up the apparent all round reactions by simply stating "I have no idea what other architects know or don't know".

Limited Knowledge
Three respondents believed there to be a limited level of knowledge amongst practitioners in New Zealand, one describing it as "rudimentary", and another as "mid range knowledge".

Systems Unknown to Respondents
Three of the comments were made with reference to the respondents' own personal levels of knowledge, one stating that her answers to question 3 (systems used or known) were clearly indicative of her personal lack of knowledge; she had indicated the use or knowledge of 'conventional' core-daylighting systems down to 'louvres', with none of the 'unconventional' systems nominated.

Not a Major Issue in New Zealand
Two respondents considered that in New Zealand there was not the same need for core-daylighting expertise as there was internationally, with one suggesting that it was uncommon for projects to occur of a nature and scale which might justify such measures.

Other Comments
One female respondent considered that architects were well aware of the issues

relating to daylight and building design, but were prevented from addressing them by the limitations of the brief.

A male respondent, who had indicated 'no' in answer to the question, qualified this by saying that for lifestyle reasons in residential situations the idea of using core-daylighting was unacceptable. His point was not entirely clear, however it could perhaps be construed to mean that no special measures should be taken beyond the more traditional methods of bringing daylight into residential spaces.

Both comments undoubtedly relate back to question 3, and concerns expressed by several respondents over limitations imposed by cost.

In spite of the gender imbalance, as noted above, the belief is held by a majority of all respondents (71.6%) that practitioners in this country are not as knowledgeable as they might be on the issue of core-daylighting. Leading on from this, the final question asks respondents if they would like to become personally more knowledgeable and thus, by implication, see the situation change within the architectural profession in New Zealand.

Would you personally like to be more knowledgeable in the use of core-daylighting systems?

Respondents were again asked to indicate 'yes', 'no', or 'don't know'.

Unlike the previous question the genders were evenly balanced in their responses to question 6. The majority of respondents were clear in their wish to know more about core-daylighting systems, with the female affirmative response at 83.7% and the males at 82%. Allowing for a small number of 'don't knows', the figures for those architects not wishing to improve their knowledge were 14.3% for the females and 14.5% for the males.

There were 9 written comments to this question, 3 from females and 6 from the male architects. The comments essentially fell into just one category, with most respondents simply qualifying their answer to the question.

One of the females had no desire for more (as she described it) "hi-tech info", with one of the males nominating 'yes' but stating he was in "no rush". Two of the respondents indicated they would research the issue if and when the need for core-daylighting arose on any projects in the future.

Whilst the majority of the surveyed architects have indicated they would like to be more knowledgeable on the issue of core-daylighting, the tenor of the comments suggests it is certainly not a high priority in their minds. It is perhaps quite reasonable to take the attitude "I will research as required", as this approach is central to the offering of any professional service, where no individual practitioner could reasonably be expected to be fully expert in all fields of their discipline. Whereas the client would be right to anticipate efficiency in the sourcing of the information, or of recommended onward referral to another professional, expert in the particular field.

The point has been made by Matusiak (2000) that it is not possible for all architects to be experts in core-daylighting, but rather that they acknowledge and understand the difficulties, and then seek appropriate professional help. This

suggests that the level of understanding held by architects, if not required to be comprehensive, should at least be sufficient to allow for informed dialogue with the acknowledged expert.

As a final part of the questionnaire respondents were invited to make further comments, and these are outlined below.

Respondents' Further Comments

A total of 70 'Further Comments' were made by the architects participating in the survey, 15 from the females and 55 from the males. As with comments specific to the six questions, the final remarks also fell into a number of categories as follows:

Examples of Projects

Ten respondents cited examples of their own projects which they felt had either incorporated some form of core-daylighting, or would have benefited from having done so.

One of the female respondents who had worked on the National Library in Wellington, pointed out the need to address the dual issues of human needs and comfort, as well as the protection of light sensitive material contained in the building. Of particular interest in this quoted example is the fact that the needs of the occupants appear to have been acknowledged by the building owners, with the construction of a glazed rooftop cafeteria.

One project I was involved with which presented major lighting issues was the National Library in Wellington. Huge areas under the building (actually underground) provide storage. Many people work here all day. All resources in the building were considered to be light sensitive. In order to provide daylight to office space, whilst eliminating direct daylight, deep specifically designed window

recesses were integrated into the cladding system. To provide relief from unlit work space a glass pyramid was built on top of the building to house a cafeteria.

On the one hand the importance and quality of natural light is acknowledged, where on the other, its deleterious effects are quite justifiably feared.

This dilemma, along with the facility to control the nature and quality of light in sensitive situations is often mentioned by users of a range of similar building types, in particular museums and art galleries:

... gallery spaces within the museum that have no daylight are so much easier to control and the exhibits look so much better as a result - really the aim of the exercise.
(Personal e-mail correspondence with the curator of the Waikato Museum: 20 July 2001)

Another female respondent had used solar tubes for lighting ground floor internal en-suites in a rest home, and she included a sketched freehand cross section of the building to illustrate (the equivalent rooms at the upper level were designed with roof windows).

A suggestion involving some interesting lateral thinking was made by another of the female respondents, although she pointed out that most of her work was on too small a scale to warrant the incorporation of core-daylighting. The idea involved the security aspect of prison design, which she felt might well be a spinoff from the use of core-daylighting systems.

With one exception it appears to be the case with most of the quoted examples that skylights, or some other form of overhead aperture system,

was the preferred method used for daylighting internal spaces. Whilst perfectly acceptable and effective, such systems obviously pose a limitation on building height and on the number of storeys capable of receiving natural light. It was interesting to note, therefore, that one of the male respondents had also used louvres for redirecting daylight, and that he did so on a regular basis when designing new homes.

Most of my new home designs use skylight or external louvre systems to manipulate light inside and out.

Higher Priority Issues
As noted by a number of the architects in their comments to Question 1, many felt that a range of other issues were equally if not more important than core-daylighting. In all, 18 of the 55 comments in this final section expressed this view.

Foremost amongst the other considerations was having a view to the exterior, a point made by 9 respondents, though some also included ventilation and other issues in the same comment.

Not only daylight but the 'long view' a window affords/enhances one's pleasure of being in a space. So you are looking not just at lighting but emotional wellbeing.

The importance of aspect was strongly made in particular by one of the male respondents who felt that "The psychology of visual aspect is often of greater importance than whether the lighting is all natural ... external vistas are important, for orientation as well as visual connection to the "world outside".

By implication core-daylighting applies exclusively to internal spaces, and several respondents recognised that another important issue also comes up with this type of planning, that of ventilation. One of the female architects believed that natural light and natural ventilation were interconnected, and that both had implications for health and wellbeing. One of the male respondents felt that ventilation was actually more important than natural light.

That it is potentially dangerous to investigate any architectural issue in isolation from others is obvious. A discussion on daylighting is no exception to this, and one respondent summed this up by suggesting that a more important issue was to establish what people's needs or wants might be, and she felt that issues such as productivity and teamwork were influenced by a whole range of factors.

Along similar lines, a number of respondents felt that a sense of compromise was important, rather than total focus on achieving natural lighting, possibly at the expense of other issues. Two architects considered that integration of natural and artificial lighting systems needed to be considered, whilst another, in specific reference to "spiritual space" stressed the importance of control on quality and quantity of daylight to ensure that the desired effect was achieved.

Integration of light systems with partial natural light - control of solar penetration with shading and dispersal techniques.

... Combination of natural and artificial lighting is more often the more cost effective solution, rather than one or the other.

a number of categories mentioned require a fairly specific response; for example, natural light into a spiritual space I consider desirable. This needs to be carefully controlled however. Degree of natural light,

orientation, and desirability of, are all fundamental to a design solution.

Not a Major Issue in New Zealand

As with comments for question 5, in which two respondents felt that the need for core-daylighting expertise was not as strong in New Zealand as it was internationally, three of the respondents made similar remarks in this section.

One female architect felt that in the USA and Europe less natural light was available, due in part to higher building densities, thus providing stronger justification for the use of sophisticated daylighting systems.

Another of the female respondents, whilst acknowledging the value of having an understanding of such issues, also felt there was little or no demand for such skills.

The third respondent, a male, also made reference to the lack of demand for expertise in the field of core-daylighting, and he suggested that the prevailing New Zealand town planning provisions ensured that housing densities would continue to be kept low.

Although it is necessary to be aware of core daylighting systems, there really is not a large demand for them in most cases. NZ's Town Planning provisions for low density housing doesn't really necessitate using/requiring them.

Budget Considerations

As for question 3, once again a number of respondents raised the issue of cost as a prohibitive factor in the debate about core-daylighting.

I have often wanted to use more active sun control

techniques, but have always had them removed from the developed design stage as an unnecessary cost. This is even with the client acknowledging sun control would make a beneficial difference. So many problems in our industry boil down to cost.

Conclusions

The survey set out to establish the state of the art amongst New Zealand architects in relation to knowledge and awareness of core-daylighting. It remains to draw a conclusion from the findings, though in doing so, the nature of the questionnaire design is firstly discussed briefly.

The quantitative aspects of the questionnaire are, by definition, measurable, and the tables are the result of this. In contrast, the qualitative aspects, resulting from comments made by the respondents, are less readily analysed, though their contribution is equally important.

It could be argued that an element of quantitative processing of the comments was in fact possible, for example where a known number of respondents all added the note "views to the outside" when answering question 1. However, the question did not ask respondents to nominate other issues which they believed might influence the wellbeing of building users, but simply whether or not they believed daylight to be important in this regard. The situation would certainly have warranted quantitative analysis had the question been phrased along the lines "List those environmental considerations which you believe can influence the health and wellbeing of a building's occupants?" In this case all respondents could be assumed to have looked at a range of considerations, rather than some choosing to do so, and a measurable set

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of responses would have been achieved.

In designing the questionnaire, thought was given to this dual aspect, as to whether or not a mix of qualitative and quantitative data could be successfully dealt with. The decision, that indeed it could, was influenced by the unique nature of the respondent group's profession. The practice of architecture, per se, involves a balance of the 'scientific' and the 'artistic', and architects deal in widely diverging areas; on the one hand in aspects such as human performance, comfort and emotion, and on the other, practicalities such as cost, technical performance of their buildings and regulatory compliance. In dealing with any project the architect brings to bear a fine sense of judgement over all of these considerations. The conclusion to this paper therefore attempts to do the same, and to balance the qualitative and quantitative aspects of the issue.

Taken as a whole, the survey indicates a reasonable level of interest in the issues raised. These issues range from general discussion on the importance of natural light for human function, through the question of client consultation, and into the specifics of designing for daylight, and the use and knowledge of systems and methods. Interest, however, does not necessarily translate into action, and there seems to be some opinion amongst the group which sees the issue as important, but not necessarily of high priority. This is exemplified by the respondent who in response to question 6, ("Would you personally like to be more knowledgeable in the use of core-daylighting systems?"), answered "yes, but no hurry".

In considering why this might be the case, other comments by respondents provide some insight. For example, there is a perception that New Zealand (with its small population of 4 million spread thinly around the country), unlike many other countries, has little or no high density building development, and that we are not therefore deprived of natural light due to overcrowding. Realistically this perception is probably more true for residential than it is for commercial projects, where arguably some central city development, particularly much of that carried out during the 1980s, would clearly have benefited from a more proactive and sensitive approach to daylight design. Although the survey was not designed to be categorical on the point, it would seem from many of the comments that a fairly high number of the architects worked primarily on residential projects, with a consequent over-emphasis in that area.

In the process of relegating core-daylighting to low priority, other issues featured as being equally or more important in the minds of a number of respondents. The provision of views to the exterior, along with well designed natural ventilation, were two of the most frequently quoted of these issues. This could perhaps be summed up as the need to ensure a careful balance of the numerous issues inherent in the process of designing architecture, with no one single aspect taking predominance over others.

The low priority viewpoint was not universally stated, with a number of respondents strongly advocating the use of natural light wherever and whenever possible. It was interesting to note that a few architects nominated actual projects they had worked on, some of which had used specific core-daylighting methods, and others where the architect felt the design

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would have been improved if such methods had been included. As to the question, "why not included?" there were perhaps three principal reasons that emerged from the survey.

Firstly, the issue of cost, and the fact that 'luxuries' such as light shelves would be amongst the first deletions where post-tender cost savings were required.

Secondly, the difficulty of engaging client interest in the issue, especially where they were not the end users of the building. This factor is possibly also largely cost driven, though it is also indicative of mindset, where the basic and traditional solution to lack of natural light is simply to install artificial.

The third, and most telling in terms of the aims of the survey, was the self admission by a number of respondents that they personally lacked the confidence, knowledge and skills required to design for core-daylighting. Some respondents felt this also to be true for most of their New Zealand practitioner colleagues.

This viewpoint was clearly demonstrated by the survey findings, particularly in relation to question 3, where the extent of use and knowledge was shown to be restricted largely to the more conventional core-daylighting systems.

The survey seems to indicate that there is no great pressure on New Zealand architects to address the issue of core-daylighting. In fact a reasonable number of the respondents seemed quite unaware that the issue even existed beyond basic conventional methods such as skylights.

If such a pressure were to emerge, it would presumably be the result of greater overcrowding

in our cities, and of clients clamouring for solutions. Human nature being what it is, little will be done until the need is present. Global warming, and, in particular, increasing levels of UV in New Zealand, may eventually be considered sufficient reason to develop appropriate design skills. A well considered core-daylighting solution in a kindergarten, for example, could protect young children from too much exposure to UV during the height of summer, whilst allowing them good access to daylight. Also, well designed internal spaces could become attractive and multi-dimensional in mid-winter if core-daylighting was addressed more proactively as a design option. Since undertaking the survey in 2002 (Barrett, 2003), the debate on sustainability in buildings, carbon emissions and global climate change, has taken off apace, and it would be interesting to follow up with the same survey now in 2008. One significant development since the survey was carried out is undoubtedly the increased receptivity of clients, and greater willingness on their part to commit to spending money on what had until comparatively recently been considered add-on luxuries. In parallel with this, architects are also now required to be far more open to these needs, and to having the necessary skills and knowledge to implement them into their buildings. A frequently quoted comment in the 2002 survey went along the lines " … not a major issue in New Zealand". It is to be hoped that the short few years that have passed since that time have turned this attitude around.

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Richard Barrett

Richard Barrett is a practising architect and a Senior Lecturer and Chair of Research at the School of Architectural Studies, Christchurch Polytechnic Institute of Technology, Christchurch, New Zealand. He graduated from the School of Architecture, City of Leicester Polytechnic (UK) in 1971. In 2003 he was awarded a Master of Architecture degree (with Merit) by Victoria University of Wellington, New Zealand. His interest in the subject matter for his masters thesis, 'core-daylighting' (systems and methods for bringing natural light into deep architectural space where conventional methods such as windows and skylights cannot readily be used), was sparked during the early 1980s whilst working as architect for the redevelopment of New Zealand's Scott Base in Antarctica. Barrett visited the continent to monitor construction, and the experience of living in constant daylight, with no apparent diurnal-nocturnal rhythm to pace daily activities, led to an interest in the physical and physiological influence brought about by natural light (or its lack), and in particular the role played by architecture in this process. This culminated in his Masters thesis (Barrett, 2003) which examined the state of the art amongst New Zealand architects. He is an Associate Member of the New Zealand Institute of Architects, and committee member of the NZIA Canterbury/Westland Branch. He can be contacted at barrettr@cpit.ac.nz

IDENTITY IN TRANSITIONAL CONTEXT:
OPEN-ENDED LOCAL ARCHITECTURE IN SAUDI ARABIA

Mashary A. Al-Naim

Abstract

This paper attempts to analyze the experience of change in Saudi contemporary architecture with special emphasis on the ways that people have used to adopt new forms in their home environment. The aim is to understand the general reactions of people towards the change over time. Identity is a social system, and unless we view it from this perspective we cannot understand how people realize it in their home environment. In this sense, we are looking for the relationship between people and their architecture rather than explaining the reasons behind any changes identified.

Keywords:

Identity; local architecture; home environment; social change.

Introduction

Identity as a concept has social and physical connotations. It constitutes a collection of cues recognised by a group of people at a specific time and place. People and places, however, are exposed to change over time. In that sense, identity may change and people may resist this change because they want to feel that they maintain a certain level of continuity. However, continuity of identity is a very debatable concept. Every society faces a real challenge to maintain its identity for any length of time, especially under conditions of rapid economic and technological change.

It is important to understand how the concept of identity is perceived by people, designers, and authors in Saudi Arabia today. A lack of identity in contemporary architecture in Saudi Arabia is indicated by many authors (Konash, 1980, Boon, 1982, Mofti, 1989 and Abu-Ghazzeh, 1997). This raises the following questions: What do we mean by identity? How do people express their personal and social identities? Is there any action we need to take to maintain individual and social identity? This paper aims to

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answer these questions. However, the purpose here is to understand why the search for an identity has become an important social and intellectual issue in Saudi Arabia.

We see identity in architecture as a dynamic phenomenon. It can change and reform over time within the frame of the cultural core of society. This paper tries to use this concept to conduct a general critique for the experience of change in Saudi architecture.

Historically Saudi Arabia has experienced drastic urban changes since the late 1930s until the present day. For that reason this review is limited to this period. The author has tried to trace people's physical reactions towards urban change, and investigate how these reactions have shaped their identity over time. Unfortunately, there is very little literature about

identity Saudi Arabian architecture (Alangari, 1996). This meant the author had to make several visits to some of the main cities in Saudi Arabia (Riyadh, Jeddah, Makkah, Dammam, Khobar, and Hofuf) to carry out a diachronic visual survey. This survey aimed to trace some of the external physical characteristics that people tried to express in their homes to maintain their personal and social identities.

The Experience of Early Change (1938-60)

'The relative importance of other people and physical forms in shaping place identity implies that distinctions made between self, others and physical environments continually serve to define bodily experiences and consciousness of the unique persons. It would seem that the home, in terms of the kind of opportunities it affords people for personal and social action and how these enable self impression and expression is one profound centre of significance to a sense of place identity.' (Sixsmith, 1986).
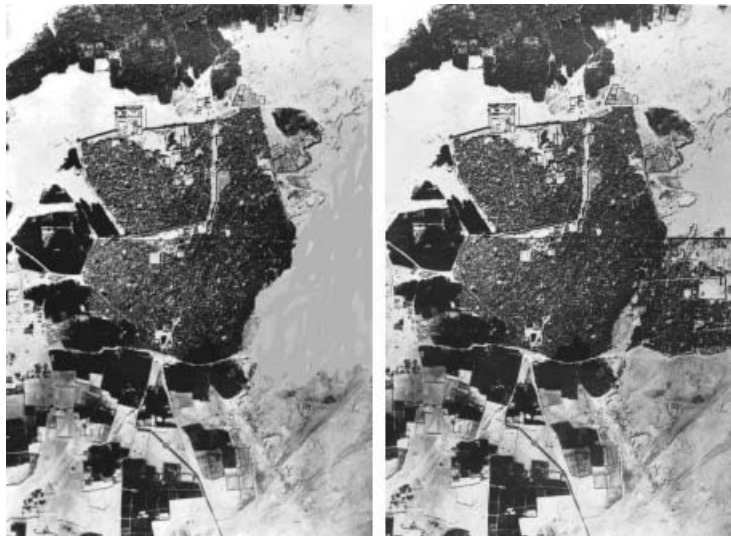
a.

b.

Figure 1-1: Hofuf between 1904 and 1935. a) Hofuf before 1904 (Assalhiyyah not yet developed). b) Hofuf in 1935 (The core part of Assalhiyyah already completed). (Source: Aerial photograph 1935 Aramco).

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Originally, Saudi Arabia consisted of several traditional societies. Despite the fact that these societies shared the same source of values, which is the Arabic-Islamic culture, each region still had specific social and physical characteristics (Talib, 1983 and King, 1998). The socio-cultural values and physical environment of each society have been disturbed by the introduction of western urban concepts in the last four decades. However, the first interaction with the new urban concept is very important in building up a spatio-temporal path for the relationship between people and their architecture in Saudi Arabia over time.

The experience of urban and architectural change in the area can be traced very early. For example, in 1904 a new neighbourhood was planed in Hofuf (Eastern Saudi Arabia) in a gridiron pattern. This first planned neighbourhood in the Arabian peninsula called Assalhiyya (was influenced by Assalhiyya neighbourhood in Damascus) (Figure 1) and was created outside the walled city by the permission of the Ottoman Sultan Abdulahmeed (Al-Naim, 1994). In fact, there are also signs of architectural change in Jeddah prior to the oil discovery when King Abdulaziz built his palace Khuzam between 1928 and 1932 and he used reinforced concrete in the construction (Andijani, 2008). However, those early experiences were disconnected, discontinued, and isolated.

The Early Physical and Spatial Conflict

The origin of contemporary residential settlements in Saudi Arabia stems from the early part of this century when Aramco (Arabian-American Oil Company) built its housing projects in the eastern region of Saudi Arabia between 1938 and 1944 (Figure 2) (Shiber, 1967). These projects introduced for the first time a new concept of space and a new home image. It is possible to say that this early intervention has had a deep but not immediate effect on the native people. It made them question what
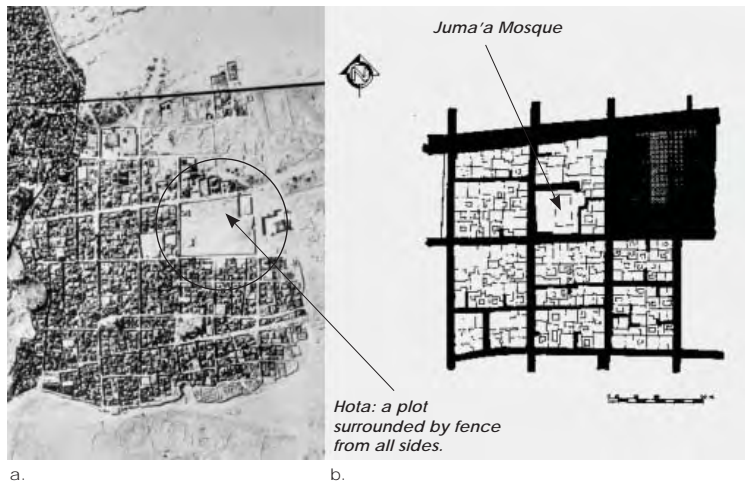

Figure 1-2: a) Assalhiyyah Neighbourhood in 1935 (Grid-iron pattern with a traditional system inside the blocks). (Source: Aerial Photograph 1935, Aramco). b) The first blocks in Assalhiyyah. (Source: Developed from Aerial Map1985 , Municipality of Al-Hasa).

they know and how they should behave. In the other words, this early change can be seen as the first motive for the social resistance to the new forms and images in the contemporary Saudi home environment.

The significant impact of this experience presented itself in conflicts between old and new in local society. The threat from interfering outside elements to the social and physical identity created for the first time a social reaction towards physical environment. Resistance to the new is expected in the early stages of change, but we need to know how people reacted to the changes and how deeply the people's image was influenced by them.

The conflict between traditional cultural values and the introduced western physical images was very limited at the beginning of modernization; the native people followed what they knew and tried to implement it in their daily lives, including their homes. However, the contrast between traditional images and the new images in the minds of local people can be considered the beginning of physical and social changes in Saudi architecture.

The first indication of a conflict between the local culture and western culture can be ascribed to Solon T. Kimball, who visited Aramco (Arabian-American Oil Company) headquarters in 1956. He described how the senior staff (American) camp in Dhahran was completely imported from United States. He said:

'No one westerner would have difficulty in identifying the senior staff "camp" as a settlement built by Americans in our south western tradition of town planning. It is an area of single-story dwellings for employees and their families. Each house is surrounded by a small grassed yard usually enclosed by a hedge.' (Kimball, 1956: 472).

This American camp, which introduced new spatial concepts, contrasted strongly with the surrounding home environments in the old cities in the region, Hofuf and Qatif. The native people still persisted with their own spatial concepts and images and resisted the imported ones. They considered them as strange things. Therefore, when Saudi workers and their relatives 'moved in, they took over any empty land available and erected basic shelters and fences of locally available material, separated from each other by narrow irregular footpaths'. This created 'a community of mud-brick and timber houses built in a traditional and comfortable way'. (Figure 3) (Shiber, 1967: 430).
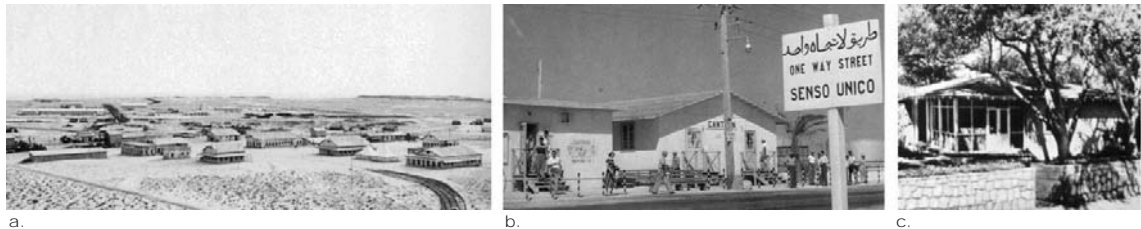

a.   b.   c.

Figure.2: The new housing image of Aramco in the 1930s and 40s. a) The early American camp in Dhahran (1930's). b) American camp in Ras Tanunurah (1950's). (Source: Facy, 1994: 92 & 96. c) One of the early houses in the American Camp in Dhahran. (Source: Lebkicher et al. (1960: p. 196).
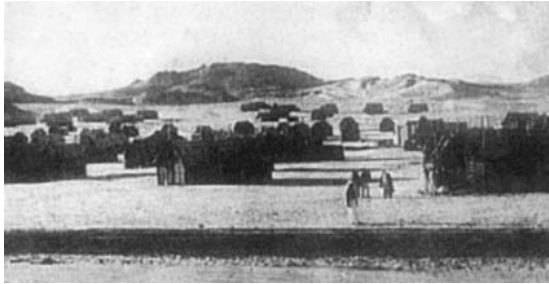
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Figure. 3: Saudi camp in Dhahran in the 30's and 40's.
(Source: Al-Youm (Local Newspaper No. 9016, 20-2-1998).

Kimball noticed this community and described the Saudi camp which was built adjacent to the senior staff camp as 'neither planned nor welcomed'. He added that 'these settlements represent the attempt by Arabs to establish a type of community life with which they are familiar. Here the employees were mostly Saudis ...' Kimball recognized the insistence of the native people on their own identity through his description of the Saudi camp as 'an emerging indigenous community life' (Kimball, 1956: p.472).

We need to mention here that in the first two decades of change several alterations appeared in local people's attitudes towards the new architecture. What Kimball described is the position of native people from the first direct contact with western culture. People, at this stage, refused the change and stuck with what they knew. This is not to say that the new images had not influenced people; however, they were in the process of developing a new attitude towards their homes. This attitude was not yet fully formed to reflect how deeply the new images broke the old idea of physical environment.

The government and Aramco were not happy with the growth of these traditional settlements. Therefore, by 1947, the government had asked Aramco, who employed American engineers and surveyors, to control the growth around the oil areas. This created the first planned cities in Saudi Arabia, which followed a gridiron pattern, Dammam and Khobar (Figure 4) (Al-Hathloul, 1981). The spatial concepts and house images that were introduced into these two cities accelerated the impact of the new housing image on the local people, not only in these two new developments, but also in surrounding old cities.
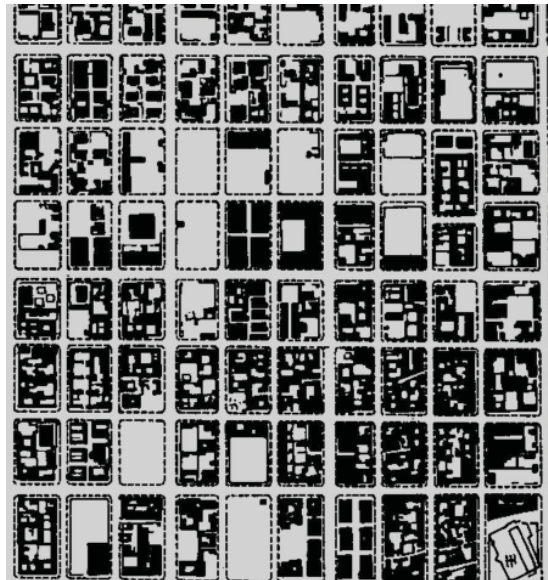

Figure 4: Planning System of Al-Khobar. We noticed that native people were still influenced by what they know. Traditional patterns were used in the large blocks and a traditional house form was used. (Source: Candilis, Draft Master Plan, Al-Khobar, 1976, p. 45).

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For example, in Hofuf, local people developed a new term called Bayt Arabi (Arabic house). This meant that people had realized that there was a difference in material, form, and spatial concepts between the Arabic house, which is the house they had known all their lives, and another type of house which had no definition except 'new house' (Al-Naim, 1993). Before the introduction of the new concepts of home to the area, people did not need to define their home because there was only one type of home, and every member in the society knew and used it. Therefore, the appearance of this term in Hofuf is considered by the author to be the first indication given by local people that they felt any kind of threat to their identity.

Early Conflicts and the Search for Identity

As we discussed earlier, this new type of house, which later became known as a villa, was imported originally in the 1930s, but it was developed in the 1950s when the Aramco Home Ownership Program forced people to submit a design for their houses in order to qualify for a loan (Lebkicher, et al. 1960). People relied upon Aramco architects and engineers to design their new houses, because there were few architects in Saudi Arabia at that time. In order to speed up the process, Aramco architects and engineers developed several design alternatives for their employees to choose from. However, all these designs adopted a style known as the 'international Mediterranean' detached house (Figure 5) (Al-Hathloul & Anis-ur-Rahmaam, 1985).

