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Rethinking Dubai's Urbanism:

Generating Sustainable Form-Based Urban Design Strategies for an Integrated Neighborhood

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Rethinking Dubai's Urbanism:

Generating Sustainable Form-Based Urban Design Strategies for an Integrated Neighborhood

by

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Dedication

This work is dedicated to my Mother who has been my biggest ally, my motivator, and my inspiration. Her major concern and goal was always to see me happy and successful in my personal, professional, and academic lives. I have learned a lot from her, more than any other human being. She taught me, inspired me, supported me, and challenged me. She had the insight and intelligence to give me guidance, assistance, care, and love. Regardless of her pain and chronic diseases, she made a huge sacrifice by sending me abroad to pursue my Master's and Doctorate in a time when she greatly needed me. After I completed my Master's in 2007, she refused to accept my decision to stay home and forget about the PhD. I still remember the night she came in my room and told me, "Just go and continue what you already started and invested in; I cannot accept you being around while you are missing a great opportunity. This is the best for you now and in the long term. As for me, your brothers and sisters will take care of me, and most importantly, Almighty God is with me; He will protect me, give me strength, and cure me." My Mother was indeed the fuel that launched and propelled this work. Without her blessings, prayers, soothing words, love, and encouragement I would have never been able to pursue my studies. It is sad that she is not around to witness this effort and achievement. My dream was to go back home and show her my work and accomplishment. But, I am sure that she can feel it and sense it even though she is in the other world.

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Rethinking Dubai's Urbanism:

Generating Sustainable Form-Based Urban Design Strategies for an Integrated Neighborhood

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The University of Texas at Austin, 2011

Supervisor: Sarah Dooling

I conducted a case study analysis of Dubai, exploring multiple urban design tactics for a more sustainable development approach to Dubai's pattern of development. Particularly, this dissertation identifies sustainable urban form design principles and strategies for a Dubai neighborhood. The research addresses the question: which form-based urban design strategies effectively deliver greater environmental, social, and economic coherence in Dubai's neighborhood development? In addition, this research addresses the question of whether certain urban form design principles contribute comparatively more than others to sustainability. I used two rounds of the Delphi technique, a structured communication technique utilizing multiple rounds of questioning, to obtain experts' knowledge and opinions to redefine urbanism in Dubai towards more ecological and social responsive practices. My analysis of the Delphi reveal that in Dubai, the most sustainable neighborhoods are those emphasizing more public participation in the initial planning process, i.e., connectivity and multiple transportation options; adequate diversity; green, open, and social nodes in the urban fabric; culturally-relevant urbanism and architecture; climate-sensitive urbanism and

architecture; eco-balanced design applications; and adaptability, all integrated with one another in the compactly arranged urban fabric.

Approaches to sustainable development must stress elements other than just design itself, such as grasping the nuances of the cultural traditions, politics, and implementation constraints. Therefore, this research also involved collecting survey responses from local and expatiate residents in Dubai and interviewing Dubai government officials in order to identify and to understand the relevant political and cultural aspects as well as obstacles associated with the experts' design recommendations. In particular, survey responses were used to: (1) identify the public opinion surrounding some of the Dubai neighborhood design ideas suggested by an international and local panel of experts; and (2) understand how the public value and prioritize the suitability of the proposed design strategies to Dubai's cultural environment.

Interviews with the local authorities in Dubai facilitated (1) the determination of troublesome challenges and constraints for implementing some of the urban design strategies defined by experts in the Delphi; and (2) identification of implementation opportunities and possible policy initiatives that might support the implementation of the proposed strategies. I also synthesized all research data to identify areas of overlap and disagreement among research participants (the experts, public, and government officials). Finally, the last chapter discusses two major obstacles challenging different aspects of sustainability. I also detail a potential solution to prevail over the challenges, and introduce potential areas of future research.

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Chapter 1: Introduction

Rapid, massive urbanization is one of the pressing issues facing the world's populations and places. Dubai, for example, is a case that requires new design tactics for changing unchecked growth and unregulated development. The current trend of urbanization in Dubai has been characterized as "vertical", "mega", "exaggerated", and unresponsive to its physical environment and culture. The juxtaposition of Dubai's urban projects contributed to a morphology that is dispersed, segregated, and fragmented yet connected by multi-lane highways. As a result, integrating ecological and social aspects to create high quality neighborhoods for Dubai embodies the ultimate challenge. Considerable efforts have been dedicated to the concept of sustainable urbanism in the last years; however, the majority of research focused on Western societies or on cold and temperate zones. Few studies have focused on hot arid zones, Dubai specifically. For that reason, this research addresses this gap and proposes a research design that aims to explore multiple design strategies and tactics that promote better sustainable urban design for Dubai neighborhoods.

The selection of developing a sustainable urban form agenda for a small scale development, such as a neighborhood scale, is based on the argument that looking at the small level is very important before looking at the larger city scale because the sustainability of the region depends upon the sustainability of the "small" urban areas that comprise the "greater" region. For example, as the health and human condition impacts the health of the individual "cell" that makes it, the sustainability of a city depends on the sustainability of the individual neighborhoods that form the greater region (Sustainability by Design, 2006).

The path towards resource efficiency and energy conservation is not only based on the incorporation of building-scale sustainability and green technologies, but also based on finding urban design tenets that organizes and arranges the elements of urban form in a sustainable manner (Wiedmann, 2008). According to Solomon (1992:46),

> the biggest and most important, most thoroughly lost and forgotten lesson about town building is that buildings alone don't matter; it is only the ensemble of streets, lots, and buildings, and the way they fit together that compromise the basis of town making.

Examining Dubai's urban growth proves simultaneously astonishing and frustrating. Dubai has urbanized and grown rapidly. The city expanded to several times its size compared to its proportions in the early 1990s. The rapid and intense developments extended the city along the Gulf shore, towards its neighbor Abu Dhabi. The current phase of urbanization, which I describe as the globalization era, is characterized by the emergence of vertical towers, artificial islands, tourism infrastructure, self-contained mega projects, several gated communities, and ethnic enclaves. The arrangement and distribution of these development patterns created what I call a disaggregated and fractured urban morphology. Because the decision-making system in Dubai operates from top to down, these patterns of developments emerged so rapidly without assessing the future environmental and cultural consequences.

It appears that prosperity from oil revenue in the 1970s; real estate speculation in the 1990s; availability of financing through banks; foreign investments; an oversupply of wealth; and the city's conservative political mechanism represented in a top-down approach in planning decision-making all contributed to the resulting massive and rapid urban growth, and the derivation of a spatially and ethnically fractured city structure. Today, several strong arguments can be made about the characteristics and typology of

Dubai's urban form: (1) Dubai's urbanism has caused large gaps or patches between developments; huge areas of desert need to be defragmented and filled connectively (Elsheshtawy, 2008); (2) the results of Dubai's urbanism are in fact forms of "real estate cloning", driven both by the rapid pace of urban expansion and by the clients emphasis on investment retunes, which resulted in general monotony, redundancy, and ineffective homogenization of the built environment (Al-Masri, 2008); and most important (3) the urban form of Dubai is perceived as neither integrated nor networked but as fragmented and dispersed, reflecting a pattern referred to as "splintering urbanism" by Graham & Marvin (2001).

The current global economic downturn offers a good opportunity to re-strategize the public policy and growth scenario in Dubai towards a more sustainable future that reconciles its social and environmental context. During this financial woe, Dubai is not seen different from the rest of the world. The fracture in the economic bubble is clearly reflected in Dubai's construction and urban activities. In March 2009, *Middle East Economic Digest* (MEED), a business journal, estimated that investors in the UAE had deferred "$335 billion-worth of construction projects." According to Hughes (2008), Dubai Waterfront City, the 1.5-billion-square-foot development master planned by Rem Koolhaas/OMA, is also frozen for further consideration. Completion of a detailed master plan for Palm Deirah, the third man-made palm island, also has been postponed. An official in Nakheel, one of the largest developer firms in Dubai, said that Dubai is "witnessing" a period of financial collapse; as a result, the firm "scaled back" its development activity and dismissed many of its workforces. Based on the explanation above, I believe this recession may slow down the economic development processes and provide a point in time when the pressures for massive development ease, and the

opportunity for assessing an urban design agenda and decision-making structure for Dubai that integrates social and ecological aspects.

My personal response and reaction toward Dubai's development typology entailed a research study aimed to "explore" and "formulate" an urban design framework for a more sustainable development pattern to Dubai's current development practice to potentially guide the city, the UAE, or other similar places in hot arid regions towards socially, economically, and ecologically sensitive practices. I dedicated several years to searching, articulating, and exploring different means to provide a knowledge base and a variety of tools and design tactics. My data derives from a wide range of people including academics, practitioners, and policy makers and strives to think, benefit, and generate discussion about this work in the design of future and existing neighborhoods.

Particularly, my research entails a case study analysis of Dubai, organized into two parts. In the first part I describe Dubai's development history, detailing the urbanization process and most pressing issues facing the city. In the second part, I explore multiple design tactics for a more sustainable development model to Dubai's current development typology. In particular, my research involved collecting design recommendations from an international and local panel of experts, interviewing Dubai's government officials, and collecting survey responses from the local and expatriate residents (please refer to Table 1 below).

Table 1: Research questions and rationale

Research Topic	Research Questions	Rationale/Purpose	Method
I am investigating sustainable urban form design principles and strategies for a neighborhood scale development in Dubai	What are the most essential form-based urban design strategies that would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai?	I convened a panel of local and international panel of experts who possesses rigorous and highly regarded knowledge about sustainable urbanism to explore, articulate and advance multiple strategies for a more sustainable development approach to Dubai's current patterns of development.	The Delphi technique (2 Rounds)
	What are the public opinions about some design ideas for Dubai neighborhood that have suggested by experts who were surveyed?	I would like to understand how the public value and prioritize the suitability of the proposed design strategies to Dubai. I also want to understand the potential benefits and troublesome challenges associated with each proposed strategy, from the public standpoint.	Surveys with local and expatriate residents
	What are some constraints for implementing some urban design strategies defined by experts who were surveyed?	I would like to identify troublesome challenges that constrain implementation of the urban design strategies identified and prioritized by the experts.	Interviews with Dubai's government officials

Chapter 2: The Case of Dubai: History, Growth, and Sustainability Concerns

INTRODUCTION

This chapter provides a descriptive analysis of Dubai detailing the establishment of the city, its urban growth, and major sustainability issues. Particularly, the chapter is divided into three sub-sections: (1) historic overview; (2) Dubai's urban growth; and (3) sustainability concerns which outline the most pressing ecological and social issues in the city as listed in the literature.

HISTORIC OVERVIEW

As grew many cities in the Gulf region, the city of Dubai started in 1799 with a cluster of houses and a defensive building. Al Fahidi Fort or Dubai Citadel is the oldest surviving building in the city. At that time, forts were conventionally simple rectangles with defensive towers at each corner. Al Fahidi, on the Bur Dubai side of the creek, served as the ruler's habitation, government office, local jail, and shelter for people in case of attack (Saunders, 2003).

The Gulf desert itself was an arduous and desolate area in which to live, and only rarely did someone come from its depth. The Bedouin who first lived there anxiously desired to migrate from the heart of the desert to the Gulf shore. However, aspirations for a better life transformed the sense of uncertainty to encouragement, motivation, and stimulus force (Munif, 1989). At the beginning of the 18th century several tribes moved close to the Gulf water, the most famous of which was Bani-Yas. In 1833, a significant development took place in Dubai when 800 people of the Al Bufalasah section of Bani-Yas tribe, one of the famous tribes in the Arab region, migrated from Abu Dhabi (the

capital of UAE at present) to Dubai (Facey & Grant, 1996). The tribe established three settlements - Shindaghah, Dubai, and Deirah –around what is called today Dubai Creek.

According to Elsheshtawy (2004), the mid 18th century saw expanded economic affluence that resulted in greater urbanization. While fishing and pearling generated the bulk of the income, Dubai's bazaars bustled with merchandise as a result of the easiness and ingenuousness of its rulers; most of the businesses were held by foreign traders, Indians and Persians, who had a great impact and force on the city's development and expansion. Just before the end of the 18th century the population of Dubai already was estimated at around 3,000.

Dubai earned its importance in the late 18th and early 19th centuries because the British were importing goods to the area via steamer and because Dubai had emerged as one of the main pearl exporters in the Gulf region, competing with Iran. In the 1870s due to the political instability and to the difficulty of life in Iran, Dubai had a greater opportunity to become one of the prime ports and major trading center in the Persian Gulf. A considerable increase in tax and inappropriate actions towards some Islamic principles in Persia (during the Shah era) drove many Arabs and Persians living along the Persian coast to migrate to Dubai, where they established a new commercial and social base. During the 1920s, as the Persian taxes became more arduous and were deemed interminable, many merchants who planned a temporary Dubai residence ultimately accepted the Dubai rulers' offer of permanent residency. These Merchants of mixed origins were given an area of land instantly to the east of Al Fahidi Fort to build houses. The district became known as Al Bastakiyya since many of the migrants came from Bastak, a city in Iran.

Since its' founding, Dubai enticed a variety of immigrants from Persia, Iraq, and other Arabic countries to work as accountants and clerks for Dubai's Merchants. Baluchis

from Indian subcontinent were another group of immigrants that appeared in the 1930s, working as porters and in other low level employments Dubai's cultural landscape included a variety of classes and ethnic groups, and it still accommodates people from all over the world. Today, the expatriate groups in Dubai are estimated to be over 65% of the total population (Kazim, 2000).

In 1903, Britain's influence to maintain Dubai as a port of call in the Gulf region was very strong because of two reasons: first, as an alternative overland and maritime route between India and Britain, and second, to buttress British attendance in order to put a stop to Russian pressure in Persia (Kazim, 2000). In the years following World War II (circa 1947-1941), Dubai vied to sustain itself as a business center and mercantile city. Nevertheless, it virtually remained a British Protectorate, a condition boosted by a series of political agreements and development projects. For example, in Sheikh Rashid's era, the former president of Dubai, a considerable amount of projects carried out with the British support. These included the electrification of Dubai in 1961, and the dredging of Dubai Creek in the 1960s. This project deepened the port through the dredging and the constructing of breakwaters. Due to high cost, funds were borrowed from Kuwait to pay for the British firm of Halcrow & Partners (Elsheshtawy, 2004).Before the discovery of oil, Kuwaiti funds yielded a great impact on Dubai, especially on education and health facilities. For instance, the Kuwait government built schools, healthcare facilities and was responsible of all educational and medical requirements and supplies.

In 1966, oil in beneficial and commercial quantities was discovered in Dubai. As a result, oil revenue added a new dimension to the city and a new era of prosperity and opulence. According to Elsheshtawy (2004), foreign labors in 1968 represented 50% of the total population in Dubai. The dramatic labor influx had considerable cultural and social effects; however, they had no political and administrative power within Dubai's

political structure. In spite of the fact that many ethnic groups had presence in Dubai; people lived in peace and harmony, and yet this condition of harmony is the norm today. December 2nd, 1971 the seven Emirates, including Dubai one, integrated to formulate the United Arab Emirates. This date, in fact, represents independency, the end of British Colonial, and the beginning of development in all levels.

Dubai's Urban Growth

The rapid expansion of Dubai transformed the city from a small port and fishing village into a global city. This growth is seen in size, territory, manifestation, and urban morphology. The literature about Dubai indicates that the city underwent four fundamental phases of urban expansion: the first phase extended from 1900 to 1955, the second from 1955 to 1970, the third from 1970 to 1990s, and the fourth from 1993 to present (Elsheshtawy, 2004) (Please refer to the photo essay in Appendix 1).

The first stage of growth which extended from 1900 to 1955 revealed an outline of slow and partial physical expansion due to constrained economic activities and trivial growth in population. Until 1955 the urban area didn't surpass 3.2 km^2 and the land use was roughly residential with limited commercial zones. Most of the people settled close to the mouth of the creek and worked in fishing, pearl diving, and trade. The majority of native people lived as extended families in "Barasti" houses, places built of palm trunks and fronds. On the other hand, other people with reasonable income lived in houses with a courtyard and a wind-tower structure. The construction system of these houses was that of coral stone, mud, and wood. Wind-towers were introduced first by Arabs and Persians who migrated from the Persian shore to Dubai. The tower functioned as a passive cooling system providing ventilation. In some cases, people the affluent incorporated two or even three wind towers. Concrete blocks were not used in construction at that period; in fact,

the first concrete block house built in Dubai was in 1956 (Gabriel, 1987). Houses were built intentionally in clusters to achieve the function of privacy and collective tribal safety. The internal parts of every enclave were linked by narrow shaded pathways designed for pedestrians and animals that were used for carrying goods and water. At that time, the only source of water was four public wells close to the enclaves and water was carried by individuals and families (Heards-Bey, 1982).

The second stage of Dubai's urbanism, described as a compact development, extended from 1955 to 1970. In 1955 the population of Dubai reached 56,000. Exactly one decade later, a British architect named John Harris designed a master plan yielding a great impact on urbanization. Harris was introduced to Sheikh Rashid, Dubai's president at the time, by Donald Hawley, a British Political Agent in Dubai. After several meetings with the Sheikh, Harris was appointed in town planning and surveying matters. With no planning experience, Harris generated his first master plan, which subsequently guided Dubai's urbanism until oil discovery in 1969. His first master plan called for the provision of a road network, land use zoning, and the determination of town center (Drawn in the Sand, 2007). In addition, the plan introduced new zones for residential quarters, hospitals, and town center. The urban area during this period expanded to 5.2 Km^2. The creek divided the city into two parts: Bar Dubai and Deirah. Deirah to the north was considered the commercial and governmental sector. \While Bar Dubai to the south was mostly residential, the inclusion of the customs house and the residence of the Sheikh gave it a political and governmental presence as well. As of yet,, oil had not been discovered in commercial quantities, a fact which limited the city's development goals (Gabriel, 1987).

In the third stage of urban expansion, Dubai underwent what is called "planned suburban growth," a period of rapid expansion which started in 1970 (AlShafiei, 1997)

and continued into the 1990s. The urban areas in this phase increased from 18 km^2 in 1971 to 84 km^2 in 1980 and then to 149.3 km^2 in 1993. The population increased from 100,000 in 1971 to 276,000 in 1980 and then to 674,000 in 1993 (Parsons-HBA, Inc, 1995). The availability of economic resources spurned the very growth during this period. Specifically, the government focused on major infrastructural projects. Harris introduced a new master plan that called for infrastructure and mobility. For example, Al Shindaghah Tunnel, which runs beneath the creek and connects Dubai to Deirah, was built. In addition, two bridges Al Maktoum and Al Garhoud were constructed to connect the two parts of the city. Before the emergence of bridges and tunnels, Abras, small rowing boats transported people across the creek from Dubai to Deirah, serving as the dominant mode of mobility across the creek. Today, Abras are still used as a mode of mobility in order to maintain the old image of Dubai and to lessen traffic congestion in the spatially dense and compact old town. This phase also witnessed the derivation of the vision for Port Rashid, Port Jabal Ali, and Dubai International airport. Schools, public buildings, hospitals, parks, and shopping centers were built as well. Moreover, two large areas were designated and reserved for residential use (now known as Al- Satwa and Jumierah) and a further two large areas were reserved for industrial use (now known as Al Qooz and Jabal Ali). Other additional lands in the southern part of the city were dedicated to education, health and leisure (Gabriel, 1987).

The fourth phase of Dubai's urbanization started from 1993 and even continues today. In this stage, Dubai took many fundamental decisions in order to emerge as a global hub. Some observers argue that the key purpose of this phase served to build the base toward modernity, fame, and globalization. Despite the great contribution of oil wealth in city development during the 70s and 80s, I argue that oil played a minor role in the 90s as the government diversified its economic base in the areas of real-estate,

tourism, retail, manufacture, and construction. Specifically, some records indicate that the economic diversification strategy claimed responsibility for 90% of the urban development in the 1990s (Dubai Land, 2004).

In the globalization era, the city planned for new financial, commercial, entertainment, governmental, and residential centers through a series of mega projects controlled by public-private partnership that brought investors through all over the world. Perhaps, the first action toward globalization was building a contemporary downtown area. The corridor along Sheikh Zayed highway towards Jabal Ali "dubbed" Dubai as a modern city. Spectacular amount of projects were built alongside this stretch of highway resulting in shifting the city's skyline, image, and center (Elsheshtawy, 2004).

Since the 1990s Dubai has experienced extraordinary development. Massive projects were frequently declared; each apparently planned to surpass the previous and even concurrent ones. One spectator noted that "mapmakers in Dubai must be constantly frustrated. No sooner have they finished their latest in-depth representation of the city when another major project is announced to send them scuttling back to the drawing board" (Smalley, 2002). Mega projects like the tallest skyscraper in the world and several man-made islands were partly based in the recognition that oil is drying up; therefore, the city had to establish a new economic by embodying a universal hub for leisure, trade, and services. But many observers trace the early start of Dubai's trade activity before the explosion of wealth brought by oil discovery in the late 1960s. Historically, the city was based on trade and commercial activities such as pearl industry, accommodating several merchants from India, Pakistan, and Persia. The idea of being a commercial hub is not something new to Dubai; it is indeed a part of its long history. But the aspiration for being a regional and global commercial and business hub has evolved in scale, capital, and strategy.

Using its transitory oil wealth, the emirate has built “free zone” areas, clusters defined by economic liberalization, technological innovation, and political transparency. Davis (2007) said that although tourism projects generated most of the “buzz” about Dubai, the city attempted to add value to its growth through a series of specialized free-trade zones and high-tech clusters. The initial Jebel Ali Free Zone, an industrial and trading hub, was followed in the late 1990s by three technological parks: Internet City, planned to create an infrastructural environment that facilitates Information and Communications Technology (ICT); Media City, a project that became a regional hub for many media corporations like CNN, MBC, and Reuters; and Dubai International Financial Center (DIFC), a stock market headquarters meant to link between the east and the west serving as an entry for the flow of investment and capital to and from the region to intensify the city’s connection to global capital markets (Katodrytis, 2005). In addition to these specialized free zone enclaves, Dubai is also planning to build a Humanitarian Aid City as a base for disaster relief; a Motor City a free-trade zone dedicated to the sale of used cars; a Dubai Metals and Commodities Centre; Healthcare Village, in collaboration with the Harvard Medical School; a Sport City; an academic city, and other series of specialized cities within a city. Davis (2007) argues that Dubai has created what American reactionaries only dream of, zones of free enterprise without income taxes.

Today, if we look at Dubai map, it appears that the urban areas are concentrated in six main areas. First, there is the existing city, long and narrow, stretches along the shore. Second, there is the old central downtown with two distinctive parts alongside the creek: Bur Dubai and Bur Deirah. Third, there is the new downtown area which is planned as a linear form along Sheikh Zayed Road. Fourth, there is the Gulf water and the projects that are being built in offshore; some of them are few miles from the original shoreline, and others are along the shore. Fifth, there is the desert expanding and

embedding into the city's structure in which its original coastal linearity are changing and becoming wider. Finally, there is the sky, where there is no limitation of height, scale, and density (Machado, 2006a).

SUSTAINABILITY CONCERNS

I describe Dubai is an extreme example of an emerging and globalizing city. For example, its infrastructure and population expanded rapidly in the last two decades; for example it had 20% of the world's operating cranes and an annual population growth rate of 8%. From a small fishing village, fairly self-sufficient, integrated and reflective of the surrounding traditional society in the mid 20th century, Dubai transformed itself in the 1990s to a global showcase. The city branded itself through expressive consumerisms, tourist attractions, massive high-rises, and an eclectic array of island projects that all in all work in an age of boundless resources.

Before the 1960s, the urban form of Dubai was compact. Its residents adapted to the harsh desert climate through different passive urban and architectural strategies in the absence of oil, money, science, and technology. However, prosperity from oil revenue in the 1970s, real estate speculation, the availability of financing through banks, foreign investments, and an oversupply of wealth in the 1990s resulted in a massive and rapid urban growth, fracturing the city. The literature indicates that the speed and intensity of change in Dubai in the last two decades triggered several sustainability concerns; I have organized most of the issues into the following categories:

1. Fragmentation (Physical and Social)

- Developments are not contiguous, described as dispersal urbanism or scattered developments
- Urban areas are divided and mainly linked by highways and roads

- Exclusion and isolation: domination of many gated communities and gated tower complexes as well as several private and self-contained urban projects
- Public spaces are privatized or semi-privatized in shopping malls and along waterfront developments
- The urban experience is repetitive and redundant based on entertainment, tourism, consumption and marketability
- There is no concern about land preservation. Disaggregated urban projects expand massively along the gulf shore and in the desert, wasting large tracts of lands.
- There is no symbiotic relationship between buildings and landscape, or people and different uses.