Compared to what happened in the Eastern region, few changes occurred in Riyadh in the 1930s and 1940s. However, an indication of social change can be found in those suburbs constructed at that time. For example, for the first time in the city, the new neighbourhoods were classified according to economical and social status (Facy, 1982). Still the construction methods and style were completely traditional. Facey described the changes in Riyadh in 1940s as:

'Despite the mushrooming development of the city outside the walls, traditional methods of construction continued to be employed. The local architecture had to be adapted to the creation of buildings for government and the royal family on a scale hitherto unimagined by local craftsmen.' (Facy, 1982: 302).
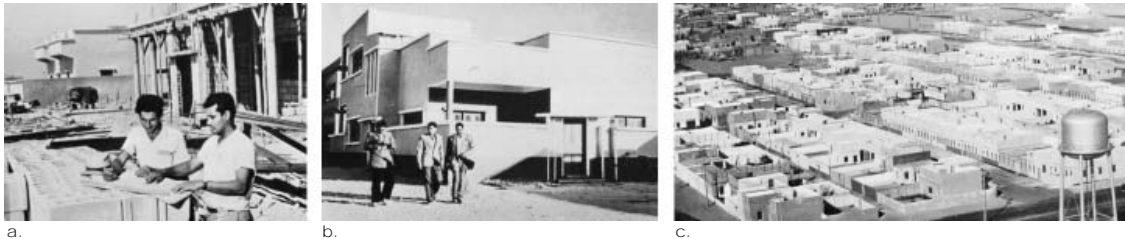

a. b. c.
Figure 5: Villa type in Dammam (1950s). a) Aramco architects and engineers in 1950's. b) Villa-type in Dammam in 1950's. c) A neighbourhood in Dammam in 1950's emerged as a result of Aramco Home Ownership Program. (Source: Lebkicher et al. 1960: 212-14).

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However, Riyadh had experienced an important experience to develop mud architecture in the first half of the twentieth century. Most of the buildings including Al-Muraba' (King Abdulziz Palace, located in the north of old city) which was completely new concept in term of size and form to the old city of Riyadh. In fact, development of mud architecture at that time was spontaneous and comprehensive; people used all new materials and merged them with local construction technology which ended up with real local built environment (Figure 6).

The aforementioned situation completely changed in the 1950s because King Saud succeeded his father in 1953 and decided to modernize Riyadh. This was manifested by two other relevant events that took place in Riyadh. The government built the royal residential district, known as Annasriyyah, in 1957, through which reinforced concrete was introduced to Riyadh for the first time (Abercrombie, 1966). Annasriyyah started, in fact, in 1951 but it was not finished yet even when Al-hamra Palace was constructed in the 1954 to host the Crown Prince (Figure 7). The conflict between new and old in the minds of local people became an important issue in Riyadh because it was facing radical physical and social change. This was manifested in the construction of Al-Malaz neighbourhood which was also completed in the late 1950s (Figure 8) (Fadan, 1983).

The urban concepts that were implemented in Riyadh were similar to those in Dammam and Khobar. Nevertheless, there was an initial difference between the two experiences. In the case of Annasriyyah and Al-Malaz, the whole projects, including planning, designing and construction, were completed by governmental agencies. People who used the residential units were given no chance to express their opinion about the houses they would use. Generally, with Aramco and Riyadh housing projects:

Figure 6: Mud architecture in Riyadh, first half of the twentieth century. (Source: Turath).

Figure 7: Alhamra Palace, different form of technology in the city of Riyadh, 1954. (Source: King Fahad National Library).

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a.   b

Figure 8: New images in Riyadh (50s/ 60s). a) Annasriyyah in 1957. (Source: Facy, 1992: 321). b) Al-Malaz planning system. (Source: Al-Hathloul, 1981: 164).

'… a completely different conception of a house, cluster, and neighbourhood has been introduced. It starts from the tiny details of the house construction, and spreads to the internal spatial organisation of the rooms and finally to the external appearance and the relationship of the house to those in the neighbourhood.' (Fadan, 1983: 97).

The imposing of the new house image was still limited to governmental and Aramco employees many of whom had experienced different cultures, either because they were not natives of Saudi Arabia or because they had studied abroad. However, these two major changes in Riyadh raised questions about the meaning of the home and disturbed the previous mental images of the local people. This can be observed by the way first Annasriyyah, and then Al-Malaz, were called New Riyadh (Al-Hathloul, 1981).

The increasingly obvious contrast between old and new made people start to think about their options. Their identity was under threat by the new and continuing urban change. Several questions appeared in their minds. Should they preserve their own traditional identity or adapt to change? Should they stick with what they knew or make use of the new concepts and technology? Certainly, people are usually more enthusiastic about experiencing the new, especially if it is associated with a distinguished social class, such as governmental employees, who appeared as highly educated elite in an illiterate society (Alangari, 1996).

Similar to what happened in the eastern region, many people who lived in the traditional areas in Riyadh kept their traditions in buildings and remained in their traditional houses right until the late 1960s. The impact of the new images was very clear but society was not yet ready to step towards the social and physical changes. Nevertheless, people in the traditional areas did make a few changes to imitate these images

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introduced by the new houses in Al-Malaz (Al-Naim, 2008).

The mud surfaces of the traditional houses were plastered with cement and the edges of the house parapets were topped with a thin layer of cement to reflect the sharp and neat edges of the concrete. These changes extended to the old style wooden external gates which were replaced by steel ones with shades similar to those in the Al-Malaz houses. It is apparent, then, that concrete structures with their neatness and sharp edges became a very common symbol used by people in Saudi Arabia to communicate modernity (Figure 9) (Al-Naim, 1996).

The agreement amongst people in the traditional areas of Riyadh about the meaning of modernity is a clear indication of their ability to create and develop new meanings within their home environment. Also, the manner in which they expressed this meaning was a very important step in absorbing the new images. This meaning of modernity was also found in other regions of Saudi Arabia. For example, many people in Hofuf changed their traditional house gates to imitate the gates in the new houses. The interesting point here is that even if the change does not lead to better conditions, people will still pursue it in order to imitate what carries status in society. This is what happened in Hofuf when people substituted their beautiful decorative gates for abstract forms because they were symbols of modernity (Figure 10).

Figure 9: The mud surfaces in the traditional houses in Riyadh plastered by cement and the traditional house gate was replaced by a concrete one because it reflects modernity. (Source:Author 1995).

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Figure 10: Traditional house gateways transformed to imitate the new house types in 50's and 60's in Hofuf.   (Source: Author, 1995).

Another important phenomenon found throughout the kingdom can also be associated with the early conflict between old and new. When old cities expanded outside their old boundaries, the new houses which were constructed in the new areas carried both local and imported images. This produced unique house forms in each region which still distinguished them from other regions. Moreover, the use of imported images was controlled by their ability to communicate the local meanings that people associated with them.

For example, in the cities visually surveyed by the author, hybrid forms were found in neighbourhoods constructed adjacent to the traditional areas. These forms were similar to the local traditional forms, but they also contained new images which had already been localized symbolically to communicate modernity, such as the concrete gate, sharp lines and edges, etc (Figure11) (Al-Harbi, 1989).

This hybrid form existed also in the two new cities in the eastern region, Dammam and Khobar,

especially in those neighbourhoods which constituted the original settlements (Figure 12) (Al-Said, 1992). For example, Al-Said studied the growth of the original settlement in Dammam, Al-Dawaser neighbourhood. He found that, between 1930 and 1970, this neighbourhood grew from 56 to 250 residential units 'mostly typical courtyard residential units as a result of contentious house subdivision and room addition'. (Figure 13) (Al-Said, 1992: 234). The situation was similar in Khobar, where the house style was influenced by the prevailing traditional styles in the region. Even though several modern settlements appeared in these two cities due to Aramco programs, people in the original settlements insisted on the traditional house form.

We can argue that people at that time were still influenced by their previous experience and were able to express this very easily since building regulations were not yet applied. This meant that people had maximum flexibility to decide the form of their houses. It is important to note here that most Saudi Arabians still had a strong connection with their social, physical and

aesthetic traditions, all of which were strongly reflected in their home environment.

We propose here that this attitude towards the new images reflects the way in which they become important communication tools in the community. This raises important questions: Was it an internal mechanism developing to absorb the new? Did the localizing of these new images by associating understandable social meanings form the main step towards internalizing these images in the collective memory? If so, this internalization of the new images was the first stage towards generating a new identity in the home environment.

Figure 11: A number of homes in Makkah constructed in the 40's, 50's, and 60's contain traditional and modern elements. (Source: Visual survey 1995).

a.   b.

Figure 12: Dammam between 1940s and 1960s. a) Dammam (Al-Dawaser neighbourhood in the 1940's). b) Part of Al-Dawaser neighbourhood and the new development in 1960's (traditional area became denser and the traditional style continue). (Source: Aramco).
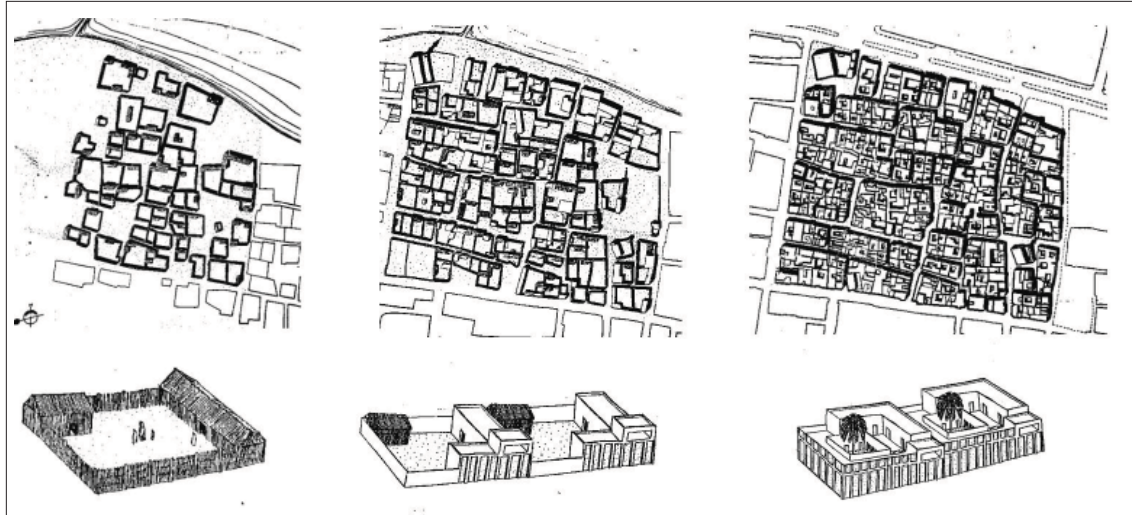
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Figure 13: Growth of Al-Dawaser neighbourhood in Dammam (1935-73).
(Source: Developed from Al-Said, 1992: 228-235 and 246).

Generally, two main lessons can be derived from the early changes in the home environment. On one hand, there is the people's persistence in reserving their existing identity. This is reflected in their tendency to use certain physical elements in the architecture to communicate to each other. Replacing the old communicative elements by acceptable new ones, on the other hand, is an initial step in the acceptance of change in the home environment. This evaluation and selection of what is acceptable for reflecting social meanings is a very important step.

The above-mentioned mechanism can be seen as a process of absorbing and internalizing the new selected forms until eventually they become part of the collective memory. As we noticed, the new forms had been filtered at the personal and cultural levels. New local

meanings had been associated with the new forms and in some cases they mixed with the traditional form to produce a new local form. We can argue that what happened was a process of identification where people strive to find for themselves a place in the modern era of the Saudi home environment.

Modernization and the Dilemma of "Rapid Architecture"

In the previous discussion we tried to demonstrate how people interact with changes in their home environment. We noticed the attempts by local people to evaluate the new in order to localize some elements that can convey social meanings. The desire by people to alter their existing identity and to adapt to changes can be considered as one of the social mechanisms by

which the society creates a balance between old and new. However, the modernization process in Saudi Arabia continued to drive people from their original physical environment, which created a new challenge for people who had already experienced some change and were ready to accept more.

A new situation occurred in the 1970s, manifested in the direct interference by the government in the physical environment. Up until this point, the change experienced had a limited impact on the people's collective mental image. Generally, we can attribute this situation to three factors represented by the changes in the economic, educational, and communication systems in Saudi Arabia and their impact on the Saudi family (Al-Suba'ee, 1987). Contemporary communication systems, coupled with economic and technological development, changed most of the local characteristics of traditional societies (Morely and Robin, 1995). The contemporary media in Saudi Arabia contributed to the introduction of a taste for modern housing to the Saudi family. The family, which was witnessing radical change in its economic status, was influenced by commercial advertisements.

Explaining the reactions of people towards the changes in the architecture is of utmost concern because this will lead us to the process which people followed to maintain their cultural core. The changes took different forms and influenced every aspect of life. Almost every citizen in Saudi Arabia was influenced by government policies that replaced traditional urban, economic, educational, and communication, etc. systems with modern ones (Babad, Birnbaum, & Benne, 1983). These changes resonated throughout

the home environment. How were personal and social identities modified to absorb the changes? What were the new meanings that occurred in the Saudi home environment? Why and how did they internalize their new identity in the home environment? These are some of questions this part will attempt to answer.

New Architectural Images (New Concept of Home)

The desire to create a modern country in a short period brought about total physical change to most Saudi cities (Lerner, 1958). As in the Middle Eastern countries, the process of modernization in Saudi Arabia 'is largely physical and heavily imitative of the western model's external departments and life styles' (Jarbawi, 1981: 21). This is manifested in the unified governmental planning policies throughout the kingdom. However, prior to 1960, most of the attempts to regulate and control the growth of Saudi cities were partial and had limited impact. By 1960, the first real building regulations were issued in the form of a circular by the Deputy Ministry of Interior for Municipalities (Al-Said, 1992). This circular as Al-Said mentions, is

'the turning point in [the] Saudi Arabian contemporary built environment physical pattern and regulations. It require [d] planning of the land, subdivision with cement poles, obtaining an approval for this from the municipality, prohibited further land subdivision, controlled the height of the buildings, the square ratio of the built [are] require set backs …' (258-9).

Still, these regulations took fifteen years until they were regularly applied in all Saudi cities. This is clearly traced from the confirmation of the master plans that were initiated for all Saudi regions between 1968 and 1978 (Al-Hathloul, & Anis-Ur-Rahmaan, 1985). For example, the first

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master plan was executed by Doxiadis for Riyadh between 1968 and 1973.This plan confirmed the setback regulations and applied planning system similar to what had been used in Khobar. It presented the grid as the most desirable pattern to be followed in the planning of Riyadh as well as in other cities of the country.

Despite the fact that Saudi architecture witnessed building regulations from the beginning of the change, however, their impact on the architecture at first influenced neither house form nor the surrounding spaces. This was because the government had not yet developed institutions to follow up these regulations. However, with the establishment of the Ministry of Municipal and Rural Affairs and Real Estate Development Fund (REDF) in 1975, the government became aware of the need to follow up the construction of private houses that had benefited from the loans. However, the strict application of these regulations 'institutionalized' the villa as the only house type in Saudi Arabia.

It is important at this stage to consider the position of the people in relation to the rapid developments in the home environment. If we go back to the beginning of the period of change we can generalize that Aramco's developments were in the Eastern region, and Aramco's home ownership program in particular may be considered the origin of the physical contradiction that appeared later in Saudi architecture(Figure 14). The home style that was imposed by Aramco's program in the 1950s continued to have a powerful impact until the 1970s, especially since the building regulations supported and encouraged it. This could be seen very clearly since owning a new detached house (villa) in Saudi Arabia became a social symbol of personal and social identity (Gabbani, 1984).

Figure 14: A number of villas constructed in 1950's by the Aramco Home Ownership Program in Dammam. (Source: Author, 1995).

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Modern building materials, especially concrete, had a very strong image. We noticed in the previous section how people transformed their traditional facades with concrete gateways and cement plasters. Table.1 shows that the cement block became an important building material in the 1960s. The mud construction system which was common in the 1940s and 50s became less important. This indicates how deep the new images that were imported by Aramco influenced the Saudi home environment.

Type of Material	1962	1986
Cement Block	70.8	84.3
Mud Brick	15	9.1
Barasati (Palm Leaves)	5.1	3.4
Tent	1.2	---
Furush (Sea Rocks)	0.8	1.7
Company (Postrable)	0.4	---
Other (mostly wood)	6.7	1.5

Table 1: Construction Materials Used by Aramco's Employees (1962 and 1968) (Source: Shea, 1972).

We can attribute the emergence of a symbolic role for the villa-type house to the appearance of a middle class in the 1950s. This class included a mixed group of people from all over the kingdom, but mostly employees of Aramco and the government. These people were characterized by their literacy and experience of material culture. This class 'brought about cultural contact between Saudi society and the Western world' (Fadan, 1983: 74), and tended to express its status by residing in the new dwelling type, the villa. Due to their contact with the other cultures, the members of the middle class were strongly influenced by the villa type housing that spread throughout the Middle East in the colonial era and which was associated with people at high levels of administration (Boon, 1982).

The villa represented modernity and the people's attitude was based on 'the stylistic association that "modern", as expressed in the modern villa style, is "good", by virtue of being modern'. The villa's ability to present individual identity and originality through uniqueness of design may also have led to its rise in popularity since the conformist of the traditional society was beginning to be seen as 'backward' and individualism as 'modern' and therefore intrinsically 'good'. Jomah notes the sense of individualism that distinguished house design in the cities of Makkah, Jeddah, and Madina in the middle of this century. He considers these styles to be representative of a shift from a 'tradition-directed' to a 'self-directed' pattern of social organization. To him, 'the concept of home was … reduced from the traditional spiritual home to the modern physical and spatial one' (Jomah, 1992: 328).

Individuals always surround themselves with specific objects to communicate with other members of the community. The need to express a common meaning in architecture encouraged the villa type to become the device which enabled the Saudi family to express its new social status. In that sense, the home can be seen as a dynamic dialectic process between individuals and their community (Altman & Gauvain, 1981). While the Saudi family expressed its wealth and modernity by owning and living in a villa, they used the uniqueness of their villa form to represent their personalities.

"Image" in Transition, Searching for New Home Identity

The desperation of families to achieve social status by owning a new villa, coupled with the interference from the government, through building regulations, created an unstable situation in the home environment. This manifested itself in the people's insistence on communicating their cultural core with their surrounding objects, especially in their homes. Therefore, external and internal alterations were made by people in their villas. These alterations created a contradictory image in the contemporary Saudi home environment (Bahammam, 1992).

For example, most of the villa-type dwellings in the Al-Malaz project were transformed to meet the local social values. This means that when the new model was imposed on the people, they tried later to adapt it to express themselves and satisfy their socio-cultural values. Al-Said studied the transformation that took place in Al-Malaz between 1960 and 1991 (Figure 15). He attributes the alterations in Al-Malaz villas to the existence of hidden rules amongst the residents; he named them as 'unwritten rules'. These rules stemmed from the 'traditional Arab-Muslim territory type' (Al-Said, 1992: 266).

Bahammam (1992) finds that most of the Saudi families in Riyadh made alterations to their private houses to meet their social needs. This phenomenon created an external physical contradiction in architecture because, in general, satisfaction of the cultural core is more important than the physical appearance of the house. This view is shared by Al-Hussayen when he attributes the alteration that people made to their houses to the ignorance of the role of the women in the society by the designers and decision makers (Al-Hussayen, 1996).

It is clear, then, that the forces of change within a society cannot totally succeed in shifting its core values because they are strongly ingrained and have an innate ability to survive. Even the aggressive imposition of new values represented by sudden physical change is only partly accepted while the rest is resisted or adapted over time. The physical contradictions, which appear in the present Saudi home environment, can be attributed to the internal resistance by members of the society in order to preserve these values (Figure 16). It is necessary therefore to consider social dynamics as well as continuous core values as main factors in achieving an understanding of continuity and change of identity in the home environment.
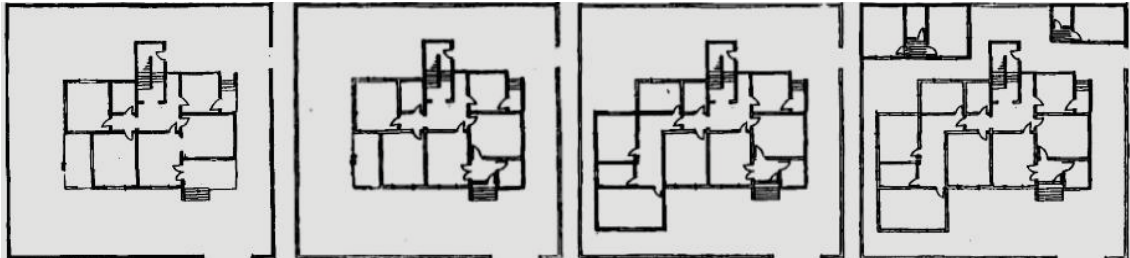

Figure 15: Transformation of Al-Malaz villa. (Source: Al-Said, 1992:267).

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The aforementioned situation completely contrasts with what happened in the early period of change, when the external form was used as a communicative tool conveying the symbol of modernity. This can be attributed to the fact that people in the early period of change still lived in their traditional houses, which were physically and socially compatible with life patterns at that time. Even when people moved out, they carried with them the traditional spatial concepts and organization and applied them in their new houses. The hybrid form that resulted from symbolizing modernity was a vital step to absorbing change. The situation was totally different for those citizens housed by Aramco and the government in villa type accommodation since they had no choice but to adopt new spatial concepts and organizations. The people's reaction to this situation was a very drastic alteration of those houses, which were constructed in the 1960s, 1970s, and 1980s throughout Saudi Arabia.

Attempts to Re-Localize House Form

Despite the fact that the form which was used as a symbol of modernity in the early period of change continued in the villa type, which they moved to later, people still made various alterations to the interior of their villas that contrasted with their outward appearance. This

does not mean that individualism in the house form is no longer valid in present architecture in Saudi Arabia, simply that if the external appearance is not compatible with socio-cultural needs, people will tend to satisfy social norms even if they create a contradictory external form.

We can link the above-mentioned situation with the current prevailing trend in Saudi Arabia, which recalls the traditional external images in contemporary houses. By using traditional forms which have proven their suitability over many years, people express the desire to eliminate contradictions in the external appearance of their contemporary homes. In the author's opinion, this borrowing from the past will not solve the problem because the interior and exterior of the home should ideally express one entity, which is not so in this case.

Nowadays, re-circulating traditional images has become a phenomenon in most Saudi cities. The attempts by government to revive the traditional architecture of Riyadh in the 1980s influenced most people of Arabia. Therefore, many people are now enthusiastic about using local architecture as a resource for the design of their new homes. Furthermore, in some cities which have no deep roots, such as

Figure16: Two villas in Hofuf (people altered the facades of their houses to provide more privacy for the front setbacks by using metal sheets to increase the height of their house fences). (Source: Author, 1995).

Dammam, the people from different regions of Saudi Arabia who have settled in the city recall images from their region of origin (Figure 17). This reflects the desperation of designers to create a sense of continuity in the contemporary built environment in Saudi Arabia.

The desire to recreate traditional images is discussed by Rybcynski (1986). He states that 'this acute awareness of tradition is a modern phenomenon that reflects a desire for custom and routine in a world characterized by constant change and innovation'. The impact of external forms on people's image is a result of the strong connection between what the eye sees and the perceived environment. People tend to evaluate the visual quality of the surrounding environment according to their past experiences. In that sense, the sentimental reaction towards the traditional images in Saudi Arabia can be attributed to the sadness and emptiness felt by people at the loss of these images rather than an expression of their actual identity.

The direct use of the traditional image in present home design is criticized by many authors because as Al-Hathloul (1992) mentions we should look at the present from our own perspective because it is different from the past. As a Saudi academician states, 'our contemporary houses have no roots. What we have now is ornamentation in the facades rather than paying attention to the home interior and respecting the surrounding spaces' (Hariri, 1996).

Despite the cultural and sentimental messages that these contemporary hybrid forms express, the use of these images, as we said in the beginning, may reveal a sense of visual continuity, but it will not reflect the actual people's identity. Compared to the early hybrid form in the beginning of the period of change, which was congruent with the internal social mechanism, the contemporary hybrid form is considered a kind of architectural fashion not linked with internal social action; rather, it expresses the desire by architects to communicate visual cultural meanings.

In fact, identity is an issue which has no clear boundaries and can change from time to time. If we consider that the traditional form reflects our roots, this does not mean that it expresses our own identity. Identity in contemporary Saudi architecture should reflect Saudi society with its contemporary morals and values. It is necessary for us to understand ourselves and the forces at work within our society and to respect them rather than impose ready-made forms and

Figure 17: Different images in the City of Dammam representing the re-use of traditional forms. (Source: Author, 1995).

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convince ourselves of their validity to represent our identity. In this sense, our identity should be inspired from within, and should proceed from our own understanding of the surrounding world, from our interaction with all aspects of everyday life.

Meanings in architecture emerge from the interaction between people and physical objects. However, the social requirements change over time, which means that the associated physical objects will also change, or at least the meaning of the physical form will change. For example, while the traditional house consisted of a limited number of multi-purpose rooms, the new economic power of the contemporary Saudi family increased demand for larger numbers of rooms by family members, which naturally increased the whole house (Doxiadis, 1977). Furthermore, the increase in number of women working outside the home, which followed the spread of education, forced many families to employ a house maid and/or nanny. This new situation developed eventually to become another tool to express social status. Also, the meaning of the kitchen changed from a dirty place to a place associated with the main living spaces that may be exposed to visitors.

The aforementioned changes in the home either in the external or the internal domains reflect how things may change in society. People tend to experience new things; this will pave the way to internalize a new identity in the home environment. Unless there are continuous shared values which have the ability to control the relationships in a society and regulate the changes, society will fall into chaos.

Conclusion

Identity, similar to other social phenomena, may change over time, which means that each generation will express its identity from its own perspective. This is not to say that society will shift from one discrete identity to another, but people will interact with new technological inventions and foreign ideas etc. Lifestyle, hence, may change and new meanings for useful things will be created. In many cases the strands of past experience will influence people's evaluation of the new things, thus enabling them to choose those new things that provide them with a sense of continuity. According to the pressure that people may be under, all or part of the old identity may continue. In that sense, in spite of this long chain of physical and social change, we cannot say that the old identity of local societies in Saudi Arabia has completely disappeared.

In this paper, we have tried to examine the reasons which have led to the search for identity in contemporary Saudi home environment. One of the main reasons uncovered was the confusion between the terms modernization and westernization in Saudi society. This phenomenon is common in many non-western societies today. However, in Saudi Arabia the situation has an added dimension because of the deeply held religious belief of its society. The resistance that the people have shown to social change reveals that even where there is a total physical change, people will keep up the vital traditions that maintain continuity for society, which we have termed 'cultural core'.

The link between tradition and the cultural core has emerged from the religious and social connotations of the traditions. The cultural core, as we mentioned previously, has the ability

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to survive over time. Its existence is essential to regulate the non-verbal communication system in any society. We proposed that in the early period of change, cultural core played a vital role in developing an internal social mechanism to absorb change. Despite the hybrid form that emerged due to this mechanism, a high sense of continuity may have existed in architecture at that time. In the later period of rapid change, the cultural core also continued to have a role. This was manifested in the wide drastic alterations to the villa type housing. Even though these alterations contradicted the external appearance of the villa, people made changes in their houses to meet their religious and social values. This showed the importance of respecting the cultural core, which exists in people's minds and begins its organizing and communicating role when people start to live in the new houses.

One important issue regarding identity should be mentioned, that identity is not something given to society, but it is something that should emerge from the interaction between individuals and groups in society and between the whole society and the surrounding physical objects. Therefore, in order to really understand the issue of identity, we should first explore the meaning of identity to people and what their mechanisms are for expressing it in the built environment, rather than impose certain forms on them and try to convince them about their validity as a reference for their identity. This study sees the prevailing trend in Saudi Arabia for borrowing from the past as a kind of architectural fashion developed and enhanced by architects and not as a decision made by the people.

Studying the mechanisms that enable people to express their personalities and develop readable codes in the community requires from us a clear understanding of the relationship between physical change and social dynamism. It is necessary to mention here that every physical object may change over time according to the change in its use by people. In that sense, new meanings may be attached to this object. Change in the meaning of the object over time, thus, may reveal how societies change and adapt to new circumstances. This is what we assume happened to the villa type housing. At first, owning a villa became a social symbol reflecting the status of the family. Later, when large numbers of people moved to villas, owning a villa lost its role as a social symbol. A new social symbol will take or has already taken its place in the society. This could be manifested in the type of building materials used, furniture, etc.

In general, people tend to express themselves in their built environment, which means that, in addition to the explicit constraints such as building regulations, the spatial relationships and the physical forms will respond to the implicit, socio-cultural constraints. People tend to identify themselves by using their surrounding objects. Moreover, this process of identification can take place both consciously and unconsciously. The process will absorb imported physical forms either by giving them a specific meaning compatible with core values or will modify these forms to meet the existing meanings.

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Mashary Al-Naim

Mashary Al-Naim is Associate Professor of architectural criticism in the faculty of architecture at King Faisal University (KFU), Saudi Arabia. Currently, he holds the position of a Vice Rector for the Admin Affairs and Business Development at Prince Mohammed University (PMU). He was the former Chair of the Architecture Department in KFU and former dean of the advancement in (PMU). He holds a Ph.D. degree in Architecture from the University of Newcastle Upon Tyne. Al-Naim served on numerous architectural and design juries such as Arab City Award, Sultan Qaboos Award and Kind Abdulla Award, and has consulted on countless design projects throughout the world, but especially in the Middle East and the Gulf Region. He is an active researcher, a prolific journalist, and practicing architect. As well, he serves as a senior editor of Albenaa magazine (the oldest, widely distributed architectural journal in the Arabic Language) since 2000, and writes a weekly column in Al-Riyadh Newspaper (major local newspaper) since 1996 and a monthly column in several newspapers. He reviewed two projects for the Aga Khan Award for architecture in 2007 (Karachi and Algeria). Dr. Al-Naim has published in both English and Arabic on topics related to sustainability, environment-behavior studies, identity and symbolism in the built environment, traditional and contemporary architecture in the Arab countries and architectural education and practice. He has published several books including: Potentiality of Traditional House (1998), Ideas and Visions in Saudi Architecture (2006) (Arabic), Political Influences and Identity of Urban Form (2005), Architecture and Culture: Critical Essays in Arab Architecture (2005) (Arabic), Home Environment in The Saudi Arabia and Gulf States (2006) (Two Volumes). He can be contacted at nmashary@yahoo.com.

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LANDSCAPING AN OFFICE PARK IN AMMAN, JORDAN: INCORPORATING SUSTAINABLE SITE DESIGN PRINCIPLES

Aydin Özdemir, Metin Başal, Ahmet Benliay

Abstract

This project investigates the concepts of sustainable site design and applies those concepts to the landscape design of an office park in Amman, Jordan. The paper defines the role of preliminary analysis and landscape design process with emphasis on site grading, planting design, and stormwater management, with a hope that future designs should be ecological and sustainable, assessing and using resources efficiently. The nature of the collaborative design approach among designers and the design process of the office park are also discussed within this paper. The result of this investigation is a new approach to site design that combines various design alternatives, aesthetic quality and environmental sustainability. The goal and intent of the presentation is to assist in providing designers an overview of issues that they should consider during site analysis and design.

Introduction

With increased concern for ecology and the environment, emphasizing sustainability and natural preservation becomes an urgent problem. Despite the recent intensification of environmental concerns regarding human practices, current designs do not usually include sustainable design guidelines. The main objective of design should be to develop and confer ideas of creating ecological sensitivity and energy efficiency, which are developed by effectively assessing and managing natural resources. The design ideas proposed in this paper should provide for effective management of nature surrounding buildings, along with a process of integration with nature. It is important to keep in mind that the goal and intent of these designs should be to assist with providing an overview of issues and considerations that need to be included to limit the impact of land development on the existing natural conditions. Designers must develop a respect for the landscape and expend more effort to understand the interrelationships of natural systems and habitats, as well as the impacts of human uses on them. In this context,

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the development of a sustainable site design should be achieved through seeking harmony between human interventions and nature.

Guiding Principles of Sustainable Site Design
Site design is a process of intervention involving the location of roads, walkways, structures and utilities, and making natural and cultural values available to users (Landphair and Motloch, 1985; Jacobs, 1986; Brinkhorst, 1991; Grant et al., 1996). Sustainable site design involves simple design and management practices that take advantage of natural site features and minimize impacts on the natural environment (Rees, 1990; Anselm, 2006; Rubenstein, 1987). Site design does not only include the process of designing new environments, but also involves renovating drainageways, revitalizing stream corridors, reintroducing appropriate vegetation to filter runoff (Jadhav and Buchberger, 1995; Mitsch, 1992) and sustaining the ecological diversity throughout the designed site (Forman and Godron, 1986; Derya, 2002; Randolph, 2003). In this context, we should consider preserving natural resources with sustainable approaches (Ellis, 2005; LaGro, 2001; Landphair and Motloch, 1985; Strom and Nathan, 1998). The result is less manipulation of the natural environment with human interventions and sustainability of the natural appearance of the environment; designs should be specific to a particular site.
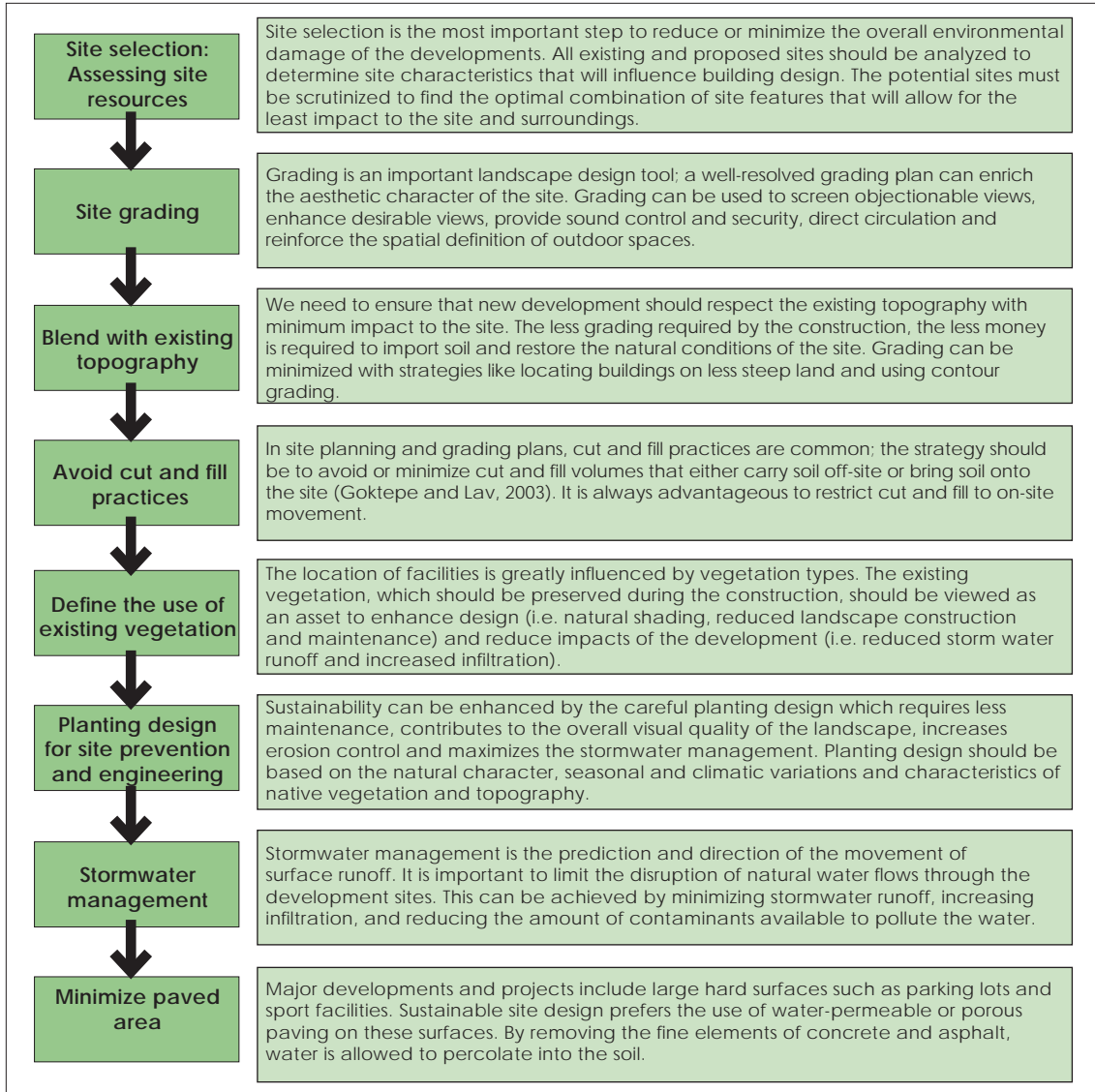
Major issues that need to be considered during sustainable design are site topography, significant natural and geological features, site grading and retaining walls, surface drainage and sediment control (Todd, 1985; Yip, 1994; Marsh, 1983; Fink and Mitsch, 2004; Lee and Heaney, 2003). It is understood that these issues are interrelated during the process of

collaboration between architects, landscape architects and urban planners in major urban development projects (Pickett et al., 1999). An environmentally responsive design process adds the elements of integrated design, design and construction team collaboration, and the development of environmental design guidelines. These elements should be incorporated into development projects from the very beginning and sustained throughout the project phases. Conventional design strategies often fail to consider the interrelationships among building site, design elements, topography and energy (Reffat, 2004; Booth, 1990). Review of these issues in the early planning stages will assist in mitigating conflicts in the later stages of detailed design and physical site development.

Selected principles and approaches of sustainable site design that are applicable to design practices (Özdemir and Başal, 2008; Untermann, 1996; Simmonds, 1997; Booth, 1990; Thompson and Sorviq, 2000; Parker and MacGuire, 1997; Beer, 2000; Harris and Dines, 1998; Andersen, 2006; Bergen et al., 2001; Rubenstein, 1987) are illustrated in matrix (1).

Goals of the Study

This paper examines the sustainable site design approaches employed during the landscape design of Jordan Armed Forces Public Security Directorate Headquarters Complex, Amman (PSD Complex). The guiding principle of sustainable development is an explicit commitment to the environment, defined as the ability to maintain the qualities of the natural environment while protecting and enhancing it for future generations. In this project, we are committed to natural systems protection and

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Site selection: Assessing site resources	Site selection is the most important step to reduce or minimize the overall environmental damage of the developments. All existing and proposed sites should be analyzed to determine site characteristics that will influence building design. The potential sites must be scrutinized to find the optimal combination of site features that will allow for the least impact to the site and surroundings.
Site grading	Grading is an important landscape design tool; a well-resolved grading plan can enrich the aesthetic character of the site. Grading can be used to screen objectionable views, enhance desirable views, provide sound control and security, direct circulation and reinforce the spatial definition of outdoor spaces.
Blend with existing topography	We need to ensure that new development should respect the existing topography with minimum impact to the site. The less grading required by the construction, the less money is required to import soil and restore the natural conditions of the site. Grading can be minimized with strategies like locating buildings on less steep land and using contour grading.
Avoid cut and fill practices	In site planning and grading plans, cut and fill practices are common; the strategy should be to avoid or minimize cut and fill volumes that either carry soil off-site or bring soil onto the site (Goktepe and Lav, 2003). It is always advantageous to restrict cut and fill to on-site movement.
Define the use of existing vegetation	The location of facilities is greatly influenced by vegetation types. The existing vegetation, which should be preserved during the construction, should be viewed as an asset to enhance design (i.e. natural shading, reduced landscape construction and maintenance) and reduce impacts of the development (i.e. reduced storm water runoff and increased infiltration).
Planting design for site prevention and engineering	Sustainability can be enhanced by the careful planting design which requires less maintenance, contributes to the overall visual quality of the landscape, increases erosion control and maximizes the stormwater management. Planting design should be based on the natural character, seasonal and climatic variations and characteristics of native vegetation and topography.
Stormwater management	Stormwater management is the prediction and direction of the movement of surface runoff. It is important to limit the disruption of natural water flows through the development sites. This can be achieved by minimizing stormwater runoff, increasing infiltration, and reducing the amount of contaminants available to pollute the water.
Minimize paved area	Major developments and projects include large hard surfaces such as parking lots and sport facilities. Sustainable site design prefers the use of water-permeable or porous paving on these surfaces. By removing the fine elements of concrete and asphalt, water is allowed to percolate into the soil.

Matrix 1: Guiding Principles of Sustainable Site Design. (Source: Authors).

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acknowledge the inherent value of the design site. The Schematic Landscape Design, which is the basis of this paper, states that natural systems and local conditions of the region are important aspects of the overall PSD site. It is, therefore, essential to plan this office development with sustainable fundamentals if the goal is to enact sustainable design practices; that is, the natural systems present on site will be maintained via Schematic Landscape Design. Doing so will produce positive benefits for all aspects of project development—energy use, water conservation, open space, land use and building management. The steps toward sustainability will further enhance the standing of this office park accomplishing its mission while incorporating sustainability into the fabric of social life. While the commitment to sustainability has been made within the preliminary plans, the next step to be taken is to ensure inclusion of these aspects from initial design to finished product. Currently, we are in the decision-making process; plans and projects were presented to the design teams and the project manager for approval, to introduce sustainable concepts, to review the sustainable construction efforts and to develop recommendations for further sustainable efforts of the PSD site.

This project presents a new avenue for the profession of landscape architecture. The planning and design process involves a team of architects, engineers and landscape architects. The role of landscape architects in the design development should be significant due to the need for sustainable design practices such as site inventory and analysis, site planning, the design of proper circulation, topographic modifications, grading and drainage, stormwater management, plant selection, ecological

sensitivity, aesthetic quality of the outdoor environment and the interaction between the built and the natural environment. The main purposes of this paper are to serve as a guide for the future developments through sustainable site design practices, to articulate an enhanced vision and prototype for sustainable urban settlements, to define the process of presenting design proposals through schematic designs and to identify basic principles of site design to guide improvement of design developments. The outcomes of this study, which are presented as the schematic landscape design proposals, attempt to present ingredients for sustainability of future designs and illustrate a useful tool during the collaboration and discussion between design groups.

Project Site

The site with an area approximately 12 hectares located in Amman was selected to establish the PSD Complex. The location of the site, which is on the outskirts of the Amman city center, houses all of the PSD offices, the headquarters, and recreational buildings, along with a proposed open space to form a rigid complex surrounded with a secure perimeter wall. The main idea that has shaped the whole layout is a disciplined unity of numerous buildings with a variety of functions within an image of a military townscape (Figure 1). The site has a terrain with several retaining walls, storage facilities and parking lots. High sloped areas on the north and mid section of the site presented major difficulties for the location of proposed buildings (Figure 2).

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Figure 1: General Layout of the PSD Complex (Source: Authors).

Figure 2: Existing Land Use, Topography and Local Vegetation. (Source: Authors).

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Phases of Site Assessment and Landscape Design Process

In 2005, we, as a landscape design team, were commissioned by the Yüksel Construction Company, to evaluate the existing site and develop a landscape proposal for the PSD Complex. The site must reflect the elements of Jordanian culture and should be designed in a manner that maintains the symbols of the religion, the originality of culture and the beauty of natural scenery in order to achieve a balance and harmony between the buildings and their surroundings. The design approach, which emphasizes ecological principles, social purpose and the indigenous landscape, allows project and design concepts to take on and strengthen the regional identity and connect the project to its site location. For these purposes, we developed schematic landscape plans aiming to discuss the project goals and schedule the improvement of design guidelines. The process of schematic design began with the gathering of basic data based on the assessments of master plans, architectural drawings, zoning cordinances, topographic and geological maps, vegetation and existing infrastructure. After all available information has been obtained, the data were examined and analyzed. The first objective of these analyses was to establish the site's advantages and limitations.

A detailed site analysis was conducted to help guide the design team and future developments. These include such items as the best areas for building locations, areas to avoid because of steep slopes, areas with drainage problems and areas where the existing vegetation should be kept. Additionally, a set of principles of landscape and site design was formulated to guide the consultant during the design and application processes.

The schematic plan provides a potential layout identifying parking design and access, roadway and walkway configuration, entryways and landscaping. The presentations were prepared by the use of computer applications (AutoCad, 3D Max and LandDesigner Pro) which enable site designers to depict quickly a land area for pictorial and analytical purposes. We used these techniques for perspective and isometric depictions of topography, slope analysis, cut and fill calculations and simulation studies.

Presentation 1: Assessment of Local Conditions

The development of landscape design began with the creation of a Landscape Analysis Plan that was based on the topography, geography and flora of the local region. Jordan consists mainly of a plateau divided into ridges by valleys and gorges, along with a few mountainous areas. By far the largest part of the East Bank is desert, displaying the land forms and other features associated with great aridity. There are broad expanses of sand and dunes, particularly in the south and southeast, together with salt flats. The Jordan River's principal tributary is the Yarmuk River. The northern area of Jordan, from the Yarmuk River to the Dead Sea, is commonly known as the Jordan Valley.

Based on the specified natural characteristics of Jordan, we proposed to simulate the local topography on several sections of the PSD site; a valley system approaching the main entrance walkway has been created. These valleys are named Yarmuk and Jordan, which are the original names of the valleys in Jordan.

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The Dead Sea was represented by the elliptical shaped basin covered with lavender (Figure 3).
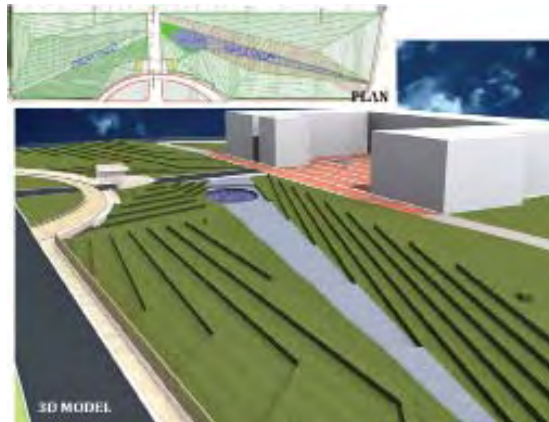
Figure 3: Entrance of the PSD Site is Designed based on the Local Conditions of Jordan. (Source: Authors).

Western Jordan has essentially a Mediterranean climate with a hot, dry summer, a cool, wet winter and two short transitional seasons. However, about 75% of the country can be described as having a desert climate with less than 200 mm. of rain annually. Jordan can be divided into three main geographic and climatic areas: the Jordan Valley, the Mountain Heights Plateau, and the eastern desert, or Badia region. The climate of the Jordan region has inspired us to simulate climatic conditions similar to the overall Jordanian climate. The platform around the mosque and the dominant hill on the site has been preserved to present the natural landscape of the region.

The highlands of Jordan host forests of oak and pine, as well as pistachio and cinnabar trees. Olive, eucalyptus and cedar trees thrive throughout the highlands and the Jordan Valley. Jordan's dry climate is especially conducive to shrub trees, which require less water. Several species of acacia trees can be found in the deserts, as well as a variety of sturdy wild flowers and grasses which grow among the rocks in this demanding habitat, rather than bringing exotic plants to the site. The goal was to keep and preserve the local flora as much as possible. We used the characteristics of the natural vegetation of Jordan, and this process was the crucial element during plant selection and local zone formation on the PSD site. (Figure 4).

Figure 4: Use of Local Plants is one Major Goal of the Planting Design (from left to right): loquat (Eriobotrya japonica), (b) bougainvillea (Bougainvillea sp.), (c) jasmine (Jasminum sp.), (d) locust (Acacia sp.) (Source: Authors).

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Presentation 2: Land Use and Nodes

The site was treated as a compact composition, as an articulation of different functional zones: (1) Entrance Zone, (2) Headquarters Zone, (3) Transition Zone, (4) Main Axis Zone and (5) Future Extension Zone. Density and the area of the green space in these zones were highlighted. The legend included the green spaces, buildings, open plazas and parking lots and aimed to show the balance between open spaces and the buildings. The basic design approach was to analyze the interaction between closed structures (i.e. buildings) and open space to increase the area of vegetation and park space. The intent was to analyze both the current site conditions effectively and create borders for future analyses, along with the balance between the potential landscape zones and buildings/structures. The focus was on the intersections and nodes for future plaza developments while assessing the pedestrian and vehicle flow on major roads and walkways (Figure 5).

Presentation 3: Site Grading and Earthwork Calculations

Due to the sloped character of the site, the analysis required topographic assessments and grading calculations. We used the average-end area method, for cut and fill volume calculations (Harris and Dines, 1998; Strom and Nathan, 1998). The solutions to grading problems were displayed as several vertical sections. The approach was to examine the entrance spot elevations of each building and to assess the buildings with their surroundings. Grading solutions included minimizing the use of retaining walls, use of walls for seating, balancing cut and fill volumes, re-elevating the point elevations, creating smooth slopes around the structures and buildings, and maximizing an aesthetic appeal. This presentation proved problematic once all the design teams calculated just how large the amounts of cut and fill would be, and they decided to reconfigure the corner elevations of all buildings (Figure 6).

Figure 5: Presentation of Nodes and Sections. (Source: Authors).
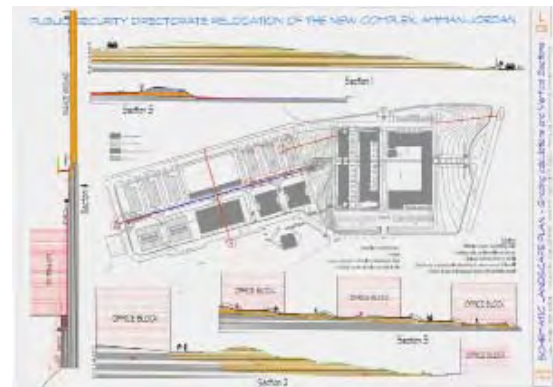
Figure 6: Presentation of Grading Calculations and Solutions with Vertical Sections. (Source: Authors).

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Presentation 4: Surface Drainage and Stormwater Management

Stormwater management was a crucial step in the analysis and design of the PSD site. Topographic conditions with point elevations were used to analyze the surface drainage characteristics. In order to sustain the surface run-off, all paved areas were sloped through the proposed open channels and inlets. An underground storage facility was recommended to collect the stormwater for irrigation and fire emergency. Topography was used as a part of stormwater management; natural reservoirs were developed to collect surface runoff, and excess water was directed to the channels and the landscaped areas. The overall goal of the stormwater management system was to keep the rate and quantity of surface runoff from the site at natural and optimum levels; the basic strategy was to reduce the amount of peak flow, runoff volume and sediments generated on site (Thurston et al., 2003).

Presentation 5: Planting Design

The Landscaping (Planting) plan included xeriscaping principles —the use of water-efficient, low maintenance native plant materials (Walker, 1991; Ingels, 2003; Barış, 2007). The fabric of the landscape reflects the goals of creating a pedestrian friendly atmosphere while strengthening the relationship between built and native environment. The use of native shrubs and ground cover plantings under mature trees along the main axis, at courtyards and in seating areas was encouraged. A carefully conceived and executed planting concept of indigenous plants aims to enhance and maintain the local image of the site. Selected plants project a proper scale relationship between the individual, buildings and open spaces and create an appropriate relationship to the existing environment. To the degree possible, landscape plans shall include the use of plant species that are indigenous to the Amman area. In cases where non- indigenous plants are used to enhance the landscape, plantings should be limited to those species that are able to resist periods of drought and which require little fertilization and use of pesticides.

The following points were considered when landscaping: (1) preservation of existing trees (Cypress, Eucalyptus, Acacia, etc.), (2) re-establishment of trees along primary roads within parking areas and along site perimeters, (3) improvement of the perimeter wall with emphasis on blocking view from outside with dense plantings, (4) focal or interest plantings around plazas and courtyards with changes in color and texture through seasons, (5) foundation planting for buildings, and (6) reinforcement of pedestrian access ways with focal plantings.

Along the hill areas of the site, a Mediterranean zone was formed; this zone is determined chiefly by its climate, which is characterized by very dry summers and mild, rainy winters; large tracts were covered with maquis (macchie), garigue, or dry semidesert (steppe) vegetation. Maquis consists of dense scrub growths of xerophytic (drought-resistant) and sclerophyllous. Garigue is usually a somewhat open association of dwarf evergreen shrubs and trees mingling with the characteristics of herbaceous plants that thrive during summer under somewhat semi-arid conditions.

Presentation 6: Temporary Landscape Areas

The architectural design concept includes future extension zones where additional office and recreational buildings will be built.

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The landscape plan proposed temporary landscape areas with sport and fitness facilities, running paths, flexible materials and removable plants. The purpose was to retain existing walkways for future extension. Materials for this site are generally flexible and foldable for easy construction. In addition, a water detention and retention system was proposed for these areas (Figure 7).

Figure 7: Presentation of Temporary Landscape Areas. (Source: Authors).

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Presentation 7: Landscape Approaches

As a conclusion of the schematic design presentations, major landscape approaches, which would contribute to the overall design of the PSD site, were established. Basic approaches of the project were integrating and articulating architectural and site design in conjunction with landscape design, blending new development sites with the character of the local landscapes by retaining islands of natural vegetation and creating new and similar vegetative buffers, which soften building facades and site facilities, seeking to develop new significant landscape features (i.e. topography) in association with attractive, creatively designed courtyards and pedestrian plazas, continuing the initial style and character of the original plantings with emphasis on transitioning and reflecting the natural formation of plantings, maintaining a selective palette of indigenous and site-adaptive plant species, and creating a sense of arrival at site entrances and at the primary entrance to the complex (Figure 8).

Certain principles have maintained the importance of the landscape aesthetics of the site as it relates to the philosophy of the landscape plan. These principles are:
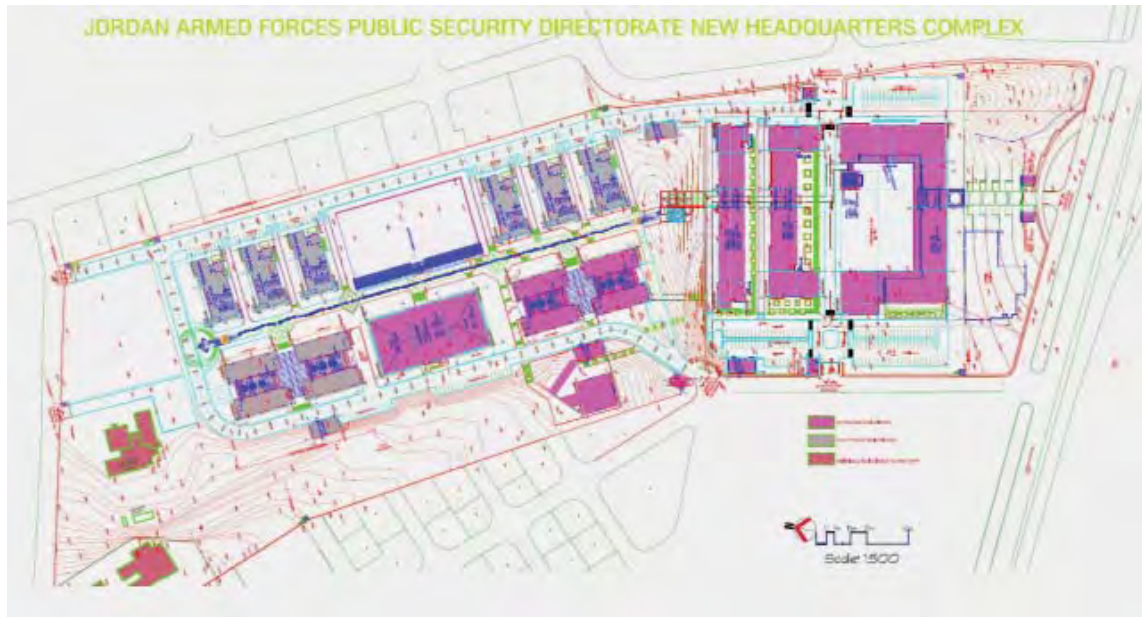
Figure 8: Site Plan of the PSD Complex. (Source: Authors).

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(1) Site character—the PSD site should maintain its small-scale ambiance, its natural appealing character, and the conjunction of formal and informal landscape setting,

(2) Common language—maintain the overall landscaped environment and a series of memorable, beautiful spaces with structures; use of a consistent vocabulary for all site elements, including planting, lighting, paving, seating, and signage,

(3) Sustainability—improve the overall landscape quality with sustainable design principles on site with the use of local plant material, balance between cut and fill of lands; preserve existing trees; collect and use stormwater for irrigation,

(4) Topography—use of topography in a creative way to reinforce the fundamental hillside character of the site; general principles included the study of grading with slopes, ridges, and elevation changes based on the existing conditions; creation of landforms—ridges, valleys, gorges, wadis, dunes and hills—associated with aridity and local climate.

General Assessment

Landscape design projects integrating sustainable site design approaches have been part of plans that have been strongly orientated toward improving the natural environment. For sustainability purposes and ecological validity, this landscape design case engaged the natural environment and ecological values have been given special emphasis. The proposed landscape plan strikes the best balance between competing opportunities and risks of the site, and attempts to present a sense of place and community by developing an inviting and open atmosphere. Another goal is to improve the quality of open space by enhancing the landscape with emphasis on the improvement of the connection between people and the natural landscape with the implementation of xeriscaping principles. Site grading is also an important landscape design tool in this project. The landscape plan's objective is to create aesthetic appeal while gracefully contouring the land to blend with existing conditions of the site.

The Mission Statement of the PSD Landscape Design seeks to provide a headquarters complex for innovation and contemplation in a large-scale urban setting. The Schematic Landscape Design and Landscape Report, which presents ingredients for future designs, and envisions the establishment of a dynamic, attractive and living outdoor environment. These presentations and analyses illustrate a useful tool during collaboration with the architects and the consultant. Indeed, they are the best examples to show us the effectiveness of designers in dealing with site design issues and environmental concerns, and how we express our own way of thinking in design.

Emerging Issues and Future Directions

Once major designs are built, they are difficult to change. The best opportunities to influence the environment, therefore, exist in the beginning stages of decision-making when key principles and strategies that guide development are established. Assessment of land uses, infrastructures, site elements and resources and future developments are important for such decisions. Designers should promote sustainable site design approaches;

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the principal component of sustainable site design is to harmonize the relationship between human and buildings, between buildings and environment, especially the natural landform. For designers, manipulation of the landform, which adds variety to the setting and reduces the sense of visual clutter common to urban centers and complex interchanges, is a very effective tool for modifying the landscape elements.

Comprehensive understanding of natural systems coupled with the application of design tools such as computer models and careful analysis of the project site can make a major contribution to the mitigation of any developmental impacts. In this respect, there is a need to highlight the role that sustainable site design approaches can play in reducing the risk of human interventions, and to mitigate the consequences. Therefore, this paper illustrates how sustainable site design practices in the early stages of a site development can be a useful tool for policy makers, planners and designers. This paper explored the natural topography as an important element of site design, which improved the identity of site with a concern that attitudes toward design should be ecological and sustainable using resources efficiently. The process and guidelines presented in this paper are intended to guide planning and design processes toward sustainable sites of better visual and functional quality. The content and material of this paper can be used by practicing landscape architects and landscape students for future projects.

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Aydin Özdemir

Aydin Özdemir received his BSc and MSc degrees in Landscape Architecture from Ankara University Department of Landscape Architecture. He attended to Urban Design Masters Program of Middle East Technical University. He graduated from North Carolina State University Environmental Design PhD Program in 2005. He is a faculty member of Ankara University Department of Landscape Architecture since 1998. His interests include developing principles of integrating landscape research and teaching. He attended several conferences and presented papers about research-teaching nexus, sustainable design and urban public spaces. He specializes in landscape design, physical and sociological assessments of public spaces and landscape engineering with a focus on site design. Dr. Ozdemir is the co-author of the book "Sustainable Site Design Approaches" (Ankara University Publishing, 2008). He can be contacted at Aydin.Ozdemir@agri.ankara.edu.tr

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Metin Başal

Metin Başal is a full professor of the Faculty of Agriculture Department of Landscape Architecture at Ankara University. He took several academic and administrative duties between 1983 and 2000. He was the head of the Landscape Architecture Association and member of the Association of Turkish Nature Preservation. He worked as a construction control engineer at the Ministry of Agriculture and as a director of science council project engineer at DSI General Directorate of Parks and Recreation Foundation. He is the co-author of several books such as "Sustainable Site Design Approaches" (2008), "Landscape Construction" (1997), "Production Techniques of Ornamental Plants" (1991) and "Ornamental Plants 1" (1989). His teaching, research and consulting work includes landscape engineering, site design, land modeling, site furniture, environmental and landscape planning and landscape design.

Ahmet Benliay

Ahmet Benliay is a full-time research assistant at Ankara University, Department of Landscape Architecture. He is currently working on his PhD at the same university in which he analyzes the sustainable landscape planning issues along the Mediterranean coast of Turkey. His teaching and research interests include landscape design, landscape engineering, site design and landscape construction. He is specialized in 3D design, computer animation and computer aided design (CAD).