2. Lack of Connection

- Intensive automobile accommodation. There is an extreme rise in automobile usage. Dubai is basically an automobile dependent city.
    - Dubai's statistical data showed that no more than 6% of the population use the bus system and motor vehicles increase by an annual average of about 12% (Albayan, a local news paper, March 2008).
    - There has been an increase of 30% in the number of vehicles in Dubai, according to the 2005 figures (Corder, 2008).
    - Vehicles in Dubai take 3.1 million trips a day, a figure expected to increase by 2020 to 14.3 million trips a day (Albayan, March 2008).
- Lack of pedestrian accessible places
- Dendritic (tree-like) street system is dominant. Ergo walking is difficult and cars are the central mode of transportation even for very short trips.

- Interconnected street patterns and urban blocks are not used or preferred in the built form design.
- Urban communities are not served by a transit system which is linked to the city's central rail system (the green and red lines).
- There is a lack of greenways or urban green corridors
- The parks in Dubai are mainly accessible by car
- There is no interconnected park system

3. Segregation

- The urban form focuses on a select portion of the population (e.g., tourists, international residents, and high income people) rather than supporting diversity or focusing on local needs.
- Ethnic and socio-economic segregation. Many low and middle income classes live in adjacent cities for affordability purposes. Many locals have their own subsidized neighborhoods. Other, including high and middle income classes live in new mega projects i.e tower complexes, gated communities, islands or themed projects, while the working classes live in old districts and in labor dorms.
- There is no variety and diversity in the urban form and the architecture of mega developments since most of the developments both are repetitive and redundant, like the eclectic array of palm tree shaped island projects.
- Developments either are mega, vertical, off-shore, excessively themed, or exclusive rather than inclusive or diverse (Machado, 2006b)
- Dubai is mainly based on a homogeneous type of urbanism in which the city becomes a pure enterprise for segregated mega developments and foreign investors. This urbanization trend predominantly focuses on selling, and its

success is linked to its marketability and profit (Katodrytis, 2005; & Doherty, 2008).

- Public spaces are mainly privatized and primarily associated with shopping malls, commercial corridors, and located along waterfront developments (Moustafa & Rifki, 2007).

4. Erosion of Local Culture

- New mega developments do not target the housing needs of native people
- Native people are experiencing a sense of isolation because use of their language is diminishing with the influx of the foreign population.
- Social stratification of city population is becoming more critical:
    - According to the Under-Secretary of the Ministry of Labor, a total of 202 different nationalities exist in the labor market in the UAE.
    - The country has one of the greatest rates of foreign nationalities.
    - The expatriate workers reached 2.6 million by 2006. Indians comprise 50%of the total number of employees working for the private sector while Pakistanis account for 18% (Khaleej Times, a local news paper, 2006).
    - The 2007 population figure indicated that there are 864,000 UAE nationals and 3.62 million expatriates in the UAE, the bulk of who base themselves in Abu Dhabi and Dubai.
    - A study conducted by Benton-Short, Price, & Freidman (2005) ranking cities in terms of immigration indicated that Dubai has the highest percentage of foreign-born residents (82%), followed by Miami (51%), and Amsterdam (47%) (Cited in Elsheshtawy, 2008).

- Cultural norms, including preferences for maintaining privacy, are not an explicit component in the design of subsidized local neighborhoods or in the mega projects.
- Many mega projects don't incorporate sites of religious pilgrimage.
- There is a dramatic shift in the social activities and communication from neighborhood or family-centric networks to market driven relations that take place in shopping malls, hotels, and other kinds of privatized spaces.
- The influx of the working class deteriorated many old housing districts and created ethnic enclaves due to lack of appropriate and affordable housing stock for population segment.
- The focus on marketing the city as driving development created urban contexts with new and diverse cultural norms that are changing the local culture of the area.
- The current urban design strategy emphasizes developing mega projects, branding the city, creating a global identity for the city, consuming luxury items and commodities, marketing this urban form itself rather than responding to the cultural norms and to the environmental conditions of the place.

5. Form and Function of the Landscape

- Landscape is seen as a real estate icon (Doherty, 2008). The focus centers more on the form and economic function of the landscape and less on its cultural and environmental functions. For example, the city focuses on large-scaled green, open spaces (albeit treeless) that serves several gated communities and golf courses. These communities are marketed as a luxury life style that increases the local real estate value.

- Urban communities lack playgrounds and sport fields.
- The green system in Dubai is not well integrated into where people live or work.

7. Environmental Deterioration

- High levels of air pollution: A study indicated that Dubai ranks among the worst in the world using an On-road Vehicle Emission Measurement device, which assigns a percentage score for the levels of harmful pollutants including hydrocarbons, carbon monoxide, nitrogen oxides, and carbon dioxide (Corder, 2008).
- Temperature increase:
    - The Meteorologist Office indicated that in May 2009 temperatures soared to their highest levels in 23 years. The daytime temperatures on May 26th reached 46.3° C, just marginally lower than 47° C, the record temperature recorded in May 1986 (Building Boom Turns up the Heat, 2009).
- Increase in urban heat islands effect
- Overconsumption of natural resources
- High levels of waste, especially construction and solid waste (Malik, 2008):
    - In 2007 the city had one out of six operating cranes in the world. Construction and demolition waste constitute 75% of the total solid waste generated globally every year.
    - From 2006 to 2007, the volume of construction and demolition waste in Dubai increased by 163% to nearly 28 million tons, as compared to 10.5 million tons in 2006**.**
    - Eight million tons are recycled each year, with the remaining amount going to landfills

- Lack of renewable energy sources and plan
- Lack of passive solar design tactics
- Developments are unresponsive to local climate
- Excessive consumption of energy and water:
    - Dubai is ranked number one in the world in terms of growth in energy and water requirements. For example, electricity growth was 15% and water almost 12% (per capita) in 2007 (Sinclair, 2008).
    - From April to November each year, 75 to 85% of power consumption is for cooling purposes (DEWA, 2008).
    - A study conducted by the Emirates Industrial Bank indicated that the UAE has one of the highest water consumption levels in the world (almost 130 gallon/day) compared to western countries. This stems from its extreme climatic condition and high per capita income (Sinclair, 2008).
- The UAE had the highest ecological footprint in 2004 as well as 2006:
    - According to the World Wide Fund for Nature (WWF) Living Planet Report 2004, the global ecological footprint was 2.2 global hectares per person, while the ecological footprint of the UAE resident was 9.9 hectares, the highest in the world (Krane, 2007).
    - In 2006, another WWF report indicated that the global ecological footprint remained the same, while for the UAE it increased to 11.9 hectares, once again the highest in the world (Mitchell, 2007).

8. Regulation and Public Participation

- The recent urban form in Dubai is homogenous and lacks sufficient connectivity to the existing city fabric and other mega developments.

- Urban developments in Dubai have been mainly unplanned and unregulated. The investors are setting up their own needs because there are no solid regulations to control them (Record News, 2008).
- There is no environmental protection agency.
- Sustainability standards are not imposed on developers. The first complete regulatory action will take place in 2015 through an Emirates version of LEED. However, it is not comprehensive as it regulates only buildings, not the urban form or large scale developments
- The city's agenda primarily relates to attracting foreign investment and capital.
- The private-public partnership of the municipality restricts and does not promote involvement of the public in decision making processes related to development projects.

Chapter 3: Literature Review

INTRODUCTION

This section is structured and organized to discuss and synthesize the classical and historical urban design debates related to urban form and sustainability. In particular, I will address the major positions, major paradigmatic shifts, as well as the merits and limitations of each debate. I will also discuss gaps in the current literature and how my dissertation research contributes to different aspects of the debates.

The urban design debate on the ability of different forms of urban development to provide better and more sustainable environments has a long history. On the earliest strategies for the colonization of land for human habitation—from ancient Mesopotamia, Egypt, Rome, and Greece, to the Medieval Ages and the Renaissance, to Post Industrialization and the World Wars, to today's modern cities—an enormous amount of material has been written, particularly regarding the benefits and the limitations of various urban models and strategies. Based on what would be regarded as significant, extreme, or controversial in modernity, I organized the urban design debates related to urban form and sustainability into two categories: classical (or historical) debates and contemporary debates. The classical debates include the work of Ebenezer Howard, Le Corbusier, Frank L1oyd Wright, Jane Jacob, and Kevin Lynch, while the contemporary debates include several sustainable urban form design principles spatially organized into four urban sustainability models—the compact city model, the polycentric system model, the new urbanism model, and the urban metabolism model.

CLASSICAL URBAN DESIGN DEBATES

Historical debates on urban design can be divided into two broad categories of debate opponents—those focused on the physical attributes of the city and those focused on both morphology (physicality) and place psychology, including activity, cognition, experience, and image. The first group—physical determinists, mostly architects—believed that big problems required big ideas, total solutions, and a comprehensive viewpoint. The second group, which focused on form as well as on perception and human animation, believed that cities' problems could be solved by addressing the smaller details, not by taking a comprehensive view.

The scope of the first group is summarized by further classification into either "centrists," who believe in the virtues of high density urban cores and criticize sprawl, or "decentrists," who favor urban decentralization, mainly as a reaction to the problems and congestion of industrial cities. The decentrist and centrist views of urban forms have long histories, but I argue that the extreme cases are Ebenezer Howard's Garden City, Le Corbusier's Radiant City, and Frank L1yod Wright's Broadacres City. The scope of the second category, on the other hand, is described through the work of Jane Jacobs, who believed in activity, diversity, and vitality, and through Kevin Lynch, who emphasized the sensory experience, cognition, and elements of good city forms (Breheny, 1996; Montgomery, 1998).

Physicality: Centrists vs. Decentrists

The most important period in the debate history between centrists and decentrists spanned from 1898 through 1935. During this period the boundaries of the debate were mapped out by three cases: The Garden City, the Radiant City, and the Broadacres City. While Le Corbusier's Radiant City represents extreme centralism and Wright's Broadacres City shows extreme decentralism, I believe that Howard's Garden City

delineates a middle ground. In fact, Howard merits consideration neither as a centrist nor as a decentrist, but as a representative of a "compromise" position because he did favor density; he did favor protection of countryside; and he did favor containment and linkages (Breheny, 1996).

In the late 1800s, Howard viewed the industrial city as a virtual nightmare and as an overcrowded entity, leading to disparity and misery. He saw little hope for the industrial city, which he believed served as a monument to greed, exploitation, and focused on the interests of the few rather than of the many. Effective city life and operation, he said, could never exist in cities of such size and characteristics. Due to the constant expansion of industrial cities, Howard advocated small, mixed-use, self-contained garden cities of about 6,000 acres and 30,000 people at a density of 15 people per acre surrounded by permanent greenbelts. Residential areas, each built around a school, would be separated from industrial areas. The central area would have civic buildings, a park, and a "crystal palace" containing shops. The town would occupy 1,000 acres, surrounded by a 5,000-acre belt of agricultural land. This belt would provide the town with food and employment opportunities, but it would also act as a green belt, preserving the town from expanding into the adjacent countryside. Each town would contain its own employment center, residential neighborhoods, and shopping districts together with an ample supply of parks and other public spaces. Howard envisioned a marriage of the best of town and country. His famous three-magnet diagram asked the question, "The people: where will they go?" The answer was to "town-country" or to "garden city." To centrists at least, Howard represents a clear decentrist position. However, I agree that Howard's Garden City decentralized approach is contained and connected, which places him at a great distance from extreme decentralists like Wright (Breheny, 1996; Brown, Dixon, & Gillham, 2009; Macionis & Parrillo, 2007).

Some centralist visionaries, like Le Corbusier, argued that changing society and solving cities' problems requires not outlying new towns as in Howard's model, but completely new central cities that are more human, more efficient, and made for everybody. In his books *The City of Tomorrow* (1927) and The *Radiant City* (1933), Le Corbusier, like Howard, condemned modern cities and proposed a new vision for urban society. But his proposal was the very opposite of Howard's Garden City. Refusing decentralization, Le Corbusier saw important advantages in concentrating people in tall, architecturally outstanding, high-rise buildings embraced by large open spaces. Such huge structures, Le Corbusier reasoned, would allow 95% of land to be free of any structure at all. To him, the city should be a place to explore and exploit human paradoxes. Although no such immense urban utopia ever came to fruition, Le Corbusier partially expressed his vision in some cities, like Paris and Chandigarh. In Paris, Le Corbusier horrified the French in 1925 with his plan for razing a large swath of central Paris in order to build massive office towers and apartment buildings, set in vast parks and connected by superhighways. However, in his 1953 design of Chandigarh, India, his vision was better received (Breheny, 1996; Macionis & Parrillo, 2007).

Frank L1oyd Wright, an extreme decentrist and a famous U.S. architect, viewed the Le Corbusier urban vision as a nightmare and disaster. He said that such high-density living should be avoided at all costs. Wright advocated decreasing urban densities, rather than increasing them. He appreciated the process of counter-urbanization. He saw city cores as a dead end, dominated by machines, choked for air, and shadowed by towers. Like both Howard and Le Corbusier, while Wright hated the industrial city and industrial capital, he accepted the integral role of modern technology. In contrast, though, he sought to increase vastly the space occupied by his utopian Broadacres City by lowering its density. His ideal city might easily spread over 100 square miles or more. He advocated

the concept that new technologies, like motor cars and electricity, could facilitate taking people back to the land. Wright envisioned a centerless, horizontal city connected by automobiles (or even airplanes) and advanced telecommunications. He strongly believed that his new vision would embrace the expression of Jeffersonian democracy. Decentralization and individuality, he felt, embodied the only way to ensure individual freedom. Broadacres City was never more than a dream or a utopian idea. The plan received massive criticism during his lifetime, but Wright never abandoned his vision. He rewrote his Broadacre treatise, *The Living City*, for the fourth time at age 90 (Breheny, 1996; Brown, Dixon, & Gillham, 2009).

Outside of Howard's Garden City, which holds many implications in today's urban planning and design, I argue that utopians like Le Corbusier and Wright share many limitations. First, they lack financial practicality. Second, each plan is a rigid vision developed by a single person who assumed that everyone would recognize and support his underlying logic. Third, the plans seem sociologically naïve (Macionis & Parrillo, 2007). Fourth, these utopians were mostly architects who believed that changing the physical world would automatically alter the social world as well (Hall, 2002). It should be noted that "city design" is not just "big architecture" (Lynch, 1981).

Physicality + Social Milieu + Cognition

Since the 1960s, the trend in city form and development shifted from big utopian and comprehensive solutions. The focus was not only on the physical form, but also on the social world, sensory experiences, and small scale details. Specific failures in urban development strategies in the United States in the post-World War II period led to strong reactions from scholars and other people. The major urban interventions of the 1950s and early 1960s garnered serious criticism. The building of the interstate highway system

through cities, and urban renewal and public housing projects were seen as tearing up viable urban neighborhoods and communities, especially in low income and racially diverse areas. Reaction to the perceived failure of these large-scale physical planning and transportation interventions pushed urban design theory and practice in new directions with an eventual turn toward social, cultural, psychological, and feasible physical attributes.

Leading this reaction was Jane Jacob, author of the *Death and Life of Great American Cities* (1961). Jacob based her work largely on the impact of cultural trends, small details, and human movement on urban form; this approach stemmed greatly from her time living in New York's Greenwich Village, which is portrayed in literature as an ultimate model of urban living. To Jacob, the city's greatest value lies in its diversity. She viewed the city's life as residing chiefly in its countless interactions and the multiple uses of its streets, sidewalks, parks, and neighborhoods. Anything that terminates this quality leads cities to their death. Jane Jacobs was the first to discover urban quality from the principle that "activity" both creates and mirrors quality in the built environment. She identified four essential requirements which set the conditions for activity: a mixture of primary land use; intensity; permeability of the urban form; and a mixture of building types, ages, sizes and conditions. Jacobs and others, such as Gehl (2001), argued that good urban places are based on streets where various types of activity occur in and between buildings. This conception led Peter Buchanan (1988) to note that "urban design is essentially about place-making, where places are not just a specific space, but all the activities and events which made it possible" (p. 33).

Activity is the product of two separate but related concepts: "vitality and diversity." Vitality refers to the pedestrian movement, rhythm, and flow in and around a street during different times of the day and night. Vitality also connects to the availability

of facilities, the economy of urban places, the number of cultural events and celebrations, the presence of an active street life, and generally the degree to which a place feels alive or animated. Diversity, on the other hand, has a far wider set of indicators—like diversity in land use, operating hours, size, housing types, density, architecture, ages, ethnicity, activities, businesses, ownership, open spaces, and so on. In short, without vitality and diversity, there can be no good urban forms (Jacob, 1962; Montgomery, 1998).

Lynch (1981), on the other hand, focused on perception as well as on form. But his work was mostly integrated with the cognitive aspect. Lynch focused on both place perception and physicality. His earlier work heeded place identity and image. He addressed the questions of place perception, comprehension, understanding, experience, legibility, and meaning. According to Lynch (1960, 1981), an individual's knowledge of a city is a function of the "imageability" of the urban environment which is the extent to which the elements of the environment make a strong impression on the individual. The personal image of the city, as Lynch (1960) defined it, is the individual's "generalized mental picture of the city's external world" (p. 4). Imageability is influenced by a city's "legibility:" the degree to which the different components of the city (defined by Lynch as paths, edges, districts, nodes, and landmarks) are structured into a coherent and recognizable pattern (Montgomery, 1998). Lynch said that imageability is one of the critical aspects of a positive urban environment. His thought, with which I wholeheartedly concur, the concept of imageability is important for three reasons. First, a clear urban image gives people knowledge of and emotional security about their place. Second, it makes acquisition of knowledge about a place relatively easy and sets people's sensibilities at ease. Third, a legible urban form strengthens the depth and intensity of human experience (Lynch, 1960). I argue that today many standard suburban patterns with their winding cul-de-sacs and broken street systems are confusing and illegible.

However, if a community has a connected street system, well-designed social nodes and pedestrian infrastructure, well-recognized landmark, good accessibility, such a development might have a stronger image and legibility (Ford, 1999).

In his later work, *A Theory of Good City Form,* published in 1981, Lynch offered five foundational principles of city performance: vitality, sense, access, control, and fit. The first measure, vitality, provides safe, healthy, and life-enhancing settings to its inhabitants. The second, sense of place, organizes the residents' perceptions and understanding about the city's form and function. The third, access, allows people of all ages and backgrounds to gain the activities, resources, services, and information that they need. The fourth, good control, means the city is arranged so that inhabitants have a degree of power in the management and protection of the spaces in which they work and reside. The fifth, fit, is the determination of how well urban environments fit the human body and human activities. The question linked to this last dimension is "Does the place work well" (Ford, 1999; Montgomery, 1998)?

The integration among those who considered the mental attributes of place, those who considered cultural association and form, and those who stressed the essential importance of activity, or "natural animation," has great implications in and influence for creating good and sustainable cities. While not forming a singular school of thought, the works of Jacob and Lynch provide a partial theoretical foundation for good urban forms and better spatial organization. Jacobs' work provides a lens for viewing socio-economic urban design by highlighting the meaning of activity and diversity in small, fine-grain urban areas. Lynch's work provides a view of physical and cognitive urban design that emphasizes the elements of place perception and good city forms. These works contribute to the concept of good cities in two ways: as a physical setting and as a societal perceptual environment. Many scholars have attempted to link these frameworks into a

normative statement for urban design. For example, Montgomery (1998) proposed making successful urban spaces by combining the work of Lynch and Jacob. In another instance, Sternberg (2000) developed an integrative framework that binds together the legibility of Lynch and the vitality of Jacob on the basis of the degree to which these principles challenge commoditization and seek coherence in an urban setting.

CONTEMPORARY DEBATES

Today, human beings need a revolution in urban problem solving. The fate of the entire earth is one of the most urgent matters confronting humankind today. It will affect each and every one of us, as well as our children and our children's children. Faced with the pressures of global warming, rapid growth, congestion, water shortage, drought, population explosion, urban sprawl, and pollution, cities today need to use land, water, energy, and resources with ever-increasing efficiency. Unlike the classical urban design debates that are recognized by the work of several individuals, such as Howard, Wright, Jacobs, and Lynch, the contemporary debates are taking place at the global, national, regional, and local governmental levels through the visions of different segments of the population, including politicians, scholars, practitioners, and citizens.

The physical determinists believed in the idea that big problems, such as those encountered in industrial cities, required big ideas. However, others, including Jacob and Lynch, admired small solutions. But in this era, the complexity of current world issues might restore the desire for big ideas. The world is now more complex and "politically driven" than it was when Howard, Wright, and Le Corbusier introduced their beliefs about city form (Breheny, 1996). The emergence of sustainable development concept—development that meets the needs of the present without risking the ability of future generations to meet their own needs (WCED, 1987)— might have recharged the

forgotten, or discredited, idea that city design ought to be done, or can be done, through the implementation of big ideas. There is currently a strong debate underway about the role of urban design in promoting sustainable development, and the big question is: Which urban forms will effectively deliver greater environmental, social, and economic coherence (Breheny, 1996)?

According to Church (1995), there exists little consensus about the nature of the sustainable city, or whether such a thing is possible, because cities are inherently complex, and sustainability is still a new paradigm. Cities are composed of multiple physical, social, cultural, economic, and historical layers and systems. To find a solid vision of urban sustainability, the complexities need to be addressed and then solved. I tend to agree with Burton, Williams, and Jenks (1996) that urban design theorists and practitioners who operate under the umbrella of urban sustainability paradigm face critical challenges. I have organized these challenges and complexities into the following issues:

- Cities are far more complex today: We actually live in an urban age. Cities are becoming the primary habitat for millions of people. In 1900, 15% of the world population of 1.5 billion lived in urban areas. By 2000, 47% of 6 billion people on earth lived in cities. In 1900, there were four cities—Beijing, Tokyo, Delhi, and London—with a population of one million. However, today there are 200 cities of one million people, 100 between one and 10 million, and around 20 megacities of more than 10 million people. The anticipation is that by 2030, 60% of the global population—almost 4.9 billion people— will live in urban areas (Fenton, 2007).

- Sustainability is a new and complex paradigm: Jones, Jenks, and Bramley (2010) argue that "sustainability is an elusive concept widely open to interpretation." Winter (1994) claims that there are over 200 definitions of sustainability. Many do not know exactly what sustainability means, but they basically believe that it is a good thing that we have to embrace it and develop more knowledge about it (Lacan, 2004). Neuman (2005) and Markusen (2003) argue that sustainability is a "fuzzy" concept that has two or more alternative meanings and thus cannot be identified or applied reliably by different people. At the same time, however, they argue that sustainability is naturally and inherently a valued concept. Gunder (2006) argues that if sustainability is unquestionably good, then sustainable cities must be good. The main idea, as I position it, claims that sustainability, in itself, acts as a "label for an ideal that many can believe in and identify with;" (Gunder, 2006) however, the significance and power of sustainability emerges when it is used in conjunction with other terms like development (sustainable development), urban forms (sustainable urban forms), or transportation (sustainable transportation system).
- Sustainability issues are very diverse: Urban sustainability is concerned with multiple issues, such as environmental protection, city forms, resource conservation, energy efficiency, water control, water quality, unbalanced demographic composition, emigration, cultural integrity, justice, food security, etc. This makes the concept very broad and inclusive of several various disciplines, making it harder to investigate and to research.

- The issues overlap: The issues are not only diverse, but also interactive, leading to greater complexity. This might require the sharing and integration of knowledge across disciplines.
- Local acceptability and place characteristics are important: Understanding the cultural and political realities of the place is important to design a sustainable urban area.
- A city is not a single, monolithic entity. Rather, it is a collectivity of sub-cultures with diverse demographic characteristics, values, and aspirations. Each is, in fact, a collection of individuals who hold different interests and values (Brooks, 2002). Consequently, urban sustainability holds more practicality when the approach focuses on an individual, case-by-case basis with an awareness of the location and its economic, social, cultural, and environmental circumstances (Wiedmann, 2008). This all speaks to how understanding the cultural context before prescribing a design intervention is so important because what qualifies as sustainable for some places is not essentially sustainable for all places (Jenks, Kozak, & Takkanon, 2008). Nonetheless, a number of practices and strategies have shown promise in some urban settings.

Given the rapid increase in urbanization worldwide and the growth in the number of very large cities and metropolitan regions, the need to achieve more sustainable urban forms grows increasingly necessary. The continuous scale of change in population and urbanization poses some questions about the adequacy of our existing knowledge of city form. If research and practice are carried out with more understanding of the complexities surrounding urban sustainability, then the goal of achieving more sustainable cities might

become more within reach. As Sir Peter Medawar said, “If politics is the art of the possible, research is surely the art of the soluble.”

The conjunction of sustainability with the built environment is a very significant matter, because urban areas take up a very diminutive percentage of the world’s surface but consume the bulk of vital resources and produce most of the environmental, economic, and social emergencies (Alseragy & Elnokaly, 2008). A considerable amount of studies address the characteristics of the sustainable city; however, there is no consensus about which framework may boost sustainability the most. This remains, in fact, a complex unanswered question. I would argue that the current argument about urban sustainability is not yet universal or complete, and it does not provide complete answers to the conundrum of which urban strategy or model should be considered more sustainable. But some considerable steps are being developed to indicate different strategies and forms of urban sustainability.