TOWARDS A SUSTAINABLE NEIGHBORHOOD: THE ROLE OF OPEN SPACES

Khalid Al-Hagla

Abstract

The neighborhood is a basic planning entity in modern residential planning theories. However open spaces as a vital constituent of the neighborhood's physical structure, have an important role to play. They are the arena of both, neighbors' outdoor interactions –consequently building the neighborhood's sense of community- and the micro ecological sphere - setting its parameters and configuring its fundamentals. The paper aims to investigate the roles and responsibilities that open spaces -in neighborhoods- have to take to achieve sustainability goals and objectives. However it follows an approach based on both the social and ecological neighborhood's ability to tackle sustainability issues. It focuses on the typical open space structure of the neighborhood as the media of different social and ecological interactions. Regarding this concern the paper differentiates between two main categories of the neighborhood's open space; "greenspace" and "greyspace". Moreover, the paper develops a three dimension matrix that sets the interrelations between different types of neighborhood open space and sustainability goals and objectives that have to be achieved within the community. It uses this matrix to assess the sustainability performance of different typologies of open space; moreover it determines the priorities of sustainability parameters that have to be applied to an assigned open space. Finally, the paper applies its findings to two different typologies of open spaces in Lebanon; Beirut Pine 'Horsh Beirut' as a greenspace, and the historical market, and pedestrian streets in Byblos as a greyspace. The application comes to show the validity of conceptual application of the proposed matrix.

Keywords:

Sustainable development; neighborhood; open space; Beirut Pine; Byblos.

Introduction

The rapid growth of towns and cities in the nineteenth century led to calls for parks to be provided for the health of factory workers and consequently it benefited society as well. This could be seen as an early precedent to highlight the role of open spaces in supporting what we now call sustainable development. This achieved a wide range of benefits to the economy (healthier, happier, and therefore more productive workers), social life (people relaxing and meeting in the parks) and the environment (as open spaces were created amongst the streets, mines and factories). (Shirley, 2005).

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Nowadays, open spaces take up more than one third of total neighborhood areas. They are playing a dual role in the structure of neighborhoods. The first is 'social': that come out of understanding the neighborhood as a 'community'. Meanwhile, the second is 'ecological': that see the 'ecological perspective' is much more appropriate to be applied to a neighborhood regarding its unique site qualities. Each of these two approaches covers a different perspective of sustainability application to neighborhood scale. However, the paper develops an integrated approach that appreciates the fact that social and environmental goals are often mutually reinforcing, thus providing a broad constituency of support for policy. Moreover, they come to the heart of the role that open spaces play.

Sustainable Neighborhood.

There are different approaches that tackle the application of sustainability to neighborhoods. Among these approaches, stands both social and ecological as two different but integrated perspectives. Regarding the social perspective, the overlapping area of both the terms 'neighborhood' and 'community' could be used to understand the definition that the Egan Review (2004) report 'Skills for Sustainable Communities', develops. It highlights sustainable communities as those which "meet the diverse needs of existing and future residents, their children and other users, contribute to a high quality of life and provide opportunity and choice. They achieve this in ways that make effective use of natural resources, enhance the environment, promote social cohesion and inclusion and strengthen economic prosperity". (Review, 2004:1) It concludes that there are

seven components of sustainable communities drawn from this definition; governance; transport and connectivity; services; environment; economy; housing and the built environment; sociology and culture.

From another stand point, Hugh Barton (1996) gives a different approach based on the 'Ecological Perspective'. He asserts that "One way of approaching the problem of sustainable design is to see each development as an organism or a mini ecosystem in its own right". (Barton et al, 1996) Regarding this point of view, a neighborhood is an ecosystem in the sense that it provides the essential local habitat for humans, creating its own microclimatic conditions, and should provide as far as possible for their comfort and sustenance.

Figure 1: Neighborhood as an Eco-system. (Source: Barton et al, 1996).

Sustainability dimensions, goals, and objectives applied to neighborhoods

The application of wide-scope conceptual sustainability dimensions to neighborhoods

needs them to be interpreted practically into goals and objectives. However, the following table sets the sustainability goals and objectives that have to be achieved at neighborhood

level. They are driven from the sustainability dimensions applied to the neighborhoods (Figure 2).
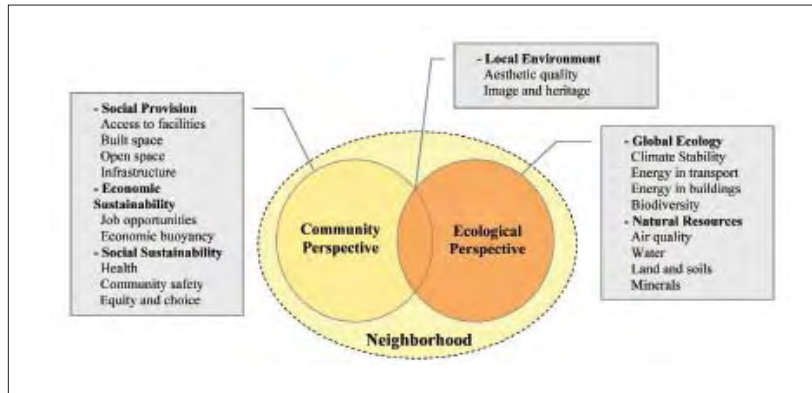
Figure 2: Sustainability Dimensions, Applied to Neighborhoods. (Source: the Author based on Shirley, 2005).

Open Space Morphology of Neighborhoods

Open spaces in neighborhoods are defined as 'any unbuilt land within the boundary or designated envelope of a neighborhood which provides, or has the potential to provide, environmental, social and/or economic benefits to communities, whether direct or indirect.' (Campbell, 2001) They could be classified according to a number of criteria, however this paper differentiates vegetated from non-vegetated areas and this leads to the following typological classification:

- Greenspace: a sub-set of open space, consisting of any vegetated land or structure, water or geological feature within urban areas.
- Greyspace (sometimes referred to as "civic

space"): a sub-set of open space, consisting of urban squares, market places and other paved or hard landscaped areas with a civic function.

Moreover; seven distinct sub-sets of publicly accessible greenspace, could be realized each with a specific and distinct primary function (Campbell, 2001):

■ **Parks and gardens:** areas of land, normally enclosed, designed, constructed, managed and maintained as a public park or garden. They can be either urban parks or country parks depending primarily on their location. They often incorporate other types of greenspace, such as children's play areas and sports facilities, but their primary function is for informal activity or relaxation, social and community purposes, and horticultural or arboricultural displays. Some parks and gardens may also be designed landscapes of

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historical importance, where they are of national significance.

■ **Amenity greenspace:** Managed and maintained landscaped areas with no designated specific use by people, but providing visual amenity or separating different buildings or land uses for environmental, visual or safety reasons. They may also be used, incidentally, as wildlife habitats.

■ **Children's play areas:** Designated and maintained areas providing safe and accessible opportunities for children's play, usually linked to housing areas and therefore normally set within a wider green environment of amenity open space. The primary function of these areas is to provide safe facilities for children to play, usually close to home and under informal supervision from nearby houses.

■ **Sports facilities:** Designed, constructed, managed and maintained large and generally (although not always) flat areas of grassland or specially-designed artificial surfaces, used primarily for designated sports. The primary function of these areas is to accommodate practice, training and competition for recognized outdoor sports.

■ **Green corridors:** Routes linking different areas within a town or city as part of a designated and managed network and used for walking, cycling or horse riding or linking towns and cities to their surrounding countryside or country parks. The primary function of green corridors is to allow safe, environment-friendly movement within urban areas. Moreover, they support wildlife colonization and therefore habitat creation.

■ **Natural/semi-natural greenspaces:** undeveloped land with little or only limited maintenance which have been planted with wild flowers or colonized by vegetation and wildlife. They also include

woodland, railway embankments, river and canal banks and derelict land, which may in some cases be thought of as temporary natural greenspace. The primary function of natural greenspaces is to promote biodiversity and nature conservation.

■ **Other functional greenspaces:** Essentially allotments, the yards of religious buildings and cemeteries.

Some classifications may wish to add an eighth type of greenspace – school grounds. However, regarding the approach of this paper, they could be included within the above typology, even if they normally include more than one type of greenspace.

There are also various types of Greyspace (civic space), including:

■ **Civic squares and plazas:** often containing statues or fountains and primarily paved, sometimes providing a setting for important public buildings.
■ **Market places:** usually with historic connotations.
■ **Pedestrian streets:** usually former roads which have been paved over and provided with seats and planters.
■ **Promenades and sea fronts:** usually used for recreational activities. They have special value when located at historical areas.

The Role of Open Space in Achieving Sustainable Neighborhood

The role that is assigned to open spaces to play within the neighborhood structure, to achieve sustainability goals and objectives, is formulated in three key issues; space management, space function (circulation of people and permeability), and the role of objects within

space (sustainable landscape). (Campbell, 2001, Ironside, 1999, Birkeland 2004) The detailed study for these issues sets the sustainability checklist applied to open spaces. These details are as follows:

■ **First: Space Management** is a key issue to be taken into consideration. As in open space terms, sustainability is a function of the inter-relationship between design and management. This includes: (Campbell, 2001) (Ironside, 1999)

- encouraging sustainable lifestyles, for example by providing paths and cycle routes

- making maximum use of existing features and assets

- strengthening the sense of place

- incorporating local or recycled materials

- encouraging community participation and involvement

-reducing inputs of non-renewable resources during construction and subsequent maintenance

- eliminating or reducing the use of herbicides and resources that affect other ecosystems

- encouraging habitat creation and native planting

- managing resources carefully

■ **Second: space function** (circulation of people and permeability), while most modern development planning uses the road network as the key structural element, a sustainable design takes the circulation of people on foot and bike and the effectiveness of public transport as starting points (Barton, 1996). However, creating

neighborhoods where walking is the natural and pleasurable means of access between activities achieves much of sustainability goals and objectives (quality of life-health economics of communities, and community participation) (National Neighborhood Coalition, 2005). Moreover, it becomes a social activity in its own right. Thus the number of people on the streets and paths itself provides security. On the other hand, Smart Growth, New Urbanism and Neo-traditional Development trends highlight the importance of developing 'mixed land use' strategies to promote walking activities. They assert that "Communities can support walking and cycling if they are developed with meaningful destinations in close proximity to each other, such as shopping, school and employment". (National Neighborhood Coalition, 2005) These movements strive for well-designed communities that provide safe and abundant opportunities for routine physical activity. The objectives are to:

- reduce the level of car reliance,
- reduce the need to travel - with the social benefits of increasing transport choice for all groups in the population,
- enhancing local security and community

■ **Third: the role of objects** within space (sustainable landscape). Landscaping elements are the basic constituent of any open space's structure. They have to be utilized to achieve sustainability goals at the micro level. Janis Birkeland (2004) draws a framework for sustainable landscaping elements as they should:

- Return to original sources of inspiration, whether nature or culture. (Papnek, 1984).

- Respond to the site, designing in harmony with its distinctive character to enable the

unfolding of the landscape's ecological potential over time. This involves:
• creating connections and themes (functional and perceptual as well as spatial) within and across sites while defining and delineating boundaries;
• transforming site constraints into environmental opportunities;
• minimizing negative environmental impacts (including sensory as well as physical pollution);
• maximizing positive impacts, off-site as well as internally.

- Minimize inputs of materials and energy and maximize outputs of renewable and reusable resources.

- Maximize resilience and dynamic stability in the landscape in such a way that each element fulfils several functions and each function is undertaken by several elements.
• maximizing the diversity of landscape elements and the diversity of relationships between elements;
• creating opportunities for the emergence of self- sustaining and self-regulating systems in the landscape.
- Create 'place' as distinct from merely manipulating space, in such a way that the design maximizes the potential for user interaction with the environment.

- Make systems visible, which means making environmental processes apparent and celebrating them.

- Minimize maintenance and maintain to enable full expression of design, acknowledging that ongoing management is itself an aspect of design, to ensure the continuity of sustainable outcomes.

On the other hand, Ironside (2005) gives a detailed definition to sustainable residential greenspace as: "Greenspace fit for its purpose, responsive to evolving needs and changes over an extended period of time, not requiring an excessive input of resources."

In addition to the previously mentioned key issues, this definition dictates that; for a Greenspace – as a division of open space- to be sustainable it should:

- meet the varied recreation and leisure needs of users and
- involve local communities

Open Space Sustainability Parameters

Based on the above-mentioned discussion, this paper proposes a three dimensional matrix that consists of two main parts. The first is a two dimensional matrix that investigates the relationship between the sustainability goals and objectives, and the different types of open spaces in a neighborhood. This matrix indicates the roles and responsibilities that each of these types has to play –divided mainly into categories of 'greenspaces' and 'greyspaces'. The second, is a two dimensional matrix that correlates the assigned sustainability parameters (checklist) –driven out of three main sustainability issues, management, circulation, and sustainable landscape– with the open spaces categories of neighborhoods, 'greenspaces' and 'greyspaces'.

However, it draws space responsibilities that have to be achieved to support sustainability practices in neighborhoods. That clearly depends on spaces' integrated dimensions: physical and non-physical. Moreover, it shows the overlapping

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area of practices that these types have to play all together to fulfill their sustainability responsibilities.

The first two-dimensional matrix answers the question about 'What' are the goals and objectives that the open spaces in a neighborhood have to achieve. And the second is about 'How' these goals and objectives could be achieved. The overlapping answers of these two questions draw the dimensions of the developed three dimensional matrix. However this matrix could be used to develop a further checklist for evaluating the open spaces performance in neighborhoods. This could be achieved in three consequent steps as follows [numerically indicated in Figure 4].

■ The first, is to determine which type of open space the study wants to investigate
■ The second, is to determine the sustainability goals and objectives that are assigned to this type of open space and have to be achieved in the neighborhood. [table 1]
■ The third, is to develop a checklist of the sustainability parameters assigned to this type of open space. [table 2]
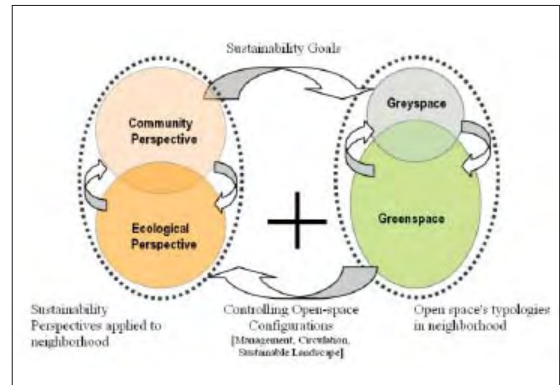
Figure 3: Neighborhood's Sustainability Mechanism. (Source: Author).
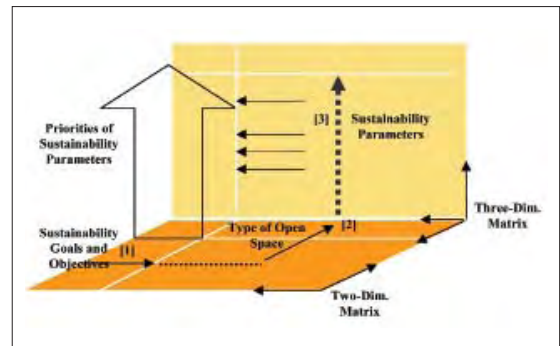
Figure 4: Three Dimension Matrix Correlates Types of Open Space to Sustainability Attributes. (Source: Author).

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Table 1: Sustainability Matrix-A (correlating sustainable development with open space typologies - Source: Author).

Utilizing the Matrix in Evaluating Open Space Sustainability Performance

The study applies its findings to two different types of open spaces. The first is the Beirut Pine 'Horsh Beirut' that is located at the southern portion of the city, at the heart of a number of residential neighborhoods. It is classified as a 'Greenspace' serving number of functions –parks and gardens, children playgrounds, and sports facilities. The second is the pedestrian open spaces at Byblos. They are classified as 'Greyspaces', however they function as: market places and pedestrian streets.

Evaluating the sustainability performance of Beirut Pine 'Horsh Beirut'

Using the proposed matrixes (tables 1 and 2), the paper builds up the following tables that focus on the functions that the Beirut Pine 'Horsh Beirut' serves (figure 5).

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Table 2: Sustainability Matrix-B (correlating sustainable development with open space typologies - Source: Author).

Figure 5: Different Activities Performed in the Beirut Pine 'Horsh Beirut', [park and gardens, children's play area, and sports facilities]-(Source: Author).

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The application of the proposed matrix to Beirut Pine 'Horsh Beirut' is divided into two succession stages; the first is to determine the sustainability objectives -and their priorities- that have to be achieved while using this greenspace, and the second is to define the parameters used to evaluate its sustainability performance.

The sustainability performance of Beirut Pine 'Horsh Beirut' is seen as complex as the multi functions that this greenspace is utilized for. The table (3) shows 'Horsh Beirut' as a composite of three different greenspace typologies; parks and gardens, children's play areas, and sports facilities. However, to determine the priorities of sustainability goals and objectives that have to be achieved through this multi functional greenspace, the paper assigns a relative weight equivalent to the type of influence that each space typology affects sustainability performance (2 to direct influence, 1 to indirect influence, and 0 to no influence). Reading table (3), and according to the shown relative scale, sustainability goals and objectives, could be re-arranged regarding their importance (indicated at the last column-right).

Sustainability Goals	Sustainability Objectives	Parks and gardens	Children's play areas	Sports facilities	Assigned Weight
Cutting greenhouse gas emissions Energy	• Reduce the need to travel		□	□	2
	• Reduce car reliance				0
	• Increase energy efficiency in buildings				0
Closing local resource loops	• Reduce demand for non-renewable resources	■	□		3
	• Reuse and recycling of resources locally	□			1
	• Local water sourcing, treatment and aquifer recharge	□			1
	• Local low-input food production	□			1
Enhancing local environmental quality	• Promote local distinctiveness and heritage	■	□		3
	• Create an attractive public realm	■	■	■	6
	• Enhance local habitat diversity	■			2
Creating a healthy environment	• Improve local air quality	■		□	3
	• Promote an active life-style (especially walking)	□	□	■	4
	• Encourage consumption of fresh fruit and vegetables				0
Increasing street safety	• Reduce the chance of vehicle/pedestrian accidents				0
	• Reduce the fear of violence		□	■	3
Increasing accessibility and freedom of choice	• Choice of transport mode for trips				0
	• More facilities accessible locally		■	■	4
Equity and social inclusion	• Choice of facilities within easy walking distance		■	□	3
	• Viability of public transport				0
Local work opportunities	• Accessible jobs for those tied to the locality		□		1
	• Reduce transport emissions	■			2
Value of local community	• Facilitate accessible social networks	■	■	□	5
	• Promote mental health	■	■	■	6
Increasing local self-determination	• Increase user/citizen control		□		1
	• Management of decentralized systems				0

Table 3: Applying Sustainability Matrix to the Beirut Pine 'Horsh Beirut' Greenspace - Section A - (Source: Author).

The matrix correlates different sustainability goals and objectives to the composite typology of the Beirut Pine 'Horsh Beirut' greenspace.

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Table 4: Applying Sustainability Matrix to the Beirut Pine 'Horsh Beirut' Greenspace - Section B - (Source: Author).

The matrix correlates different sustainability 'Parameters' to the composite typology of the Beirut Pine 'Horsh Beirut' greenspace.

Table (3) shows that: for Beirut Pine 'Horsh Beirut' –in its composite greenspace typology-, the sustainability goals that have the first priority to be achieved are to: enhance local environmental quality and to increase the value of local community. Moreover, the sustainability objectives are: to create an attractive public realm, to promote mental health, and to facilitate accessible social networks. Moreover, Table (4) shows that: the most important sustainability indicators are as follows:

Does the Beirut Pine 'Horsh Beirut' ...... ?
- Strengthening the sense of place?
- Encourage community participation and involvement?

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- Meet the varied recreation and leisure needs of users?

Does the Beirut Pine 'Horsh Beirut' ...... ?
- Reduce the need to travel?
- Enhance local security and community?
- Return to original sources of inspiration?
- Create 'place' as distinct from merely manipulating space?

Evaluating the sustainability performance of pedestrian streets and historical marketplace at Byblos

The sustainability performance of the pedestrian open spaces at Byblos is seen as complex as the multi functions that these greyspace are used for.

Figure (6) and table (5) show streets of Byblos as a composite of two different greyspace typologies; historical market spaces, and pedestrian streets. However, reading table (5), -according to the shown relative scale-, sustainability goals and objectives, could be re-arranged regarding their importance (indicated at the last column- right).

Table (5) shows that: for the pedestrian open spaces at Byblos, the sustainability goals that have the first priority to be achieved are to: enhancing local environmental quality, increasing both the value of local community and street safety.

Figure 6: Views of Different Architectural and Urban Features of Byblos Spatial Expression. [the open spaces function as; historical market place and pedestrian streets]-(Source: Author).

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Moreover, the sustainability objectives are to: promote local distinctiveness and heritage, facilitate accessible social networks, reduce car reliance, create an attractive public realm, reduce the fear of violence, and promote an active life-style (especially walking).

Moreover, Table (6) shows that: the most important sustainability indicators are as follows:

Do the greyspaces at Byblos ...... ?
- Enhancing local security and community?

- Create 'place' as distinct from merely manipulating space?
Comes to the second priority the following

Do the greyspaces at Byblos ...... ?
- Return to original sources of inspiration?
- Strengthening the sense of place?
- Reducing inputs of non-renewable resources during construction and maintenance?
- Reduce the level of car reliance?
- Reduce the need to travel?

Sustainability Goals	Sustainability Objectives	Market spaces at Byblos		
		Market place	Pedestrian streets	Assigned Weight
Cutting greenhouse gas emissions Energy	• Reduce the need to travel	▫	▫	2
	• Reduce car reliance	▫	■	3
	• Increase energy efficiency in buildings			0
Closing local resource loops	• Reduce demand for non-renewable resources		▫	1
	• Reuse and recycling of resources locally			0
	• Local water sourcing, treatment and aquifer recharge			0
	• Local low-input food production			0
Enhancing local environmental quality	• Promote local distinctiveness and heritage	■	■	4
	• Create an attractive public realm	▫	■	3
	• Enhance local habitat diversity		▫	1
Creating a healthy environment	• Improve local air quality		▫	1
	• Promote an active life-style (especially walking)	▫	■	3
	• Encourage consumption of fresh fruit and vegetables			0
Increasing street safety	• Reduce the chance of vehicle/pedestrian accidents		■	2
	• Reduce the fear of violence	▫	▫	2
Increasing accessibility and freedom of choice	• Choice of transport mode for trips			0
	• More facilities accessible locally	▫		1
Equity and social inclusion	• Choice of facilities within easy walking distance	▫	▫	2
	• Viability of public transport			0
Local work opportunities	• Accessible jobs for those tied to the locality	▫		1
	• Reduce transport emissions		■	2
Value of local community	• Facilitate accessible social networks	■	■	4
	• Promote mental health		▫	1
Increasing local self-determination	• Increase user/citizen control		■	2
	• Management of decentralized systems	▫		1

Table 5: Applying Sustainability Matrix to the Byblos Greyspaces - Section A - (Source: Author).

The matrix correlates different sustainability goals and objectives to the composite typology of the Byblos greyspaces.

Table 6: Applying Sustainability Matrix to the Byblos Greyspaces - Section B - (Source: Author).

The matrix correlates different sustainability 'Parameters' to the composite typology of the Byblos greyspaces.

Conclusion

This paper proposed an approach based on the intersecting area of both social and ecological approaches to investigate the potential of open space to achieve sustainability goals and objectives in neighborhoods. Such an approach is chiefly based on the dual role that open spaces play in articulating the character of neighborhoods. They are the domain for different

social interactions and shared community activities, and the field of micro-ecological features to express their personality.

In its review of literature on neighborhood open spaces, the paper utilized a classification that would be appropriate to its approach. It differentiated between 'greenspace' and 'greyspace' as the main categories involved in open spaces. It placed special emphasis on 'greenspace' as more relevant to achieving sustainability prospects at the neighborhood level. As well, the paper discussed different types of 'greenspace' and their role in the neighborhood; parks and gardens, amenity greenspace, children play areas, sports facilities, green corridors, natural/ semi-natural greenspaces, and other functional greenspaces. Moreover, the paper highlighted different types of 'greyspace'; civic squares and plazas, market places, pedestrian streets, and promenades and sea fronts.

Three main sustainability attributes of neighborhood's open spaces were discussed; space management, space function (circulation of people and permeability), and the role of objects within space (sustainable landscape). Consequently, the paper concluded a set of parameters that could be used as an indicator of sustainability performance at the neighborhood level. These parameters were utilized to develop a three dimensional matrix correlating: different typologies of open spaces, sustainability goals and objectives, and sustainability parameters. Such a matrix was applied to two different space typologies in Lebanon; Beirut Pine 'Horsh Beirut' as a greenspace, and the historical market, and pedestrian streets in Byblos as a greyspace. The application comes to determine the priorities of both sustainability goals and objectives,

and sustainability parameters that have to be evaluated at each area.

Regarding the Beirut Pine 'Horsh Beirut', the paper concludes that: to enhance local environmental quality and to increase the value of local community are the main goals. Meanwhile, to create an attractive public realm, to promote mental health, and to facilitate accessible social networks are the main sustainability objectives. Regarding the historical market, and pedestrian streets in Byblos, the paper concludes that: to enhance local environmental quality, to increase both the value of local community and street safety are the main goals. Meanwhile, to promote local distinctiveness and heritage, facilitate accessible social networks, reduce vehicular movements, create an attractive public realm, reduce the fear of violence, and to promote an active life-style (especially walking) are the main sustainability objectives.

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Khalid Al-Hagla

Khalid Al-Hagla is an architect and urban designer, has a master degree in urban design (1997), and Ph.D. in sustainable development (2000) from Alexandria University, Alexandria, Egypt. He is Associate Professor of Architecture currently teaching at the Faculty of Architectural Engineering, Beirut Arab University, Beirut, Lebanon. He taught at the Arab Academy for science and Technology (AAST) from 2000 to 2003, Alexandria, Egypt, and at the Dept. of Architecture, Faculty of Engineering, Alexandria University, Alexandria, Egypt from 2000 to date. His research interests include sustainable development, cultural sustainability, sustainable tourism, urban design, New Urbanism. Dr. Al Hagla has practiced architecture in Egypt, was Consultant for Engineering Department, Bibliotheca Alexandrina, from 2000 to 2003, and is currently an expert at the General Organization for Physical Planning, Egypt. He can be contacted at khalid@pylon-group.com.

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EMERGING CITIES ON THE ARABIAN PENINSULA:
URBAN SPACE IN THE KNOWLEDGE ECONOMY CONTEXT

Alain Thierstein and Elisabeth Schein

Abstract

Networks of the growing knowledge economy significantly influence spatial development on different scales. This paper proposes a framework for analyzing the impact of global knowledge economy networks on the rapidly developing urban space of emerging cities on the Arabian Peninsula, and vice versa. Two aspects of the described research are innovative: First, a global relational geography-perspective builds the basis for approaching the analysis of urban space development in emerging cities on the Arabian Peninsula. Second, the empirical methodology of the research project is a newly defined method triangulation, setting an example for systematic analysis of local urban development in a global context. The method triangulation combines three different research angles: A knowledge economy firm perspective, an on-site observation perspective and a planner perspective. The method triangulation defines the procedure for the research application in selected case study cities on the Arabian Peninsula. Initial results from applying the research methodology in the city of Dubai give a first indication, that emerging cities on the Arabian Peninsula play a significant role in the global and regional knowledge economy networks. Locally developed urban spaces reflect and influence the significance of cities in the global knowledge economy context. Especially the global visibility of urban spaces on a city district scale, which specifically address the needs of knowledge economy players, contributes significantly to the attractiveness of emerging cities on the Arabian Peninsula.

Introduction:
Coherence between Global Knowledge Economy Networks and Local Urban Space

Since the late 20th century cities on the Arabian Peninsula have emerged as fast growing knowledge economy locations. Unique for this region is the phenomenon of extremely young and fast urban development. Turning presumably valueless desert sand into highly attractive real estate, emerging cities on the Arabian Peninsula have gained global importance in terms of connectivity with other prominent cities in global knowledge economy networks in a very short timeframe.

The "World City network" ranking (Taylor, 2004)

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outlines the best connected cities within the global network of advanced producer service firms. The Top 200 list contains seven emerging cities from the Arabian Peninsula with a young history of rapid ascension. Sorted from the highest to the lowest rank the cities are Dubai (UAE), Manama (Bahrain), Jeddah (Saudi Arabia), Riyadh (Saudi Arabia), Abu Dhabi (UAE), Kuwait (Kuwait) and Doha (Qatar).

Since these cities developed in parallel to the growing importance of the knowledge economy, case example cities on the Arabian Peninsula seem to be the ideal place to answer our central research question: How does the global significance of emerging cities in the context of a growing knowledge economy affect the development of local urban spaces and vice versa? To answer this central research question this paper proposes a framework consisting of four parts that can be exemplified as follows:

The first part discusses theoretical approaches associated to relational geography and urban development in an economic context and gives definitions for frequently used terms of this paper. The theoretical and conceptual considerations are leading to the three main hypotheses of the research project.

The second part outlines the newly developed method triangulation, proposing a feasible empirical approach for a systematic analysis of local urban development in a global context. Furthermore, the process for selecting case-study cities to apply the method triangulation is outlined.

The third part presents preliminary results of the application of the research methodology in the city of Dubai by discussing the initially suggested hypotheses.

Finally the fourth part concludes by synthesizing the major first findings of the research project and by giving an outlook of the further proceedings.

Related Theoretical Approaches and Definitions

In this research project we bring together two different scientific fields: Relational geography and physical urban development. Therefore this chapter aims to provide an overview of the two areas: First, we explain the used theoretical approach of relational geography and define the term knowledge economy. Second, we give a background on the topic of urban development in an economic context and define the term urban space. The outlined conceptual frame will finally guide us to the key hypotheses of the research project.