According to Jabareen (2006), in 1990 the EU published a significant Green Paper advocating the foundation principles of sustainable urban form (CEC, 1990). Since then, scholars, people in practice, local and international organizations, and societies in the West introduced different principles and models of sustainable urban forms that comply with the three core dimensions of sustainable development (social equity, environmental stewardship, and economic development).

For instance, the definition of form-based or formal urban design strategies draws from the literature as follows: Dumreicher, Levine, & Yanarella (2000) argue that a sustainable city should be compact, dense, diverse, and highly integrated. Wheeler (2003), on the other hand, finds that five urban form principles – “compactness, contiguity, connectivity, diversity and ecological integration” - hold particular significance to the challenge of developing more sustainable metropolitan regions.

Another definition emphasizes that sustainable urban form includes high density of the built environment, with diversity of residents and land uses that integrates multiple transportation options and passive systems arranged compactly (Jabareen, 2006).Other studies indicate that the following seven form-based urban design principles lead to sustainable communities: proximity of employment to housing; diversity of housing types; accessible mixed-use corridors; investment in green and smart infrastructure; interconnected street systems; five minute walking distance to amenities and transit options; and an integrated system of parks and green corridors into the urban fabric (Condon, 2010).

The discussion above lists the most desirable sustainable urban form strategies as indicated in the literature. Based on my moderate review of the literature, I have found that the aforementioned strategies are spatially arranged and organized into four significant urban sustainability models that the hold potential hope: the compact city model, the polycentric urban system model, the U.S. new urbanism model, and the urban metabolism model. All tend to embrace the listed strategies above through advocating urban forms that reduce car travel, decrease energy consumption, save sensitive lands, and encourage social diversity and economic viability.

The Compact City Model

Urban compactness includes density of the built environment, intensification of its activities, efficient land use planning, diversity and mix of uses, containment initiatives (urban growth boundaries or green belts), and efficient transportation systems (Jabareen, 2006). Compactness also refers to urban contiguity and connectivity, which implies that future urban growth should develop adjacent to existing urban fabrics (Wheeler, 2003). For many researchers and practitioners, compactness is very essential to

achieve sustainability. Many argue that the sustainable city should be compact, dense, diverse, and highly integrated (Dumreicher et al., 2000; Jabareen, 2006; Wheeler, 2003). Sherlock (1990) found that compactness parallels with livability and works intensively to avoid long commuting, which is considered the most uneconomical and inefficient aspect of modern cities. The compact city has been advocated by many scholars as one of the most sustainable forms of development. However, this claim might prove dangerous or impractical because it has not been validated by empirical research. Hence, the argument about the merits of this city form remains controversial (Williams, Burton & Jenks, 2000).

Claims state that the compact city protects the countryside and green lands, as well as lowering the emissions into the environment by reducing automobile travel. The counter-arguments maintain that the compact city increases traffic congestion, which leads to greater air pollution in urban centers, noise pollution, and loss of ecologically urban green areas. It is also claimed that the compact city improves the economic attractiveness and activity of an area by supporting small and local businesses. However, it is also argued that the compact city leads to higher land prices and higher rents, thus making housing and business opportunities prohibitively expensive. Further claims state that the compact city provides a safe and socially equitable environment by fostering social and cultural diversity and activity. Other arguments say that higher densities lead to more crime, less sense of privacy, and higher land prices that cause middle- and lower-income people to suffer questionable (Williams, Burton & Jenks, 2000). In short, the debates and arguments around the merits of the compact city may be organized into four points: First, the claims about the sustainability of the compact city have not been proved. Second, the feasibility and the social acceptability of the compact city remain vague and questionable (Williams, Burton & Jenks, 2000). Third, urban compactness results in the

gradual loss of green areas within the built environment (Beatley, 2000). Fourth, the urban policies that promote the compact city are not broadly applied in our cities today. Fifth, the physical dimensions and scale of the compact city are indistinguishable from those of other urban models.

First, much of the classical literature about compact cities focused on its lower levels of travel, and hence lower levels of fuel consumption and emissions. The work of Newman and Kenworthy (1989a; 1989b; 1992) has been central to this claim. For a number of large cities around the world, the authors related gasoline consumption per capita to population density. They found a consistent and replicable pattern: higher densities were associated with lower fuel consumption. They found that cities with the lowest densities and highest fuel consumption rates were in the United States; European cities were moderately fuel-efficient; and Hong Kong with its high density figures and effective mass transit was the most efficient. A similar outcome emerged from the ECOTEC (1993) study for the UK government. Based on the fact that transport is the fastest growing contributor to CO_2 emissions, the findings above have been generally accepted (Breheny, 1996).

Gordon and Richardson (1989) were against the work of Newman and Kenworthy. They found that commuting distances in the United States tended to remain stable or fall in recent years, despite continuing decentralization, because most work- and non-work-related trips today are from suburb to suburb. This observation was supported by Levinson and Kumar (1994), who found that travel times have remained constant; they attributed this to the "rational locator" of services and daily uses. I criticize the work of Newman and Kenworthy for focusing too heavily on the single variable of density, when other factors like car ownership, gasoline prices, road supply, car parking, personal choice and preference, availability of public transport, income level, family size, and

demographic characteristics are important in explaining travel behavior. But at the same time, I believe that if the lower pollution and lower energy consumption arguments do not withstand scrutiny with the compact city, then the land preservation claim probably does (Breheny, 1996).

Second, even if the compact city is deemed to be environmentally sustainable, it might not be acceptable to the local population. In other words, the compact city might not be accepted as a future form for sustainable cities unless the consumers and inhabitants are convinced that compact cities provide good quality of living in terms of housing, job opportunities, recreation, services, transport, and access to amenities. Recent trends do not offer great hope for the acceptability of the compact city. For instance, a survey study in Norway indicates that dense and intensified urban areas with restrictions on automobile traffic are perceived by many as an undesirable reduction of individual freedoms (Naess, 1993). I argue that the question of social acceptability is very complicated because different people have different standards, expectations, values, and life styles. This has to do mostly with the cultural particularities of the place as well as the demographic and economic situation of the person.

Third, many argue that although urban policies encouraging density save hinterlands and many sensitive agricultural resources, they cause a gradual loss of urban green areas. For example, compact growth policies in cities like Amsterdam have resulted in the loss of some neighborhood green spaces. A report by the Amsterdam Physical Planning Department reported the following negative impacts on urban green spaces:

> In the past few years Amsterdam's compact-city policies have led to a more intensive use of land. The expansion and compaction of the city have largely been carried out on open space in the city districts. Sport zones have been rezoned for housing purposes…and parks and gardens have also been used. (City of Amsterdam, 1994, p. 156)

Fourth, modern cities do not seriously consider the concept of urban compactness in their urban policy agendas. In fact, the rate of growth and decentralization continues to increase. Portland, Amsterdam, and Hamburg are notable among the few exceptions that enforce multiple urban strategies and policies that limit uncontrolled growth. Currently, the most common urban compactness implementation policies are urban containment and intensification strategies. Intensification utilizes urban land more efficiently by increasing the density of development and activity. The intensification of the built form includes development of previously undeveloped urban land, redevelopment of existing buildings or previously developed sites, conversions, and additions and extensions (Jenks, 2000). Intensification implies the use of consolidation, which refers to the idea that new projects should be established on abandoned lands instead of at new sites. Implementation of this idea can occur on a variety of scales, from an urban infill to the formation of entirely new settlements. Urban intensification is supported because it reduces the need to travel by car, preserves land, and encourages regeneration of neglected lands (Burton, 2002). Intensification is also advocated for economic sustainability reasons. For example, development in existing urban areas can be serviced by existing infrastructure like roads and utilities—such as electricity, water, gas, and telecommunications—whereas new settlements involve substantial extension of services and infrastructure.

Urban containment techniques, on the other hand, prevent the outward expansion of the urban field and funnel the growth inward. They seek to employ a collection of public policy tools to control urban expansion so that cities take a compact sustainable form. In general, urban containment policies seek to use at least two different methods to control growth: greenbelts and urban growth boundaries (Jabareen, 2006). The Urban Growth Boundary (UGB) is a political line between urbanization and rural lands. Land development beyond this political designated zone is controlled to restrain sprawl, to

protect open space, and to support the compaction and intensification of inner-city cores and neighborhoods (Staley, Edgens, & Mildner, 1999). This system is also recognized by other terms like urban limit line (ULL), blue line, or green line. The system is best known for using regulatory techniques to prevent urban development outside the boundary. Oregon is one of the few states that attempted to deal with the issue of massive urbanization through the use of urban growth boundaries established around cities and metropolitan regions (Jabareen, 2006). The growth boundary of Portland, Oregon, is an example of regional land use planning that protects natural resources and reshapes the metropolitan area into a more compact form. During the last three decades, Metropolitan Portland has funneled its urban expansion into more compact forms. Although many criticize the UGB system since it increases land prices and rents inside the boundary, I believe that the system reflects several environmental and social benefits. For instance, between 1979 and 1999, the Portland Metro area had a 40% increase in population and only a 20% increase in urbanized areas; while, in contrast, between 1990 and 1994, Kansas City had a 5% increase in population and a 70% increase in urbanized areas (Georgetown Environmental Law & Policy Institute, 2005).

Finally, I argue that scholars do not have a solid framework as a reference for the morphology and scale of the compact city. For instance, what elements make a city compact? Is it the scale, the urban size, the density, the urban policy, or the time needed to travel across it? Is it 1000 ft^2, 10,000 ft^2, or 100,000 ft^2? Does it have to do with population size and intensity? Or is it contained, defined by a political or physical boundary like a wall as in medieval cities, green belt as in London, or urban growth boundary as in Portland? Technically, all of these questions are, perhaps, unanswered and undefined.

The Polycentric System Model

The sheer scale of changes from a rural to a predominantly urban population leads to some questions about the suitability of our existing knowledge about the feasibility of the compact form in promoting urban sustainability. The ability of the compact city to cope with the explosion of urban population must be given serious consideration. I argue that due to the accelerating rate of environmental and social emergencies, as well as the increase of urban population around the globe, a single monocentric compact region might not be the best to achieve a more sustainable urban form. As a result, it is essential to think about new sustainable city forms. The physical atmosphere of this city does not need to be a traditional compact mass; instead, it may explode into small urban areas or several specialized districts, each having a distinct flavor and function. Binding these urban agglomerations together would be the merits and attributes of the compact city like social integration, density, diversity, accessibility, and an effective transit system (Jenks & Kozak, 2008; Okabe, 2005; Thomas & Cousins, 1996).

This model, which is often described as a polycentric urban network, has become increasingly important within the current urban debate. It can refer to different urban scales of the built environment, whether at the world, national, regional, or city level. It is described by different terminologies, such as polycentric regions, polycentric urban systems, multimodal urban systems (these being centers, sub-centers, or nodes), and networks (being a system of linkages that connect such sub-centers and nodes) (Jenks & Kozak, 2008). Polycentrism is also characterized either as a phenomenon that has evolved over time, or as one that is totally new, resulting from good planning (Faludi et al., 2002). One of the most common definitions of polycentrism is as follows: “A series of anything between 10 and 50 cities and towns, physically separate but functionally

networked, clustered around one or more large central cities, and drawing enormous economic strength" (Faludi et al., p. 3).

This definition mainly applies to polycentrism on a regional scale. However, as Hall and Pain (2006) note, "the entire concept of polycentrism proves highly scale-dependent (p. 4)." In fact, polycentrism is applied to urban systems on city, regional, metropolitan, national, and global scales. Polycentrism is not only dependent on place or physicality, but also on communication and physical linkages that allow the equal movement and interaction of people. The concept of integration and inclusion are fundamentally important in polycentric urban systems. However, our cities today are characterized by disconnected urban settings or splintering urbanism as evidenced by the segregated and fragmented urban forms that are mainly interrelated by multi-lane highways (Jenks, Kozak, & Takkanon, 2008).

The dangerous and negative side of polycentrism appears when people misinterpret it to mean fragmentation and sprawl. This issue can be addressed in three questions: What are the differences between polycentric development and fragmentation? Is polycentric development just a form of organized sprawl? Are new urban centers or nodes integrated into a polycentric system, or they are just fragmented sub-centers set within what appears to be polycentric in form (Jenks, Kozak, & Takkanon, 2008)? Welch Guerra (2005) argues that, at least since the 1990s, urban fragmentation has emerged in most large globalizing cities and urban regions around the world. This phenomenon includes a strong amplification in the dispersion of urbanism, a new type of socio-economic spatial segregation, a territorial fragmented expansion, unequal distribution of jobs and incomes, a new type of life style, and a new type of spatial relationship within and between cities in which highways and low density developments are dominant. Other signs of urban fragmentation are the increasing numbers of exclusive communities,

disconnected urban areas, defensive bastions against lower-class people, sales of predominantly luxury life style aspirations, privatization of open spaces, heavily trafficked roads, lack of an efficient transit system, and pricing and policies that isolate rather than integrate large groups of the population (Jenks, Kozak, & Takkanon, 2008).

Two general examples, Los Angeles and the Randstad, represent significant models in addressing the differences between fragmentation and polycentrism (Jenks & Kozak, 2008). The Randstad in the Netherlands often is used as a paradigmatic example of European polycentric development. It is composed of four main cities: Amsterdam (the state capital), The Hague (the seat of the Dutch government), Rotterdam (the international port), and Utrecht (the center of social and cultural amenities). These agglomerations have different urban functions, but they all form a coherent functional network of an integrated polycentric model. This polycentric network is successful because the cities are well-connected with a high speed rail and accessible to all through one hour's travel (Okabe, 2005). Additionally, the government spatial planning policy encourages integration and avoids competition between them. The L.A. case, on the other hand, mainly is described as a model of urban fragmentation because it is structured as a highly dispersed city-region with massive suburban sprawl and segregation (Jenks & Kozak).

Mega cities and large urban agglomerations in the world suffer from an unstoppable process of growth. This development transforms these entities from monocentric to polycentric forms. Achieving urban sustainability in the face of such growth is a challenge. For those cities that remain in their pure monocentric form, the compact city concept is not practical for attaining what is claimed to be a sustainable urban model. As a result, I view the concept of the polycentric urban system as an alternative. The polycentric system supports social and economic equity, enhances

physical and social integration, uses green and efficient transport systems, and focuses on the sustainability of both the single node as well as the entire network. I argue that if a polycentric urban system possesses all of these characteristics, then the concept might hold some hope in the face of global sustainability challenges. However, if the nodes are immersed in a network mainly connected by highways or where the social and economic contrasts are obvious, it can hardly be considered as s sustainable urban model; instead, it represents a fragmented and dispersed system (Jenks & Kozak, 2008).

The New Urbanism Model

In the United States, a number of strategies have been proposed as alternatives to prevailing patterns of low density, fragmented, and auto-dependent land development. Central among them is something called neo-traditional or "new urbanism," a concept developed by a group of architects and urban designers in the 1980s. The most common names among them are Andres Duany, Peter Calthorpe, and Elizabeth Plater-Zyberk. New urbanism essentially calls for a reinforcement and utilization of several traditional urban elements (Katz, 1994; Norquist, 1998). New urbanism synthesizes a whole range of spatial and social patterns that are not only good urban design, but also that fit with many classical ideas, like Jacob's vitality and diversity, and Lynch's sense of identity and place (Ellis, 2002). Advocates call for a return to walkability, transit system, and a grid pattern with narrow streets, short blocks, high density, and mixed-use developments. All buildings should have expressive frontages where they face the street. Traditional commercial districts should include a commercial corridor with retail, housing, services, and a transit system, all within 5 minutes' walking distance.

The implication of new urbanism in the U.S. context could be found in many urban projects that created residential densities beyond the suburban norm, promoted

downtown revitalization and densification, blended different combinations of uses and housing types in pedestrian oriented blocks rather than superblocks, and promoted the development of residential, commercial, and civic uses near rail stations (TOD) (Jabareen, 2006). New Urbanism derives its philosophical and practical stances from (1) a wide body of historical and contemporary literature on city design; (2) the in-depth study and emulation of universally recognized, "great urban places"; (3) existing literature in the field of "environment and behavior"; (4) experience with the actual new urbanist projects; and (5) a growing body of scholarly research on the performance and practicality of new urbanist plans (Moudon, 2000).

Congress for the New Urbanism, the organized body of the movement found in 1993, has a number of task forces working on issues such as the environment, education, community and social equity, public participation, transportation, and inner-city conditions (Ellis, 2002). I link the strength of new urbanism to its applicability on many scales. In fact, the CNU Charter is composed of three sections (the metropolis/city/town; the neighborhood /district/corridor; and the block/street/building). Each section has nine principles for a total of 27. Another positive aspect of new urbanism is that its strategies are practiced both in urban in-fill projects and in totally new developments. New urbanists demarcated a very specific set of dimensions for the shaping of urban form, as opposed to the abstractions and wording of some other models. In fact, its dimensions mostly are written into codes known as smart or form-based codes, which are commonly generated from public participation processes (Talen & Cliff, 2002).

I argue that another sustainability advantage of new urbanism lies in its participatory approach to urban design and planning. New urbanists use several methods for public involvement like the charrette. Charrettes are frequently used both to solicit community input and to educate residents about design alternatives (Farr, 2008). The

charrette is used widely in new urbanism projects and it is known as a powerful technique in the planner's kit. Its target is to bring decision makers, stakeholders, and the public together over a period of time to create a feasible and socially acceptable plan. Generally, the decision-making process occurs during stakeholders' meetings, several public hearings, and workshops, all of which take place during the charrette. This collaborative design and planning workshop, which engages different segments of the population, creates feedback loops and the necessary information to generate viable plans (Farr, 2008). The process creates social capital and furnishes an educational ground that teaches the public the tools of community design and planning. My main concern about this participatory method rests in that the organizers sometimes have specific interests and needs to enforce in advance. Put another way, they might use the public to obtain the most beneficial and profitable elements for them. However, many in the design and planning profession know how to run an efficient charrette by promoting a hands-on design for the public. For example, many organizers guide the public to reveal their concerns and needs through brainstorming and several discussion and design workshops.

While there has been much support for new urbanism ideas within the design and planning profession and scholarship, a considerable amount of skepticism and even hostility remains (Ellis, 2002; Ford, 1999). The dispute about new urbanism often is shown in the conflict between two groups: those who would create a fence around the movement and then proceed to criticize it for being too architectural and shallow, and those who would claim that any innovation in urban design (having to do with in-fill, preservation, transit orientation, or neighborhood design) is a success. Some urban designers initially discredited the movement as oriented towards architectural design and details. However, I argue that if new urbanism continues along the same path—in the direction of being a tolerant movement that embraces the ideas of public participation,

sustainable development, environmental protection, and anti-sprawl projects—then it could emerge as a flexible and dynamic urban sustainability model.

Douglas Farr (2008), in his book *Sustainable Urbanism: Urban Design with Nature,* argues that "Smart Growth, New Urbanism, and Green Building Standards (LEED)" create a pathway to a sustainable life style and provide the philosophical and practical foundations of urban sustainability. The principles of new urbanism, as listed above, certainly are linked to the enhancement of urban sustainability. The adoption of compact, high density, mixed land uses; walkability; interconnected street systems; preservation of environmentally sensitive areas; less auto-dominated landscapes, and alternative modes of transport lead to fewer emissions, more land preservation, less reliance on cars, less pollution, and less environmental degradation.

I argue that although the virtues of new urbanism in urban sustainability as yet lack empirical proof, it remains a powerful strategy in designing good urban forms. The Charter includes great sustainability dimensions, but the challenge remains in the implementation process where the interests of some particular groups, mainly developers, bend in favor of marketability and profit. My own position towards new urbanism is that its central focus is not style or cool architecture, but rather the spatial structure of urban elements. The biggest and most important lesson about town building is that buildings alone don't matter because what compromises the basis of town making is the ensemble of streets, blocks, landscapes, and buildings, and the way they fit together (Solomon, 1992). Lastly, the model is very influential in city design; however, it needs a lot of improvement in the areas of urban morphology, technology, ecological protection, and social equity.

The Urban Metabolism Model

The idea of urban metabolism, or the city as an organic whole, refers to a condition of equilibrium and stability to be obtained through appropriate adjustment of the flows and stocks of resources and energy. This model tends to be materialized in a set of technical and engineered processes (Newman & Jennings, 2008). Cities require substantial environmental inputs (water, energy, food, etc.) and generate outputs (waste, emissions, etc.). Traditional thinking sees this process as a linear route (inputs are drawn in, outputs flow out). Recently, many cities are attempting to connect these inputs and outputs in a circular process with the intention of reducing long term ecological impacts, using resources more efficiently, and reducing economic costs. Sir Richard Rogers argues in his book *Cities for a Small Planet* for the necessity of new form of planning that replaces our linear approach to pollution and resource consumption in cities with a circular sustainable system (Rogers, 1997). The key idea of the urban metabolism model is that cities must begin to look for ways in which outputs represent productive inputs or food for other processes in the life cycle (Beatley, 2000). Currently, most cities utilize a linear metabolism system in which resources flow in and wastes flow out, unlike natural ecosystems in which resources cycle in the system (Girardet, 1992; 2001). As a result, cities need to close resource cycles and adopt a more circular metabolism with recycling, treatment and reuse of waste and grey water, and management of storm water and floods.

A number of actions to support the urban metabolism and ecocycle balancing have already emerged in practice. These include the conversion of sewage sludge fertilizer and its use in food production, and the production of biogas from sludge. The biogas fuels vehicles and combined heat and power plants in cities. In this case, wastes return to residents in the form of district cooling or heating. Stockholm's efforts to promote a balanced ecocycle are one of the most promising examples. For example the

city's production of heat and energy takes an ecocycle approach in several ways. Many of its combined heat and power plants are generated by waste which results in the use of a renewable energy source and the conversion of a waste stream into a productive good (Beatley, 2000).

An equally powerful metaphor of a balanced circular metabolism is to see the city as a living environment, basically like a forest, wetland, or a prairie. Several debates and writings address the need to reconnect the city with its hinterland as a fundamental stride in moving towards a more eco-balanced circular metabolism. This ecosystem's view of cities has been emerging increasingly around the globe, especially in Europe. In the 70s, the shortage of fossil fuels made the European, especially the Scandinavian countries, the world's pioneers in eco-balanced planning. While no European city has succeeded in completely implementing a circular vision, there are many exemplary beginnings that provide rich insights. For instance, Helsinki brings wild nature almost to the city-core; Germany and the Netherland use green-roofs to create new habitats and nature in their urban settings; Dutch cities organic household wastes are typically separated and commonly digested and used to produce biogas; Kuhmo in Finland constructed a power plant in which wood waste (like wood chips) provides 95% of fuel; and Denmark operates a facility that produces biogas from both household wastes and agricultural wastes (Beatley, 2000).

The ecological footprint provides a useful measure of the scale of city's metabolism. The ecological footprint of a city measures the amount of land it takes to support the basic needs for food, water, energy, and materials, and to absorb greenhouse gas emissions and other waste. Minimizing the ecological footprints of cities embodies a huge task that will require changes not only to city form and operation but also to the way that people live. Bringing production and consumption back to a balanced condition is an

important sign of city's well-being and sustainability (Newman & Jennings, 2008). The future task is to generate an eco-balancing model that has more direct input into the structural design of urban areas (Beatley, 2000). I argue that this model can't be considered as a comprehensive model of urban sustainability because it predominantly focuses on environmental sensitive practices without emphasizing the social and human realities of urban settings. Other drawbacks associated with this model are attributed to the fact that eco-cycle design approach is cost-intensive, very sophisticated, and highly technological; As a result, it might not be adopted or used effectively throughout the world, especially if it contradicts the level of financial resources, the level of expertise, current agenda of development and growth, and lastly the political well.

SYNTHESIS: CHARACTERISTICS OF SUSTAINABLE URBAN FORMS

A non-sustainable city would be recognized by population decline, environmental degradation, inefficient energy system, inefficient transport systems, a loss of employment, emigration of industry and services, social stratification, loss of cultural identity, fragmentation, and segregation. Even though these indications provide a sense of what a non-sustainable city might be, I argue that there is no complete consensus on the definition, typology, characteristics, or dimensions of a sustainable city. In fact, this paradigm is still an unanswered question. Part of the problem stems from the complexity of our cities, as each region has specific cultural values, social norms, political systems, economic capabilities, and environmental qualities. Another part of the problem is due to the complication surrounding the term "sustainability" itself. But we do not have to start from scratch in our search for urban sustainability. Many classical and contemporary debates provide various principles and practices for the functional and practical organization of urban forms.

Although there is no agreement among them about the nature of the sustainable city, or about which urban forms contribute more to sustainability, I argue that the sustainable city is farther away from Le Corbusier's homogenous replicable towers, but closer to his vision of concentration and density. The sustainable city deviates completely from Wright's individuality, auto-dependent, and decentralized low density developments. The sustainable city is closer to Howard's magnet of town and countryside. It is closer to his density levels, connected satellite towns, and his ideas that advocate the protection of countryside. The sustainable city has Jacob's diversity, choice, vitality, and human base animation. The sustainable city is one in which Jacobs diversity is tolerated and encouraged. It is the city where there is no excessive and unjust spatial separation of income and ethnic groups. The sustainable city is where residents have equal access to services and amenities, and where economic opportunities and housing are available for all segments of population. The sustainable city does further a daily interaction of people, classes, businesses, and work. The sustainable city also reflects Lynch's imageability, legibility, aesthetic and visual experience, and sense of place and time. It also has his dimensions of city performance: vital, sense, fit, access, and control. The urban elements and image of the sustainable city should also make a strong impression on the individual's perception, comprehension, understanding, and experience.

The sustainable city has a circular, not linear, metabolic system that balances production and consumption. The sustainable city has new urbanism's participatory approach to urban design and planning. The sustainable city embraces the idea of public participation and the spirit of diverse and cumulative opinions. The sustainable city has the characteristics of the compact city: diversity, mixed-use lands, connectivity, contiguity, walkability, proximity, and control. But if the compact city faces an intense

urban and population growth, the sustainable city should be polycentric in form and characteristics. In this situation, the sustainable city would be spatially and socially connected, inclusive and accessible to all.

These synthesized urban design strategies can possibly be consolidated into a conceptual framework binding three urban design schools, integrated and overlapped with one another: (1) physical design (morphological solutions); (2) cognitive urban design (perception and place identity); (3) and social urban design (diversity, vitality, and human interaction with place) (see Figure 1). My research particularly focuses on one concept of this framework— the urban form.

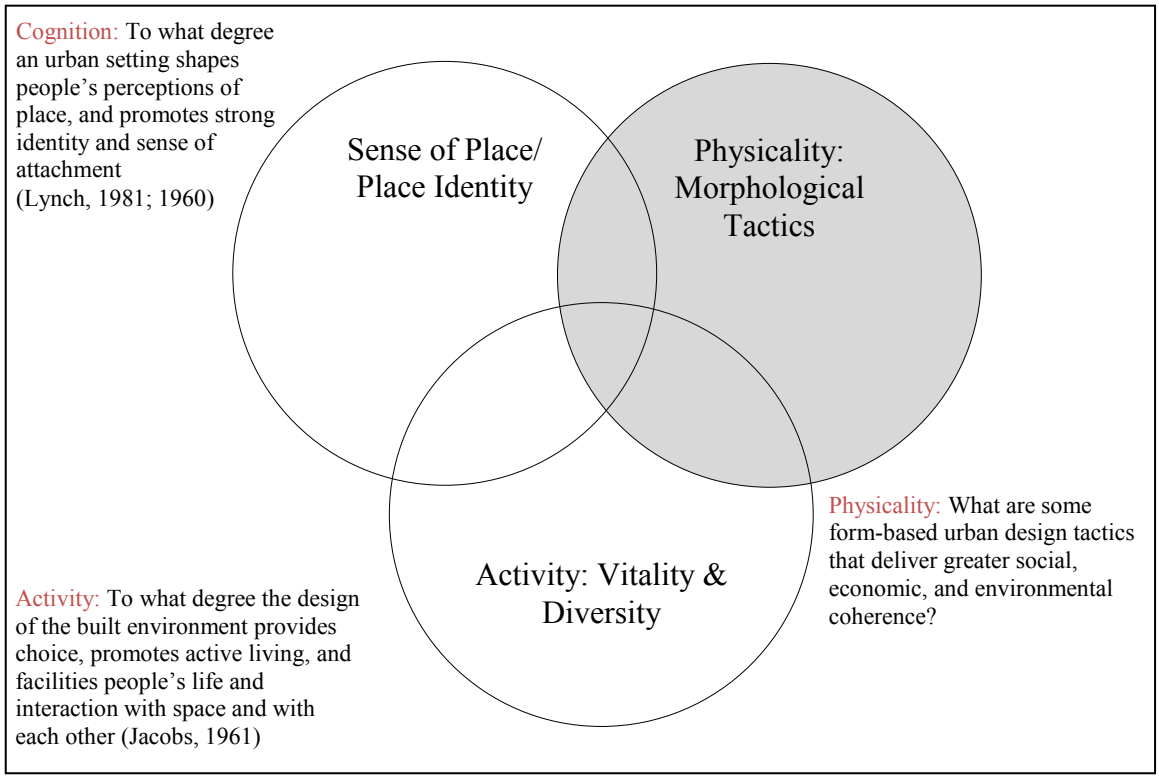


Figure 1: A Framework for sustainable urban forms.

Note: This framework is an improvement of an earlier models cited in Montgomery (1998)

GAPS IN THE LITERATURE

Based on my moderate review of the literature, I argue that there are five major voids in the existing body of knowledge. First, sustainable urban form is a new paradigm that requires more studies and research efforts. There are a lot of publications that address sustainable urban forms and their concepts, typologies, models, and qualities, but when we look at the amount of peer-reviewed articles, it appears that the number of publications is very limited. In fact, from my humble review of the planning and urban design journals, I only found three to four articles that particularly address this area of research; the oldest article was published in 2005 by Stephen Wheeler, affirming the argument that this area of research is new. Second, most of the peer-reviewed articles were descriptive in nature, listing and discussing the potential benefits and virtues of particular strategies without addressing urban and building scale specifics and details (e.g. density levels, height of buildings, ideal block size). Third, most of the strategies discussed in the literature are policy or form-based oriented strategies; researchers did not include process-based oriented strategies such as the adaptability and potential benefits of participatory planning approaches in city building. Fourth, the existing body of knowledge in urban sustainability lists and discusses the effectiveness and efficiency of many design strategies without addressing the cultural and political context of the place itself. Understanding the social norms and political realities of the place before prescribing a design intervention is so important. For example, it is significant to know if a proposed design strategy is culturally valued or accepted among the public (users), and how this strategy is politically assessed by the government in terms of implementation. This indicates that the existing studies only weakly addressed the cultural and political barriers associated with sustainable urban form strategies. What makes my research unique and different from the previous studies is that the research's design aimed to

identify and to understand the relevant political, cultural, and environmental issues and obstacles associated with the experts design recommendations. I believe that the possibility of designing a sustainable neighborhood relies on understanding the cultural norms and political reality in Dubai.

Fifth and most important, considerable efforts have been dedicated to the concept of sustainable urban design and sustainable urban form in the last years; however, the majority of research has focused on Western societies. Only a handful of studies have focused on hot arid regions, specifically Dubai. Therefore, this research addresses this gap and proposes a research design that aims to explore, to articulate and to advance design strategies and tactics that promote better sustainable urban design for Dubai. It is possible to learn from the existing principles; however, it is neither practical nor feasible to apply the exact concepts for Dubai with totally different environmental context and cultural beliefs. Therefore, there is a need for a specific urban sustainability framework that fits with Dubai's landscape and culture.

The statement above is asserted by some scholars who argue that what is sustainable for one place is not always sustainable for another (Jenks, Kozak, & Takkanon, 2008). In other words, there is no solid urban sustainability framework that fits all cases. It is more practical and feasible to plan for sustainability on an individual "case-by-case basis," because every city has different economic, social, cultural, and environmental circumstances (Wiedmann, 2008). Though there is no universal model for urban sustainability, numerous practices and strategies demonstrated promise in some urban settings and could be readapted in other settings. This argument is affirmed by Kriken, Enquist, and Rapaport (2010) who believe that sustainable urban form principles and strategies, defined in his work and urban design literature, can be applied across the

world; however, implementation and techniques will vary by "local climate, local culture, and geography."

RESEARCH CONTRIBUTION

My research contributes to different aspects of the urban form and sustainability debates. Particularly, my research subsidizes a development of a knowledge framework for urban sustainability in the Dubai region that focuses on social, ecological, and political aspects of this unique urban environment while also remaining potentially applicable to the UAE and other similar places in the region. I utilize Dubai as a case that requires recommendations for changing unchecked growth and unregulated development. Dubai has undergone rapid and intense urbanization with little forethought in terms of sustainability, and therefore sits most in need of design guidelines promoting more environmentally and socially sensitive practices.

The significance of my research stems from investigating the issue in a unique context that raised several sustainability concerns over the last decade. The geographic and environmental nature of Dubai i.e., hot, humid, arid, lacking water resources and land productivity both for food and for landscape, make the case even more challenging and difficult to study in terms of prescribing urban design interventions and forms. Furthermore, the case also is critical as Dubai's location in the Arabian Peninsula, where the social values and cultural norms often are described as moderate yet conservative, differ from the rest of the Arab and Islamic World. In addition, Dubai is characterized by a centralized political system in which prominent individuals employed in city's public agencies and large quasi-private corporations largely control planning decision-making. In this system decisions are often made from the top and roll down, challenging the notion of collective approach in city design and development as defined in sustainability

literature. This dynamic of linear decision making resulted in several environmental and social emergencies and renders the case even more challenging to study. In short, Dubai is a unique urban setting with deeply held cultural norms and extreme climatic conditions as well as a unique political and governance system.

I also argue that my research contributes to the existing body of knowledge by stating that understanding sustainable urban design does not only entail ideal design principles, but also it involves understanding/exploring the cultural and political traditions of the place. It is vital to be aware of users' acceptance of and satisfaction with individual, particular design strategies as well as policy makers' assessment of implementation constraints. To fulfill this goal, my research involves three kinds of human subjects: experts, government officials, and public (see Figure 2). Part of my research design involves synthesizing those three subject's responses to compare different opinions and reactions across research participants. This process allows me to explore and to report agreements, disagreements, and competing priorities among the three groups. Out of this analysis I identify the relevant political, cultural, and environmental issues associated with the areas of agreement and disagreement among research participants. Then I recommend different approaches addressing key cultural and political challenges for future implementation. In many ways, the design strategies prioritized by research participants reflect ideals about what sustainable urban forms entail. Yet, Dubai is a unique place, with a conservative political structure, deeply held cultural beliefs, and harsh environmental conditions. Therefore identifying culturally and politically feasible approaches for future implementation of the experts' generated design strategies requires careful understanding and awareness of Dubai's unique characteristics.

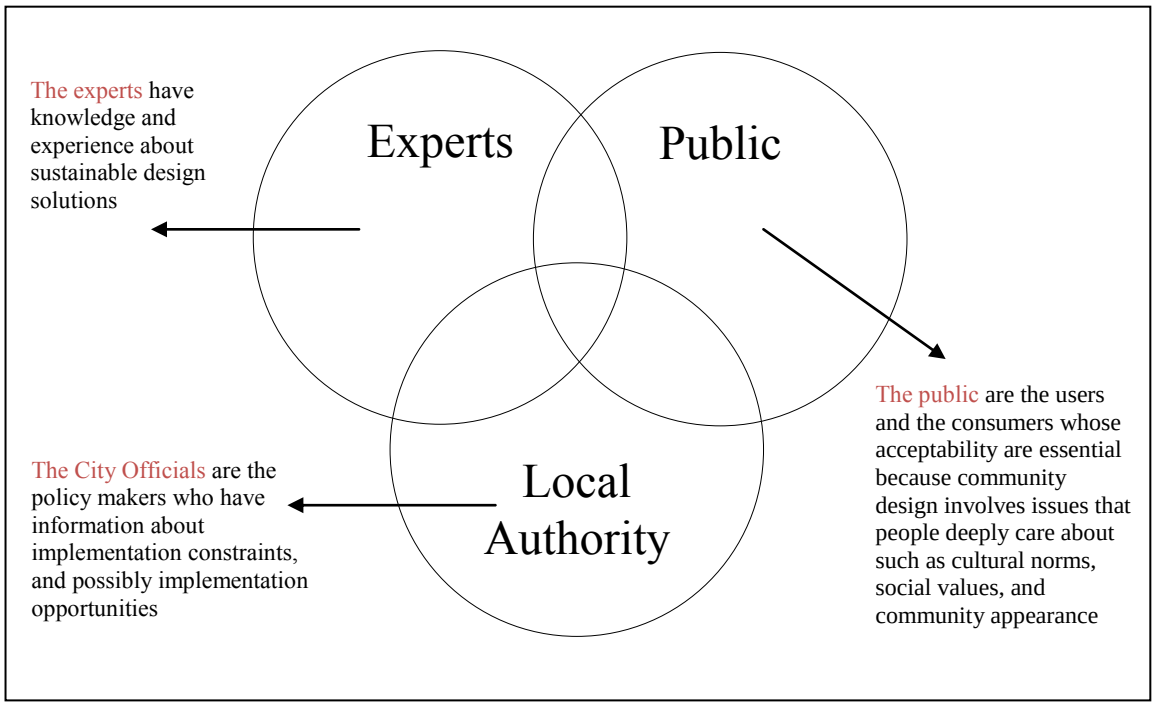


Figure 2: Aggregation of research subjects

The outcome of the research, a framework including most effective sustainable urban form design strategies, could be tailored for multiple clients, including researchers, students, practitioners, and city officials. For example, scholars could use the research findings to expand and explore different aspects and dimensions of sustainable urbanism in hot, arid regions. In addition, findings could be incorporated as codes and policies that guide future developments. Currently Dubai's urban development suffers from a huge lack of utilizing different planning and urban design principles. In particular, neither urban design practice nor architecture is controlled by sustainability guiding principles (Wiedmann, 2008). If implemented, the research outcome could continue to advance and, thus lead to incorporation as a regulatory framework that steers the direction of urbanism in Dubai toward more socially and ecologically relevant practices.

Chapter 4: Research Design

INTRODUCTION

This chapter presents my research design and methodology. In the first section, I provide a brief summary of my overall research design. The following sections detail my methodological strategies and organize the information into three sub-sections: Delphi technique, interviews, and surveys. Every sub-section discusses research questions and objectives, and chronology of data collection including sources of participants, and participants' recruitment. I also include in every sub-section discussions about sample size, reliability and validity issues, and limitations of research design.

SUMMARY

I conducted a case study analysis of Dubai, organized into two parts. In the first part I described the history and background of Dubai, detailing the urbanization process that resulted in several ecological and social problems. In the second part, I conducted exploratory analyses comparing expert, resident and government prioritizations of sustainable urban form design strategies for neighborhood development in Dubai. I used three methods of inquiry: (Refer to Figure 3)

First, I used two rounds of the Delphi technique to obtain experts opinions regarding sustainable urban design strategies for Dubai neighborhood development. This Delphi study brought together academics and practitioners in the fields of urban design, planning, architecture, and sustainable development in order to formulate and to prioritize most effective urban design strategies for Dubai's urban neighborhood. The Delphi was structured to collect and analyze experts' opinions through a series of two questionnaires, followed up with two reports that complied and synthesized experts' opinions and

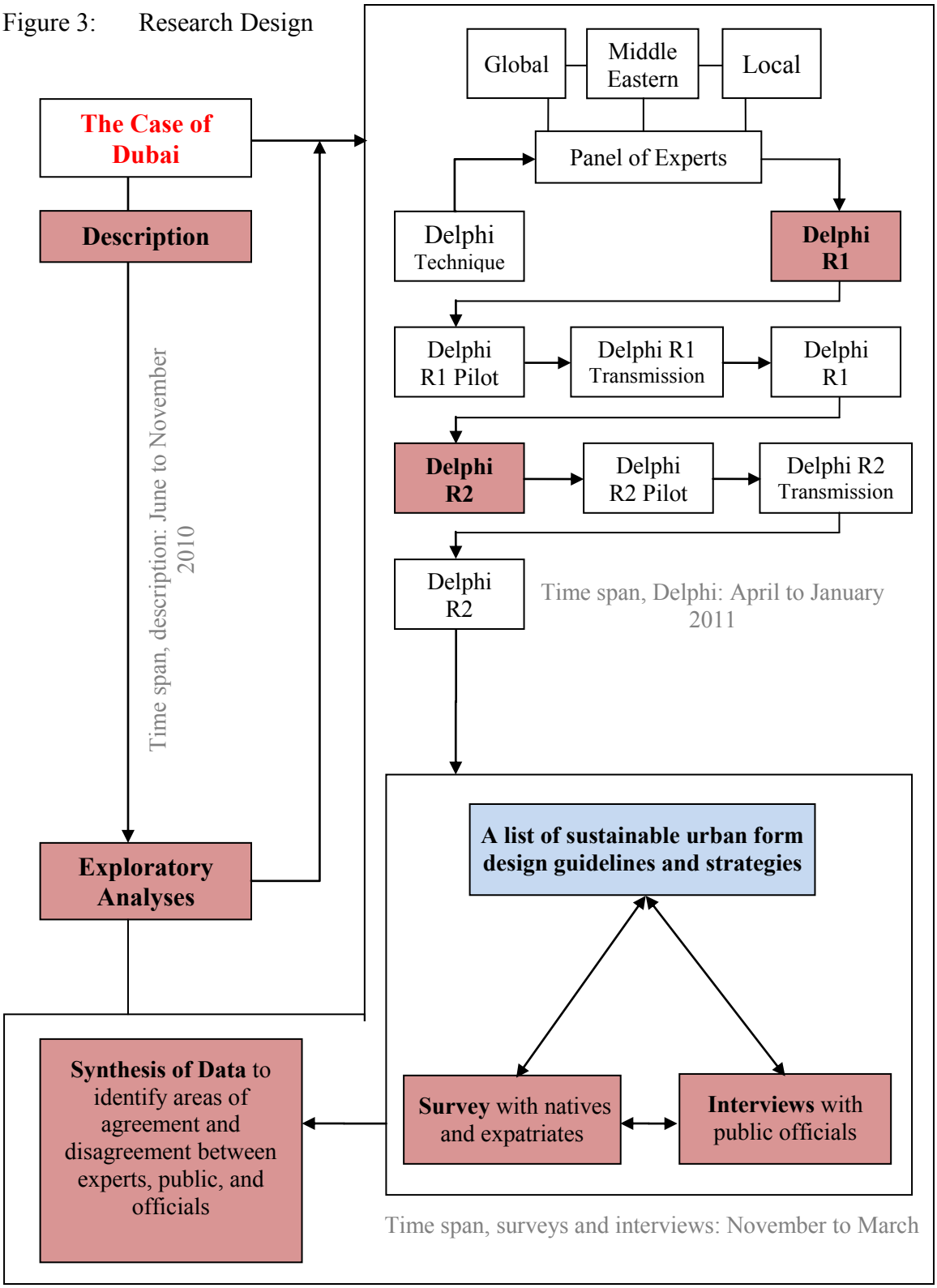
recommendations. Out of my analyses, I produced a framework that includes most important sustainable urban form design themes that aims to reflect Dubai's unique ecological and social characteristics, while also being potentially applicable to other similar places in the region.

Second, I conducted seven interviews with government officials in Dubai to identify troublesome challenges that constrain implementation of the urban design strategies identified and prioritized by the experts. In addition, the interview asked participants to identify opportunities and recommendations for implementing (i.e., putting into policies, regulating) some of the urban design strategies.

Third, I conducted self-administrated surveys with the population in Dubai (including locals and residents) to identify the public reaction to and preference for the design ideas for Dubai neighborhood suggested by the Delphi panel.

In order to make the data management concise and efficient, I only included 10 urban design strategies in both: interviews with the government officials and surveys with the public. As the experts on the Delphi panel provided an extensive and large amount of information and detailed design themes and strategies, it was neither feasible nor practical to use the total number of design themes and ideas identified in the Delphi. As a result, I limited my selection to 10 strategies. First, I chose the strategies that are culturally and politically controversial in Dubai such as public participation, bike infrastructure, high density levels, and inclusive housing. Second, I chose the strategies that were highly recommended and emphasized by the experts surveyed including short blocks and interconnected street systems, macro-network of transit, green spaces, environmental design, and walkability. It is important to note that high density levels, public participation, and mix of uses were also highly recommended by experts in the Delphi.

Figure 3: Research Design



THE DELPHI METHOD

Introduction to the Delphi Technique

The Delphi method is based on a structured process for collecting and analyzing information from a panel of experts in the field by a series of questionnaire s interspersed with opinion advice (Adler & Ziglio, 1996). It is also defined as a method that structures a group of experts to facilitate problem solving, explore ideas, and deal with complex problems (Linstone & Turloff, 1975). The method is also conceived as a group technique who aims to acquire the most reliable consensus of opinion from a group of experts through a series of structured questionnaires with controlled opinion feedback (Dalkey & Helmer, 1963). But recent Delphi applications eliminated the constraint of the mandatory search for consensus (Landeta, 2005).

The method is used when there is incomplete knowledge about a problem or a complex situation (Adler & Ziglio, 1996; Delbeq et al., 1975). In addition, it is used to investigate and find what does not yet exist (Czinkota & Ronkainen, 1997; Skulmoski and Hartman 2002). I argue that there is a common perception that Dubai is not considered to be a sustainable city, so I convened a panel of local and international experts who posses rigorous and highly regarded knowledge about sustainable urbanism to explore, articulate and advance multiple strategies for a more sustainable development approach to Dubai urban patterns of development. I argue that only a handful of previous studies focused on sustainable urbanism in hot arid regions, Dubai specifically, as the majority of research centered on Western societies. Therefore, my research addresses this gap and aims to evolve the lack of knowledge about urban sustainability in hot arid regions into a credible framework that includes most effective urban design strategies that guide Dubai and other similar places in the region towards a more sustainable approach in urbanism.

One of the main reasons to employ the Delphi in this research is that sometimes a conventional group discussion tends to generate premature solutions; dominant personalities and prolonged speeches might enforce participants' opinions. Members of the group are usually repressed from expressing opposite perspectives or contrasting ideas due to variation in power, reputation, or professional and social status among the participants. In addition, group meetings sometimes are not constructive and lead to a sense of frustration among some members. Accordingly, the Delphi is an appropriate technique to address the shortcomings of conventional group meetings by eliminating the dominance of power, by empowering all members, and by focusing more on problem identification and solution generation rather than on excessive conflict and verbal debate that occur in conventional meetings (Delbeq et al., 1975).

The Delphi also provides the flexibility of the method in terms of organization and financial resources. Other kinds of group meetings require tremendous amount of organization and resources to bring a large number of people together, particularly when addressing the geographic dispersal of key players. Although the statements above demonstrate the potential benefits of the Delphi technique, I affirm that one of the major challenges of conducting the Delphi in this research was my anticipation of having limited response rates as I was not providing experts with any sort of compensation. Experts have busy schedules and multitudes of commitments that restrain them to take part in any study or consultation that does not offer compensation for their donation of time.

Row and Wright (1999) characterize the Delphi method by four major keys: First, anonymity of Delphi participants: This allows the participants to freely express their ideas and feedback without concern regarding the effects of dominant individuals in group-based processes and excessive social pressures that might occur when the

participants are known. Second, iteration: This allows the panels to refine and reassess their response and previous judgments in light of the progress of the group's work from round to round. Third, controlled feedback: This notifies that the exchange of information between the experts is open but yet managed by the researcher (Landeta, 2005). Controlled feedback process consists of a well-structured summary of the prior iteration distributed to the panel. This provides every participant an opportunity to refine and to reassess his/her opinion and to provide additional insights and information in light of the data provided by the other members. Fourth, statistical aggregation of response, especially in rating and ranking questions: This provides an opportunity for a quantitative analysis.

Delphi Questions

Delphi Round 1 Questions

The first round of the Delphi predominantly included open-ended questions divided into three areas of inquiry (refer to Appendix 2 for Delphi 1 panel instrument)

1. Identification of most important form-based urban design strategies for sustainable urban neighborhoods in Dubai: In this part experts were asked to identify the five to ten (5 to 10) most essential form-based urban design strategies that would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai. Experts were also asked to explain why they considered each of the proposed / selected design strategies to be important.
2. Identification of lessons from Urban Design Interventions established in the literature and in practice: In this part, experts were asked to identify two to four (2 to 4) places, projects or examples that represent promising sustainable urban design interventions and strategies that exist in hot arid areas, the Middle-East,

North Africa, or any other parts around the globe. Then from the collection of provided examples, experts were asked to explain at least two benefits and lessons from each example and to identify the most important principle that could potentially be applied to Dubai's future neighborhoods.

3. Evaluation of traditional and contemporary urban form strategies: In this part, experts were asked to rate on a scale of 1 to 5 where 1 is (very low), 2 is (low), 3 is (moderate), 4 is (high), and 5 is (very high) ten design strategies from the traditional and contemporary parts of Dubai. Experts were asked to base their rating of the strategies on their potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods; they were also asked to explain their ratings.