Theory of Relational Geography and Definition of Knowledge Economy

Relational geography is a relatively new scientific discipline, analyzing the importance of locations within the global city network in the context of the growing knowledge economy. One of the most influential works for nowadays studies on relational geography is Manuel Castells` publications about the space of flows. Manuel Castells argues, that " our societies are constructed around flows: flows of capital, flows of information, flows of technology, flows of organizational interactions, flows of images, sounds and symbols…" (Castells, 1996: 412). He developed a new perception of spatial and urban development by identifying the space

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of flows as the underlying concept of spatial development rather than the space of places, represented by world cities and other territorial spaces: "The global city is not a place, but a process […]" (Castells, 1999: 39). The space of flows enables real-time interaction without physical proximity. While this is a necessary condition for globalizing markets, it is not sufficient, since face-to-face interaction is still "critical, to establish and maintain personal relationships of trust and cooperation" (Hall, Pain, 2006:10). Thus in order to properly understand the multi-scalar simultaneous development of large-scale urban structures, one has to consider a dual analytical approach. The relational worlds of non-physical functional inter-locking networks of knowledge-intensive firms is to be conceptualized as 'spaces of flows', while the physical side of localized urban nodes of these same inter-locking networks are to be considered as 'spaces of places'.
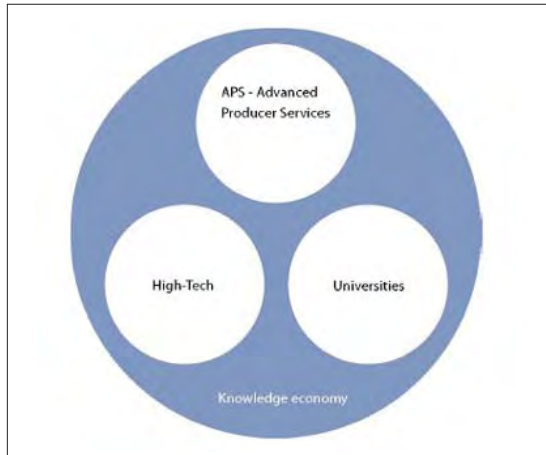
Figure 1: Structure of the Knowledge Economy. (Source: Thierstein et al., 2006).

Within the space of flows the growing knowledge economy has been identified as a major development driver (Raspe, van Oort 2006; Thierstein et. al., 2006). Knowledge economy as defined by Thierstein is an interdependent system of APS firms, High-Tech industries and knowledge creating institutions such as universities and research establishments (figure 1). Combining science based knowledge and operating experience is characteristic for innovation and thus for the knowledge economy.

The exchange of knowledge to a large extent requires geographical, social and cultural proximity, which at the core is based on personalized face-to-face interactions (Saxenian 1991; Oinas 2000; Torre, Rallet 2005). In this context we have to differentiate between two categories of knowledge: Codified knowledge and tacit knowledge (Polanyi, 1964). While codified knowledge can be easily standardized and replicated, the transfer of tacit knowledge requires contacts in person. Therefore "[…] tacit knowledge is localized in particular places and contexts" (Malecki, 2000:110). The described "local nature of knowledge" (Malecki, 2000) forms the basis for several studies on location strategies of knowledge economy firms, which aim to identify non physical global firm knowledge flows and networks.

Peter Taylor developed an empirical research method, to quantitatively identify inter-locking firm networks and measure the non physical connectivity of cities by analyzing intra-firm company networks (Taylor, 2004). He used the networks of Advanced Producer Service (APS) firms, one pillar of the knowledge economy, to come up with a ranking of world cities regarding their connectivity degree.

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An analysis of the location behavior of knowledge-intensive economy (KIE) firms is also part of the research project described in this paper. The focus of the analysis in this case lies on the following two pillars of the knowledge economy: Advanced Producer Services (APS) firms and High-Tech firms. In the paper we will refer to these two sectors with the term knowledge-intensive economies (KIE). Universities and academic research institutions are omitted in this context since these institutions do not in general display a very dynamic multi-branch, multi-location behavior like the otherwise private firms in the APS and High-Tech sectors. We have defined KIE on basis of the international NACE classification (Nomenclature générale des activités économiques). Table 1 shows the lines of businesses, which have been included in the empirical research.

Another highly influential researcher in the area of relational geography is Saskia Sassen. She showed, that knowledge-intensive head offices of APS firms are mainly located in core metropolitan regions, which act as nodal points within an international network of cities. In 2001 she identified New York, London and Tokyo as the "global cities", which are prioritized locations for a large share of APS firms (Sassen, 2001).

However, the geo-strategic role of regions as well as cities changes over time. Wallerstein presented an analysis of the emerging world system and the core mechanism of the European capitalist trade system (Wallerstein, 1974). Thus the world capitalist system is organised in three parts: (1) the core areas – European territorial entities or states for a long time have been the "core" of the world economy; (2) The peripheral areas, that have been exploited to supply cheap labour and natural resources and were markets for surpluses of the core area; (3) the semi-peripheral areas that always acted – and do so today – mediate in the sense of transaction services between the former two areas. Wallerstein's analysis later evolved into functional network concepts like 'Global Commodity Chains', 'World City Networks' or 'Global Production Networks' (Coe et al. 2008).

Furthermore, history shows that cities can gain and loose their significance within the global city network. This is simply a question of time. As Peter Dickens outlines (Dickens, 1998), the world economy follows long waves of economical up- and downturns. Driven by radical innovations these economic cycles influence the functional hierarchy of cities. The growing importance of cities on the Arabian Peninsula from a relational geography point of view is evidence of Dickens theory.

Advanced Producer Services (APS)	High Tech
Accounting	Chemistry and Pharma Industry
Insurance	Mechanical Engineering
Banking and Financial Institutions	Computers
Law	Electrical Machinery
Logistics	Telecommunication
Design and Architecture	Medical and Optical Instruments
Management and IT Consulting	Vehicle Construction
Advertising and Media	

Table 1: Overview of Knowledge-Intensive Economy Sectors (Source: Authors).

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Urban Development in an Economic Context and the Definition of Urban Space

Economic change historically seen has had an impact on urban development and urban space. Europe, for example, has faced its highest emergence of new cities back in the 13th century, when technical inventions in the agricultural sector and a flourishing trade economy have stimulated growth (Gross et al., 2004).

Another example for the impact of economic change on urban development and planning is the industrialization age. Industrialization created the demand for a city wide spatial segregation of urban functions. Ebenezer Howard developed the garden city as a segregated place for living with low density (Howard, 1902). However, the functional division, as manifested in the Charter of Athens, as well as the low density degree in certain city spaces created disadvantages like an increased commuting traffic and the loss of city enlivement around the clock. These factors later on lead to the postulation of traditional city spaces with a high degree of functional intermixture and density by Jane Jacobs (Jacobs, 1993).

But not only historic examples show, that economic change has an impact on urban development and urban space. Nowadays the growing knowledge economy strengthens the role of cities as nodal points of exchange for tacit knowledge within the global space of flows.

But how can cities fulfill the requirements of a globally connected location and what exactly are the requirements of the knowledge economy towards urban space? A closer look at emerging cities on the Arabian Peninsula is expected to help in answering this question. These cities have been free of boundaries from the above described historic urban developments, as their history of ascension is still very young. Dubai for example developed in a very short timeframe from a small fishing village to a global city attracting international knowledge economy firms. While in 1950 it still was a small town with no more than 20.000 inhabitants, it is a global hub with more than 1,5 million inhabitants today (United Nations, 2004). Besides Dubai several other emerging cities on the Arabian Peninsula have developed to highly attractive locations for the knowledge economy in the last decades.

If we want to analyze the impact of the growing knowledge economy on urban spaces, we need to define the term urban space first. We can look at space from different perspectives. Complex scientific theories about space underline this. Henry Lefebvre outlines three different angles, to observe space: Space is lived, perceived and conceived (Lefebvre, 1991). On the one hand side we live in space, which means that space is the basis for our social interactions. But space is also a physical, materialized surrounding, which we perceive with our senses. Finally, space is conceived in the sense of how architect, politics, scientists and others theoretically think about the outline of space and act upon the physical space as designers and planners. These three perspectives of space need to be considered, if we want to analyze space in a comprehensive way. Therefore our methodological research approach will also reflect the described perspectives, which will be presented later on.

Talking about urban space from any of the above mentioned perspectives, we have to

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consider three different dimensions of space (Boesch, 1989): First, the dimension of distance, which reflects the proximity and availability of urban functions as well as the density of buildings, people and inhabitants. Second, the dimension of functionality which consists of the existence of urban functions, the degree of functional diversity and the morphology. Morphology is defined as the sequence of open and close spaces, the sequence of public and private spaces and the building types (e.g., high rise, one-story solitaire building). Third, the dimension of process which considers the urban development over time and the agents involved in the urban development and planning process.

Bridging the Gap between Existing Research: The Three Central Hypotheses

We have so far given some background on the two scientific areas of relational geography and physical urban development. In order to answer our central research question regarding the impact of emerging Arab cities` global significance on the development of local urban space in the context of a growing knowledge economy, we have to bring the two scientific approaches together. The relational geographical analysis of emerging cities will give us a global functional perspective on the emergence of cities on the Arabian Peninsula, while a physical urban development analysis will compensate that from a local view point. In this way we can test the following three central research hypotheses:

• **Hypothesis 1:** If cities with a high functional connectivity rank in global city networks have emerged on the Arabian Peninsula in recent years, then this is due to a rapid growth of knowledge-intensive economies influenced by various favorable location-specific development forces.

• **Hypothesis 2:** If an emerging city on the Arabian Peninsula is attracting knowledge-intensive economies, then a specific urban space aiming to fulfill the demand of knowledge-intensive economies is created there.

• **Hypothesis 3:** If the urban space of emerging cities on the Arabian Peninsula is fulfilling the demand of knowledge-intensive economies, then these developments can teach western-European cities urban requirements of knowledge-intensive economies.

The third research hypothesis focuses on Western-Europe, since the authors of this paper are of Western-European origin. However, theoretically the third hypothesis can also be applied to any of the so-called developed regions other than Western-Europe.

Method Triangulation and Defining the Study Area

The method triangulation developed and applied in the described research project proposes an applicable empirical approach for a systematic analysis of local urban space development in a global context. As outlined before, our methodological approach reflects the three perspectives of urban space described by Lefebvre (Lefebvre, 1991). The method triangulation therefore consists of three complementary research methods:

• Survey with knowledge-intensive economy firms (lived urban space)

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• On site observation of urban structure and space (perceived urban space)
• Content analysis of planning process and material (conceived urban space)

The three research methods are conducted in the above described sequence. In the following we will describe the research methods in greater detail, outlining the expected results of the methods and their benefit of combination.

Survey with Knowledge-Intensive Economy (KIE) Firms (Lived Urban Space)

Target of this method is to develop an understanding for the following three factors: 1. The importance of emerging cities with respect to its non-physical connectivity degree (globally and in relation to other locations on the Arabian Peninsula) based on KIE firm location descriptions, 2. The location criteria of emerging cities globally attracting KIE firms and the relevance of local facilities for KIE city location selection, 3. The requirements of KIE firms regarding urban space. An online survey is used for a broad, quantitative evaluation of these factors. Interviews with managers and board members of KIE firms qualitatively validate the results of the online survey.

Zawya as one of the most exhaustive company databases in the Middle Eastern region is used to source firms for the online survey participation. A link to the online survey is sent via e-mail to all firms, which fall into the NACE code classifications of KIE defined above. In this way we reach out to a large amount of firms with low effort. However, the response rate of sending out survey invitations via an anonymous e-mail is very low (around 1%). Therefore this broad range invitation is combined with personalized e-mail invitations to company managers sourced by online business networks

(such as the global business network Xing or smaller local business networks). Personalized invitations usually reach out to a smaller range of people, since the effort of sourcing potential survey participants one by one is rather high. However, the response rate of sending out personalized invitations is around 20%.

Interview partners for the qualitative validation of survey results are selected from the sample of survey respondents. The criterion for selection is to achieve a variety of KIE firm interviews from different lines of businesses, company sizes and globalization degrees.

The following benefits from this method are created for the on site observation, the second part of the method triangulation: The local facilities influencing the global KIE location selection as a result of the KIE survey can be compared with the existing local facilities in emerging cities. Furthermore, the dimensions of urban space required by KIE can be compared with the existing dimensions in specific KIE relevant districts within the cities. Finally, the distribution of KIE business buildings across emerging cities can be explored through the business building location indication of survey respondents. That information is useful to identify potential city districts with a high accumulation of KIE firms for the following observational research in specific KIE relevant urban spaces.

Onsite Observation of Urban Structure and Space (Perceived Urban Space)

Target of this method is to get an understanding of the overarching urban structure of emerging cities on the Arabian Peninsula and to analyze in detail urban spaces in specific KIE relevant city districts. We can finally compare the resulting knowledge gained on the existing city

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structure and spaces with the requirements of KIE regarding urban space.

The method combines a broad graphical urban structure analysis of the whole city space with a deep dive analysis of specific city spaces with a high relevance for KIE businesses.

The broad graphical urban structure analysis includes a graphical allocation of KIE business buildings across emerging cities. Furthermore, we outline the distribution of urban functions, the building and inhabitant density as well as the degree of functional diversity in city ground plans and sections.

The deep dive analysis in one specific urban space per analyzed emerging city allows a closer look at an urban space with a high relevance for KIE firms. This analysis is conducted via behavioral mapping in combination with photographic observation. The used place-centered behavioral mapping method describes "how people use a specific space" (Dohr, Guerin, 2008: 4). Via using this tool we can describe the density and type of people as well as the use of available urban functions in specific urban spaces in a defined time period. We conduct behavioral mapping sessions combined with photographic observation in a city space of approximately 300 square meters on two different days: On a working day and on a weekend day. During these two days we observe the selected urban space for a total time period of 10 minutes seven times a day: In the early morning between 5 am and 8 am, in the forenoon between 8 am and 11 am, at noon between 11 am and 2 pm, in the afternoon between 2 pm and 5 pm, in the early evening between 5 pm and 8 pm, in the late evening between 8 pm and 11 pm and at night between

11pm and 5 am. The criteria for selection of the respective city space and perspective for behavioral mapping in combination with photographic observation are the following:

• Observation area is a public, open space
• Selected perspective should capture an average flavor of the respective KIE relevant urban space (amount and type of people, infrastructure, building and green structure; degree of lightness and shadow; colors of surrounding buildings and nature)
• Special characteristics of specific urban spaces should be captured (e.g., walk-able urbanism idea in Dubai International Financial Center)

The results of the broad graphical urban structure analysis and the in depth behavioral mapping analysis of specific urban spaces describes the qualities of urban space in emerging cities. These qualities are finally compared with the requirements of KIE regarding urban space. The overlap of existing urban qualities and urban requirements from a KIE perspective defines the degree of KIE satisfaction with the local urban spaces.

The following benefits from the on site observation method are created for the content analysis of planning process and material, the third part of the method triangulation: The KIE satisfaction degree with the local urban spaces can be compared with the relevance of urban planning objectives, to design KIE attractive city spaces. Furthermore, planning process and objectives in emerging cities on the Arabian Peninsula can be evaluated with respect to the qualities of the existing urban space in a knowledge economy context.

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Content Analysis of Planning Process and Material (Conceived Urban Space)

Target of this method is to understand the process and objective of planning urban space in emerging cities on the Arabian Peninsula and its compatibility with the requirements of KIE firms. We can achieve this by using two tools: A graphical urban structure analysis over time and interviews with planers from different institutions involved in physical urban planning.

The graphical urban structure analysis over time is used to analyze when KIE relevant urban spaces developed. In this way we can reflect the timeframe, in which emerging cities developed highly attractive urban spaces for KIE firms.

In order to understand the guiding principles and objectives in developing KIE attractive urban spaces as well as the organizational setup of city planning we conduct interviews with key persons in charge of urban planning. The favorability of planning objectives for KIE attractive urban spaces as well as regulatory conditions for ensuring the objectives of urban planning in the context of creating KIE attractive urban spaces are evaluated. In addition, the interviews are leveraged to create an organizational chart of the institutions and offices involved in urban planning within emerging cities, as the organizational structure is expected to have a large impact on the pace of urban development in emerging cities.

In a city, which fully answers the needs of the knowledge economy in terms of urban space, the results of the method triangulation would show that the observed qualities of urban space and urban space expectations of KIE firms are identical. Since emerging cities on the Arabian Peninsula have developed into highly attractive KIE locations in a very short timeframe, these cities are expected to come close to an ideal KIE location – at least in certain dimensions. We finally transfer findings from emerging cities on the Arabian Peninsula to cities in so called developed regions such as Western Europe. Potential learning areas can be outlined along three dimensions:

• Spatial resources: General exposure to spatial resources in the context of dispersing knowledge-intensive economies
• Urban development: Consequences for urban development in the context of growing knowledge-intensive economies based on analyses of urban space in emerging cities
• Urban planning processes: Outline of means to enhance proper regional and urban development according to the requirements of knowledge-intensive economies through conscious planning and proper involvement of decision makers

After having investigated the method triangulation and its targets and benefits in detail, we will conclude this chapter by defining the study area of the research project.

Defining the Future Study Area: Three Case-Study cities on the Arabian Peninsula

Three case-study cities on the Arabian Peninsula have been selected, to which the method triangulation will be applied. A comparison of results across all case-study cities will enable us to determine the validity of our initial hypotheses on a broader basis. The selected case-study cities are Dubai (UAE), Doha (Qatar) and Manama (Bahrain).

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The following criteria have been used for selecting the set of case-study cities:

• Absolute and dynamic importance of cities within the global city network

• Favorable influence of location-specific development forces (geo-strategic position, politics / regulation, financial investments / economic growth, history and culture)

• Diversity of institutional context (nation state)

• Operational possibility of conducting research (taking into consideration the social restrictions in some nation states)

For the purpose of evaluating emerging cities on the Arabian Peninsula on basis of these criteria a pre-selection of cities has been made. We have pre-selected seven cities on basis of the Top 200 "World City network" ranking (Taylor, 2004) which outlines the best connected cities within the global network of advanced producer service firms. Figure 2 shows a map of the Arabian Peninsula highlighting the preselected cities and the finally selected case study cities.

Preliminary Research Results from Dubai

So far we applied the method triangulation to one out of the three selected case study cities: The city of Dubai. In this chapter we summarize the preliminary findings and research results. In parallel we discuss the initial research hypothesis.

Dubai and its Status in the Global Network Economy

To elaborate on the status of Dubai in the global network economy an online survey with 98 knowledge intensive economy firms (78 APS and 20 High Tech firms) and 10 qualifying interviews were conducted. The following multi-layered results were gained in Dubai:

• The history of growth of KIE firms is young and rapid. On average the survey firm respondents
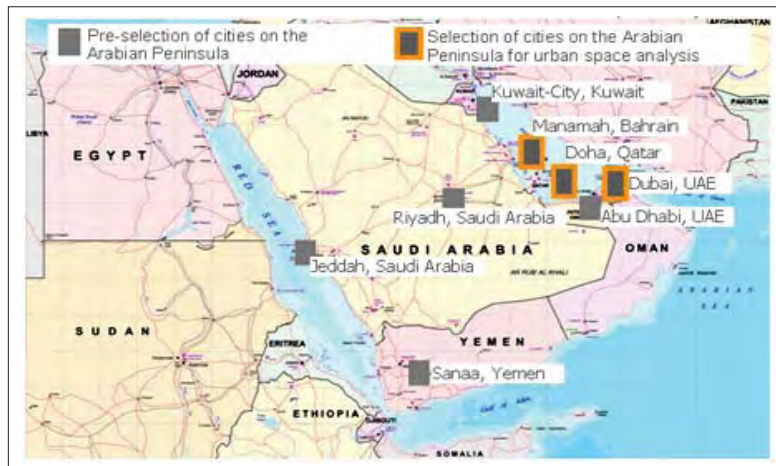

Figure 2: Map of Arabian Peninsula, highlighting the preselected and finally selected case-study cities.
Source of map: http://www.baghdadmuseum.org/maps/me2003.jpg (downloaded at 24th of April 2008, adapted by the authors).

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have established their company subsidiary in Dubai 8,6 years ago.

• The indication of survey respondents regarding other firm subsidiaries than the one in Dubai have lead to a measurement of the inter-firm network connectivity of Dubai to other cities on the Arabian Peninsula as well as to global locations on other continents. Around 75% of the 98 responding KIE firms have firm subsidiaries in locations other than the Arabian Peninsula while they established the best connection to Europe (figure 3).

• 50 out of 98 firms participating in the online survey have indicated one ore more additional firm subsidiaries on the Arabian Peninsula, showing the best connection to Abu Dhabi (UAE) followed by Doha (Qatar) and Ryiadh (Saudi Arabia) (figure 4)

• City selection of Dubai as a firm location has been mainly driven by the following geo-strategic, political and economic criteria: Availability of important international airport hub, ease of market entry for foreign companies and people, low taxes/duties and high financial subsidies, favorable political and economical climate and stability.

• Infrastructural criteria (like seaport / airport hub availability) as well as the accessibility of supply and delivery markets were rated slightly more important by High Tech firms than by APS firms.

• The qualifying interviews with KIE firm managers gave a reasoning for the co-existence of several firm subsidiaries on the Arabian Peninsula in around 50% of all survey responses: Even though certain functions of the value chain (research, development, production) and cross-sectoral functions (operations, finance, IT, HR) are often centralized in one firm location on the Arabian Peninsula, the market oriented functions of the value chain (customer service, distribution, marketing) require de-central firm locations responding to local market conditions.

The above mentioned survey results serve as a preliminary verification for our first hypothesis: The significance of Dubai within the global KIE city network is a result of rapid KIE growth in the latest years due to various location-specific development forces. Final and full appreciation of the results of course is possible only after having finished the entire empirical study.

Requirements of KIE Firms Regarding Urban Space in Dubai and Actual Urban Space

The online survey with knowledge-intensive economies (KIE) has disclosed the distribution pattern of firm locations across the city of Dubai as well as the KIE firm requirements regarding urban space. The distribution of firm locations across Dubai (figure 5) shows that KIE firms are mainly accumulated around the following city districts: Dubai International Financial Center (DIFC), Knowledge Village, Internet City, Media City and Jebel Ali free zone. DIFC is the district with most KIE firm location indications. The basis for figure 5 were 64 out of 98 survey responses (50 APS and 14 High Tech firms) who provided information about their business building location in Dubai.

The described city districts are free zone areas. Free zone areas are specifically designed to attract firms of certain sectors to Dubai. Advantages of being located in such zones are exemption from taxation combined with a high facility, infrastructure and maintenance quality. The ease of market entry, which is one
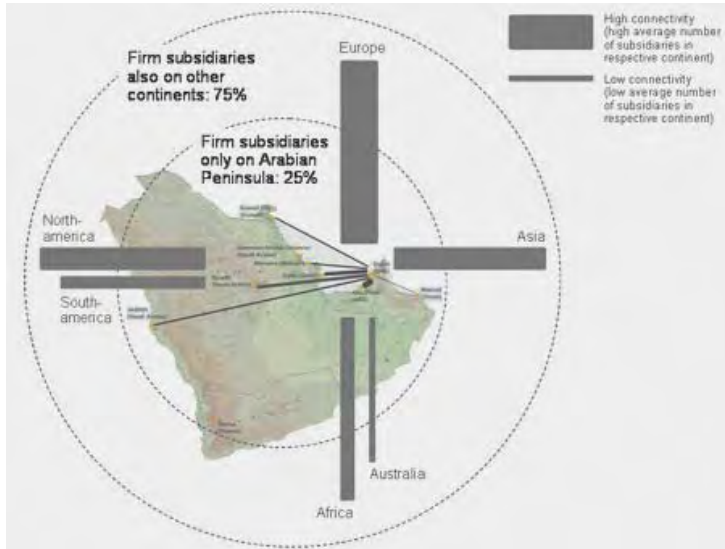
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Figure 3: Global Non Physical KIE Firm Network Connectivity of Dubai. (Source: Authors).
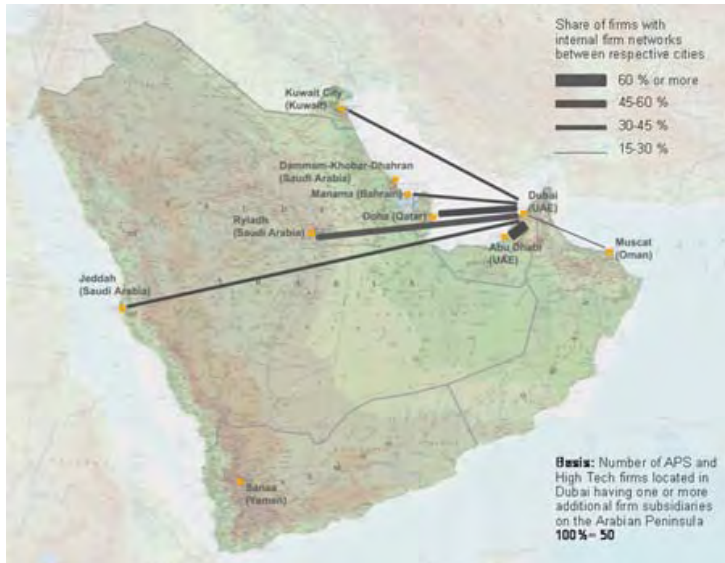
Figure 4: Non Physical KIE Firm Network Connectivity of Dubai to Other Arab Cities. (Source: Authors).

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major criterion for selecting the city of Dubai as a company location, is increased tremendously through such city districts. City spaces like DIFC are internationally visible through adequate marketing. Not only the characteristics of the city as a whole are relevant for global KIE firm location selection: In particular the attractiveness of selected city spaces in a city like Dubai which specifically answer the needs of KIE firms influence global firm location selection.

Requirements of KIE in respect to urban space have been articulated in the online survey as well as in the interviews with KIE managers. The major findings are:

• In general time and quality of commuting is rated to be more important than distance. However, distance still matters for urban functions which are used on a daily basis during business life (e.g., restaurants, living locations, partner / subcontracting firms, important infrastructure facilities) rather than rarely used urban functions (e.g., exhibition center).

• A sound mix of urban functions in walking distance around the business location has a high relevance for KIE firms. The degree of urban density and the built morphology are less relevant for KIE, however highly relevant for customer-oriented sectors (e.g., banks). These sectors articulated the need for a high people- and experience-density as well as the preference for stand-alone buildings of branches.

• KIE managers have expressed a high satisfaction degree regarding the outline of urban spaces (density, functional diversity, morphology) on a city district scale. This can be underlined by the findings from behavioral

mapping and photographic observation in DIFC. As figure 6 outlines, the people density in the observed urban space in DIFC differs around the clock. However, the space has never been observed empty during the 10 minute observation time periods. This adds value to the experience of the public space, since it enlivens the space and creates a safety factor. The following various activities have been observed, which are stimulated by the offered broad range of urban functions in walking distance (restaurants, shopping facilities, green spaces, infrastructure): Walking, standing, phoning, sitting, eating / drinking, smoking, talking to other people, shopping. The offered functional diversity is creating an environment for multi-dimensional use of public space.

• A major urban disadvantage of Dubai has been recognized in the configuration of single city districts in the overarching city of Dubai. Former function separating zoning approaches (Dubai structure plan, 2003), the bundling of affordable housing at the outskirts of Dubai or in neighboring emirates and a lack of public infrastructure connections are reasons named for high traffic congestion in Dubai. This is influencing the quality of living and the attractiveness of Dubai for knowledge workers.

• The necessity of available urban functions for leisure and recreation is rated low from a pure business perspective. However, a lack of leisure and recreation facilities is articulated as one major reason for expatriate knowledge workers to limit their stay in Dubai to a certain timeframe. Shortage of skilled labor competence is the consequence tightened by a war for talent between the emerging cities on the Arabian Peninsula.

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Our initial second hypothesis has been shown to be provable on a city district scale. However, looking at Dubai from an overarching perspective, the city currently lacks certain factors to be and remain attractive for knowledge workers on a long-term basis.

Planned Urban Space in Dubai in the Context of a Growing Knowledge Economy

The objectives of "turning Dubai into a vibrant science and technology hub" and "attracting and retaining highly skilled employees" are outlined in the Dubai Strategic Plan 2015 (Dubai Strategic Plan 2015, 2007: 22). Satisfaction of KIE with urban space in Dubai can be seen as one enabler for reaching the above described objectives. Interviews with major organizations involved in urban planning in Dubai helped to elaborate on the satisfaction degree of KIE with urban space. Planners gave reasons

for the KIE perception of well designed city districts, which however are described as being disconnected on an overarching city level: Semi-governmentally owned organizations (Emaar, Dubai Holding, Nakheel) supported by several private firms have been responsible for the design of city zones in Dubai during the last decade. Cutting the city into zones partly with specific functions attached (Dubai structure plan, 2003) has helped to attracted foreign investment for specially marketed city areas and has increased the pace of city development through parallel planning approaches. The missing link of city areas is seen as a disadvantageous consequence of that development.

The Urban Planning Committee and the supporting consulting company Urbis currently work on an urban master plan 2020 for Dubai.
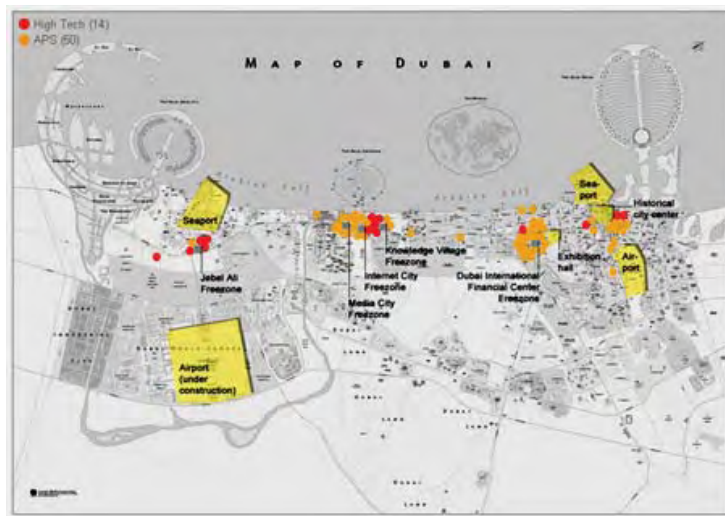
Figure 5: Map of Dubai indicating KIE business building locations. Source of map:

http://www.maps-me.com/images/ Map_of_Dubai_small.jpg (downloaded at 28th of April 2008, adapted by the authors).