Delphi Round 2 Questions

The second round of the Delphi, on the other hand, included more close-ended questions. I structured the second (2^{nd}) round of the Delphi as a close-ended style with the intention of maintaining panel stability, as few experts in the first round complained about the length and intensity of the first Delphi instrument. Additionally, I intended to generate consistent categories of data such as exploring agreements and disagreements between experts statistically as well as qualitatively, and thus make the data management process concise, accurate, and less time consuming.

The content of the 2^{nd} round questionnaire included ten questions. Experts received the major design themes from the first round of Delphi to rank/prioritize with justification for ranking and selection of five most effective foundation design principles out of nine. Questions also were designed to identify site scale and building scale design specifics and details including density levels, height of buildings, and size of ideal urban

blocks. Furthermore, I intended to discover the suitability and effectiveness of some design ideas and decision-making strategies such as incorporating inclusive housing, bike infrastructure, high density levels, and public participation within Dubai's cultural, political, and climatic context. The 2nd round Delphi questions are briefly listed in table below. Please refer to Appendix 3 for complete Delphi 2 instrument.

Table 2: Summary of Delphi 2 questions

Summary of Delphi 2 questions	
1	Do the nine foundation principles of sustainable urban form, generated in the first round, have equal weight and effectiveness?
2	If the nine principles do not have equal weight and effectiveness, what are the five most effective principles for achieving socially, environmentally, and economically integrated neighborhoods in Dubai?
3	Do experts think that the concept of compact Development, as it was described in the first-round Delphi and as applied to Dubai, should include all of the other foundation principles?
4	What is an appropriate minimum level of residential density for the following development types in Dubai's neighborhoods: (1) detached single family units (one to two stories) and (2) multi-family units (low-rise buildings, two to three stories)?
5	Should building heights be capped at 12 stories in Dubai's neighborhoods?
6	What is an ideal length/range of urban blocks for a new neighborhood development in Dubai?
7	Is the incorporation of bike infrastructure (dedicated bike lanes and other easements like parking and zones where bikes are the priority) in Dubai's neighborhoods appropriate and potentially effective?
8	Would experts support a building code that legislates environmental performance based on orientation, location and size of shading structures on buildings, and location and size of windows?
9	Could inclusive housing (incorporating housing units for the working class within neighborhoods) be successfully implemented in Dubai?
10	Could a participatory approach to urban design and planning be successfully implemented in Dubai?

Data Collection Process

Sources of Potential Participants

The participants in a Delphi panel typically are considered experts in the relevant fields. However, the literature on Delphi methodology does not specify a desired or sufficient level of expertise among panelists. The methodological strategies regarding the definition of expert and the selection of experts have not been fully detailed. In most Delphi studies researchers rely upon: (1) respondents who are readily available including professional and senior associates in a research institute, school, or practitioner firm; (2) other respondents whose reputation and knowledge are well established and known in the field; (3) and those who have related background and experience concerning the target issue (Hill & Fowles, 1975). Adler & Ziglio (1996) introduced four requirements that participants should possess in order to collect meaningful data: knowledge and experience about the issues under investigation; capacity and motivation to participate; sufficient time to contribute; and effective communication skills.

Participants selected in the Delphi do not represent the general population, rather they provide expert insight and commentary based upon extensive experience and knowledge that the general population does not possess (Fink & Kosecoff, 1985). Based on 15 months of investigation in the field of urban design, looking at academic publications, sustainability conferences lists, and professional work, I established a list of 182 potential participants, including academics and practitioners known and experienced in the field of urban design, planning, architecture, and sustainable development. Experts were selected from different geographic settings, including the UAE, the Gulf region, the Middle East, the Indian-Subcontinent, Europe, North America, and Australia. Particularly, the list included:

1. Academics who live in the UAE, have conducted research and/or urban design/architecture projects in the UAE, and who have planning or design backgrounds.
2. Academics who live in the Gulf region or the Middle East, have conducted research and/or urban design/architecture projects in the UAE or the Middle East, and who have planning or design backgrounds.
3. Academics who live in Europe, North America, or Australia, have conducted research and/or urban design/architecture projects in the UAE, the Middle East, or global-wide and who have planning or design backgrounds.
4. Academics who have published on the current debates in urban design related to the intersection between future urban forms and sustainability.
5. Professionals who live in the UAE and have practice in urban design and sustainability in the UAE, the Gulf, the Middle East, or global-wide.
6. Professionals who live in Australia, Europe, or North America and have practice in urban design and sustainability in the UAE, the Gulf, the Middle East, or global-wide.

Procedures for Participant Recruitment

First, a personalized invitation letter written on the University of Texas School of Architecture letterhead was designed (letter is attached in Appendix 4). The invitations were sent to every expert individually, not as a group email, to protect their privacy. The letter adequately explained the research topic to the potential participants. In particular, the letter included: a brief summary about the research objectives and purpose; examples of questions; the number of iterations; the estimated time of participation; the benefits of participation; background information about the main investigator and the academic

supervisor; investigators' and supervisors' contact information and signature; confidentially and privacy protection statement, and other consent requirements.

To increase the response rate, I also included two incentives in the letter in return for the experts' generous donation of time. The first one provided the participants a package of information that reviews Dubai's development history showing photographs related to the traditional and contemporary urban forms and listing the most pressing issues facing the city. The second incentive, on the other hand, was to provide the participants with a digital copy of my dissertation upon completion.

I started the recruitment process by sending around 20 to 25 invitations every four days. Depending upon the initial response rate, cover letters went out again to obtain a larger sample size. My intent was to have at least 25 experts in the panel. I emailed the questionnaire materials to the experts no later than 15 minutes after receipt of their confirmation of participation. In order to control and monitor the Delphi data collection process, I created a spreadsheet in Excel including the participants' names, place of residence, origin, contact information, and deadline dates. Every expert was given a total of 25 days to email me their responses. I set up a plan to e-mail three reminders before the deadline date. I sent the first reminder email 10 days before the deadline; the second reminder email four days before the deadline date; and the third reminder email, one day before the deadline. In the last reminder email I asked respondents if they needed a time extension to return their responses.

My approach to synthesizing participants' responses was divided into three parts. First, I compiled all responses and created a code system. Based on the Delphi rules and protocols as well as on the legislative requirements of the Review Institutional Board Review (IRB) at the University of Texas at Austin, the panel's contribution was analyzed and reported anonymously. Every expert was assigned a letter code combined with

numerical figures, organized alphabetically. Secondly, I spent "prolonged time" (Creswell, 2003) with the experts' responses to identify major themes, ideas and areas of overlap and disagreement. Thirdly, I wrote a report, within 25 days of receiving the last response, summarizing the outcome and results of the first round and provided it to the experts in digital form.

I followed the similar procedures in conducting the second round Delphi. However, there were three extra procedures. First, I invited more experts to take part in the second round panel, as some experts from the first round were unable to continue their participation. Secondly, I emailed a summary of the first round results to the new members in the panel. Thirdly, the second Delphi instrument asked experts whether they would prefer to remain anonymous (referred to as an expert research participant) or to receive public acknowledgement of participation (referred to by name and affiliation and complied into a list of publically acknowledged participants) in the dissertation and in resulting publications. Upon receiving respondents preference, I created a directory of participants, including names, titles, and contacts in the final report. The entire process started in April 2010 and ended in January 2011, a total of 7 months.

Sample Size

There is a wide range in the sample size in Delphi studies. Sample size might pose a major concern to the researcher since there are no specific rules in the Delphi literature determining the appropriate sample size. According to Delbeq et al., (1975), where the panel list is homogeneous a smaller sample of ten to fifteen people may yield adequate results. However, if the group is heterogeneous, then a larger sample will probably be required. Witkin & Altschud (1995) note that the approximate size of a Delphi panel usually rests below 50, but more participants have been employed in other cases. Ludwig

(1997) documents that, the majority of Delphi studies have used between "15 and 20" respondents (p 2). It is important to note that in survey studies there is a reduction in error and an increase in decision quality and generalizability as sample size increases; however, in Delphi studies the quality of the sample is more important than the quantity. That is, 10 who have highly regarded knowledge and experience yield more accurate and valid results than 30 with less experience.

Generally, the response rate in both rounds of the Delphi was very acceptable. The panel was comprised of local, regional, and international experts (refer to Table 3). In the first round, I sent 128 invitations letters. Responses to the first round questions varied. For example, of 128 experts, 38 experts contributed to the first question, 33 to the second question, and 35 to the third question. Conversely, a larger group of respondents, 41 experts, participated in the final round of the Delphi, 30 of which contributed in both rounds 1 and 2, and 11 of which participated only in the final round. When seven participants from the first round could not complete the final round of the Delphi due to work and travel commitments, I invited more experts to join the second round to increase the response rate. The new invitations were sent to a total of 36 experts who showed interest or agreed to participate in the first round, but their heavy work commitments limited their involvement. Out of this group, 11 experts joined the second round panel, making the total number of participants 41. Please refer to Table 4 for detailed information about the response rates.

Table 3: Experts' geographic setting and origin

Place of residence	Origin	Number of experts
UAE	UAE	6
UAE	Egypt	5
UAE	Yemen	1
UAE	Pakistan	1
UAE	Germany	1
UAE	Italy	1
UAE / South Korea	U.S.	4
Bahrain	1	1
Kuwait	Kuwait	2
Kuwait	Italy	1
Oman	Egypt	1
Egypt	Egypt	2
Australia	Australia	2
Italy	Italy	1
Germany	Germany	1
Germany	Spain	1
U.K	U.K	1
U.K	Egypt	1
U.K	Algeria	1
U.S.	U.S.	8
U.S.	Ireland	1
U.S.	India	1
U.S.	Persia	1
U.S.	South Korea	1
U.S.	Algeria	1

Table 4: Delphi response rates

Delphi Round 1	**Response rates**	
	N=	**%**
Invitation letters were sent to	128 experts	100 %
Agreed to participate	38	29.687 %
Did not respond	34	26.562 %
Agreed initially, but then declined or did not respond	20	15.625 %
Declined:	36	28.125 %
Reasons are listed below	**Out of 36**	
School commitments	1	2.7 %
Work commitments	15	41.666 %
You are asking for too much work	6	16.666 %
Will be in vacation	2	5.555 %
Not his/her area of specialization	6	16.666 %
Did not provide reasons	3	8.333 %
Family commitments and health issues	3	8.333 %
Delphi Round 2	**Response rates**	
	N=	**%**
7 experts of the first round did not complete round 2		
Invitation letters were sent to additional:	36 experts	100 %
Agreed to participate	11	30.555 %
Did not respond	24	66.666 %
Declined	1	2.777 %
Total number of participants in round 2 = (11 + 31) = 42		

Validity and Reliability

Issues of reliability, internal validity, and generalizability are highly debated topics in qualitative research (Lincoln & Guba, 2000). The major concerns that threaten Delphi findings' reliability, replicability, and generalizability relate to the method's application (design and implementation) rather than to the methodology itself. For example, poor validity can result from a lack of care and rigor in the selection of experts, vague protocols, ambiguous or badly worded questions, and inadequate or misleadingly

analyzed feedback reports. Because most problems with validation and reliability originate in poor research preparation and execution (Creswell, 2003), I took the following steps to minimize bias and enhance the consistency, accuracy, and validity of the Delphi's findings.

First, I spent 15 months investigating a variety of experts to identify those who would make for the highest quality panel. The panel I created consists of experts who had the necessary background to make an effective contribution to the topic of sustainable urbanism; had an emotional, academic, or professional connection or commitment to the topic; and were highly motivated to participate in the study. I expected that experts living in the Middle East, especially those living in the Dubai area, would be more deeply involved with and aware of Dubai's environmental, political, and socio-cultural circumstances, and that their proposed design strategies would therefore be more culturally, socially, and politically sensitive. Therefore, I made sure that the panel included experts living in the Middle East, the Gulf, and the UAE, in addition to those living in North America or Europe.

Second, I carried out two pilot tests to improve the precision and comprehensibility of the questionnaire materials (including the invitation letter, research questions, and an information package about Dubai) and to respond to any difficulties or vagueness in the research process. In the first test, participants in the fields of planning, architecture, and urban design reviewed the questionnaire, enumerated their concerns about the instrument, and made recommendations to improve it. After I reviewed the pilot results and edited the instrument, I took the Delphi materials to the University of Texas Writing Center to test its wording and comprehensibility with three different editors. I followed these procedures in both rounds of the Delphi.

Third, I provided the panel of experts with a reference document about Dubai's urban issues and development. This comprehensive information package included a photo essay and background information about Dubai's urban issues that experts could refer to in responding to the Delphi questions. The photo essay demonstrated the United Arab Emirates' geographic setting and political boundaries; Dubai's traditional urban morphology; Dubai's urban growth from 1822 to 2006; the intensity and rapidness of Dubai's urban expansion; and Dubai's current urban morphology. The background section included an introductory paragraph about Dubai's urban issues and a list of the city's urban and sustainability concerns.

Fourth, to secure panel stability, continuity, and effective collaboration until the end of the process, I minimized Delphi questions and requirements, especially in the second round, and gave participants adequate time to respond to questions (Landeta, 2005). Fifth, I used "rich and detailed description" (Creswell, 2033) to convey findings to the panel. To make the generated Delphi data rich, "thick," convenient, and easily navigable, I divided the first feedback report into three levels. Level one provided a synthesized and organized executive summary of the first round's findings. Level two provided more intense and concentrated findings coupled with citations and some selected quotations. Level three included a higher and more intensive level of detail; it included contributions from the full panel.

Sixth, I spent "prolonged time" with the experts' responses. This helped me to acquire and develop a deeper understanding of the narratives; find themes; discuss and report agreements, disagreements, and opposing information among the panel; make comparisons, and "triangulate" different sources of information by investigating opinions and responses from the local, regional, and international sources and using it to generate a "coherent justification for themes" (Creswell, 2033).

Seventh, the interaction and exchange of qualitative information improves the quality and accuracy of the Delphi findings; the experts in the Delphi have a real opportunity to refine and reassess their response and previous judgments in light of the progress of the group's work from round to round. In addition, to be more rigorous I used a "checking" (Creswell, 2033) technique in both rounds of the Delphi to determine the accuracy of the qualitative findings through taking the feedback reports of each iteration back to the experts to determine whether the outcome is accurate or not. Particularly, when I send the first iteration results I asked the experts to assess and express their feelings about the findings. Some experts responded and included some concerns about the first round findings in their response of the second round Delphi, requiring instant changes. I responded to their requirements and point of concerns by dedicating a section named "adjustments to the first round results" in the Delphi's final report.

Eighth, because qualitative research is "fundamentally interpretive," and open to criticism of subjectivity (Creswell, 2033, p.182), I tried my best to not connect my own values, influence, and self-reflection with the experts' responses, thereby avoiding biased conclusions that lack both external and internal validity (Borman, 1986, p.43). The organization and categorization of the results and responses on both rounds of the Delphi reflected my best attempt at synthesizing these data in a consistent, accurate, and rigorous manner. Ninth, I used an external editor from the University of Texas Writing Center to review the wording and comprehensibility of each feedback report before being transmitted to the panel.

Last, I argue that the Delphi findings can be generalized and transferred to another context or and setting located in hot arid regions. The involvement of several and well-acknowledged experts in the fields of design and sustainability led to a point of

"theoretical saturation," (Krueger, 1998) which means responses were becoming repetitive and there was little to be gained by involving more participants or repeating the process once again. Specifically, I observed a level of saturation after the 25th response. According to Glaser and Strauss (1967) and Krueger (1998), saturation enhances the reliability and validity of the results and is attained when new participants no longer yield new information.

Limitations to Delphi Design and Data

Limitations to Delphi design and outcome mainly relates to the design of the first round instrument. There were almost no limitations associated with the second round design and data. The first round Delphi included three core questions; the design of question two and three placed some limitations on the kinds of data I were able to collect. For example, the design of question two strove to identify two to four examples of urban design interventions and then address how the city of Dubai could learn from the provided cases. The question also attempted to collect visuals and drawings from the experts. In many cases, the quality of data collected from this question was very low. In fact, few experts indicated this question is inappropriate and intense. In fact, one participant in the pilot study asked me to rethink or rephrase this question as it is time-consuming. A better way to approach this question in future work is to make it an optional question (voluntary) by asking the experts the following: If applicable, please identify two cases or places that represent promising sustainable urban design interventions that exist in hot arid areas, or any other parts around the globe. From each example that you provide, please provide some visual aids explaining different lessons that can be derived for a Dubai neighborhood.

Another major limitation applies to the design of the third question in the first round instrument, the ratings questions. The design of this question confused some experts in their ratings and this in terms affected some of the results. For example, experts were asked to rate the following strategy: the emphasis on the culture of alternative and clean transit system represented in Dubai Metro and a future plan for tram lines and bike infrastructure. It is clear that this design strategy includes two kinds of clean transportation modes: bike infrastructure and transit systems. This led few experts to rate each strategy separately, and this led me to take the average of their ratings in my analysis. It is vital for future researchers to not combine two different measures or strategies into one; each design tactic must be rated individually to avoid skewed results.

INTERVIEWS

Introduction

Kong, Mahoney, and Plummer (2002) argue that "the interview became a tool of modernist democratization and ultimately of social reform" (p. 240). Fontana & Frey (2002) say that interviewing is one of the most common and powerful ways in which researchers try to understand fellow humans, phenomenon, or a particular situation. Briggs (1986) reported: it has been estimated that "90%" of all social science investigations are based on different kind of interviews including ethnographic, oral history, group interviews, phenomenological, and in-depth interviews.

Atkinson and Silverman (1997) and Silverman (1993) argue that the use of interviewing to collect data and information is so massive nowadays that it has been claimed that we live in an "interview society." Both qualitative and quantitative researchers rely on the interview as an effective method to obtain data whether the target is to explore in-depth information or to garner a simple point on a scale (Fontana & Frey,

2002). In this research, I conducted interviews to identify challenges and constraints that limit the implementation of some urban design strategies identified by experts in the Delphi and that explore implementation opportunities within the Dubai's existing government framework.

Interview Questions

I conducted semi-structured interviews with seven officials in Dubai's local authority including Dubai Municipality (DM) and the Road and Transportation Authority (RTA). I have designated the interview process into four parts: (Please refer to Appendix 5 for a full version of interview protocols)

1. In the first part, I presented my research topic, goals, background, and required consent forms.
2. In the second part, participants defined constraints for implementing some urban design strategies defined by experts that were surveyed (i.e. walkability, bike infrastructure, a macro-network of transit, interconnected street systems and short blocks, green and social spaces in the urban fabric, diversity of residential offerings, diversity of land use and building types, density levels, environmental design of buildings, and public participation in city design and development).
3. In the third part, participants indicated, from the aforesaid strategies, the five most important and effective strategies on the future development of Dubai.
4. Last, interviewees expressed their opinions about implementation opportunities and possible policy initiatives that might support the implementation of these proposed strategies.

Data Collection Process

I prepared an invitation letter written on The University of Texas School of Architecture letterhead to explain the research goals and nature to the potential participants (please refer to Appendix 6). In particular, the letter included: a brief summary about the research objectives and purpose; interview questions; the estimated time of participation; the benefits of participation; background information about the main investigator and the academic supervisor; investigators' and supervisors' contact information and signature; confidentially and privacy protection statement, and other consent requirements.

To find the target sample, I met with the head of the Research and Strategic Planning Section located in the Planning Department in Dubai Municipality. During the meeting I presented the invitation letter, demonstrated my research topic, and asked for opportunities to conduct interviews in the town planning authority. I also explained to the chair that my research requires participants who served several years in Dubai public agencies, have planning knowledge, and possess expertise in the dynamics of Dubai's decision-making and implementation processes. The department chair welcomed the idea and introduced me to four potential officials specialized in planning and urban design. Later that same day, I met with the four officials, introduced myself, presented the invitation letter, and asked about opportunities to arrange a future interview. They all agreed to participate in the research and, in fact, a couple referred me to other two potential participants in the RTA.

These ice breaker meetings helped me in scheduling an interview date; knowing the background of the interviewees and their work responsibilities; being familiar with the place and people; being interactive with them; and generally being physiologically and mentally prepared for the interviews. In addition to the town planning officials I sent

three more invitations: two to the suggested officials in the RTA and one to the director of Architecture Heritage Department in Dubai Municipality. All three officials agreed to interviews, bringing the total number of participants to seven. Participants either had a planning or an architecture degree; particularly, six had a degree in planning. They all served in Dubai public agencies for several years and the minimum number of service years among them was seven years.

I prepared for the interviews by printing two copies of the protocols, memorizing the questions, and fully charging the audio device. Before conducting each interview, I asked permission of every participant to record the conversation. I explained to amenable participants that they could stop the audio device at any time during the interview. After the interviews, I started transcribing and organizing notes, resulting in a total of five transcripts. For the interviews that were not audio recorded, I based my analysis on memory and on notes taken during the interview. All participants save one were interviewed in English; I translated the latter interview notes from Arabic into English. Once I assembled all my notes and my transcripts, I accumulated the interviewees' responses (constraints on implementation) for single, specific design strategies into one document. Then, I compiled the responses of the second question (opportunities for implementation). Last, I spent an extensive amount of time reading the data with the intention to find patterns of information and themes for analysis.

Sample Size

Out of eight invitations, seven officials accepted involvement in the research. The official who did not respond (either yes or no) was the head of the Strategic Planning Section, who I met in the first time. However, his effort and his help in locating the

potential participants were outstanding and exceptional. A table follows summarizing the sample size, participants' background, and length of interviews.

Table 5: Government interviews

N	Specialization	Interview Date	Interview Length	Interview Language	Audio Record
1	Expert in land use planning	Dec 27 at 10 am	Around 1 hour	English	No
2	Expert in housing	Dec 28 at 9 am	1 hour 31 minutes	English	Yes
3	Senior urban planner	Dec 23 at 10:30 am	52 minutes	English	Yes
4	Senior urban planner	Dec 23 at 1:30 pm	1 hour and 4 minutes	English	Yes
5	Expert in urban design and decision-making processes	Jan 2 at 11:30 am	51 minutes	English	Yes
6	Expert in traditional architecture and urbanism	Dec 27 at 1:30 pm	Around 50 minutes	Arabic	No
7	Expert in urban design and planning	Jan 4 at 1:30 pm	2 hours and 20 minutes	English	Yes

Validity and Reliability

Krueger (1998) argues that qualitative analysis is more complex than quantitative analysis, especially when addressing validity and reliability. For example, consider the distinction between analysis of words and analysis of numbers. The first can be "seductive" because researchers can gain a sense of accomplishment and confidence through different experiments, regression, or statistical procedures. But the second looks more complex because the researcher deals with an extensive amount of narratives and texts. In fact, the analysis procedure is like a "detective work." One looks at words, clues, consistency, disagreements, and ideas. In fact, the essence of qualitative research lies in finding patterns and themes, making comparisons, and contrasting one set of data with another (Creswell, 2003).

In interviews, for example, the complexity lies in the extensive and large amount of data and information collected in a short period of time (Krueger, 1998). To be

rigorous and precise in interpretation and analyzing interview data, several steps can be taken during and after the interview. Based on several validity and reliability criteria that discussed in Creswell (2003) and Krueger (1998), I took the following steps to enhance the accuracy and reliability of my results:

First, during all interviews I avoided bureaucratic and dominant mode of discussion and evaded vague and non-transparent words and questions to promote a free and open environment for interaction. Second, I offered each interviewee adequate opportunity and time to share his/her opinion. Third, I listened carefully to the participants, took notes, audio recorded the discussion, observed how they responded, and asked respondents to clarify any areas of ambiguity.

Fourth, I spent "prolonged time" reading, listening, and organizing the interviewees' responses. This enabled me to acquire and develop a deeper understanding of the transcripts; report agreements, disagreements, and opposing information among interviewees; and "triangulate" different opinions to generate an accurate conclusion and "coherent justification for themes" (Creswell, 2033). Particularly, during the interviews and while listening and writing the transcripts, I paid a particular attention to the following analysis criteria originated by Krueger (1998): the meaning and context of comments, the internal consistency, the extensiveness of comments, and the intensity of comments.

In particular, in analyzing the data I concentrated on the meanings as opposed to the words and I did not take interviewees' responses and ideas out of context. In other words, I did not connect my own values and opinions with the interviewees' responses as my own thoughts may convey a different meaning and generate subjective information. I used in my analysis the original opinions and thoughts of the research participants. I also focused on the internal consistency which has to do with any change of opinion. For

example, an interviewee might alter or change his/her view during the interaction with the moderator. Therefore, a major challenge fell to me to report these changes and discover what is "leading" to these changes (Krueger, 1998). This case occurred only once during the seven interviews and it is reported in the research findings section.

I also reported the extensiveness and intensity of comments. The extensiveness of comments refers to how many different interviewees talked about a particular issue. This indicator can give the reader a sense of support for an idea, or a consensus among interviewees. Detecting intensity, on the other hand, has to be done during the interview and while listing to the transcript. The intensity is observed through voice volume, speed, emphasis on certain words, display of feeling, and change in speaking patterns (Krueger, 1998).

Fifth, I used "rich and detailed description" (Creswell, 2033) to report the findings. For example, in order to make the generated data rich, "thick," and navigable, I organized the interview findings in a hierarchal approach into two levels of details. Level one provides an executive summary of constraints that limit the implementation of the urban design strategies identified by the Delphi experts, while level two provides more intense and concentrated findings coupled with selected quotations from the interviewees.

Last, I argue that interview data regarding implementation opportunities (putting strategies into policies) and implementation constraints are generalizable, but yet within Dubai's metropolitan area as policies, development priorities, and decision-making processes change from one city to another. This statement stems from my observation of a level of "theoretical saturation" after the fifth interview. This means that interviewees' responses became repetitive with no substantial amount of new information, so there was little to be gained by interviewing more government officials. According to Glaser and

Strauss (1967) and Krueger (1998), saturation enhances creditability and validity and is mostly attained when new participants no longer provide large amount of new data.

Limitations to Interview Design and Data

There are no particular limitations to the interview design and data collected. The questions were well structured and worded clearly; all interviewees provided a complete answer to the questions. But what might seem significant for future researchers is involving participants or authorities from at least two government-private agencies such as Nakheel and Dubai Holding. This will enable future investigators to (1) confirm or refute the government participant's perceptions of or claims about private developers' approach to sustainability, which is described to be very narrow and short-sighted oriented towards selling and profit; (2) identify constraints for implementing some of the strategies suggested by experts, particularly, in private projects; (3) identify why there is a lack of coordination between the city's agencies and private corporations; (4) identity the sort of power and distortions that manipulate decision-making, implementation, and planning processes within the private agencies; (4) determine how these firms receive their strength and power in the market, a power that overruled the public agencies in many situations.

SURVEYS

Introduction

"We shape our buildings; thereafter, they shape us," *Winston Churchill.* Churchill's point of view about architecture and buildings has strong ties to community and city design. The way we design and shape our built environment directly affects the human behavior, relations, interaction, productivity, expenditure, movement, and health. Whose opinions, then, could be more essential in building the future of our cities than

those of the people who live there (Local Government Commission, 2010)? In my research, I conducted self-administrated surveys (provided in two languages, Arabic and English) to understand and obtain the public opinions and reactions to some urban design strategies defined by experts in the Delphi.

Particularly, the survey intended to: (1) identify the public opinion about ten design ideas for Dubai neighborhood that have suggested by an international and local panel of experts; (2) understand how the public value and prioritize the suitability of the proposed design strategies to Dubai; (3) identify the potential benefits and troublesome challenges associated with each strategy; and (4) identify the public opinion about the five most important design ideas that will most likely improve the quality of Dubai's neighborhoods.

Survey Questions

Particularly, the participants were asked to rate on a scale of 1 to 3 their opinion about the important design ideas for and qualities of their ideal neighborhood should have. Number 1 in the scale indicated that the design idea is not important at all, 2 somewhat important, and 3 very important. The 10 urban design strategies used in the survey protocols were the same strategies used in the interviews with the government officials (i.e. walkability, bike infrastructure, green areas in the neighborhood, housing choice, mixture of uses and buildings, environmental design of buildings, network of trams in neighborhoods, neighborhood street systems, public participation, and land size for a single family house). In addition to the rating questions, the participants were asked to indicate the five most important design ideas that will most likely improve the quality of Dubai's neighborhoods. Please refer to Appendix 7 for a full version of survey instrument.

Data Collection Process

The target was to have no more than 200 participants (UAE citizens + residents) in this research effort. I intended to include a mixture of citizens and expatriates, both male and female, in order to understand the opinion of different segments of population about the proposed urban design strategies. The survey was distributed in government bureaus including Dubai Municipality (DM), Dubai Electric and Water Authority (DEWA), Road and Transportation Authority (RTA), Dubai Courts, Jabal Ali Power Station, Ministry of Social Affairs, and Dubai Rulers Office.

Subjects received both English and Arabic versions of the survey, and both versions underwent several tests for comprehensibility and wording. On the front page of the survey instrument participants were asked to choose the language that is most appropriate for them.

The package included the protocols as well as the information about the research goals. In particular, the survey included: information about the research topic, objectives, and purpose; instructions of how to answer the survey; the survey questions; the estimated time of participation; confidentially and privacy statement; consent requirements; and contact information of the main investigator and the academic supervisor (only an email address was provided; the package did not include any phone numbers due to cultural sensitivity reasons).

The survey sampling technique was non-probability convenience sampling, indicating that the sampling process did not involve random selection. Accordingly, the findings are not meant to be generalized and projected to the population at large but rather indicative of potential general trends such as an analysis revealing agreements and variances between men and women or locals and expatriates.

The procedures for the recruitment of potential participants started with combining the English and Arabic versions into one digital form and then printing the surveys. I printed around 200 copies of the survey, a total of 6000 sheets. I then started to locate a contact or two in Dubai public agencies to manage the survey distribution and to collect responses. As I handled the surveys with every contact, I explained to him/her all the rules and consent requirements. Part of the discussion was not to distribute the survey among specialists such as architects, planners, or engineers. I was collecting responses from each contact every three to four days. I had no direct contact with any of the respondents; however, there were few cases where participants emailed me asking for a digital copy of the survey to complete it electronically.

While I was receiving responses, I created a system to manage and organize the collected data. Particularly, the first step entailed organizing responses into four groups: local male, local female, expatriate female, and expatriate male. Second, I scanned the responses in a digital form, PDF format. Third, I tabularized the demographic information of the participants. Fourth, I listed data limitation and missing responses and information. Fifth, I translated all the Arabic responses into English. Sixth, I compiled the responses for single, specific design strategies in a separate Word document file for each sub-group (local female, local male, expatriate female and expatriate male). Last, I spent an extensive amount of time reading the data with the intension to find a thematic approach for analysis.

Sample Size

A total of 151 subjects (UAE citizens + residents) participated in this research effort to determine the public opinion about design ideas for Dubai neighborhood that have suggested by an international and local panel of experts. Out of 200 surveys

distributed in Dubai's public agencies, 151 surveys were returned, indicating a response rate of (75.5 %). A mixture of local male (52 individuals), local female (53 individuals), expatriate male (38 individuals), and expatriate female (eight individuals) responded to the survey.

Tables (6) though (9) show the demographic information of the survey respondents. If we look at the tables, it appears that the majority of participants are "college graduate," while the second largest education attainment appears to be "high school degree" for the locals and "some college" for the expatriates. There is a clear indication that the majority of all sub-groups (local men and women, and expatriate men and women) lives in Dubai in a variety of city's neighborhoods. As for the age, the tables reveal that the majority of locals' age group lies between 20 and 35 years, while the expatriates are mostly over 35 years old. It is important to note that expatriates respondents from the Indian Sub-continent (13 participants) are the most prevalent, while respondents from Egypt (9 participants) are the second most prevalent.

Table 6: Demographic information: Local female participants

Local Female									
Age									
Cohorts	16-19	20-25	25-30	30-35	35-40	40-45	45-50	> 50	Total
Participants	5	16	17	11	3	1			53
Educational Level									
Degree	Less than high school	High School	Some College	College Degree	Master's Degree	Doctorate Degree			
Participants		20	2	28	2				
Place of Residence									
Cities	Dubai		Sharjah	Ajman	Um-AlQuwain				
Participants	48		3	1	1				

Table 7: Demographic information: Local male participants

Local Male									
Age									
Cohorts	16-19	20-25	25-30	30-35	35-40	40-45	45-50	> 50	Total
Participants	1	14	12	8	6	5	4	2	52
Educational Level									
Degree	Less than high school	High School	Some College	College Degree	Master's Degree	Doctorate Degree			
Participants	2	15		32	3				
Place of Residence									
Cities	Dubai	Sharjah	Ajman	Um-AlQuwain	RAK				
Participants	47	2	2		1				

Table 8: Demographic information: Expatriate male participants

Expatriate Male									
Age									
Cohorts	16-19	20-25	25-30	30-35	35-40	40-45	45-50	> 50	Total
Participants			4	5	7	7	4	11	38
Educational Level									
Degree	Less than high school	High School	Some College	College Degree	Master's Degree	Doctorate Degree			
Participants		1	5	28	4				
Place of Residence									
Cities	Dubai	Sharjah	Ajman	Um-AlQuwain	RAK				
Participants	31	4	2						
Nationality									
Country	India	Bangladesh	Pakistan	U.S.	U.K	Iran	Turkey		
Participants	7	4	2	1	1	1	1		
Country	Egypt	Jordan	Iraq	Palestine	Sudan	Morocco	KSA		
Participants	9	4	3	1	1	1	1		

Table 9: Demographic information: Expatriate female participants

Expatriate Female									
Age									
Cohorts	16-19	20-25	25-30	30-35	35-40	40-45	45-50	> 50	Total
Participants		1	2	2		1			8
Educational Level									
Degree	Less than high school	High School	Some College	College Degree	Master's Degree	Doctorate Degree			
Participants			1	6	1				
Place of Residence									
Cities	Dubai	Sharjah	Ajman	Um-AlQuwain	RAK				
Participants	7	1							
Nationality									
Country	Philippines	Germany	China	U.K.	Jordan				
Participants	3	1	1	1	2				

Validity and Reliability

To enhance research validity and reliability, I followed the following steps. First, I carried out two pilot applications to improve the precision and comprehension of the survey materials, and to reduce difficulties and vagueness in implementing and administrating the survey. In the first test, participants reviewed the English version of the survey and reported their comments and point of concerns. Once the English version was finalized and approved, I translated the survey into Arabic. Then, the Arabic version was subjected to several strict tests to resolve ambiguity and vagueness in language and to ensure that the translation is precise and identical to the English version. As the survey was designed for the general population, I did not use any technical or complex terminologies in either the Arabic and English versions. Instead, the survey language was simple, easy to read, and worded clearly. I also used very simple visuals to explain in further details some design ideas such as short blocks and interconnected street systems

and macro-network of transit in neighborhoods. In general, I think the survey materials were worded clearly; in all the received responses, I had only two cases where one respondent reported that he did not quite understand one question, which was related to density levels, while the other participant did not understand the question of street systems.

Second, I used a very precise and rigorous approach in reporting the findings. For example, I did not include responses where respondents rated a design strategy as not important at all, and then selected the same strategy as one of the five most important strategies (nine cases). I also excluded cases where participants rated a strategy twice or did not rate it at all. In addition, cases where participants prioritized less or more than five strategies were not included in the analysis (27 cases). Furthermore, in cases where respondents rated a strategy as not important at all but their comments clearly indicated the opposite, I based my analysis on their provided comments and explanations and changed their ratings into the opposite rate (a total of six cases were found and all related to housing choice).

Third, I spent "prolonged time" reading and organizing the responses. This enabled me to acquire and to develop a deeper understanding of their opinions; report agreements, disagreements, and opposing information among all sub-groups (local female, local male, and expatiate male); and "triangulate" different opinions to generate an accurate conclusion and "coherent justification for themes (Creswell, 2033)." In my analysis I paid particular attention to the following analysis criteria originated by Krueger (1998): the meaning and context of comments, and the extensiveness of comments.

As an example, because qualitative research is "fundamentally interpretive," and open to criticism of subjectivity (Creswell, 2033, p.182), I used in my analysis the original opinions and thoughts of the participants. I tried my best to keep participants'

responses and ideas within context by not connecting my own values, influence, and self-reflection with their responses to avoid biased and misleading conclusions (Borman, 1986, p.43). I also reported extensiveness of comments, which refers to how many different participants emphasized a particular issue. This indicator enabled me to observe overlap and agreements among survey respondents.

Fourth, I used "rich and detailed description" (Creswell, 2033) to report the findings. For example, in order to make the generated data rich, "thick," and easy to navigate through, I organized the survey findings into two levels of detail. As previously stated, level one provides an executive summary paragraph about the participants' opinions. In contrast, level two provides more intense and detailed findings coupled with concentrated description and selected quotations from the participants.

Limitations to Survey Design and Data

It is important to note that part of my initial plan was to distribute the survey in high-schools (public and/or private), and universities (public and/or private); however, the timing proved a factor as the field work took place in December and January while many schools were in winter break and others were within the final examination period. I also planned to distribute the surveys in different neighborhoods and mosques. However, it is not acceptable either politically or legally to use mosques as places of conducting research or lecturing without requesting authorization from General Authority of Islamic Affairs and Endowment; however asking for such access from the authority means further complication.

As for distributing the surveys in neighborhoods, this approach had two limits. First, it is socially unacceptable or undesirable to approach neighborhood residents; people in the UAE are not used to taking surveys or being interviewed, especially where

they live. In addition, it is culturally unacceptable for me as a male researcher to approach the female population, especially the local females. Second, it is difficult to manage and control survey dissemination and collection in neighborhoods because it is not socially appropriate to disturb residents from time to time to collect responses. What further complicates the process is Dubai's lack of a well-established system of mail and street addresses for postal delivery to send and receive survey responses. I also explored the possibility of recruiting participants spontaneously while sitting in a café or mall; however, due to cultural constraints I could not approach any subject.

Part of my research design involved creating and publishing online surveys using "SurveyMonkey" to reduce the busywork of collecting and managing data, and perhaps recruiting a larger number of participants. Online surveys make the process of data collection and analysis easier, more efficient, and less time consuming. For example, online survey tools automatically tabulate responses, report comments, and provide options to view and download results graphically (charts and graphs) in different formats. Although "SurveyMonkey" is a powerful tool in designing and conducting surveys, I did not use it in my research due to two major limitations. First, you can create a survey in any language, but the website does not effectively support the Arabic language. In particular, the website does not provide support and assistance in creating language formats that go from right to left, like Arabic. Then, any open-ended comments will not come into the survey in the right to left format, leading to a major limitation in reporting data in an accurate format. Second, my survey instrument included several graphics and visual aids, but the online survey tool does not provide support in creating questions coupled with graphics and visuals.

It is important to note that I did not face any difficulty understanding participants' responses as the survey instrument was clearly worded and precisely designed. In fact, I

had only two cases where participants did not grasp two particular measures: street systems and density levels. If this case had occurred more frequently, it would have been a sort of limitation to my research design and methods. This in terms might place constraints on the kinds of data collected, and thus influence the kinds of conclusions drawn from the results. To address this limitation, future researchers might use a different approach to measuring density and street systems. For example, researchers might use aerial photos of different street systems instead of using abstract street diagrams. This will allow them to explore differences in perceptions of what connectivity means among participants. Researchers can also use examples of different housing types representing various density standards (low, moderate, and high) instead of using different sizes of land parcels in order to explore the differences in perceptions of what density means among the different groups of people surveyed and interviewed.

It is very hard to claim that the survey results are generalizable even though I observed a level of saturation and consistency in responses for both, the ratings and prioritization of strategies. Given the cultural constraints related to the interactions between myself , the male researcher, and potential female survey respondents, I had to use convenience and purposive sampling based on to whom and where I had access rather than using a probability sampling method. I also did not intend to generalize and project the findings to the population in Dubai at large or the UAE as a whole, but rather intended to explore general trends such as agreements and variances between groups of men and women or locals and expatriates. Therefore, it is difficult to argue that survey results are representative, and can be applied from the sample to the target, or study population (Dubai population) with confidence. Perhaps a coherent, accurate, and more generalizable conclusion might be generated by taking a larger sample size with equal representation among men, women, expats and locals.

For example, there is a lack of representation of low-income laborers in my research; researchers might think about different ways developed in qualitative methods to address this particular gap in future work. The low-income community members represent half of the city's population; therefore, their participation is very critical. But the difficulty remains in finding translators who can speak Indian, Bengali, Urdu, and Tagalog to interview them effectively.

There is also a missing representation of the seniors (natives and expatriates). This demographic group has special needs and priorities and must be involved in future work; the difficulty remains in finding an appropriate access to this particular group. It is important to note that using self-administrated surveys with the working class, as well as the seniors might lead to imprecise conclusions as the laborers are less educated than the average public in Dubai and the seniors might require further explanation of particular strategies. Perhaps the most appropriate way to survey those groups would be face to face structured interviews.

Chapter 5: Delphi Technique: Findings

DELPHI ROUND 1

Introduction

The first round of the Delphi study assembled some of the finest minds, including academics and practitioners, in the fields of urban design, planning, architecture, and sustainable development. The experts in the panel were asked to give their opinions and recommendations about rethinking urbanism in Dubai. The first round of the Delphi included three questions: 38 experts contributed to the first question, 33 to the second question, and 35 to the third question. Experts' participation in this round generated a very informative input and knowledge ground that advances design strategies and ideas for an alternative urban design in Dubai, as well as in the region. Particularly, the first round instrument included the following questions:

1. Identification of (five to ten) most essential urban design strategies that you anticipate would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai.
2. Identification of (two to four) places, projects, or examples that represent promising sustainable urban design interventions.
3. Rating (on a scale of one to five) 10 urban design strategies and policy initiatives

Analysis Strategy

This section provides an executive summary of the Delphi first-round questions, synthesized and organized into three sub-sections:

- *First*: The first step summarized the generated essential form-based urban design strategies that would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai. While not, per se, form-based strategies, a summary of recommendations related to decision-making and process-based strategies such as civic engagement and public participation in city design and development also warrants inclusion in this level of analysis.
- *Second*: The generated case studies and examples of urban design interventions are listed in five summary tables. The first table shows the most frequently cited cases, the second discusses briefly the significance and limitations of the most often-cited case (Masdar City), the third table includes examples in Dubai, the fourth table organizes the cases in terms of geography, and the fifth shows the contributed cases by each expert.
- *Third*: The experts' ratings of the design strategies from the traditional and contemporary parts of Dubai to integrate economic, cultural, and environmental components within Dubai's new neighborhoods were collected and quantified into two sets of tables. The first set of tables (five tables) demonstrates the accumulated ratings and some statistical analysis such as percentage, average, and median for every strategy or policy initiative. The second set, on the other hand, includes only one table in which the design strategies from the most-recommended strategies to the least-recommended strategies are ranked.

Form-Based Urban Design Strategies

The first section of the Delphi asked: Which form-based urban design strategies will effectively deliver greater environmental, social, and economic coherence in Dubai's neighborhood development?

The experts' response to this question is organized along nine major urban design principles that contain issues and elements to consider, as well as possible design strategies. The nine core strategies interrelate and overlap with one another. The categorization of the results and responses into nine form-based urban design principles reflect my best attempt at organizing these data in a consistent and rigorous manner. Although the order of the nine strategies does not reflect a ranked preference identified by the researcher and the experts, my review of the experts' contribution indicates an extensive and intensive emphasis on compact development and connectivity.

Based on the experts' reply to the first question, the following nine form-based urban design foundation principles would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai: (1) compact development; (2) connectivity and multiple transportation options; (3) integration; (4) diversity; (5) green, open, and social nodes in the urban fabric; (6) tradition-based urbanism and architecture; (7) climate-sensitive urbanism and architecture; (8) eco-balanced design and planning; and (9) adaptability. While not, per se, form-based strategies, recommendations related to decision-making and process-based strategies (such as civic engagement and public participation in city design and development) are also considered to be vital for sustainable Dubai neighborhood.

1. Compact Development

The vast majority of the experts on the panel supported urban compactness in Dubai's new neighborhoods as well as within its existing urban areas. The experts argue that a sustainable Dubai should be based on the merits and strategies of compact development that promote:

- Densification (a variety of densities should be provided),

- Urban infill/intensification (vacant lands should be utilized and filled appropriately),
- Walkability and pedestrian-friendly streets,
- An interconnected street system,
- Effective and multiple transit options
- Proximity of housing to employment, amenities, daily uses, and services
- A mix of uses distributed appropriately and preferably within short distances, and
- An urban management policy that restricts and manages growth, mostly related to city and regional scale.

Compact urban forms with the aforementioned strategies create an opportunity for people from different socio-economic statuses to live in the same place and have proximate access to the same amenities and uses. Dubai, in fact, should embrace the concept of compact development because many social, environmental, and economic benefits are associated with this development model. This concept maximizes integration and connectivity, minimizes surface exposure to solar radiation, reduces heat gain and cooling load, maximizes shading, minimizes walking distance and commuting time, increases social interaction, and minimizes the use of private cars and, thus, pollution levels, and makes the area easy to navigate and, hence, increases efficiency and safety.

Both advantages and limitations are associated with urban compactness. The major concern with compact forms, as described in the Delphi, is the concentration on high density levels that might affect quality of life, create congestion and traffic, minimize open spaces, minimize the sense of privacy, and, perhaps, increase the price of land and real estate. To overcome some of these limitations, the Delphi outcome suggests several strategies, such as the following: (1) areas where public transport accessibility is

high should adopt high-density figures; (2) loss of open spaces should be avoided; instead, compact urban forms should be combined with more open spaces (A4, 2010); (3) neighborhood design and planning should embed a variety of density levels, not single ones, including high and moderate(A5, F2, 2010); and (4) the distribution of mass transit stops and mix of uses (services, employment, daily uses) should be distributed appropriately and in proximity (perhaps within 5 minutes' walking distance).

Compact urban forms with a mixed use land development strategy (horizontal as well as vertical) could bring different functions (housing, employment, leisure, daily uses, civic, institutional, and services) in proximity (A4, 2010). A development strategy for mixed-use development should not only be focused along transit corridors but also planned and regulated horizontally and vertically in different parts of new neighborhoods. If fairly integrated and distributed in a compact development, different uses can reduce the number of daily automobile trips. This, in fact, will bring different uses within walking distance and result in less CO_2 emissions, better air quality, less energy consumption, less noise, less pollution, less congestion, fewer traffic problems, shorter and fewer car trips, "less wastage of time, fewer accidents, less stress, and fewer physiological and financial negative impacts (A1, 2010)." A diversity and mix of uses could also offer people convenience, choices, and opportunities. It could also increase the viability of local businesses and recreational facilities and could lead to a vibrant, dynamic, and active community lifestyle (K, 2010). However, the key factor in achieving this is to provide affordable and leasable spaces, at least at the ground level, to encourage and establish small businesses and retailers to, in turn, attract a large number of diverse people (R2, 2010).

A compact development with an interconnected street system that accommodates traffic-calming policy measures and a network of walking facilities, gardens, retail stores,

restaurants, cafés, and other social meeting places provides venues as well as opportunities for people to interact formally and casually at different times of the day (A5, 2010). This could, consequently, support small businesses and activities in the neighborhood and could "ensure a vibrant, attractive community life more conducive to social communication and casual encounters" (R2, 2010).

The success of urban compactness also depends upon multiple effective transportation modes. A system of public and personal transit networks in a "hierarchical level," going from (shaded) sidewalks, bicycle lanes, trams, and buses to major metro lines will reduce the number of car trips and increase connectivity levels both internally (within the neighborhood) and externally (with other neighborhoods and the surrounding urban environment) (R2, 2010).

Urban compactness is also associated with effective intensification and urban infill strategies. Many older districts in Dubai have deteriorated; some have been demolished and allocated to quasi-government firms for the development of large projects; others have lost their identity and original population to building deterioration, lack of services, traffic congestion, and the influx of the legal and illegal working classes. A compaction process combined with a good infill, intensification, and diversification strategy within the city structure or near the existing city fabric with smaller plot sizes and small blocks could revitalize the old parts of Dubai, increase densities, reduce land consumption, and prevent the expansion of infrastructure (A4, 2010). There are still huge tracts of land within the dense urban fabric of Dubai that sit vacant, without explanation, despite their valuable locations. A redevelopment strategy should be adopted in order to densify and to utilize these empty lands appropriately (D, 2010).

Based on the data provided in the Delphi, I organized the debates surrounding urban compactness into three categories. Although the panel vastly supported compact

urban forms, several major debatable and unanswered questions remain, including the scale of compact neighborhoods, the appropriate building heights (low, medium, high, or a combination), and the city's future growth direction, whether it is more functional to expand contiguously as a monocentric urban structure, or as a networked city, a polycentric urban system.

Any form-based urban design framework must establish an optimum size for a development to be feasible and sustainable (K2, 2010). In this regard, one might ask what the scale or the size of practical and good compact neighborhoods should be. Should it be 1000 ft^2, 10,000 ft^2, or 100,000 ft^2? Does it have to do with population size and intensity? Very few studies address the solid physical scale of compact urban forms. For example, one scholar argues that compact urban forms require a form small enough to reduce the desire for a private automobile and large enough to provide a variety of opportunities and amenities that enhance urban living. Other scholars, on the other hand, state that compact cities should include neighborhoods of 5000 inhabitants. A recent alternative (also mentioned in the Delphi) can be found in the work of Peter Calthorpe. His Transit Oriented Development (TOD) model, which is diverse, dense, and connected, having a physical dimension of 400-600 feet (a five- to ten-minute walk) from the center to the edge, purports to be a compact urban form (D, 2010). Another scale indicator in the Delphi seems also to be critical, although it is not associated with urban compactness per se. The expert argues that the key to the sustainability of the built form is:

> the organization of communities within Dubai's older urban fabric that clusters a neighborhood around a distribution of 'town centers'. Such communities would operate at about 100,000 people in scale and would have diversity of community uses that create walkable patterns of development (R1, 2010).