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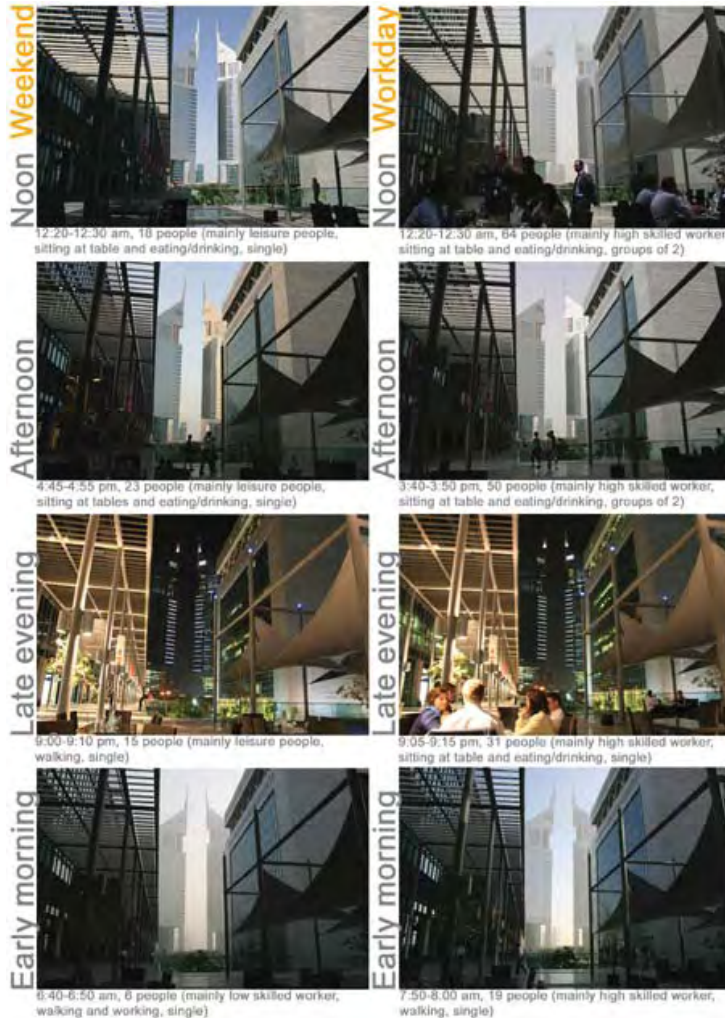
Figure 6: Behavioral Photography-Based Mapping and Observation in DIFC on 18th/19th and 21st/22nd of April 2008. (Source: Authors).

Addressing the requirements of KIE regarding urban space as outlined in the KIE survey results in this context should be seen as one success factor for strengthening the city of Dubai as an attractive location for the knowledge economy. In addition, collaborative planning approaches of Dubai and neighboring functionally connected cities on the Arabian Peninsula

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(figure 4) could enrich urban planning from a regional, normative perspective.

Conclusion and Research Outlook

The application of the newly introduced method triangulation in the case of Dubai has shown that the used methodological approach is a highly useful tool to comprehensively examine local urban spaces in a global context. The combination of methods has proven to be a successful way to test hypotheses from different viewing angles. Only through the multi-layered perspectives taken into consideration the research can describe the complex character of urban space.

Dubai has gained global significance through the growth of knowledge-intensive economies. Globally visible, KIE attractive urban spaces on a city district scale contribute besides other factors to the global attractiveness of the city for KIE firms. These urban spaces fulfill the requirements of KIE firms in respect to their business building location. However, Dubai from an overarching city perspective has deficits in certain areas such as the disconnection of city districts leading to infrastructural problems as well as the unavailability and poor quality of leisure and recreational facilities. These areas pose a threat for the talent market in the knowledge economy sector of the city.

In the further proceedings of the ongoing research project we will apply the method triangulation to two other cities on the Arabian Peninsula: Doha (Qatar) and Manama (Bahrain). We will compare the results to the preliminary findings gained in Dubai. After we will have conducted our research in all three cities, we will evaluate our initial hypotheses. Finally we will transfer our findings from the observed emerging cities on the Arabian Peninsula to western European cities.

The final outcome of this research project is seen to be valuable for a number of different organizations such as governmental and educational institutions dealing with urban planning and development in Arab and Western European locations, representatives from global knowledge-intensive economy firms as well as people with a personal interest in regional and urban planning and development in locations on the Arabian Peninsula.

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Alain Thierstein
Alain Thierstein holds M.Sc. and Ph.D. degrees in Economics. He is full professor for spatial and territorial development in the architecture department of Munich University of Technology since 2005 and was associate professor for territorial and spatial development at the Swiss Federal Institute for Technology in Zurich (2000-2004). Besides that he is head of urban and regional economic development with the consultancy of Ernst Basler + Partners Ltd in Zurich since 2004 and member of the board of directors at the Institute for Public Services and Tourism (IDT-HSG) since 1998. He has published numerous papers and authored and co-edited several books about urban, regional and territorial development, innovation and regional policy and cross-border cooperation and policy evaluation. He is a member of the scientific boards and committees of several organizations including the European Regional Science Association (ERSA), the Swiss Council for Territorial Development and the International Society of City and Regional Planning (ISOCARP). He can be reached by email at thierstein@raumentwicklung.ar.tum.de.

Elisabeth Schein
Elisabeth Schein holds a diploma in Architecture. She is a Ph.D. candidate at the institute for spatial and territorial development in the architecture department of Munich University of Technology since 2007. Besides that, she is a senior associate consultant (currently on sabbatical leave), working for McKinsey & Company, Inc. since 2005 in different knowledge economy sectors across Europe. She is a member of the clima design

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association and of the urban landscape institute at Munich University of Technology. Her research focus lies on the Arabian Peninsula and its urban developments in the latest decades. She can be reached by email at schein@raumentwicklung.ar.tum.de.

CLIMATE, CITIES AND SUSTAINABILITY IN THE ARABIAN REGION: COMPACTNESS AS A NEW PARADIGM IN URBAN DESIGN AND PLANNING

Mustapha Ben-Hamouche

Abstract

Over centuries, the climate in Arabia has become a major factor that shaped daylife of the local societies and thus, the form of their cities. Old cities were charactrized by their compactness which stemmed from the need for protection from the harsh environment. Urban fabric has been dominated by the building masses, the limited number of enclosed public and outdoor spaces, and the inward-looking architecture. Besides its environmental utility, compactness also provided a physical support to the local community and reflected its strong social structure and complex network of kinships. Nowadays, Gulf cities that are mostly shaped by the modern movement and American life style (comma removed) are in complete negation with their past. An unprecedented sprawl effect is taking place all over the Gulf countries due to the heavy reliance on private transportation, high building technology, powerful air-conditioning systems and private housing. Reconsidering compactness in the present urban planning and design practices, would not only insure a cultural continuity with the rooted urban history of the region, but also meets the recommendations of the recent findings in research on sustainable urban development. Modeling compactness from the study of the old cities into urban indicators and design guidelines would provide an alternative design and planning process to architects, planners and decision-makers. Far from being exhaustive, the study consists of analyzing some old cities that are located in the hot regions, according to the available documents, and extracting urban indicators that help measuring and applying compactness in planning and design.

Introduction

Climate has always been a major factor in the shaping of cities. In hot regions such as the Arabian-Persian Gulf, daily life including dressing, food and social conduct as well as urban forms were to a large extent dictated by the sun's path and heat. Old cities were compact in order to respond to the need for protection from the sun's heat and harsh environment.

By the advent of modernity, a radical change in the urban forms as well as social conduct occurred. Cities were planned to adopt the political and social aspirations for progress and to reflect the symbols of modernity such as private transportation, wide roads, individual

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housing and zoning for land-use, free standing glazed towers and mass parking in the heart of the cities. A dispersed form of building entities thus gradually replaced the old compact model within a life-span of three to five decades.

Recently however, studies showed that such a shift is increasingly having negative impacts on most aspects of human life. The new model is not only disadvantageous to the environment but is also causing rupture with rooted traditions, degeneration of community sense, and economic deficiency.

The aim of this paper is to highlight the concept of compactness over history, to prove its validity for today's planning practices, and to develop the convenient instruments that help planners and professionals measure it, and apply it in urban development and design.

Compactness as a New Paradigm

World urbanization is increasingly becoming the source of environmental degradation and dilapidation of natural resources. Cities witness a continuous outward expansion that is believed to be unsustainable. Compactness is thus increasingly becoming a key word in the recent urban studies that relate the concept of sustainability to the built forms. The compact city is becoming the subject of numerous studies in the search for empirical evidences advancing the claimed effects of compact built form on sustainability. A list of advantages were enumerated to prove, at least at the theoretical level, the outweighing of the compact model over the present dispersed one (Chain et al., 2008: 29-30, Thinh 2002 p476, Whiteford V. et al. 2001).

Among its claimed advantages are the conservation of land, the reduction of reliance on car, thus the reduction of fuel emissions, the support of public transport and walking and cycling, the increase of access to services and facilities, the efficiency in the distribution and provision of utilities and infrastructure (Burton 2002,219, Chain et al., 2008: 29-30). However, such studies, despite their global scale, are mostly based on the experiences of the developed countries, (USA, Europe, Japan and Australia). Cities in less-developed countries, despite their present tremendous growth rates and their long history in urbanization that evidently precede the West, are thus virgin cases for such studies (Chain et al. 2008, Catalan 2008).

In the case of the Middle East and North African (MENA) region, the study of compactness would have other dimensions such as the continuity with the long urban history that lasted thousands of years, the social structure that reflects the tribal system and strong kinships, the responsiveness to the hot climate in both energy-saving terms, and thermal comfort at the city level.

On enshrining compactness in today's urban planning and land-use however, its meaning is the first debate, with the second being the techniques for measuring it (Thans 2002, Burton E 2002). Regarding its meaning, it was broadly accepted that it depends on the scale of approach that varies from the regional level to the block and building level (CNU 2000, Crane R. and Crepeau R. 1998, Stanley B. 2005, Eben-Saleh 2005). At the city and neighbourhood level, which is the scope of this study, compactness mostly relates to high density, mixed and intensified land-use, and urban form. Instruments for measuring compactness

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are, however, still under study (Chain et al. 2008, Catalan 2008, Eben-Saleh 2005). They are believed to depend on the local circumstances which cannot be standardised. In practice, a major problem of such instruments is that their complexity too often based on mathematical models, a fact that they make them out of reach of professionals, architects and planners, and decision-makers.

Measuring Urban Compactness

The present study departs from the hypothesis that considers compactness as a major factor of sustainability. On aspiring for practical results, the recommendations of (Istanbul +5) declares that success (and failure) in social and environmental development towards sustainability should be measured through urban indicators (Etzion Y. 1994). However, despite the extensive literature on sustainability and urban indicators, many aspects of urban planning and design have not yet been covered. Examples of such aspects are climatic responsiveness and social cohesion. Regarding the few existing ones dealing with urban form and planning in general, there seems to be no effort to make them at the hands of planners and architects, as most of them are dominated by their technical aspects (Assis (de) E.S. et al. 1999, Golany G. S. 1996, Kilical A.A. 1990, Eliasson I. 2000, Burton 2002).

The aim of the present study is thus to contribute to the universal discourse on sustainability through the definition of some practical indicators that help achieve compactness in the light of the Muslim-Arab city gaining experience. Practicality requires that these indicators should be few, simple and clear enough to be used

by professionals as an alternative to current practices.

It is believed in this study that the inherited cities could help in the calculation of the required indicators. They are deeply rooted in the history of human civilization and thus reflect the maturity of the human mind in the making of cities. The old Arab-Muslim cities, mostly located in the hot regions are believed to reflect this condition and be the extreme examples and bottom line of compactness. They represent valid, reliable and plausible sources of reference for measuring compactness. It is, however, obvious that their high degree of compactness could not be fully adopted in the planning and design of today's settlements due to the change in the standard of living, the technological advancement that introduced private transportation, and the air-conditioning system, as well as the increasing individuality that dominates the community life. However, their presence will form a starting point and a landmark to the academia as well as the professionals to elaborate more suited indicators according to the local conditions of each community.

Indicators for Compactness

In searching for an approach for assessing urban compactness, studies are hindered by the absence of recognized indicators for both urban compactness and urban sustainability (Jenks & Burgess, 2000). Large sets of indicators are however available (Chen et al. 2008: 33). On analyzing compactness in Chinese cities, Chen et al. limited their study to the population density dimension. Burton (2002) developed a set of density, mix-use, and intensification indicators to measure compactness of 25

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English towns. Softwares were developed to simulate and measure compactness. Thans et. Al (2002) used GIS in representing German cities as a grid of sealed cells reflecting the building density, and calculating the distance between the black clusters. A set of urban models based on cellular automata (CA) techniques were developed for better understanding of urban evolution. Li Xia et al. (2008:185) tested the (CA) techniques to simulate, predict, and optimize urban development in a Chinese region to promote compact cities by using local rules. In negation to compactness, approaches were adopted to assess the urban sprawl in present cities through the study of land-cover change in a given period of time (Catalan et al. 2008: 177).

In the Present study, the analysis is limited to the urban form of six selected traditional cities (figure 1). In the absence of other vital data such as population density, land-use, car-ownership and transportation systems, that could if they exist, surely refine the results, the study is limited to three indicators that are believed to help measuring urban compactness.

Indicator I concerns land-use at the city level. It shows the percentage of land covered by buildings within the urban perimeter. Built-up area comprises all types of constructions
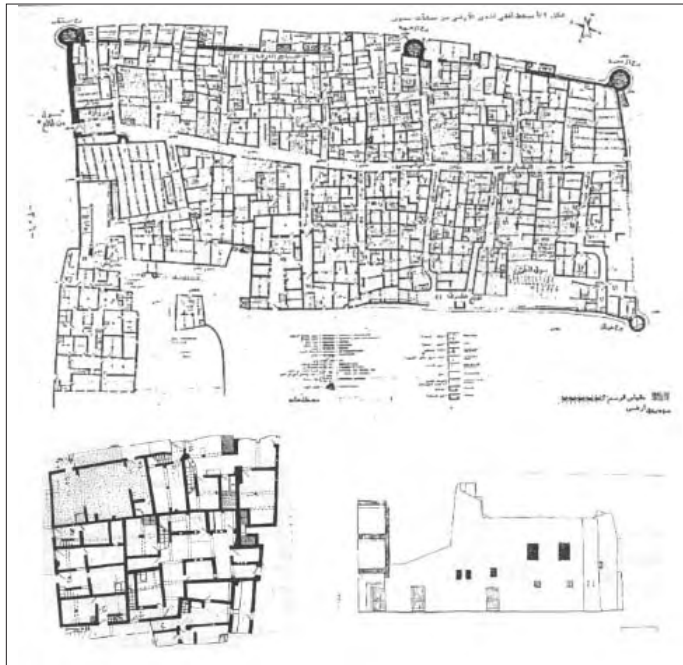

Figure 1(a,b,c): The Old City of Sudus, Saudi Arabia as am Example of the Case Study Documents used for the Calculation of Urban Climatic Indicators shown in table 1. (Source: Uthman, 1996).

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including public facilities as well as housing. The remaining percentage that is formed of streets, squares and derelict land within the city wall is therefore void.

Indicator II represents the intensity of building in private parcels. Courtyards and private open spaces are generally surrounded by the building mass. A typical form consists of a house that has a square form within which a courtyard occupies the centre.

Indicator III concerns the relationships between the mass and the void in the external envelope of buildings which is simply represented by the percentage of openings, doors and windows, in the mass of the elevations and walls. Due to

the inward typology, a building might have an internal envelope that opens onto courtyards which gives on the public space.

A comparative table of ratios is then established from the calculation of the indicators for the selected cities (table 1) . Cities are classified according to their climate in two categories: the arid and the hot-humid climates. Due to the lack of data on density of population, types and intensities of land-use in each of theses cities, the study is limited to their typology and morphologic aspects.

The accuracy of the present results was also subject to the available material on the selected cities. While some of them, like Sudus and

The City	Cities in Hot Humid Regions			Cities in Arid Regions		
	Manama (Bahrain)	Muharraq (Bahrain)	Hofuf (Saudi)	Sudus (Saudi)	Ghardaia (Algeria)	Fez (Morocco)
Date of foundation (AD)	Around 1900	Around 1900	930	Around 1700	11th Century	789
Location (lat. & long.)	51East 26 North	51 East 26 North	49 East 25 North	46 East 25 North	04 East 03 North	05West 34 North
% of Streets & open spaces	27.19	30.76	21.7	17.76	13.22	10.28
% of courtyards	10.74	8.00	12.44	13.97	3.65	12.60
Total of openness	37.93	38.76	34.14	31.73	16.87	22.88
% of Built-up areas	62.06	61.24	65.86	68.27	83.13	77.12
Ind1= Public Void/Mass	**0.37**	**0.44**	**0.28**	**0.21**	**0.15**	**0.11**
Ind2=Private Void/Mass	**0.17**	**0.13**	**0.18**	**0.20**	**0.04**	**0.16**
% of openings to outside	35.8	39.05	14.00	8.74	4.9	?
% of Openings to Inside	41.40	49.50	32.50	5	?	21.04
Ind3=Openings/facades	**0.56**	**0.63**	**0.16**	**0.09**	**0.05**	**?**

Table 1: Comparison of Different Cities Located in Arab Hot Regions
Documents on these cities is drawn from the following sources: Wali T. 1986, Uthman, M.A.S. 1996, Olgyay V. 1973, Al-Hathloul S.A. et al. 1975, Al-Naim M. 1998, Majed E.I. 1987, Bianca S. 2001, Donnadieu C et al. 1977, Al-Khenaizi O. 1994, Ministry of Housing, Municipalities & Environment, Bahrain 1999. Maps and drawings on buildings and elevations were scanned and then digitzed in order to calculate the different ratios.

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Manama have been thoroughly covered at the morphological level, others such as Ghardaia and Hofuf depended on a few surveyed parts of the cities.

Indicator I: The Public Void/Mass Ratio
The most common characteristic of the desert cities that could be deduced from the table is the domination of the mass over the voids at the city level (figures 2 a & b). Voids that include streets and open areas have ratios that range between 0.13 and 0.44. Aerial views show these cities in a form of a continuous body that is perforated with squares for courtyards and lines of winding streets. The most compact city in the selected set is Fez that has openness only 0.11.

Public void/Mass indicator in the humid region is however significantly higher as it ranges between 0.28 and 0.44. This is generally due to the need for continuous evacuation of humidity. Large, long, and straight street lines play the role

of canyons that accelerate wind movement (Chan A. T. et al. 2001, Golany G. S. 1996, p462). Other open spaces such as public courts and plazas are generally minimized in both cities as they are source of heat gain.

Indicator II: The Private Void/Mass Ratio
This indicator for both categories of cities ranges between 0.13 and 0.20. There seems to be no significant difference between the two climatic classes at the private level. It is however exceptionally low in the case of Ghardaia (0.04) which could be considered as the minimum openness ratio that a human settlement could reach. Most houses in this city are of two levels. In order to reduce the incoming sun-rays to the house, the void of the courtyard in the roof is much smaller than that of the first level. The very small amount of light coming from that void suffices all the rooms at the ground level. A person entering the house for the first time will feel that most spaces are dark. However, after

Figure 2a: Muharraq City in Bahrain, 1966 (Source: Directorate of Survey, Bahrain).

Figure 2b: The Urban Fabric of Muharraq City (Source: Directorate of Survey, Bahrain).

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a few minutes he/she gets used to the space and feels that the darkness is coupled with the freshness.

It could be deduced then that the percentage of openness in buildings in both types of cities is the same. Courtyards are generally the major elements that provide buildings with air and light. Sometimes, they are treated with vegetation and water elements to create microclimate.

Indicator III: The External Envelope Ratio
There is a significant difference regarding this indicator between the two classes of cities in terms of openings at elevations. Whereas the ratio in Ghardaia is 0.05 which means that openings to outside are practically absent, it goes up to 0.63 in the case of Muharraq where openings are generally screened with wood. The latter ratio is in fact calculated regardless of the screen locally called Mushrabiyya.

This difference could be explained by the opposite requirements in each climatic zone. While in arid zones, heat and glare are the major problems facing human settlements and thus requiring small openings for minimum lighting. High humidity rate in humid regions requires large and opposite openings that speed up cross ventilation.

External surfaces in some cities are also covered with harsh surfaces and thick particles so as to reduce reflection to outside and provide increments of shades to the elevation that might have up to 50% of the total surface shaded (Kaizer T. 1984).

Seasonal and diurnal migration and internal zoning of the home in accordance with the heat dynamics i.e. mode of transfer, change over time, etc, also provide passive solutions to overcome the undesired effects of climate in these cities. Terraces are in some cities intensively used during night as living spaces, as rooms at the ground level are hot, because of the time-lag. At early morning before sun-rise, the rooms becoming fresher and are used for other domestic activities. This life cycle then radically changes in autumn, where the rooms at night become warmer.

Simulating Compactness

The real results obtained from the analysis above can be proved though a simulation of urban compactness. The shape of the buildings and the assemblage pattern play a primordial role in the thermal performance of the urban forms (Lechner N. 2001:439-441, Markus TA & Morris E.N. 1980:373-375).

The first simulation is concerned with the shape of the building. It consists of demonstrating the preference of the concentric simple forms in buildings on complex, spread-out forms of buildings. Houses that are mostly cubic in form, and inward-looking, provide minimum external shell that is exposed to sun-rays. On calculating a ratio Y1, Surface-Area/Volume, that divides the total area of external envelope (X2) on the volume of the house form (X3), it could be easily seen that the exposure ratio Y1=K. 1/X decreases with the increase of the dimensions of the cube (table 2, figures 2&3).

The second simulation is concerned with the pattern of assemblage of building units that for the urban morphology (table 3, figures 4&5). Compactness could be achieved in its simple form though the grouping of buildings and the

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increase of shared walls. In comparison between the dispersed type of urban setting and the compact form, the first one shows that the number of faces exposed to sun-rays increase exponentially and thus lead to a tremendous solar heat gain.

The Cube Side In a given Unit	External Envelope Exposed to Sun: 5. X2	Volume X3	Ratio of Exposure Y=K.1/X
1	5	1	5
5	125	125	1
1o	500	1000	0.5
20	2000	8000	0.25
50	12500	125000	0.1
100	50000	1000000	0.05

Table 2: The Decrease of the Surface-Area/Volume Ratio with the Increase of the Size of the Cubic Building Side. (Source: Author).
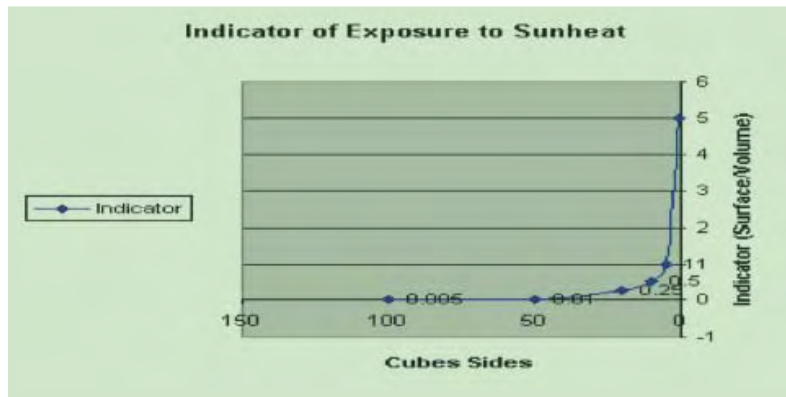

Figure 3: The Relationship between the Size of the Cubic Building and the Exposure to Sun. (Source: Author).
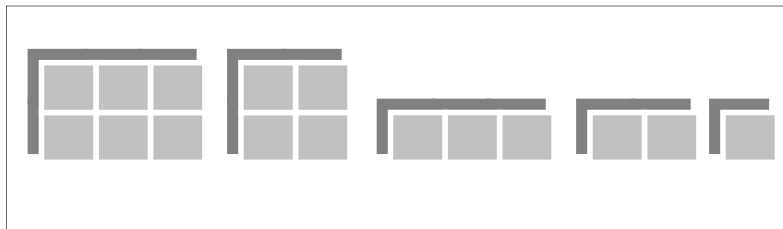
Figure 4: Different Assemblage of Building units showing the Degrees of Compactness. (Source: Author).

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Cubes	Number of Faces in a Dispersed Form	Number of Faces in Compact Assemblage
Number of Cubes	Number of Sides in a Dispersed Setting	Number of Sides in a Compact Setting
1	5	5
2	10	8
4	20	12
6	30	16
8	40	20
9	45	21
12	60	26
16	80	32
20	100	38
80	400	100

Table 3: A Comparative simulation of Two Sets of Cubes showing the Exponential Decrease of Exposure to Sun-rays in the Case of Compact Form. (Source: Author).
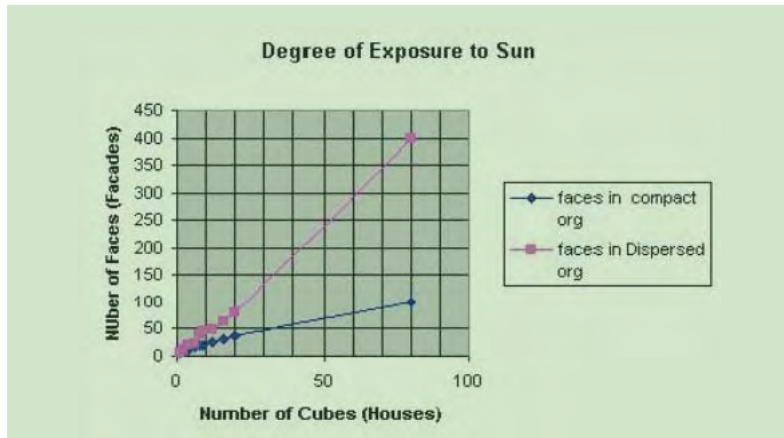
Figure 5: A Graph showing the Difference in the Exposure to Sun-rays between the Two Urban Forms; the Compact and the Dispersed ones. (Source: Author).

Re-Inventing the Compact City

The compact city is increasingly becoming an integral part of a larger new approach to city planning and design which is called new-urbanism. The new movement it has been undergoing since its birth, firing from the supporters of the present practices. It fails to recognize changing social relations, technological development, and forces of production in modern life (Furuseth O. 1997: 211). It is in other words, criticized as being a

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mere re-conduction of the old compact model and is thus, a mere nostalgia and a utopian-romantic vision (Ford L.R. 1999:249).

However, adopting compactness in the post-modern era is becoming more and more acceptable in literature (Burton 2002, Thans 2002). It is based on two strong arguments that are: the growing information technology, and the increasing concern for sustainability (Schroeder et al. 2001, 573-587). To this, the long rooted urban history of city-making, mostly based on the compact model, should be added.

Sections below are based on a model that represents two historical shifts in the form of the city. The first one occurred during the industrialization era from the old compact city, to the modern dispersed city, and the second shift is expected to occur in the information age from the modern dispersed city back to the post-modern compact city. Some promising visions as well as practical aspects for the development of the post-modern compact city through the combination of the concepts of sustainability and IT are stated below.

The Compact City in the Information Age

Information technology is believed to provide an opportunity to release urban planning from car movement, mechanization, and physical constraints of space dimensions and appropriation, and thus rebuilding the new compact city. Most of urban activities that generate traffic (comma removed) could be redesigned in a way to fit the wired city concept, a fact that is taking place gradually through the e-government projects (Reddik C 2004).
Rapid growth of web-based applications

on government premises showed significant cost savings through structural changes in productivity and delivery of government information and services (Reddik p2). The project consists of two stages which are information cataloguing, and online transactions building. Three areas are being developed in this concern: the government-to-government (G2G), the government-to-citizen (G2C), and the government-to-business (G2B) relationships. Each stage and relationship is believed to have deep impact on the use of physical space, the city morphology, and its urban dynamics. Trips to pay bills and fees, applications for building permits, commercial registers, banking and financial transactions, passports and other official documents would enormously reduce traffic mass once accomplished through IT networks. Ministries, municipal headquarters, and banks that have long been occupying huge urban spaces, and competing for land in the city centre and in capitals might also shrink to the minimum functional space and be located anywhere in the region once information is stored and accessed digitally through IT connections. Parking places for both public and staff could either be shrunken or eliminated in favour of the virtual world and other ways of mobility and electronic contacts.

Opposite to the XIX century industrial city that sprawled as a result of the mechanical mobility, the city in the information age might witness a back-shift to the compact city due to the rise of other means of communication and new conditions of work. The sprawling phenomenon in this vision might lose its momentum, if networking is exploited to face the disparities between human settlements within the same region, and between the big cities and their

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peripheries, through the redistribution of services, goods and job opportunities in the region.

The Compact City in the "New-Urbanism"

Compact city may be better placed in the context of the new urbanism theory. This planning movement that emerged in the USA in the mid-1980's, best known as CNU (Congress of New Urbanism), reflects the strong reaction in the country that most witnessed the development of today's dispersed urban model.

The new movement, despite its short age, as it was officially founded in 1993, is gaining momentum due to the ever-increasing calls that relate environmental degradation, social breakdown and depletion of economic resources to urban sprawl and dispersed forms of developments. Compact city is thus announced, among other principles as a remedy to the cancerous sprawl and suburbia.

On the ground, the CNU has today over 3,100 members in 20 countries and 49 states, that include architects, landscape architects, planners, economists, real estate agents and developers, lawyers, government officials, educators, citizen activists, and students. Though the movement has drawn criticism from much of the architectural academy, the ideas behind CNU's Charter have been gradually integrated into the curriculum at the top planning and architecture schools. In practice, over 210 "New Urbanist" developments under construction or complete in the United States are counted (CNU 2008).

It is evident that physical solutions by themselves will not solve social, economic, and environmental problems, but neither can economic vitality, community stability, and environmental health

be sustained without a coherent and supportive physical framework (CNU2000).

Conclusion

The compact city was the most efficient urban model that traditional communities in the hot regions of Muslim Arab countries developed in response to the harsh climatic agents. At present, compactness is becoming the central theme of sustainable development. The present study approached compactness from the historical standpoint through the analysis of a number of old cities located in the region. The objective was to define practical urban indicators that enable professionals and decision-makers to measure compactness.

The universal shift to information technology that is gradually shaping various aspects of life would have a direct impact on the form of the future city. The compact city that is believed to respond better to ecological and social concerns might find its way to revival in the new information age.

In the light of the movement of new urbanism, compactness is considered as a key word in its new language that guides professionals to good design and planning. Its application embraces all scales of physical environment starting from the region to the block and building level.

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Mustapha Ben Hamouche

Mustapha Ben Hamouche holds a Doctorate in Urban and Regional Planning from the Institut Français d'Urbanisme, Paris VIII University, a Master of Philosophy (M.Phil) in Architecture from the Faculty of Arts, University of Newcastle Upon Tyne. He graduated as an architect from EPAU; the Polytechnic School of Architecture and Urbanism, Algiers. In 1986, he joined the University of Blida, Algeria, as an assistant professor, and taught there for nearly 10 years where he was also deputy director of postgraduate studies and research programs. In 1995, he left academia and worked as an Expert-Planner in Town Planning Department of Al-Ain, United Arab Emirates. At present, he is Associate Professor at the University of Bahrain. He published several books and papers in Arabic, English and French on urbanization in the Gulf, urban history in North Africa, the impact of Islamic law on the built environment in traditional Muslim cities, and the application of GIS on Planning and Land-Use in the Arab Gulf cities. His recent focus is on the application of chaos and fractals theory on traditional urban fabrics. He can be reached at mbenhamouche@eng.uob.bh

THE FUTURE OF AFRICAN CITIES

Muhammad al Najib Brimah

Abstract

Too much time is spent nowadays analyzing the symptoms of urban problems in Africa, without looking at the root causes of those problems. This paper addresses the future of African cities from an African perspective. Urbanization in the context of the west is an aberration because its roots are found in the industrial development of the west. When an African speaks his native tongue, the whole street becomes his neighborhood plaza, playground and the market, even though the western method of planning did not make provision for this. When he speaks the foreign colonial language he only sees the street and not the plaza, the playground, the market or the rest of the neighborhood. From a purely ecological perspective, shanties and their inhabitants are a good example of the new, green urban metabolism. Despite their sanitary and security failings, they often have a social vibrancy and ecological systems that get lost in most planned urban environments.

Keywords:

Africa; traditional culture; urban mannerisms; city development.

Introduction:
The Roots of African Urbanism

I would like to comment on academic and creative work on the future of African cities. Rehabilitation and planning proposals are made by many of my colleagues. Although very good papers exist, they are not innovative because their sympathies are along the lines of western models of city planning. I am not sympathetic to the neo-colonialist legacy inherited by Africans, illustrated in the development of cities like Abuja which spins out of control in its development, without cautionary reference to Lagos. The population of Abuja today is the same as London's — 7.5 million people — yet a little over a century ago London was the largest city in the world. In that time, Lagos was described as a golden island by the colonialists, with a population of less than 100,000 people and London had a population of a little over 1 million inhabitants. The academic discussion of such developments include extensive surveys of what others have said about the continent and ideas on what others have said an ideal city should be, with back-up references and footnoted quotations. Yet I find

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the intellectuality of it to be based on western ideas and worldview. There are no references from an African point of view.

Reference should be made to Architect Theophilus Okin's book (1968), which was published by UNESCO when he was doing postgraduate work at Columbia University's School of Architecture and Planning, where I also studied. Okin was a good friend. He is from Kwara South. When last I spoke to him his work was focused in the Middle East. I also feel that reference should be made to the late Dr. Lambo's work on how urbanization impacts on the mental state of the African, with reference, in Lambo's case, to the Aro community.

Too much time is spent nowadays analyzing the symptoms of urban problems in Africa, without looking at the root causes of those problems. Urbanization is not natural to the African perspective; what is spoken about are the post-colonial problems of Africa. The seeds of this problem were planted during the colonial era because the structure of African towns can be looked at in two broad aspects. We have traditional African urbanization, not influenced by western styles: for example, if you take old or ancient cities like Timbuktu, Djenne, Mopti, Gao, Agades, Chingetti, Kano, Zaria, Katsina and Ilorin or Mombasa and Zanzibar in east Africa, you will find that they were influenced by a cubist spatial pattern. In terms of gaps between opposite structures, these are for foot traffic. Those for camels are a little wider and tend to lead into atriums, squares and plazas. The layouts of dwellings and economic activities are segregated. Economic activities in these cities are not daily routines but occur on fixed market days. The structures, forms and

organization of these towns are not influenced by western definitions of urbanization.

Major Traditional African Cities: War and Commerce

I have been to most of the major ancient historical Saharan towns and the capital cities of several countries lying between west and north Africa. I visited coastal north African towns and north African Sahel towns from Morocco to Egypt. In the west African Sahel I visited Nouakchott, Attar, Chingetti, Dori, Ouagadougou, Mopti, Timbuktu, Bamako, Severe, Gao, Tillaberry, Zinder, Tchiro, Agades, Niamey so I say all of the above from experience and from my knowledge of the history of this region and of ancient Egypt.

Urbanization in the context of the west is an aberration because its roots are found in the industrial development of the west. There was no urbanization in England, for instance, until the industrial revolution. Until this time people just lived in shires and homesteads. The landlords were the lords and no one had any rights because all that existed was the right of the landlord. With mechanization and the employment of people to operate in large productions, we had the magnet that began drawing people from the shires and homesteads to the centers where the mechanized economic bases were located. Self-interest and greed came in and the owners of these means of production began to draw people from the countryside and outlying shires to the centers of production.

The people who made the move then began to shed their rustic, down-to-earth and sincere mannerisms for the urbane, yet pretentious

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mannerisms associated with this mechanized and unnatural environment. Gone were the humble mannerisms of the country-folk who stand with cap in hand before their employers, men and women who had a natural rhythm with the farms, the rivers and fields in which they had previously worked and who understood the unpredictability of the natural elements that controlled growth, death and the rebirth of plant and animal life. Instead, the people in the growing production centers could work with no inhibitions in front of a machine that asked them nothing, and was quite often predictable in the monotony of its working. There was no need for humility or inhibitions any more, and with this came the gradual development of the urbane manner of the city-folk; a culturedness so-called, which in actual fact was nothing but arrogance.

Urbane mannerisms arise with machines because being urbane is a mannerism dialogue between the individual in front of the machine and the machine itself. Urbaneness is the mannerism of urban areas. Moving to such areas in search of work opportunities is urbanization. When this takes place the people crowd themselves into tenement-style living and lose their humble way of life, with closeness to their animals, the birds in the environment, the soil. They lose the free air space between individual dwellings. With no more gardens to separate them, the partition between neighbors becomes a single wall. Decency and shyness are eliminated and indecency creeps in. Overcrowding then breeds immorality and violence. Intuitive ecological awareness dissipates because their ecological footprints and their bio-capacity to absorb the adverse environmental impacts of the conditions under which they live are lost.

This is the root history of urbanization, as it began in the west. There are other urban centers in Africa, such as Ibadan or Kumasi in Ghana. The Yorubas are the most urbanized nation in the sub-region. Their settlements were not influenced by western patterns until the colonial era, even though the morphology of their towns are different than those of say, Kano, Zaria or Katsina. The architectural spatial forms found in the region between Ilorin and Bida are more rectangular, than cubic, and surround a courtyard. Although these two were conquered by the Fulani and Fulani emirates were established, they developed a distinct form, different from places like Kano, because of the environmental factors present in Ilorin and Bida. Their pitch and gable roofs, as opposed to the flat parapetted roofs found in Kano and beyond, are for hydraulic reasons, to shed rainwater.

These old African cities were founded on two reasons. The first is that they were gathering points for war and the second is that they were centers of commerce, not of industry. They were centers for the exchange of goods on specific market days and they became points of human settlement. Their internal zonings were along clan lines and they had no industrial activity zones centered on the use of machines. The communities were linked with artisan work places and schools. However, these were not schools for learning skills geared at specifically earning a living. They were schools of self-knowledge, for knowing the Creator and for learning the adab (the courtesies) of socialization.

The connection between Nupeland and Ilorin is Raba, in Nupeland, and Ilorin being prominent gathering points for war. Raba was the center

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of power for Majiya, a Nupe prince engaged in a succession struggle with Jimada, another prince, after the death in 1805 of the Etsu Nupe. Majiya had allied with Mallam Dendo a Fulani scholar to oust his rival, Jimada. However Dendo's increasing popularity was a cause for alarm to Majiya and he expelled the scholar, who sought refuge in Ilorin and rallied forces from Shehu Alimi, the leader of the Ilorin jihad and also sought help from Shehu Usman dan Fodio, the leader of the Sokoto jihad to attack Majiya's forces. Ilorin was the rallying point for the joint forces before the defeat of the Nupe. The Nupe were routed in war by the Fulani in 1810.

The History of Ilorin and Traditional Culture

I will give a brief description of Ilorin as a point of convergence for Hausa refugees, Muslim Yoruba refugees, Fulani warriors, Kanuris, Kontagoras, Barubas and others. Ilorin was, and is still, divided into four quarters, with each quarter being under a war commander, a balogun, in the Yoruba language, or sarkin yaki, in Hausa. The baloguns are under the command of the emir, who appoints them. The emir himself is also appointed by the baloguns, who are the kingmakers. The baloguns within Ilorin town also have villages in their hinterlands, that they control, run by their respective representatives, who tend to be the next in line for the office of balogun. The emir appoints district heads within the emirates. The walled city is Ilorin proper and anything outside of the city gates is referred to as oko, the hinterland within the emirate. Jebba, for example, falls under the emirate of Ilorin. The settlement patterns of the inhabitants of each of the four balogun districts of Ilorin is an indication of the direction they originally

migrated from. The wall of Ilorin city was totally destroyed in 1892, in a battle between Ilorin and the Baruba (Borgu) who were helped by British troops. So we see that these old cities were war cantonments and this makes their structures different from those of western towns. They were places of refuge, war and later commerce and spiritual education. They were not cities born from the greed and consumerism of the western ethos.

The behavior of dwellers of such towns were based on correctness, meaning modesty and humility and the most humble of such behavior involved the removal of objects on the road that could be a source of injury, as said by the Prophet Muhammad, peace and blessings be upon him. The primary source of such a human settlement begins with the home, with the focal point being the inner courtyard, which is restricted to the family living in that home. The audience chamber for guests is the entry lobby, or the zaure, in the Hausa language, which leads into the courtyard. Male guests to the house do not go beyond the zaure. The plaza, which is the focus of all the houses that belong to a clan, is the linking or connection point of the whole clan. The main market square is the tertiary plaza linking all the clan settlements in the town.

Market days shift from town to town and because these towns were founded as rallying points for war, they tended to be walled towns and these walls served as the peripheries or the limits of the towns. All of the above refers to walled towns from Ilorin northwards. The wall defines the traveler because the musaffir, the traveler is the one who has gone beyond the limits of the wall. For such a man or woman, the traveler, some of the demands of the Sharia

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customs are relaxed, so, for example, prayers are halved.

African cities are the way they are today because of the patterns that colonization took. The peripheral countries of the coast had all their capitals along these coastlines, which developed as port towns, initially linked to the sources of slaves, meaning slaves as commodities, through footpaths. When railway lines were introduced these were linked by railway connection, then also linked by roads with the appearance of the automobile. The rail and road lines, after slavery, came to be linked to the sources of raw materials, meaning minerals and agricultural products. Communication lines were not planned to link town to town within hinterlands, but only to link sources of raw materials to the coastal port towns. It was therefore natural that when these countries gained independence, the people of the hinterland would find themselves with no opportunities, except by the movement to the capital cities where the few industries established by the colonialists existed, to look for work and take on the urbane manners of city folk. This change would come to have a negative impact on the humility and modesty that is the natural disposition of people of the countryside.

Village Depletion and the Growth of Megacities

In my book Architecture for Afrikans (Brimah, 1972), I predicted that by the year 2000, the majority of Africans would live in the few urban centers of their countries, in cities with populations of over 2 million people and above. We can see

that all the villages in the environs of Lagos and Badagry have now become a part of Lagos. The same holds for Kano, Kaduna, Enugu, Zaria and so on. The same has happened in Accra. The peripheries of all these towns are nothing but squatter settlements. The appalling state of many of today's African cities is the result of the colonially-induced pattern of rural-urban migration. All the models we use as templates for planning, for the restructuring of our cities, are part of our problem, not the solution.

London is a problem. In reality London is just a conglomeration of hundreds and hundreds of villages brought together by mechanization — the bringing together of the East End and central London and other parts. One of the worst slums in England, up to one hundred and fifty years ago, was the London Bridge area. Families, meaning hundreds of people, lived in the bridge towers and in tenements on the bridge. Conditions were so bad that people openly defecated on the bridge, in the vicinity of the bridge and corpses were everywhere. There were mountains of garbage, worse than what we find in Lagos today. London started as a small village in the Euston area, before the arrival of the Romans, and its chief was said to be a cannibal called London, who is reputed to have eaten some of the invading Romans.

New York, Paris, Hamburg and other western cities also tasted the kind of humble beginnings of a city like London. They all had their little core villages that grew as they became centers of manufacturing, and had their fair share of overcrowding, poverty, slum dwellings, dirt and disease. From the time Ford came up with his Model T automobile in Detroit, USA and inaugurated the manufacturing process that

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turned out these everyman's cars, the automobile had a negative impact on the structure of American cities and their growth. This was in the late 19th and early 20th Centuries. Towns were now planned for cars and not human beings, and the towns lost their focal points as people spread out from the center. This impacted on services such as roads, electricity, water supply, drainage. The western towns we now emulate are actually the decadent result of their growth. They are not ideals of human settlement. They are breeding grounds for immorality, crime, high finance and its attendant decadence. It extricates interpersonal relationships and upholds individualism and sets down criteria for nuclear family type human settlements, by breaking down extended family structures.

Researchers into African urbanism become too engrossed with the Dajjalian western viewpoint. The ideal pre-colonial African settlement tends to be ignored, and the usual frame of reference is completely different from the African mental framework. Western towns, as they are being developed and structured today, serve the western way of life, the western socio-economic and immoral system. Globalization has now linked all the colonial territories of the old imperial powers, as part of this western system. Prophet Muhammad, peace be upon him, said the Dajjal has the letters K F R, written on his forehead. The Dajjal has one eye and this one eye means globalization, a single system that everybody is made to follow. This, in other words, is a single socio-economic system, a single moral system and a single pattern of human settlement. He, peace be upon him, also said at the end of time we will see a woman giving birth to her own mistress, the bare-footed, the wretched and shepherds exalting themselves

and competing in the erection of very high buildings, sky scrapers, and this is when we will see the naked, the deaf and the dumb being rulers of the earth. In this time he said living under the earth would be better than living on its surface. He also said when the time comes that we see two people fighting over a space that is no bigger than the size of a brick, that we should leave such a town. The latter is a prediction of the kind of overcrowding that we have in today's megacities like Tokyo, Mexico City or Lagos.

If we look at skyscrapers today we very clearly see the statement made above relating to vertical megastructures. For example, one recent skyscraper in the Islamic world has a 5 million square meter space (45 million square foot), is one hundred and sixty nine storeys tall, being built by 20,000 workers, to contain about 30,000 units of dwellings, meaning serviced residential spaces, also with shopping, business, hotel and leisure facilities. The facilities simply refer to the various communities in the skyscraper. A single studio residential space in this building will rent for US$100,000 per annum. The building is a series of rectangular tubes of different heights, tied together, to serve as a single cantilever tube. As their heights increase the numbers of tubes reduce and elevators will have to be changed several times before reaching the top of the building. Each level is a different community. From the lobby at ground level to the topmost floor the tower is three-quarters of a kilometer high. Those who live and work in the building will be able to live for one year within it, without having to go anywhere because it is a town in itself, a settlement of homes. There is nothing that one wants to do that cannot be done there, whether this be going shopping or going

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to the theatre. Anything that one can do in the borough of Manhattan, New York City can be done in this towering city. I have coined this term "towering cities" to describe these tube-like human settlements.

The amount of electrical energy and water to be consumed by inhabitants of this and similar skyscrapers will be more than what all of the over-20 million inhabitants of Lagos, one of the world's twenty megacities, presently consume. Lagos, Nigeria and Cairo, Egypt made the list of the twenty megacities of the world. These twenty megacities occupy only 2% of the earth's surface yet consume three-quarters of the earth's resources every year. The cities of the future, of the rich economies will be towering cities, or eco-tower towns, namely small-sized cities of about 40-50,000 families, like today's tallest skyscraper cities.

From the Kitab al Irshad of Allama Majlis, comes the hadith of Abu Jaafar al Baqi, a sixth generation grandson of the Prophet Muhammad, peace be upon him:

"When the Qayim, peace be upon him, rises, he will go to Kufa. There he will destroy four mosques. There will not remain a mosque on the face of the earth, which has a verandah except he will destroy it and make it flat. He will fix the main street and every (building) which juts out along the road will be destroyed. He will destroy the latrines and waste pipes (which jut out) onto the roads…"

As planners we must be dialectical. By that, I mean we must make ijtihad (deductions) and find reference points in our own source of knowledge and our own source-history, making that the template or the matrix when planning our human settlements. We must look at the way our families are structured in planning our dwellings — the limits that are set between men, women and guests and the limits that are set even within the individual family, between parents and children, during periods of siesta. We have to look at the distances between the doors of our homes and our main activity areas, such as work places, places of worship and neighborhood recreational meeting points and neighborhood commercial activity areas. Parameters for restricting automobiles from the pedestrian corridors of the communities must also be established. Private courtyards and neighborhood plazas linking clusters of houses should be design elements in town planning proposals. Building heights must meet human scales, with none being taller than the minarets and church-bell towers of the respective neighborhoods. All these should form part of the criteria and design guidelines for planning human settlements in Africa.

Planning Education for Africa

When urbanists writing on Africa make reference to Frederick Engels, we must remember that Engels was from the elite of 19th Century Britain, those who owned the means of production that attracted rural folk to what became urban centers; places like Manchester, where his father had his factory. This is despite the fact that Engels was sympathetic to the cause of Karl Marx. Let me mention the work sponsored by the Club of Rome on the Limits to Growth, led by Dennis Meadows, the then-young Harvard computer wizard. The Limits to Growth painted a bleak picture of this planet earth if the greed for the exploitation of natural resources continued unsatiated. In 1972, I was an enthusiast of this book and bought one of

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its first copies, when it was published. This book led me to become an advocate of bionic design and it led me to work on a handbook for the design of sanitary facilities for developing countries. The book involved text and graphics on how to construct Clivus compost toilets and rainwater harvesting for small towns and rural areas, for the World Health Organization, under the supervision of Architect Professor Sweeney, at the Architecture Research Center of Texas A & M University, College Station, Texas.

Planning education that basically perpetuates western town-planning principles is all that schools of architecture and planning teach all over the world. I am not saying that planning for drainage, water supply or electricity, or the calculation of the bending moment of a simply supported beam or the introduction of shear walls in a multi-storey building, for transmitting diaphragm loads should follow an African or European solution. These are universal scientific principles, which must be learned by all students and applied while planning and designing. However, spatial organization within an African setting must be guided by the culture and socio-economic patterns of Africans. As far as planning education is concerned, calling a town planning course urban planning is a misnomer because town planning is a freshly ground activity concerning the creating of a new human settlement, whereas urban planning is not the same.

We cannot plan a state of chaos, all we do is ameliorate chaos. What I mean is that urbanization is chaos because it represents a decadent stage of human settlement, where all rules governing sane human living have broken down and the collective patterns of extended family networking have been taken over by the singularity of the nuclear family. This is the massing of different cultures and social behaviors into a denseness similar to black holes, in which all the laws of nature break down and light, meaning discrimination, the rules that govern correct behavior, is extinguished. The mannerisms of the urbane are pretentious. Survival is by the fittest and compassion is at a low ebb. For third world countries, what this means is that the infrastructural services that support the urban centers break down and human habitation becomes substandard. For this reason, there cannot be urban planning. There can only be urban restoration and preservation. The preservation aspect has to do with sustainable development. Thus urban planning, as a course, should fall under the purview of departments of architectural and historical restoration and planning. Urban centers can only be restored and rehabilitated. They cannot be planned. The only plan that can be done is the planning of the organization of its restoration. So changes have to be made in planning education so that urban planning becomes urban rehabilitation.

When an African is within his community and he speaks to another African, in his native tongue, the way he perceives his community, the rhythm between the people on the streets, petty traders, children playing and the buildings that define the shape of the neighborhood, is different from when the same person speaks a European language with his fellow countryman. When he speaks his native tongue, he does not see the rigidity of the arrogant western forms that invaded his community with the advent of colonialism. What he sees is the humility associated with the traditional forms and their rhythms of collective responsibility, which say:

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We are all family in an extended framework as opposed to European individualistic or nuclear family structures, whose architectural statements manifest as the elimination of family compounds and neighborhood plazas. When he speaks his native tongue, the whole street becomes his neighborhood plaza, playground and the market, even though the western method of planning did not make provision for this. When he speaks the foreign colonial language he only sees the street and not the plaza, the playground, the market or the rest of the neighborhood. Everyone hurries into his house in a shroud of suspicions about the next person.

City Density and Shantytowns

Cities come and go but earth remains with its blue skies, its rivers, fauna and its green cover, no matter how pessimistic the western viewpoint is, as to earth's future. Earth will remain until the last day. Express flights are being planned to Saturn. Ways are being looked for on how to live in black holes and serious efforts are being made to produce antimatter. With this, construction methods are being planned on how to construct a universe, in the search for the Higgs boson, the elusive particle that physicists believe is responsible for the mass of the universe. No matter how many tunnels are built under the earth, for the smashing of matter with anti-matter and no matter how many ascents are made from the earth into their towering cities, when living on the earth has become a burden for humankind, they will still have to descend from those towers and come down to earth, going back to the basics, which is the fundamental way of living; living with humility.

The excerpt below from the New Scientist magazine of the 17th June 2006, titled ECOPOLIS NOW describes the dilemma of western planners (Pearce, 2006). It shows that the tools for the planning and design of cities in the hands of western planners have failed them. The failure of western cities is the failure of the western socio-economic system and its decadent culture. Culture is the behavior of people, the way they live — meaning the clothes they wear, the food they eat, the way they worship and how they organize their dwellings. Socialization is how they interact with each other and this stems from the culture they have. Their economic system is the result of their culture because an economic system is the exchange of goods and services. The goods are what they wear, what they eat. What they use are the things they buy and sell and these are things that stem from their culture. The services are the delivery elements in their social transaction.

When people abandon their culture and their socio-economic transactions, they lose their community structures and spatial patterns, things fall apart and immorality becomes the norm of a society that has lost its culture. This is what has happened to western people. The economic system adopted when they left their rural settings and were overtaken by the self-interest and individualistic greed associated with the urbanization they created, with its technology, that breaks down families and promotes immorality and the freedom to do as one wishes means that they have now reached the end of the city and cannot go beyond the towering eco-cities.

They now look for solutions in the poor zones. Unfortunately, the shanties in the cities of the third

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world being referred to below are the decadent outcome of human settlements in the third world. They are not ideals. The shanties are only the manifestation of the disease called rural-urban migration resulting from the lack of economic opportunities for country-folk because economic activities are centered in the cities and these become magnets for drawing people from the rural areas. The future of African cities lies in the return to their own traditional settlements and drawing inspiration from their spatial forms and organizations, using them as templates, along with our planning and architectural skills, in the provision of infrastructural services with its sound structural, mechanical and electrical engineering supports, using materials that are native to us, in a current manner of usage, knowing its proper strengths and wear and tear specifications. We do not have any choice but to go back to our own socio-cultural basis of spatial neighborhood design because it is the neighborhood that makes human settlement.

Below is the New Scientist excerpt (Pearce, 2006):

"Dense cities heat the air around them. Stone, concrete and asphalt absorb more solar energy, and reflect less, than natural surfaces such as grass, water and trees, so they pump up the temperature at night. Vehicles, air conditioning and electrical appliances also give off heat, while tall buildings cut down winds that can disperse the heat. So cities are usually about 1 °C warmer than the surrounding countryside during the day, and can be up to 6 °C warmer at night."

"The denser the city, the worse the effect. In hot climates, where many of the world's super-dense megacities are found, air conditioning is used to keep the indoor temperature bearable. On a hot day in many of these cities, air conditioning can consume more energy than any other single activity."

"To cut this huge use of energy, many cities are taking steps to counter the heat-island effect by redesigning buildings to reduce direct sunlight through windows, increase ventilation, cool the air with water fountains and cut energy absorption by painting external walls white. Planting trees along the streets can help reduce the air temperature too. Up to 400 liters of water can evaporate from a single tree every day, cooling the surrounding air. In Miami, researchers found that summer electricity bills were around 10 per cent lower in neighborhoods with more than 20 per cent tree cover than in neighborhoods with none."

"While planners look at how to cut back the energy consumption of big cities, at the other end of the scale are shantytowns — organically evolved and self-built by millions of people in the developing world without a planner in sight. These shanties meet many of the ideals of eco-city designers. They are high-density but low-rise; their lanes and alleys are largely pedestrianized; and many of their inhabitants recycle waste materials from the wider city."

"From a purely ecological perspective, shanties and their inhabitants are a good example of the new, green urban metabolism. Despite their sanitary and security failings, they often have a social vibrancy and ecological systems that get lost in most planned urban environments."

"So perhaps something can be taken from the chaos and decentralized spontaneity embodied in shanties, and combined with the planned infrastructure of a designed eco-city. Cities built without extensive high-rise can still be dense enough to make life without a car profitable, and they can retain the economies of scale needed for the new metabolism built around efficient recycling of everything from sewage to sandwich wrappers. At the same time, they need to remain flexible enough for people to adapt them to the way they want to live. The key is to put people and ecology joint first."

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Conclusion

Western countries speak from only one side of their mouths when they talk about sustainable development. The wealthiest nation, the United States, imposes sustainable development guidelines on some others, especially those it donates so-called development grants and funds to, yet refuses to ratify the Kyoto Treaty on the environment. Ensuring sustainability of the environment is not simply a matter of latching on environmental impact assessment guidelines on every project while the engine of greed that drives the present world still grinds. Sustainability is to leave things as you find them and maintain them in order for others to find them in the state that you met them. There is the case of a hundred-year old man whom Sayyidina Umar, the second caliph, found sweating and working in the fields, planting wheat. He asked him why he was going through all the trouble and the old man replied that he found wheat when he came to the world and had to continue planting in order for those coming after him to also find wheat. The sustainable city is where the psyche of the inhabitant is not under siege, his mental state is balanced and his socio-economic and cultural state, health conditions, his spirituality, his ecological footprints and the bio-capacity index of his environment are all balanced. These are the parameters by which sustainable human settlement can be defined and not by taking a cue from the prevailing conditions of the shanties of the third world, which are simply symptoms of bad planning.

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Najib P. Brimah

Najib P. Brimah, or Muhammad al Najib Peregnino-Brimah (1947-2007) was born of Nigerian parents in Accra, Ghana, where he spent the first seventeen years of his life. He studied architecture at Texas A & M University, College Station, Texas and Columbia University, New York, obtaining a master's degree in health facilities design in 1974. After working with Max O. Urbahn and Associates, a New York-based architectural firm, he established a practice in Lagos, Nigeria. Among his designs is that of the Nigerian national mosque in Abuja, Nigeria's capital. He greatly admired the work of Egyptian architect Hassan Fathy, and dedicated the last fifteen years of his life in a sometimes uphill battle promoting earthen architecture as an avenue to delivering quality housing to the urban poor, and affordable housing to the not-so-poor. His deepest passion though, was the quest to understand the structure of the universe. He engaged in conversation with a number of physicists, including the late David Bohm. Najib P. Brimah was very much in sympathy with Prince Charles's ideas.

Editorial Note

This unpublished manuscript by the late architect and urbanist Muhammad al Najib P. Brimah was received by the Editors from his widow, Mrs. Halima P. Brimah in February of 2008, shortly after her husband's decease. We have decided to publish it with only minor revisions, so that its message will not be lost to world urbanism. There are many references to topical African architecture that may be confusing to Western and other non-African readers. We have decided not to cut any of this material, however, hoping instead that African readers will profit from reading the situations and case examples the author was referring to. Najib Brimah often writes in anger and says controversial things, in response to what he sees as a totally wrongheaded approach to his continent's severe urban problems. We decided to let the author have his final say, in his own words.

SKYSCRAPER FUTURE VISIONS

Mohamad Kashef

Abstract

This paper addresses two skyscraper visions: Tokyo's Sky City and the Shimizu Mega-City Pyramid. Prompted by the dearth of land and growing urban problems in Tokyo, these skyscraper visions offer alternative built forms with revolutionary technologies in building materials, construction methods, energy generation, and transportation systems. They are designed to be self-sufficient with homes, offices, outdoor green spaces, commercial establishments, restaurants, hospitals, trains, cars, and conceivably everything that hundreds of thousands of people need during the course of their lifetimes. The promise is that creating such vertical cities would relieve Tokyo from overcrowding and replace the urban concrete "jungle" on the ground with super towers straddling expansive green spaces or the water of Tokyo Bay.

Keywords:

Skyscraper; mega-city; Tokyo.

Introduction

Like other utopian ideas (Fishman 1977), The Mega City Pyramid and Sky City aim to create total environments, making it possible for residents to live from cradle to grave without a need to set foot outside the city limits. Though reminiscent of Le Corbusier's Contemporary City (Boesiger, 2006), Arcosanti (Soleri 1984) and other radical Mega City concepts of the mid-twentieth century, the Sky and Pyramid cities present somewhat plausible urban living scenarios. They incorporate analyses of innovative building components, construction techniques, and movement systems that make them appear not such a distant reality. Ropungi Hills (Fig. 1) could be seen as a smaller-scale dry run for the Sky City concept. It is a self-contained urban complex that replaced a crowded housing district in the middle of Tokyo. Residents were relocated during construction and came back to a skyscraper complex that caters to all their needs, including homes, offices, shops, and public spaces (Jerde Partnership). The Shimizu Mega-City Pyramid and Tokyo's Sky City concepts have been popularized by the "Extreme Engineering" video series of the Discovery Communications (www. discovery.com).

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Figure 1: Images from Roppongi Hills Development in the Center of Tokyo (Jerde Partnership; www.jerde.com).