The success of compact urban forms is associated with an effective strategy of land use development. Since mixed-use development requires different building types, the height of the buildings (whether they should be high-, medium-, low-rise, or a combination) still remains controversial. Few experts are in favor of low-rise development over medium- or high-rise since low-rise development minimizes surface exposure to solar radiation and reduces heat gain and cooling loads. In fact, low-rise buildings reflect the "most" energy-efficient height, so they can be cooled/heated passively. Such architecture brings people back to the street level and encourages greater social interaction (F; G; R2, 2010). Another recommendation favors medium-rise development over low- or high-rise because medium-rise structures could provide high- to medium-density levels while maintaining a human scale environment (A1, 2010). Other experts sit in favor of low-rise architecture combined with taller medium- and high-rise buildings (max. 12 stories) with an appropriate set-back above the 3rd or 4th floor (D; R2, 2010). Another group of experts are in favor of high-rises. They argue that, in terms of sustainability, it is more beneficial to build high-rises (more than 12 stories), because it can house a large number of occupants on a small plot of land (M, 2010). In addition, high-rises are more environmentally friendly in terms of saving land, while using energy and water resources in a more efficient manner (S, 2010). In addition, the shortage and price of land are major concerns in Dubai; therefore, low-rise housing will not be affordable in the near future (A4, 2010).

The success of compact forms is also associated with time span and growth. The remaining debatable major urban form question concerns whether to concentrate future growth contiguously, in a monocentric form, or to divide into small urban areas or several specialized districts, with individually distinct flavor and function. The glue binding these urban agglomerations together would stem from the merits and attributes of the compact

city, including social integration, density, diversity, connectivity, accessibility, and an effective transit system. This model is often described as a polycentric, or networked, urban system (Jenks & Kozak, 2008; Okabe, 2005; Thomas & Cousins, 1996b).

Although there are some debatable points regarding urban compactness, the panel recommendations generally indicate that successful compact forms include a variety of density levels; an urban infill strategy; intensification of uses and activities; an interconnected street pattern; efficient land-use planning; a variety of uses distributed effectively; efficient/multiple transportation options; proximity of housing to employment, amenities, daily uses, and services; and, perhaps, containment initiatives (Urban Growth Boundaries).

A sustainable Dubai must embrace the concept of compact development; however, a major concern in Dubai would be the potential for compromising privacy of single family houses in a dense environment, which would require a reconsideration of current regulations at all scales from the individual dwelling unit to urban configurations that regulates aspects such as land use distribution, heights, setbacks, street layout, etc (K4, 2010).

2. Connectivity & Multiple Transportation Options

Dubai is generally described as an auto-dependent city, where people heavily rely on private automobiles in the vast majority both of short and long daily trips. A sustainable Dubai deviates completely from Dubai's current transportation model that is based primarily on the post-WWII North American model of highways and superblocks (D, 2010). Most of Dubai's urban areas sit inside large super blocks surrounded by multi-lane highways and grade-separated interchanges that restrain accessibility, connectivity, and pedestrian linkages between and within urban areas (S1, 2010). It appears that

Dubai's overreaching approach, which emerged in the mid-1990s, was to build the first city of the 22nd century at the beginning of the 21st century; however, Dubai impractically followed the ideal of the "functionally separated" and disconnected city that works at the expense of enormous resources, a concept that has "miserably failed" around the world (F1, 2010).

Based on Dubai's mobility, movement, and accessibility issues, the panel recommendations that mostly likely will enhance connectivity and accessibility are associated with two major aspects: (1) street networks and block typology; and (2) the integration of multiple transportation networks (mass transit/pedestrian facilities).

Street Networks & Block Typology

Dubai's road networks, or "the super transportation model," based on multi-lane highways, superblocks, and disconnected street patterns, should be re-conceptualized and replaced. This system has few intersections per square mile or square kilometer. Dubai roads, which, in most cases, do not accommodate pedestrian facilities and are designed for high-speed travel, are very wide, both in their overall width and lane width. In addition, the vast majority of street systems comprise an "even coarser grid with more of a dendritic pattern, including the secondary and tertiary roads and streets, which are typically incomplete, disconnected grids" that isolate many areas, increase travel time, and make walkability and accessibility very difficult (D, 2010).

Large blocks or super blocks kill physical activity, reduce choices, and place a burden on traffic and pedestrian movement. Therefore, developing an interconnected street system leads to greater pedestrian and vehicular accessibility (A & N, 2010). Smaller blocks make both walking and biking more feasible, convenient, and exciting. Smaller blocks also make automobile trips easier and quicker since direct and multiple

routes can reduce congestion (D, 2010). If an interconnected street system with a sufficient public transportation system is designed along major corridors, it can reduce the width of inner and local streets. This strategy would provide the possibility of shading most of the street networks. In addition, it allows greater integration of more pedestrian and bicycle infrastructure, and parking sites would occupy fewer areas (F2, 2010). According to one expert (R, 2010), the most important design strategy for a comprehensive reinterpretation of Dubai's street patterns is giving vehicle operators more choices via a redundant system of street grids.

Integration of Multiple Transportation Networks (Personal / Public)

Effective, accessible, and affordable public transportation could lead to lower carbon emissions, less traffic congestion, and less sprawl. Some economic benefits associated with public transportation include reducing the total transportation cost for the public, reducing travel time and cost "as cars removed from the road through public transit options lead to less congestion and faster speeds for remaining motorists (A2, 2010)." Public transportation also plays a great social role in travel and commuting by ensuring that all segments of society possess the ability to travel, not just those with a driver's license and access to an automobile (A2, 2010). Still, the question of accessibility and affordability of any public transit system plays a vital role in achieving the claimed economic, environmental, and social benefits.

The majority of experts argue that public transportation should become an important aspect of future neighborhood developments in Dubai. Neighborhood centers and major mixed-use corridors should be linked by street transit in the form of trams or a dense network of bus routes to Dubai's Metro stations, both the existing and the planned ones (the current transit system in Dubai does not operate in this manner) (R1, 2010). In

general, Dubai Metro connects passengers to a series of shopping malls, tourist locations, business districts, etc. Its service lines do not extend to residential areas. The Metro does not mainly go to where people live and doesn't take them to where they work. Additional metro lines combined with a macro transit network of trams should supplement the existing system to connect larger zones (R1, 2010). A dense network of bus lines for short trips in a range of "1 to 2 km" could also bind residential neighborhoods to the light and heavy transit infrastructure (G1, 2010).

Additional specific panel-driven design strategies to enhance public transportation and to heal some of the pressing connectivity issues in Dubai are: (1) improvement and enhancement of pedestrian accessibility and linkages to the current Metro stations as well as future stations (C; D, 2010); and (2) improvement of transit parking spaces and facilities because the current stations have very limited space or, in most cases, no space for transit parking (F, 2010). Most important, Dubai should design a network of personal and mass transit networks in a hierarchical and integrative manner going from (shaded) pedestrian infrastructure, bicycle lanes, trams, and buses to major metro lines to permeate the entire city, thus reducing the use of private automobiles and, hence, emissions (B; R2, 2010).

The panel advice regarding personal transportation or movement networks is organized with respect to pedestrian access (walkability) as well as bicycle access. However, the recommendations intensely focused on reinforcing pedestrian connectivity.

First, in terms of cycling, "bicycling in public r.o.w.s. is virtually non-existent" (D, 2010) even though the topography in Dubai is flat, which makes it potentially conducive physically to bicycle (E, 2010). This statement is asserted by an expert who resides close to the Dubai Mall and works on the other side of Sheikh Zayed Road. The commute by car normally takes him between "5-15 minutes," depending on traffic

congestion. By bus, the commute would require changing buses "twice" and would take close to "an hour." A trip by bicycle, although entirely possible by distance (4.5 km) and desired by the expert, is impossible, as bicycle paths appear not to be planned by the city (F2, 2010).

In climatic terms, cycling might not be favorable for half of the year. Cultural norms and traditions in Dubai could also make cycling more complicated and difficult to adopt. Cycling for local Emiratis (men and women) might not be acceptable at all. However, Dubai is a city where the local population comprises mere 10-17% of the total population; therefore, dedicated bicycle lanes might be utilized by residents from other countries, even Middle-Eastern countries (E, 2010).

Second, in terms of walkability, approximately 29 out of 38 experts support walkability even though it might not be favorable during the extended hot and humid season (April to October). Walkability reduces commuting times and the number of vehicle trips. It improves air quality and promotes an active lifestyle (K, 2010). Walkability creates opportunities for neighbors to get to know each other, which leads to greater social interaction and, perhaps, lower crime rates. The neighborhood traffic system and flow should focus on designs aspects that reduce automobile use and increase pedestrians' safety. This will lessen CO_2 emissions and enhance walkability, public safety, health, and quality of life (A7, 2010). To encourage walking, traffic-calming methods (other than speed bumps and speed humps) – perhaps dominant in pedestrian zones – and other measures to reduce auto travel speeds in mixed flow conditions may be used in dense areas with a great deal of foot traffic. To ensure safety and security, pedestrian infrastructure at night requires adequate lighting and public surveillance (E, 2010).

Car orientation and dependence will, sooner or later, fragment and segregate Dubai's population further (G2, 2010). Pedestrian orientation, therefore, is required for community-building. At present, walking facilities at the neighborhood level are totally disadvantaged in Dubai. An expert in the panel who visited Dubai argues that

> I stayed at a hotel across from the World Trade Centre, the conference venue, but had [limited] ways to cross the multi-lane Sheik Zayed Road and had to take a taxi that went all around before getting me to the place that I could have crossed in few minutes – I am sure that many had similar experiences (G2, 2010).

According to one expert, indoor malls are, generally, the "only place Emirati walk, even when the walk is fairly short and sub-aerobic" (D, 2010). There are a limited number of walkable areas in Dubai with sufficient infrastructure, activities, and destinations to make walking a practical and compelling transportation mode during the better half of the climatic year. Dubai Marina phase 1, Dubai International Financial Center (DIFC), The Walk at Jumierah Beach Residence (GBR), Burj Khalifa and the lake, and the old part of Dubai and Deirah are a few exceptions designed for diverse and active pedestrian activity and movement (D, G3, 2010).

The characteristics of these vibrant pedestrian spaces might be intensified also at the neighborhood level (G3, 2010). According to the panel input, some of the design elements and strategies associated with a pedestrian-friendly environment are: density, shaded walkways, safety, interconnected street systems and block typology, high-quality public spaces and streets, destinations, accessibility, good distribution of amenities and daily uses, good distribution of transit hubs, proximity, and density and diversity of programs and activities.

3. Integration

The urban form of Dubai is disorganized and not integrated, socio-economically or physically (G3, 2010). Developments are not contiguous, described as "individual urban events" or scattered developments (A3, 2010). Urban areas are divided and mainly linked by highways and high speed roads. There is no symbiotic relationship between buildings and landscape, or between people and different functions (uses). The result is that the city is formed by individual and mono-urban zones with no "shared features" (G2, 2010). Based on the experts' advice, a sustainable Dubai rejects the city's current urban form that lacks "a well-defined, coherent and an integrated" city structure and land-use strategy, resulting in socio-economic and physical fragmentation and segregation (S1, 2010). Based on the experts' recommendations, a sustainable Dubai deviates from the city's current urban form and planning agenda created over the last two decades: isolated ethnic and cultural enclaves; segregated socio-economic enclaves; mono-functional and mono-typology fragmented districts; gated tower complexes and gated communities; urban areas that are divided, disconnected, disintegrated, and mainly linked by multi-lane highways; and, finally, exclusive urban projects that extended off-shore, along the shore, and in the desert.

Based on the urban issues demonstrating the fragmented and segregated nature of Dubai's urban form, the panel proposed various design strategies and recommendations to heal and to integrate the disaggregated and fractured nature of urban Dubai. Strategies for urban integration are proposed at different levels and scales ranging from the integration of functions, uses, multiple mobility systems, and technologies into the design and planning of new neighborhoods to integration with the existing urban fabric and city parts.

Some specific strategies proposed to strengthen urban integration are: (1) the integration of different scales (from the dwelling to the city, sustainable solutions are sought at all scales); (2) the integration of nature, green areas, and parks into the neighborhood; (3) the integration of shaded, walkable, and green connectors into the neighborhood fabric; (4) the integration and linkage between multiple transport modes; (5) the integration of different functions, especially residential with services and daily uses into the neighborhood; (6) the integration between housing (life), employment (work), and transportation means; and, finally, the integration of modern technologies (such as efficient energy and transportation systems) with some strategies for Dubai's traditional city patterns.

Although the vast majority of the panel provides a wide variety of strategies to achieve greater integration, two experts note that it is very difficult to attain socio-economic integration universally and, specifically, in Dubai's neighborhood development (J; S3, 2010). In Dubai, integration, or "congregation," a preferred term used by an expert, might occur outside of neighborhoods (malls, commercial streets, urban parks), but not in spaces inside neighborhoods (S3, 2010).

4. Diversity

Dubai's urban form and land use development focus on a select portion of the population (e.g., tourists, international residents, and high-income people) rather than supporting diversity or focusing on local needs. An obvious ethnic and socio-economic segregation exists in the spatial structure of the city. Many low and middle income classes live in adjacent cities or old parts the city for affordability purposes. Many locals have their own subsidized neighborhoods. Other residents, including high and middle

income residents, live in new mega projects like tower complexes, gated communities, islands or themed projects, while working classes live in old districts and labor dorms.

The main issue derives from the strong desire from Dubai's local authority and real estate industry to make the city a consumption center and a "mono-functional" business hub for the rich. Dubai's success so far in achieving this development trend derives merely from soft regulations as well as its tax regime, which made the city a tax-free hub for multi-national corporations. To be successful in the long run, Dubai should adopt a resilient development strategy that focuses on diversity, especially in land use, economic and commercial activities, urban form, industry, and leisure.

Since the urban form in Dubai is based on a mono-type and market-driven urbanism with little forethought in terms of sustainability, diversity, as a core form-based urban design principle, is strongly suggested by the panel. Diversity works against segregation and has a far set of indicators such as diversity in land use, operating hours, size, housing types, density, architecture, ages, ethnicity, activities, businesses, ownership, open spaces, and so on. In the Delphi, the four core diversity indicators emphasized by the panel are: (1) diversity of buildings, architecture, and density; (2) diversity of housing types or residential offerings; (3) diversity of uses; and (4) diversity of economic activities. All in all, the aim is to provide opportunities and choices for people from different socio-economic statuses to live in the same place and have access to the same amenities and services.

The majority of experts on the panel argue that a sustainable Dubai should have Jacobs' diversity, choice, vitality, and human base animation. A sustainable Dubai is one in which Jacobs' diversity, especially diversity of housing types, density, buildings, employment, land use, and economic activities and sources, is tolerated and encouraged. A sustainable Dubai is a city in which there is no excessive and unjust spatial separation

of income and ethnic groups. A sustainable Dubai offers residents proximate and equal access to services, amenities, and employment, and where economic opportunities and housing are available for all segments of population. A sustainable Dubai should be based on indigenous as well as diversified economic resources, not mainly on outsourced and foreign capital. Although diversity remains a core indicator of sustainability, some comments in the Delphi indicate that it is very difficult to achieve socio-economic, ethnic, and cultural diversity within neighborhoods in Dubai as well as across the world.

To assert the statements above, the following selected quotations indicate that ethnic and socio-economic diversity is a very complex aspect to exist inside Dubai's neighborhoods and elsewhere:

> 1. Middle income people generally seek privacy and are not particularly interested in local spatially communities. The groups in Dubai that would seek a socially sustainable local neighborhood would be: (1) migrant workers: They need spaces to meet in comfort with local amenities at hand; and (2) possibly children although children do not seem to play outside much anymore (J, 2010).

> 2. . . . Touching upon the social and economic [diversity], . . . neighborhoods [in Dubai] are not only economically segregated, but also ethnically segregated, as jobs and social class in the emirate are often striated along a discrete ethnic spectrum as well . . . I think that the possibility . . . of [diversity] . . . is visible in spaces outside of neighborhoods [such as parks and neighborhoods, but this kind of mix is often described as gathering or congregation, not integration or diversity] (S3, 2010).

5. Green, Open, and Social Nodes in the Urban Fabric

In Dubai, and many other places, people tend to "move from an air-conditioned house to an air-conditioned car to an air-conditioned mall" (A2, 2010). Opportunities for interaction and building social capital rarely exist. On one hand, mixing or congregating in Dubai mainly occurs in shopping malls year-round; on the other hand, it occurs in Dubai Marina, The Walk, or urban parks during the better half of the climatic year. To

increase social interaction and opportunities to assemble inside neighborhoods, the experts argue that a sustainable Dubai will exist where a system of green, open, and social nodes are incorporated into the urban fabric to promote daily interaction of people, classes, businesses, and work.

The panel design recommendations focus intensely on providing sufficient, accessible, and diverse green, open, and gathering spaces within the urban fabric. Each neighborhood should have an integrated system of parks and green corridors, all networked within the urban environment and intensely programmed, intensely developed, and accessible by foot and other transportation options. Some examples of social nodes discussed by the panel provide opportunities for leisure, meeting, gathering, mixing, congregating, and interacting on sites and streets (i.e. parks, squares, waterfront, playgrounds, green promenades and pathways, small piazzas, mosques, pedestrian amenities).

Other considerations discussed in the Delphi that should be associated with the design of open spaces and streets are programs and activities for different ages, landscaping strategy, quality of space, locations, design of streetfronts, scale, water and irrigation, the use of indigenous and tolerant planting materials, and, most importantly, shading as a very critical aspect.

The positive social, economic, and environmental impact of nature or social spaces on the urban environment earns discussion time by the panel. First, from the environmental perspective, green areas would help to reduce the urban heat island effect, particularly with the introduction of indigenous, drought-tolerant planting. Furthermore, rows of trees provide some form of refuge from the sunshine (A2, 2010). However, vegetation also increases humidity and needs enormous amount of water; therefore, it should be planned and used carefully (J, 2010). Second, from the social perspective,

"neighborhood foci" are essential for creating social capital among residents (B, 2010). All new neighborhoods in Dubai should have "a foci and access to open spaces." Open spaces and vibrant streets provide places for physical activities, commerce, psychological satisfaction, security, social interaction, and culture (D, 2010). These qualities embody important aspects of sustainable living that promote well-being and vitality and make any area livable, humane, and an attractive destination (G3, 2010). Dynamic streets and open spaces in many cases also provide income for owners; this could stimulate many local businesses within neighborhoods. Simultaneously, though, open space developments should strike a balance between public and private spaces rather than privatizing most of the space, which is already a common practice in Dubai (A7, 2010).

6. Tradition-Based Urbanism and Architecture

The vertical and mega vision of Dubai is mainly based on imported construction and design principles that demonstrate a sense of physical materialization and power without any awareness to the environmental and cultural conditions of the region (A3, 2010). The focus on marketing and foreign investment driven urbanism has created urban contexts with new and diverse cultural norms that are changing the local culture of the area. Dubai's main urban design strategy focuses on developing mega projects, branding of the city, creating a global identity, consuming luxury items and commodities, and marketing this urban form rather than responding to the cultural norms and environmental conditions of the place. As this urban agenda gave rise to several social and environmental emergencies, Dubai became the object of theories, reports, and design models recommending the end of the mega, vertical, biggest, and tallest in the name of cultural, social, climatic, and environmental components (A3, 2010).

The propensity to import design and master planning work to the Emirates and the region has been obvious in the last two decades. Increasing recognition and awareness has led to several disputes regarding this style of urbanism and architectural design and its suitability for one of the hottest and driest region on earth. Establishing a cohesive set of urban policies that addresses the relationship between urban typologies and cultural norms is a complex proposition, but "necessary for responsive neighborhood design" (K4, 2010). Sustainable urban forms will mostly likely be possible if they are "underpinned" by a strong policy agenda that commits to "global sustainability goals" while respecting "locality" and considering local development and implementation of solutions (K3, 2010).

According to one expert, the "radical cut" from the cultural and climatic conditions of the area accentuates the urban issues in Dubai (G3, 2010). A sustainable Dubai should not be excessively vertical and mega such that the planning and design principles are imported. A sustainable Dubai should not be based on physical materialization and indications of power without any awareness of the ecological and cultural conditions of the place. In this regard, some experts argue that it is vital to train and encourage local talent and architects to produce the next generation of architecture and urbanism in the city. This will distinguish Dubai and minimize reliance on imported consultation that, in many cases, produced an urbanism with no ties to the cultural norms and environmental conditions of the place (R, 2010). The utilization of local knowledge, experience, techniques, and materials will create a profound foundation for the persistence and protection of local culture (A3, R, 2010).

A sustainable Dubai should focus on fewer, smaller, iconic buildings that deviate from Dubai's "monumental weakness for monumentality" (D, 2010). A sustainable Dubai should "honor" the traditional forms of urbanism and architecture (D, 2010).

Lessons from the past are very essential to the progress of modern cities. However, this does not mean to replicate the exact form, architecture, and conditions of Dubai's historic urban typology (G3, 2010). Recuperating the identity of the site and the spirit of the place (as ancient claimed, the "genius loci") is not a nostalgic operation but a necessary need and acknowledgment (G3; N, 2010). A sustainable Dubai should accentuate the influence of stories, memories, art, culture, religion, beliefs, histories, style, local talents and ideas, etc. on the design of the urban form, architecture, and people's movement and interaction.

Lessons from the past essentially enhance civic identity, value, and a sense of pride and belonging (A5, 2010). Architecture and urbanism has evolved over hundreds of years. Many indigenous forms and principles that reflected the traditional and climatic conditions have been lost with technological advancement in design, construction, and mobility. According to one expert, a sustainable Dubai should revive and integrate some of the traditional (indigenous, Islamic, and Arab) urban forms and ideas with modern technologies and transportation advancement to fit our contemporary needs (A, 2010).

As many experts honor the traditional urban typologies, some question that finding the right design language is a big challenge in Dubai. In reality the city accommodates a multi-culture society and most of the urban product, even the traditional, is imported. In addition, the city in the last two decades has been a target of merely short-term sighted urbanism, which employed postmodern design language without honoring the climatic and cultural values of the traditional patterns (F2, 2010). Consequently, "many parts of Dubai look like space ships landed on a new planet," disconnected from its spirit and culture (F2, 2010).

Even though the vast majority of the panel acknowledges the significance of traditional urbanism and architecture, which were once imported as well, few argue that

the traditional design patterns are important and could work, but not as a key solution that integrates environmental, social, and economic factors into neighborhood design and planning. Besides, some arguments indicate that while some traditional urban morphology and new developments may work to integrate cultural and aesthetic components, it would prove difficult to successfully replace current development trends and morphologies (B1, 2010). Dubai's old urbanism and building styles represent unique products of historical adjustment to the extreme climate in the region, before the introduction of energy dependent technologies. Now these design patterns and elements possess great traditional and spiritual values, and yet could improve cultural identity. However, it is to be studied and investigated to what extent this natural adaptation can complement modern forms and technologies and thus reduce energy consumption and boost the civic integrity of the indigenous population (B1, 2010).

7. Climate-Sensitive Urbanism and Architecture

The provision of climate-adaptive urbanism and architecture, which does not require resources or complex mechanical operations, is currently weak or perhaps even nonexistent in Dubai (R2, 2010). An expert on the panel argues that no development in Dubai, with its extreme weather conditions, should be based on an "old-fashioned" carbonized fuel system without being sensitive to the climatic parameters of the place (B, 2010). As a result, the experts argue that a blend of active and passive system strategies should be the norm in any urban development in Dubai (R1, 2010). The goal for a sustainable Dubai should be complete avoidance of outside renewable and climate-sensitive urbanism and architecture.

This goal will strongly affect the physical environment as extreme high rises will most likely lack practicality. When executing and employing passive design strategies

and striving toward zero fossilized energy use, low and mid-rise structures with moderate density levels are more practical and indeed efficient (B, 2010). Some experts claim that a sustainable Dubai should not ignore local and traditional building types and methods (B, 2010). Sustainable solutions related to material choices; correct solar-air orientation of urban forms and street systems; location, size, treatments, and distribution of openings; and building typology and massing should emerge from historically proven strategies. Technological advancements hold import, but the local knowledge of what worked in the past and why it is critical for understanding sustainable building solution remains vital (B; B1, 2010).

Another expert affirms the statement above by arguing that the traditional city fabric is a very "sustainable one" (R2, 2010); it understands how buildings' arrangement, composition, and masses; sun movement and angles; and wind directions and velocity shape and affect the built form as well as social life and movement. The bio-climatic and social design principles of the traditional Arab and Islamic urbanism have been acknowledged and accredited over centuries. Today, these principles, in combination with technological advances, can be utilized, adapted, and used as references for new urban developments in Dubai (R2, 2010).