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Tokyo Sky City

Tokyo Sky City is a super tower concept proposed by Takenaka Corporation engineers that, if ever built, would reach two thirds of a mile high, twice the height of current tallest skyscraper, and accommodate136,000 people (Takenaka, www.takenaka.co.jp). It would have a 30-acre footprint and require the demolition of 120 Tokyo city blocks. Tokyo's soil mainly consists of loose sandy sediment with bedrock more than a mile-and-a-half deep, which makes it the worst choice for an approximately 600-million-ton super structure. Takenaka proposed a foundation system that

would entail digging thousands of shallow friction piles (concrete-filled) and topping them with a massive, reinforced concrete slab. This would create a unified, immovable footing anchor with a bearing capacity equal to or exceeding bedrock. The weight of the super structure above would be supported by six mega columns along the hexagonal perimeter of the tapered tower profile (Fig. 2). The closest existing example of such mega columns would be those used in Taipei 101, which is almost half the size of Sky City. Each mega column in Taipei 101 was made of three-inch-thick steel plates and filled solid with steel reinforcement and concrete. The Sky City
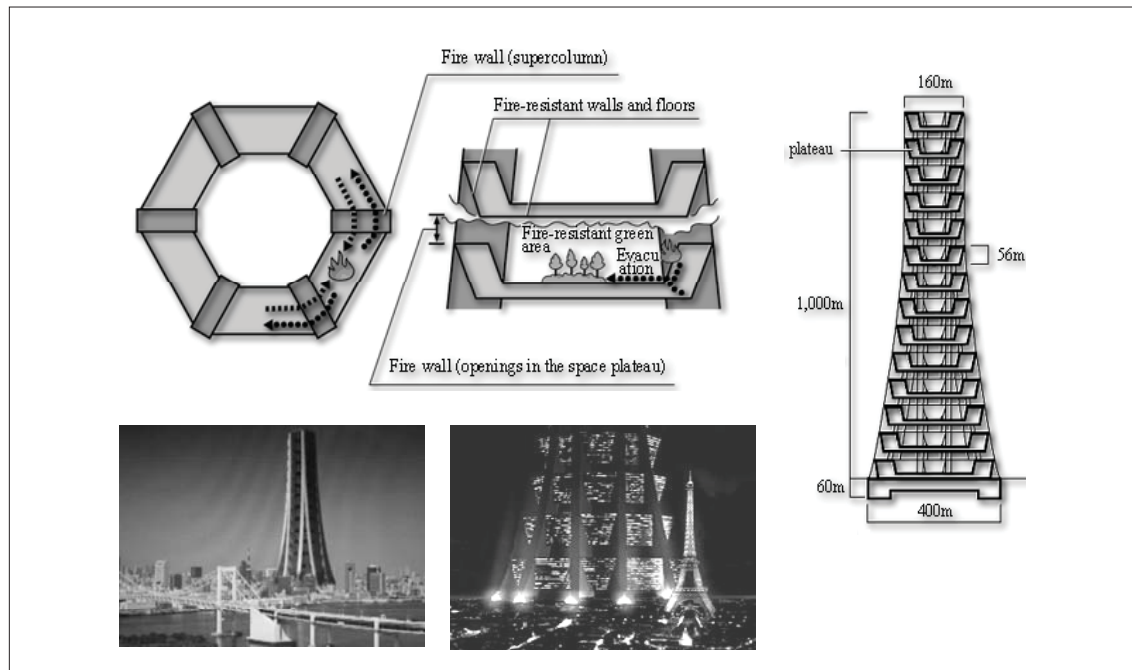

Figure 2: Sky City Concept Images and Diagrams (Discovery Communications, www.discovery.com; Takenaka, www.takenaka.co.jp).

mega columns would be massively larger and require almost three billion pounds of steel. It would probably require a global network of steel mills operating at full capacity for months to produce enough steel for Sky City. Transporting column sections and other structural members from steel mills to the Sky City construction site would be impossible or at best extremely difficult to accomplish (Discovery Communications).

Factories would have to set up shop on site and use automated construction technology to fabricate, build, and assemble mega column sections from the ground up a much smaller space and work on demand to regulate the building sway induced by wind (Discovery Communications). An all-weather automated construction system called "Big Canopy" (Fig. 3) was developed by Obayashi engineers and is already in use in Japan; this would facilitate the on-site assembly of column and roof sections. This system incorporates four major elements: 1) a self-rising, all-weather, temporary roof canopy supported on four hydraulic jacks; 2) a computer-operated hoist system with various cranes mounted against the roof; 3) a battery of high-speed construction lifts; 4) an automated management system that directs the flow of materials (Thai Obayashi; Wakisaka et al. 2000; Gassel 2005).

Most innovative about the Sky City concept is the open plateau system (Fig. 4); the mass is articulated vertically into 14 building clusters or rings, each of which is 180-feet high and surrounds an open, outdoor space larger than a football stadium; the vertical rings are separated by a 60-foot open air gap, making the building hollow. Massive space trusses would be used between plateaus to support the weight of the

levels above. The air gap between plateaus would allow noxious smoke to dissipate, quickly reducing dangers associated with fire. As soon as each plateau is finished, it would be habitable and people could move in while higher plateaus are under construction. The completion of each plateau would create an entire community with homes, offices, shops, cinemas, recreational facilities, etc. (Discovery Communications). Wind tests for Taipei 101 have shown that the buck-shaped skyscraper could create extreme wind conditions that would put the building at risk. Engineers had to reconfigure the building corners to a cutout "W" shape to deflect wind. The Sky City could generate much stronger winds, especially at high altitudes. The circular cross section and tapered profile, as well as the 60-foot, open-air gap between Sky City plateaus would allow wind to slip right past and through the building mass. Another innovative solution is the use of computer-operated, hydraulic piston dampers as a counterweight to reduce building oscillation with the wind. Ordinarily, it might need a fifty-million-pound counterweight. The automated power counterweight would occupy a much smaller space and work on demand regulating the building sway induced by wind. Rope free multi-decker elevators and high speed monorails traveling at 30 miles/hour would move thousands of Sky City residents horizontally and vertically throughout Sky City.
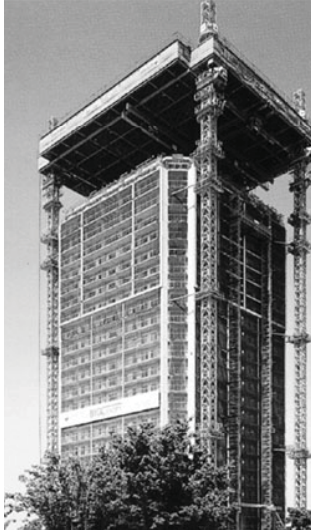
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Figure 3: Big Canopy –
Automoted Construction System
for High-Rise Buildings (Thai
Obayashi,
www.thaiobayashi.co.th).

Figure 4: Sky City Open air Plateau
(Discovery Communications, www.discovery.com).

The Shimizu Mega-City Pyramid

The Shimizu Mega-City Pyramid is a conceptual scheme for the construction of a massive, pyramidal open-air truss over Tokyo Bay in Japan (Fig. 5). The gigantic truss would be able to support the weight of two dozen eighty-story skyscrapers hung from critical truss joints. The structure would be over 3,000 feet high and would house 750,000 people. Its footprint would cover the area of 275 Tokyo city blocks (Discovery Communications). If materialized, it would be the first offshore city ever built and the largest man-made structure on earth. The Shimizu Mega City Pyramid is proportionately identical to the ancient Egyptian pyramids (Eternal Egypt, www.eternalegypt.org). However, it is 55 times larger than its ancient inspiration and "hollow," lacking the unyielding appearance of the solid stone Egyptian pyramids. It bears more resemblance to the Luxor Hotel in Las Vegas, Nevada built in the mid 1990s with the exact match dimensions of the ancient pyramids. The Luxur Hotel (Fig. 6) has the largest glass-enclosed atrium in the world and serves as a dry run for the Mega City Pyramid. Wind tunnel tests for the Luxur Hotel showed that a dangerous vortex of wind usually occurs on the leeward side of the pyramid, causing a drastic drop in air pressure that could pull the heavy glass curtain

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off the building. Engineers had to redesign the glass curtain attachments to withstand wind turbulences on the Pyramid surfaces (Discovery Communications).

Wind test results of the Luxur Hotel guided the exposed truss design of the Mega City Pyramid, which would be totally open to the elements, allowing wind to blow throughout the structure. This would drastically reduce wind impact on the Pyramid and improve the structure's ability to withstand powerful typhoons in the Pacific. Only habitable spaces within skyscrapers and circulation channels would be enclosed. Despite such an open truss design, the weight of the steel trusses of a 3,000-foot-high pyramid, 24 skyscrapers, and all other facilities that service 750,000 people would exceed trillions of pounds. According to the design scheme, the pyramid weight would be supported on 36 massive columns sunk in Tokyo Bay. Each column must be able to handle 50 million tons, which is more than 50 times the weight of the Golden Gate Bridge (Discovery Communications). The weight of the proposed structure is so large that it cannot be built with currently available materials. The Mega City Pyramid design relies on the future availability of super-strong, lightweight materials based on carbon nanotubes. These are nanoscale cylinders of carbon with a lattice of carbon atoms, each of which is covalently bonded to three other atoms. The structure of a nanotube can be imagined as a sheet of graphite rolled into a tube akin to a sheet of chickenwire. It buckles, but does not break and can be straightened back without any damage.

When perfected, carbon nanotubes are expected to be vastly lighter, stronger, and

Figure 5: The Shimizu Mega-City Pyramid Proposal in the Tokyo Bay;
(Discovery Communications, www.discovery.com).

Figure 6: Luxor Hotel in Las Vegas, Nevada, the Largest Glass-Enclosed Open Atrium in the World (Source: Author).

longer lasting than steel. Mixing nanotubes with plastic and metal can give them extraordinary strength, creating a new generation of super-strong and super-lightweight composites that would make steel obsolete (Gasman 2006;

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Poole et al. 2003). Construction logistics for such a giant building is beyond the capacity of even the most accomplished construction companies in existence. No cranes or hoisting mechanisms in operation today can jack these massive structural members into place. The design scheme calls for spider-shaped, robotic plants that would spin a web of massive trusses, transforming carbon and other materials into miles of support right on site.

Dante Bini proposed an air-induced hoisting system to lift millions of pounds of trusses into position. Bini spent a good deal of his career designing and building large, reinforced concrete domes, replacing cumbersome scaffolding with an air-lifting mechanism. In 1967, he laid out a large, inflatable membrane on the ground and topped it with a web of reinforced steel held in position by a network of high-tension steel springs. Almost 300 tons of wet concrete followed, which was covered by a second membrane to hold
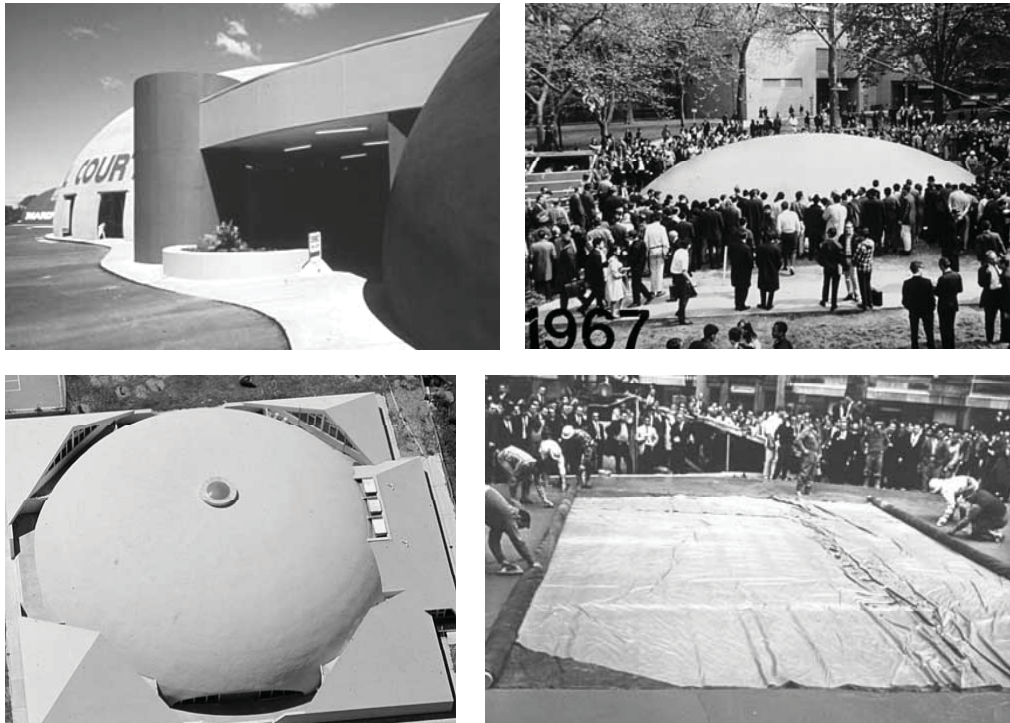

Figure 7: Binishell Domes during and after Construction in the United States and Australia (Dante Bini, www.binisystems.com).

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it in place. Defying structural logic at the time, Bini pumped air under the first membrane, and a large dome shell was shaped into place in less than an hour (Fig. 7). Following several successful attempts in the United States and Australia, Bini has built hundreds of such domes around the world. He proposed to use a similar system to lift the massive truss members of the Mega City Pyramid into position (Fig. 8). The idea is to build a square truss base on location and then connect the corners diagonally with telescopic expandable truss shafts that will be jacked into place by an inflated balloon placed underneath (Dante Bini, www.binisystems.com; Discovery Communications).
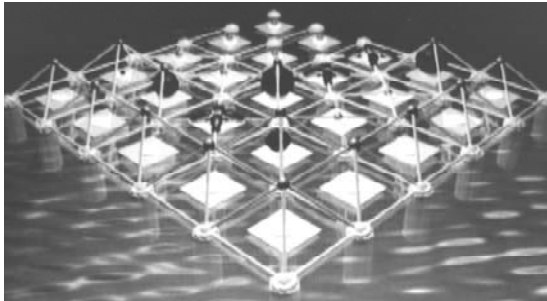

Figure 8: Using Bini's Inflatable Dome Method to Lift Trusses of the Mega City Pyramid into Place (Discovery Communications, www.discovery.com).

The most innovative aspect of the Mega City Pyramid design concept is its three-dimensional transportation system. The truss members forming the pyramid are hollow, with an internal space large enough to allow trains and cars to move freely between different parts of the city; structural members double as the city highways or subway tunnels. Trusses connect at hollowed

spheroid nodes, which would provide structural support and serve as transfer points for travelers (Fig. 9). Residents and visitors could also connect to an outside transportation system that carries them to the heart of the city of Tokyo (Discovery Communications). Transit options would include accelerating walkways, inclined elevators, and a personal rapid transit system where individual, driverless pods called "ULTra" would travel within the trusses. Heathrow Airport in London recently adopted the ULTra (Fig. 10) Personal Rapid Transit (PRT) to provide better access to its terminals. Each pod can fit four passengers and travels along guideway networks. Powered by an electromagnetic grid imbedded underneath guideways, ULTra is an on-demand, driverless car summoned to the rider location and not vice versa. It is an environmentally friendly form of transportation that saves more than half the fuel used by current private and public transportation systems (ATS, www.atsltd.co.uk).
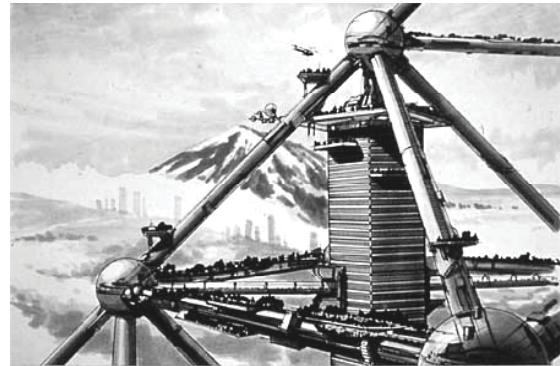

Figure 9: Skyscrapers Hung from Critical Truss Joints which also Function as Transportation Hubs in the Mega City Pyramid (Dante Bini, www.binisystems.com).
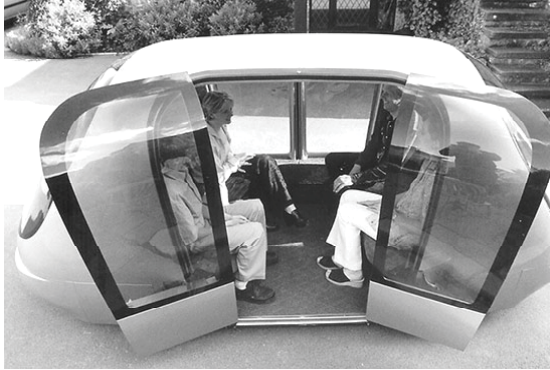
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Figure 10: PRT (Personal Rapid Transit): ULTRA (ATS, www.atsltd.co.uk).

Epilogue

Skyscraper building has been driven in part by the scarcity of land in congested urban areas, as in the cities of New York, Hong Kong and Tokyo. Higher land value renders a stacked-up office space a more efficient and economically viable solution; there is no where to go but up. However, the sheer size and spectacular height of skyscrapers engages people's imaginations, emotions, and memories. Once built, a skyscraper becomes a symbol for the place where it resides. The image of the Empire State building has come to represent New York City globally. The Sears Tower turned into a household name that epitomizes technological prowess and corporate power in Chicago. Considered the last great engineering achievement of the twentieth century and the tallest buildings in the world for several years, the Petronas oil company towers have become symbols for the economic success and arrival of modern Malaysia. They are a source of national pride and provide

Malaysians with a sense of accomplishment and reward for being the world's chief exporter of semi-conductors. Petronas Towers created a powerful image that forever will be associated with Kuala Lumpur.

The catastrophic collapse of New York World Trade Center Towers in September 2001 led some to predict the end of the Skyscraper Age. These predictions proved to be wrong; New York is rebuilding and when completed in 2010, the Freedom Tower will pierce the sky at 1,776 feet high, in a clear reference to the year of U.S. independence. Despite the recent Asian financial market crisis, the Shanghai World Financial Center is moving ahead and scheduled for completion in 2009. At 1,614 feet high, it is expected to be among the tallest in the world. Taipei 101, the tallest building in the world today (1,670 feet) is being challenged by Burj Dubai, which is expected to rise above the 2,000-foot mark. A spiraling, 115-story tower is on the drawing board and may be built along

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Chicago's lakefront. This bold proposal comes on the heels of equally bold, but unsuccessful attempts, such as the famous "Skyneedle" of Cesar Pelli. The race is on!

The last hundred years have produced three different skyscraper styles. The golden age skyscrapers refer to those built before the World War II, such as the Woolworth, Empire State, and Chrysler buildings. These were unique structures with Art Deco ornamental references and iconic configurations. After World War II, the elegant, art deco skyscrapers gave way to the glass and steel box characteristics of modern architecture. The glass and steel box grew out of a strict interpretation of the modern dictum, "form follows function." The idea of exposing the steel and concrete members and removing any ornamental references or structural impurities was embraced as a requisite for good architecture. The Seagram building in New York epitomized this Skyscraper Age that was summed in Mies Van Der Roh's slogan "less is more."

The next generation of skyscrapers is referred to in different ways, such as postmodern, high-tech, ultramodern, etc. Advanced building materials and structural systems, as well as digital media, are fueling architects' imaginations and desire to test the limits and indulge in creating spectacular building configurations that can be described as steel and glass firework displays. Form and function have become somewhat dissociated. From helicoidal and spiral to sail-shaped, cantilevered configurations defying gravity, the tall structure is regaining its status as an icon and asserting itself as a symbol of culture and civilization. The Shimizu Mega-City Pyramid and Tokyo's Sky City visions revived various twentieth-century colossal skyscraper ideas such as Antonio Sant Elia's Citta Nova and Frank Lloyd Wright's Mile High. They reenacted these ideas within an ultra modern framework that avails of technologies yet to be perfected. The scientific prowess that accompanies the Shimizu Mega-City Pyramid and Tokyo's Sky City visions coupled with the need for vertical space may eventually transform them into reality.

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Mohamad Kashef

Mohamad Kashef, Ph.D. He is assistant professor of planning and design, College of Arts and Sciences, East Carolina University, United States. He practiced architecture, urban planning, and project management with multinational consulting firms and construction companies in the United States, Canada, Egypt, and Saudi Arabia. Taught courses, seminars, and studios in urban design, history and theory of architecture and urbanism, and historic preservation. Assisted various cities and communities in the United States in the preparation of downtown development plans and urban design guidelines. Combined architectural and urban planning education and practice (BArch, MA, PhD). Registered Architect and Licensed General Contractor in Canada and the Untied States. Research is focused on introducing a balanced physical planning and design agenda that integrates both architectural and planning knowledge with an emphasis on sustainable practices. A special research interest in tall buildings and multi-use structures that integrate unique architectural configurations with innovative technologies and green solutions. Other design and research concerns include heritage and urban conservation within a global context. Participated in the revitalization and restoration efforts of the Historic Citadel District in Cairo, Egypt. He can be reached by email at Kashefm@ecu.edu.

"ALGORITHMIC SUSTAINABLE DESIGN: THE FUTURE OF ARCHITECTURAL THEORY", A SERIES OF 12 LECTURES BY NIKOS A. SALINGAROS.

Nicola Giacomo A.G. Linza, William Gay & Anna Grasso-Gay.

Professor Nikos A. Salingaros, a practicing Urbanist and Architectural Theorist, presents a powerful series of compelling hour-long lectures that apply cutting-edge mathematical techniques to architectural design. This breakthrough lecture series seeks to explain the foundations of architectural form using scientific concepts from hierarchical scaling to memes. Dr. Salingaros has applied the most exciting scientific developments of the past decade, such as fractals, complexity theory, evolutionary biology, and artificial intelligence to produce a series of lectures explaining in great detail the mathematical and scientific basis behind structure, and how structures affect the way in which human beings interact with the built environment. The twelve lectures were integrated to relate topics such as algorithmic processes, cellular automata, Sierpinski carpets, harmony-seeking computations, generative codes, and New Urbanist codes. The lectures were transmitted live via streaming video to participating institutions throughout the world, and have now been made freely available.

Modernity's love affair with progress has subconsciously masked the eyes of society to the true purpose of architects and architecture. Self-centered expressionism has become the new norm and often-scientific observation is misconstrued and falsely used as justification for the abstract forms this kind of architecture produces. Dr. Salingaros highlights the flaws in this justification, and shows that the educated and informed use of scientific study as a support for architectural design is possible.

Utilizing the monograph "Harmony-seeking computations" by Christopher Alexander, as well as extracts from Alexander's "The Nature of Order", Books 1, 2, and 3 and Stephen Wolfram's "A New Kind of Science", Salingaros was able in his lecture series to outline in a clear and straightforward manner how all matter both biological and inanimate organizes itself into coherent structures. He proposes that the greatest architecture is complex and coherent; but neither random, nor simplistic. In this lecture series, Salingaros uses the scientific method to answer many of the important questions in architecture: What makes something beautiful? How important is ornament in design? Is there a connection between the design of a building and the physiological and psychological

Lecture Series Review   Reviews and Trigger Articles

NICOLA GIACOMO A.G. LINZA, WILLIAM GAY & ANNA GRASSO-GAY

state of its users? What should the relationship of the building be to its site and surrounding areas? Salingaros not only informs the pupil of his scientific findings, but also proposes practical solutions that can be utilized in the offices of architects and urban designers today. Interestingly, his findings seem to trump the basic Modernist Principles that are taught since the Bauhaus school of architecture, and which have lead to the egocentric and absurd architecture of the day.

His course is not limited to algorithmic studies but branches out to nearly all elements of architectural design and urbanism. Through his exploration of fractals and their occurrence and survival in nature he dismantles their avant-garde application as merely image-giving devices (as has been seen in much of the work of Frank Gehry and Daniel Libeskind) and reorients the designer to utilize fractals as models to develop algorithms that lead to the creation of life-giving harmonious designs. Dr. Salingaros builds a bridge healing the void between practical architecture and architectural theory.

For a number of reasons, we live in a world that has unfortunately glorified anti-architecture for 100 years. Since the inception of Modernism there has been an increasing body of architectural schools, practicing professionals, real estate investors, publications and architectural media who individually, and in cooperation, used pseudo-intellectual posturing and often false applications of abstract geometry, frequently in tandem with an utterly insufficient knowledge of constructional engineering and architectural laws. We have seen a misuse of mathematical terminology such as fractals (the term most often adopted by the practitioners of Deconstruction in a pseudo-intellectual attempt to describe their proposals).

If one considers, as Dr. Salingaros states, that the Universe's "wonderfully rich complexity is ignored and suppressed by a contemporary design canon that seeks plainness and a false purity, while at the same time promoting disorder rather than coherent structures", one comes away from the lecture series with a deep cognitive understanding of how to generate "life" in structures and the built environment. In addition, one is left with a fresh appreciation of how buildings and cities can be drastically improved, by the incorporation of this knowledge, in the way they relate to people. Dr. Salingaros's lectures cover material not found elsewhere on the subject and certainly not taught in architecture schools today. This lecture series establishes a significant educational counter-attack to anti-architecture. It is a powerful reference source for students (and professionals) interested in learning humanistic architecture. By following Dr. Salingaros's lectures in a logical and methodical progression, one is provided a comprehensive and universally clear understanding of humanistic architecture that will counteract all the destructive teaching of architecture schools, the media, and most architecture books.

Dr. Salingaros's lecture series, for the first time, creates a complete program of algorithmic sustainable design. His program is one that may be utilized in the development of a new kind of architect (as well as a new architectural training program). Dr. Salingaros's series brings both practice and education back into the realm of true higher knowledge, with solid ethical principles, enabling the creation of

an honest architecture and architect. An honest architect is one who encompasses an intellectual understanding of humanity, universal laws, mathematics, geometrical constructional principles, and who has the tools and knowledge to create timeless, humanistic designs in architecture and urban planning.

With its many answers and no lack of "Eureka" moments, this lecture series will leave its pupils with a true grasp of the world around them. It gives them the tools to critically analyze and learn from the failures of architecture and urban design in the 20th century, while maintaining a love affair with real, human architecture, and with humanity itself. This is not the love affair with a false image of progress based on the ideas of a few egocentric designers, but one that leads to a better understanding of our deepest connection with nature and the world within which we live and upon which we depend.

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Nicola Giacomo A.G. Linza IV

Nicola Giacomo A.G. Linza IV is the founder of Nicola Linza & Partners, an intelligence consulting group specializing in the areas of policy, analysis, corporate environmental management, environmental design, and security planning. Linza served as board director of the AIA, Palm Beach, and is the 1997 recipient of their award for "Outstanding Contributions to the Membership." He has also served on the President's BSA Best Practices Research Subcommittee, as well as the boards of five other organizations. Linza is a graduate degree candidate in National Security with an Asian Studies concentration, is trained as an architect, and educated in environmental science.

Anna Grasso-Gay

Anna Grasso-Gay is currently an architect intern in San Antonio working for Michael G. Imber, Architect. She studied architecture at the University of Notre Dame where she received her Bachelor's of Architecture. In addition to her formal education Ms. Grasso-Gay lived in Queretaro, Mexico for part of her youth and has traveled extensively through Europe, both of which have helped shape her interest in urban and sustainable design. She aims to create living spaces that will be in harmony with the human body and its environmental surroundings.

William D. Gay

William D. Gay received his Bachelors of Science in Architecture from the University of Texas San Antonio. While attending UTSA, Mr. Gay spent a semester in Castiglion Fiorentino, Italy. His goal is to create architecture which will be as timeless and in-tune with the environment as the buildings that captivated him as a young photographer. Currently Mr. Gay is an architect intern for the firm of Michael G. Imber Architect in San Antonio.

A CALL FOR TRANSLATION: "AFTER AMNESIA: LEARNING FROM THE ISLAMIC MEDITERRANEAN URBAN FABRIC, 2007" BY ATTILIO PETRUCCIOLI

Ashraf M. Salama
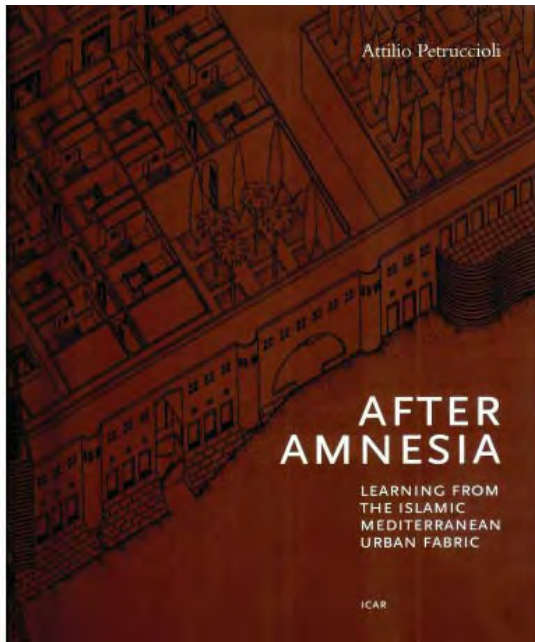
The new book **"After Amnesia: Learning from the Islamic Mediterranean Urban Fabric, 2007" by Attilio Petruccioli** comes after marvelous efforts he has undertaken in articulating the need for understanding the city, its structure, fabric, and the essence behind the physical manifestation of the Islamic/Mediterranean Urbanism. Through this and previous publications, professor Petruccioli is a well known authority in architecture and urbanism in countries with Muslim traditions. His three decades of experience on this subject are clearly reflected in this book.

The book is constituted in beautifully illustrated four chapters, each of which addresses a specific aspect of the physical realities of the Islamic city. The first chapter introduces issues that pertain to the dialectic relationship between buildings, cities, and civilizations and highlights the typological processes involved. The second chapter involves a typological analysis of the Islamic houses which formed the structure of many cities including Fez, Mostar, Aleppo, and Algiers--among others. Chapter 3 addresses the physical aspects of the building tissue in the Islamic city and the dialectic relations between the building tissue and the larger contextual fabric. In chapter 4, the city is analytically described as an urban organism;

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it also involves methods of interpretation while at the same time concluding with the fact that Islamic cities have unique character, especially in terms of its spontaneity and intentionality.

In my position as architect and academic in architecture and urbanism, I can confidently argue that there is a severe lack of serious Arabic publications and Arabic reference materials. This is evident if one would search any public or academic library or navigate the World Wide Web. While there have been some writings or reports on the urban environments of the Islamic cities, they are scattered, difficult to have access to, or are published in obscure or low quality publications. In essence, this manifests the urgent need to develop and secure the necessary funds to translate and publish this book into Arabic. A logical reason is that the book is of high value to the academic and professional community in architecture, planning, and built environment studies. Such a community is exemplified by practicing architects, planners, landscape architecture and those who are working in these fields in the academy and their students. Therefore, it serves the interests of a wide spectrum of reader types.

Looking around in most Islamic cities in the Mediterranean basin, one can find that while architects manage individual buildings well enough, the overall urban environment in those cities is increasingly mismanaged. The reason is that many architects are lacking the fundamental understanding of the city and its evolution, how it was, it situation in the preset, and how it should position itself in the future. Therefore, this book if translated into Arabic those who make decisions about Islamic cities including current and future generations of architects and planners would have an easy access in Arabic to the fundamentals of development in those cities. This is not all, it will facilitate decision making based on understanding the evolutionary aspects of the Islamic city and its traditional fabric. Truly, this book is a conscious endeavor that deserves special attention by translating it into Arabic in order to have the full potential benefit to a larger segment of professionals, academics, and students in the Arab World.