Other expert-driven strategies accentuating the significance of climate-appropriate design in building a sustainable neighborhood are as follows: (1) buildings' construction should be more compact so that the relationship between one building and another provides shade (F2, 2010); (2) the "tight-grained," traditional forms of small streets and alleys need revival in some areas of the neighborhood, as both climatic as well as cultural benefits are associated with these forms (D, 2010); (3) limited glazed façades and highly shaded areas and surfaces are essential for the reduction of heat gain, cooling loads, and environmental impact (K1, 2010); (4) microclimatic orientation of urban form and street

system should respond to solar orientation and air directions (N, 2010); (5) the neighborhood built structure should incorporate low to mid-rise, double or single loaded garden courtyard typologies(N, 2010) (7) construction should include pedestrian-scaled, shaded pathways, using both "hard shadows" from building forms, compositions, and light structures and "soft shadows" from trees (N, 2010).

8. Eco-Balanced Design and Planning

A sustainable Dubai should be based on a circular, not linear, metabolic system that balances production and consumption with the intention of reducing long-term ecological impacts, using resources more efficiently, and reducing economic costs (M, 2010). In Dubai, already scarce natural resources still are subject to extreme consumption. The provision of green and modern technologies that save and manage power, water, food, and waste currently range from weak to nonexistent in the city (R2, 2010). Since Dubai holds little consideration and forethought for green living and ecological balance, the vision for a sustainable Dubai should align with the provision of green infrastructure and a green economy that most likely will lead to a more ecologically balanced environment. Based on the collected panel members' recommendations concerned with eco-balanced design and planning applications, I found an intensive emphasis on the following themes: (1) low-carbon energy systems; (2) air quality; (3) water management; (4) waste management; (5) materials use; and (6) food security and sources.

An expert argues that no development in Dubai, with its extreme weather conditions, should be based on "old-fashioned" carbonized fuel systems (B, 2010). "Net zero architecture" and a mix of active and passive system strategies should be the norm in any development (R1, 2010). Another expert, Expert (M), recommends that Dubai should

accept and align with the San Francisco Declaration 2008 and the UNEP Green Economy Initiative in its urban design strategy and neighborhood development. The SFD declaration, according to the expert, is considered the "Eco-City Machinery." The declaration promotes eco-balance design and planning applications and organized along four main themes: ecological security, ecological sanitation, ecological industrial metabolism, and ecoscape integrity.

The green economy as described by the expert, on the other hand, "results in improved human well-being and reduced inequalities over the long term, while not exposing future generations to significant environmental risks and ecological scarcity." The main sectors of a New Economy according to the UNEP Green Economy Initiative are: renewable energy, low-carbon transport, energy efficiency, clean transportation, waste management, freshwater provision, sustainable agriculture and fisheries, and forest management. Excluding the last element "forest management," Dubai can implement and apply all other sectors (M, 2010).

9. Adaptability

The design of the urban form is not an "end product." It is, in fact, a continuous process based on demand, market operation, policies and regulations, population growth, urban growth, and resources. The idea of the expansion and multiplicity of the urban environment and their need to be adaptable over time have been discussed by many scholars. The role of policy-makers, experts, and the public (the users) lies in deciding along which path the growth should occur. Based on this concept, the sustainability of the urban form is considered "a process rather than an end state." Consequently, experts argue that changes in urban forms should be resilient and open to adaptation over time as more technologies and users emerge, as more decision-making strategies appear, and as

more social, economic, and environmental changes occur, thus requiring change and adjustment.

Designing sustainable forms requires an emphasis on the process (both that of growth as well as that of decision-making guiding the anticipated growth) as fundamental and essential themes. Accordingly, an expert argues that, in order to make Dubai's urban from more sustainable, the city should consider the future by focusing on growth strategies and demand, information collection, and decision-making in order to generate the right solution that fits correctly with different circumstances and time spans. This adaptability, according to Williams et al, enables decision makers to "address the complexity of the urban system and place specificity, and to respond to change."

According to Expert (K3), the entire concept of adaptability is highly scale-dependent. In fact, design for adaptability is applied to urban systems on building, block, neighborhood, city, and regional scales. As an example, if a compactly designed city faces an intense change such as urban and population growth, the city should be ready and able to adapt to this change physically, politically, technically, socially, and economically. To take another example, social spaces should have a flexible design to allow for modification and change due to new "agreed-upon activities." Also, residential units should be adaptable to changing needs of the occupants.

Adaptability, in fact, furnishes the ground for planning for future change which anticipates the unexpected as well as the expected (G, 2010). Adaptability is not only dependent on place or physicality but also on decision-making strategies, policies, and communication. In short, a sustainable Dubai should be adaptable and flexible.

Decision-Making and Process-Based Strategies

While not a form-based urban design strategy, many experts argue that policies and decisions that promote public participation in city development could contribute to the creation of more coherent, integrated, and sustainable living environments. One expert argues that sustainable cities have to be built based on the interests of people rather than that of the exclusive interests of developers and politicians (F2, 2010). A large number of experts on the panel believe that a sustainable Dubai deviates entirely from the conservative, top-down approach in city planning and design that creates several power relation struggles, like the marginalization and abandonment of public input. A sustainable Dubai rejects disorganized and uncoordinated institutional arrangements. A sustainable Dubai deviates entirely from the control of developers that are free and unregulated by good urban design strategies as well as building-based approval, building performance evaluation systems, and environmental impact assessments.

A sustainable Dubai should consider a participatory approach to urban design and planning. A sustainable Dubai should embrace the idea of public participation and the spirit of inclusive, diverse, and cumulative opinions, regardless of age, gender, ethnicity, religion, and income, in city design and development. Diversity of opinion also provides opportunities for greater numbers of people to learn and benefit from good urban design and, thus, possibly reach a decision that is socially, economically, and environmentally sensitive as well as integrative (K, 2010). It is also essential to note that a sustainable Dubai considers public involvement not only in the planning and design process but also after implementation and occupancy (K3, 2010).

Since the planning and decision-making process in Dubai is centralized (top-down approach), lacks transparency and coordination, rests under the control of private corporations, does not incorporate public participation, and does not require pre-project

environmental impact assessments, the experts suggest several decision-making and process-based strategies that most likely will lead to practical, fair, and feasible decisions. These strategies are organized long two major themes: (1) public participation; and (2) coordination between Dubai's institutions that provide the basic infrastructure of new developments, along with coordination between the institutions and quasi-government corporations. The panel argument regarding the planning and decision-making process indicates that the emergence of sustainable urban forms depends not only on content (physical form) but also on process.

Examples from Urban Design Interventions

In this part, experts were asked to identify two to four (2 to 4) places, projects or examples that represent promising sustainable urban design interventions and strategies that exist in hot arid areas, the Middle-East, North Africa, or any other parts around the globe. Then from the collection of provided examples, experts were asked to explain at least two benefits and lessons from each example and to identify the most important principle that could potentially be applied to Dubai's future neighborhoods.

The majority of experts responded to the first part of the question, identification of cases that represent promising urban design interventions. However, only a few experts responded to the other parts of the questions, identification of lessons, benefits, and the most important principle from Dubai. Due to this limitation in data, I limit my analysis in this area. In particular, I listed the generated case studies and examples of urban design interventions in five summary tables. Table 10 shows the most frequently cited cases, Table 11 discusses briefly the significance and limitations of the most often-cited case (Masdar City), and Table 12 includes examples in Dubai. The remaining tables

addressing the cases in terms of geography and the contributed cases by each expert are presented in (Appendix 8).

Table 10: Summary of most frequently cited cases by experts

Case Study / Example	Frequency	Mentioned by Experts
Masdar City: Abu Dhabi	11	A1, A7,C, E, F2, J, K2, N, R1, R2, S
Traditional City Fabrics (The word traditional entails Islamic, Arabs, as well as Dubai's indigenous urban patterns)	3	K, G2, S
Xeritown: Dubai, by SMAQ	2	F2, G3
Abu-Dhabi Development	2	A2, A4
Dohaland: Doha, Qatar	2	G, N
Barcelona, Spain	2	A2, N
Portland, U.S.	2	A2, M
Vancouver, BC, Canada	2	A2, A4

It is slightly surprising that many experts cited Masdar, and yet the project is still exists only on paper; construction has barely begun. Abu Dhabi may need a decade or two to deliver Masdar into the market as the project requires such technologically advancement. Abu Dhabi took a bold and historic step that embraces renewable and sustainable energy technologies by establishing the Masdar Initiative— a global cooperative platform that engages in energy security, climate change, and sustainable development. Masdar City is claimed to be the world's first zero-carbon, zero-waste, and car-free city. Foster & Partners— in collaboration with Bioregional and WWF (World Wide Fund for Nature) — is preparing the entire city master plan. This ambitious approach's significance lies in that it emerged in an environment where energy is cheap and abundant. Abu Dhabi is the first hydrocarbon-producing city in the region that has taken such a significant step towards sustainable living.

Many argue that Masdar City is physically a utopian model or a global showcase. In sharp contrast, I argue that the model is an urban experiment that tests and examines the ability of technology and human knowledge in delivering more socially and environmentally sustainable urban settings. Masdar provides many lessons about how future cities should be built in the region. If it succeeded, it would provide a rich knowledge base about the ability of technology and human experience in solving our modern cities problems. I am not against the idea of building an entirely new city from scratch, especially one based on the concept of compact development and circular and eco-balanced metabolism.

The city of Abu Dhabi does not lack for financial resources; it has already a solid vision and available excess capital to deliver this project. I argue that Masdar is a constructive, rich, and an intelligent step towards a more sustainable future that could partially or completely influence other regions. Masdar City could create important precedents that raise expectations and awareness about what is possible in physical, environmental, and technological terms to create more environmentally sustainable settings, not just for the UAE, but also for other parts of the world.

But this does not indicate that the model has no downsides in terms of its design and sustainability framework. For example, Masdar has some limitations in its social sustainability agenda and in its huge reliance on advanced technological systems still under development. It is true that the model is a paradigmatic shift in city design and development; however, the idea might not be replicated in its entirety throughout the UAE, the region, or the world, especially if it contradicts their economic ability, level of expertise, current agenda of development and growth, and lastly their political well. The following table summarizes experts' opinions about Masdar city, divided into strength (positive aspects), and limitations.

Table 11: Positive and negative aspects of Masdar, the most cited case

	Positive design aspects
	Masdar with its compact development approach represented in low to mid rise courtyard typologies is very appropriate for desert climate.
	The architectural design and neighborhoods' morphology are very strong
	Emphasis on orientation to achieve best solar/sir, micro-climate coupled with narrow, shaded pedestrian free pathways, and integrated with mixed-use design and below grade parking and services suits the environmental conditions of the region
	The use of massive roof top solar energy production system that "harnesses the sun" while providing shading is an elegant and smart approach to provide energy and shade.
	One expert cited Masdar as "a modern walkable city."
	One expert argues "Handling of cars" in Masdar is very effective as automobiles are pushed to the fringes of the city, while pedestrian facilities, regional and macro transit stations (PRT), provide accessibility options with the city itself and within the greater metropolitan area.
	One expert argues that Masdar "meshes the experience of hundreds of years" with the latest in design and engineering.
	One expert says that Masdar is "state of art carbon-capture-storage technology experiment."
	Masdar has a scientific and strategic significance represented in housing Masdar Institute of Science and Technology in collaboration with MIT, seven highly regarded international institutions, and IRENA, The International Renewable Energy Agency.
	A key design aspect in Masdar is "liberating" the surface level for pedestrian movement and interaction (C, 2010).
	Limitations
	One expert argues that if the project is built as originally conceived, is it then "reproducible, and if so, at what frequency and on what scales?
	Masdar city appear to be very ambitious and perhaps "unrealistic."
	The costs of "22 billion dollars put this project in a different light." This Eco-town is being developed without considering an equitable approach in its land use distribution, housing strategies, as well as the type of population that will live there. Is Abu Dhabi designing Masdar for the Emiratis, the UAE residents, the expatriates, people in business, students and researchers, or a combination of all? Most important question, why should people live in a walled city in the desert with temperatures reaching 125°F, apart from the existing city?

Table 11 continues

	According to one expert, the project appears to have completely "misjudged the market and indeed its intended population" (R1, 2010)
	One expert argues that the proposed housing typologies in Masdar do not suit the Emirati population and their living norms; in fact, there has been little interest from developers to respond to the needs of the indigenous population.
	Masdar is a promising approach; however, this needs to be examined after its completion.
	One expert argues that Masdar sets out a clear agenda for sustainable development, but there is an unrelenting struggle to "implement anything."

Another unexpected situation derives from the respondents that limited their selection of cases to Dubai itself as shown in Table 12. For example, Expert (E) argues that Mirdiff is a development that applied some of new urbanist principles such as diversity in housing types and land use development. This neighborhood is a popular place to live and play as it offers several housing options and entertainment facilities for different population segments. Expert (D) also argues that Dubai has other high quality urban areas such as: The Walk at Jumierah Beach Residences in Dubai Marina and Dubai International Financial Center (DIFC). These two cases earned importance from their focus on density, program mix, and pedestrian facilities which bring hundreds of populations to the streets, promoting social congregation and human interaction.

For example, Jumierah Beach Residences in Dubai Marina is composed of a collection of skyscrapers that are alike on a large podium. The upper side of the podium serves as a retail space and semi-private gardens. Part of the podium is used as a garage while the other part accommodates the Walk, which is approximately one kilometer long, with a very wide sidewalk that moves parallel to public beaches and private resorts. Many restaurants, cafes, and retail stores with tables, benches, and "temporary market stalls" make the place hugely popular for hundreds of pedestrians from all over the world

who come for walking around, eating, people-watching, sidewalk activities, live shows, exhibits and other programmed activities. “It is a place to see other and be seen by others” (D, 2010).

DIFC is another good urban intervention in terms of facilitating pedestrian movement and public transit. Expert (D) argues that this urban complex is similar to “New York’s Rockefeller Center” in its high quality outdoor space. This “gate village” has in its heart a car free pedestrian promenade, one kilometer long, binding a collection of mid to high rise buildings on a “pedestrian grid,” with elegant landscape and materials, and good access to metro stops. The only downside of this urban complex, albeit a serious one, is that the project is basically “a large cul-de-sac,” with no connection to the surrounding urban environment, specifically to Dubai’s new down town area.

Table 12: Urban interventions in Dubai

Urban interventions in Dubai	
Xeritown: Dubai	Dubai: Up-Town Mirdif
Al-Maha Resort, Dubai	Dubai Marina
The Walk at Jumierah Beach Residences in Dubai Marina	Badrah development for Nakheel which was designed as a LEED Silver neighborhood, Dubai
Dubai International Financial Center (DIFC)	Dubai World Trade Centre and other buildings of the 1970s and 1980s in Dubai
Cairo Dubai, Dubai	Bastakiya, Dubai
Old Town: Fountain/Dubai Mall/Burj Khalifa	

Evaluation of traditional and contemporary urban form strategies

This portion asked experts to rate on a scale of 1 to 5 ten design strategies from the traditional and contemporary parts of Dubai. Experts were prompted to base their rating of the strategies on their potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods; they were also asked to explain their ratings.

The experts' ratings of the design strategies were collected and tabularized into three sets of tables. The first set of tables (five tables) demonstrates the accumulated ratings and some statistical analysis such as percentage, average, and median for every strategy or policy initiative. The second set, on the other hand, includes only one table in which the design strategies from the most-recommended strategies to the least-recommended strategies are ranked. The last sets of tables (10 tables, shown in Appendix 9) reveal experts' qualitative opinions of the 10 strategies organized along two major themes: potential benefits and limitations of each strategy.

Ratings of Traditional Urban Form Patterns

The collected ratings and some statistical analysis results such as percentage, average, and median for every strategy or policy initiative are shown in the following tables. The ratings and statistical data represent an accumulation of 35 experts' responses. In cases where the respondents rated a strategy as 3.5 or 4.5; the final rate was rounded down. For example, 3.5 was classified as 3 and 4.5 as 4. When the respondents gave two different ratings for one strategy, an average was taken, and then the final rating rounded down. Cases with a missing rating were classified as 0.

Table 13: Strategy 1: Experts' ratings of urban orientation

An urban orientation that minimized direct solar access and maximized the flow of prevailing winds.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	20	8	6	1	0
Percentage	57.14 %	22.86 %	17.14 %	2.86 %	0
Average	4.28				
Median	5				

Table 14: Strategy 2: Experts' ratings of shaded pedestrian-focused community

Narrow, shaded, and interconnected pedestrian-focused community.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	12	13	9	1	0
Percentage	34.29 %	37.14 %	25.71 %	2.86 %	0
Average	4				
Median	4				

Table 15: Strategy 3: Experts' ratings of transition between spaces

A culturally meaningful transition from the private, to semi-private, to public spaces that provided experiences of security, safety, privacy, and more frequent exchanges among residents.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	18	7	4	2	3
Percentage	31.43 %	20.00 %	11.42 %	5.71 %	8.57 %
Average	4.05				
Median	5				

Table 16: Strategy 4: Experts' ratings of courtyard typologies and passive design solutions

Courtyard typologies, shading elements, cross ventilation techniques, and wind towers as passive cooling structures.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	14	6	15	0	0
Percentage	40.00 %	17.14 %	42.86 %	0	0
Average	4				
Median	4				

Table 17: Strategy 5: Experts' ratings of high density

High density of low-rise housing arranged in a compact form.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	11	9	8	7	0
Percentage	31.43 %	25.71 %	22.86 %	20.00 %	0
Average	3.71				
Median	4				

Highly Recommended and Less-Recommended Strategies

The traditional urban form strategies, from the most-recommended strategy to the least-recommended, are shown in the table below. For every strategy, the numeric value in the highly recommended section represents the sum of very high votes and high votes in the scale. The numeric value in the less-recommended section, on the other hand, represents the sum of very low votes and low votes in the scale. Moderately recommended strategies, on the other hand, are represented by a rating of 3, reflecting moderate potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.

From the traditional urban form patterns, *an urban orientation that minimizes direct solar access and maximizes the flow of prevailing winds* represents the most preferred strategy. Being in "perfect alignment with nature" (N, 2010) is an important sustainability indicator that can reduce energy demand. Correct orientation could reduce the overall heat gain into all building facades, lessen cooling loads, reduce power supply, and result in a large reduction of CO_2. Orientation is not only important in improving thermal comfort and reducing energy but also in improving mental and psychological well-being through providing adequate light and air ventilation in buildings. This strategy is a "simple means of maximizing on-site opportunities" (N1, 2010) and warrants as much consideration as possible.

High-density, low-rise housing arranged in a compact form is the least-recommended strategy. This rating is given not because of the compact form but because of the use of mono-density level (low-rise) instead of integrating a variety of densities. Experts write that high–density, low-rise housing is good, but taken alone, it is not enough. It must be mixed-use; it must become middle-rise near transit stops. Using a variety of dwellings is a key to providing housing for different population segments and ages. A better model would consist of high-to moderate-density with medium- and low-rise buildings arranged compactly. Additionally, Dubai is well-known for its superlative architecture and mega approach to urbanism, with buildings soaring in height and size. This kind of urbanism and architecture reflects a position of power in the region; therefore, designing for more low-rise housing might reflect "a modest paradigm" that could be "questionable" (F1, 2010). For more information about experts' opinions of single, specific design strategy, please refer to Appendix 9.

Table 18: Highly recommended and less-recommended strategies for traditional urban form patterns

Strategy:	An urban orientation that minimized direct solar access and maximized the flow of prevailing winds.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	28
Moderate	6
Less Recommended	1
Strategy:	Narrow, shaded, and interconnected pedestrian-focused community.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	25
Moderate	9
Less Recommended	1
Strategy:	A culturally meaningful transition from the private, to semi-private, to public spaces that provided experiences of security, safety, privacy, and more frequent exchanges among residents.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	25
Moderate	4
Less Recommended	5
Strategy:	Courtyard typologies, shading elements, cross ventilation techniques, and wind towers as passive cooling structures.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	20
Moderate	15
Less Recommended	0
Strategy:	High density of low-rise housing arranged in a compact form.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	20
Moderate	8
Less Recommended	7

Ratings of Contemporary Urban Form Patterns and Policies

The collected ratings and statistical analysis results such as percentage, average, and median for every strategy or policy initiative are shown in the following tables. The

ratings and statistical data represent an accumulation of 35 experts' responses. In cases where respondents rated a strategy as 3.5 or 4.5; the final rate was rounded down. For example, 3.5 was classified as 3 and 4.5 as 4. In cases where respondents gave two different ratings for one strategy, an average was taken, and then the final rating rounded down. Cases with a missing rate were classified as 0.

Table 19: Strategy 1: Experts' ratings of diversity of uses

The incorporation of an appropriate level of services, amenities, and daily uses within urban communities.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	21	8	5	1	0
Percentage	60.00 %	22.86 %	14.29 %	2.86 %	0
Average	4.48				
Median	5				

Table 20: Strategy 2: Experts' ratings of clean and mass transit

The emphasis on the culture of alternative and clean transit system represented in Dubai Metro and a future plan for tram lines and bike infrastructure.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	18	8	8	1	0
Percentage	51.43 %	22.86 %	22.86 %	2.86	0
Average	4.17				
Median	4				

Table 21: Strategy 3: Experts' ratings of mixed-used corridors

The construction of mixed-use corridors, multi-use structures, and a concentration on vertical zoning.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	13	9	6	2	5
Percentage	37.14 %	25.71 %	17.14 %	5.71 %	14.29 %
Average	3.6				
Median	4				

Table 22: Strategy 4: Experts' ratings of green building standards

The implementation of Emirates green building standards (Emirates LEED) in 2015.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	12	6	10	5	2
Percentage	34.29 %	17.14 %	28.57 %	14.29 %	5.71 %
Average	3.51				
Median	3				

Table 23: Strategy 5: Experts' ratings of green roofs

The implementation of greenroofs in public, private, multi-family residential and commercial buildings.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	3	5	10	9	8
Percentage	8.57 %	14.29 %	28.57 %	25.71 %	22.86 %
Average	2.57				
Median	2				

Highly Recommended and Less-Recommended Strategies

The contemporary urban form patterns and policy initiatives, from the most-recommended strategy to the least-recommended, are shown in Table 26 below. For every strategy, the numeric value in the highly recommended section represents the sum of very high votes and high votes in the scale. The numeric value in the less-recommended section, on the other hand, represents the sum of very low votes and low votes in the scale. Moderately recommended strategies, on the other hand, are represented by a rating of 3, reflecting moderate potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.

Among the contemporary urban form patterns and policies, *the incorporation of an appropriate level of services, amenities, and daily uses within urban communities* is the most recommended strategy. These policies are important ingredients for sustainable neighborhood design and good planning. Appropriate distribution of different uses such as shops, places of work, schools, social amenities, and recreational amenities within walking distance is vital to supply the daily needs of a household and, hence, reduce the number of daily trips, mobility, expenditures, pollution, traffic costs, accidents, stress levels, and greenhouse gas emissions. Most importantly, these measures minimize transportation needs and encourage walkability and, thus, support a sustainable and dynamic lifestyle.

On the other hand, *the implementation of green roofs in public, private, multi-family residential and commercial buildings* is the least-recommended strategy. This strategy received a very low rating because green roofs yield more benefit in moderate climate zones with substantial rainfall. Water provision remains a very expensive service. The policy also lacks practicality due to the high cost of construction, maintenance, and irrigation. It is also unfeasible because the reduction in cooling requirements as well as

heat gain is not significant since it is mainly limited to the floor below the roof (refer to Figure 4). Tall buildings also render the policy ineffective because the footprint is too small to make a substantial difference. Besides, greenroofs cannot be applied to buildings that are in non-district cooling systems since the cooling towers will occupy most of the roof. For more information about experts' opinions of single, specific design strategy or policy initiative, please refer to Appendix 9.

Table 24: Highly recommended and less-recommended strategies for contemporary urban form patterns

Strategy:	The incorporation of an appropriate level of services, amenities, and daily uses within urban communities.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	29
Moderate	5
Less Recommended	1
Strategy:	The emphasis on the culture of alternative and clean transit system represented in Dubai Metro and a future plan for tram lines and bike infrastructure.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	26
Moderate	8
Less Recommended	1
Strategy:	The construction of mixed-use corridors, multi-use structures, and a concentration on vertical zoning.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	22
Moderate	6
Less Recommended	7
Strategy:	The implementation of Emirates green building standards (Emirates LEED) in 2015.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	18
Moderate	10
Less Recommended	7

Table 24 continues

Strategy:	The implementation of greenroofs in public, private, multi-family residential and commercial buildings.
Recommendations	**Number of Ratings/Votes**
Highly Recommended	8
Moderate	10
Less Recommended	17

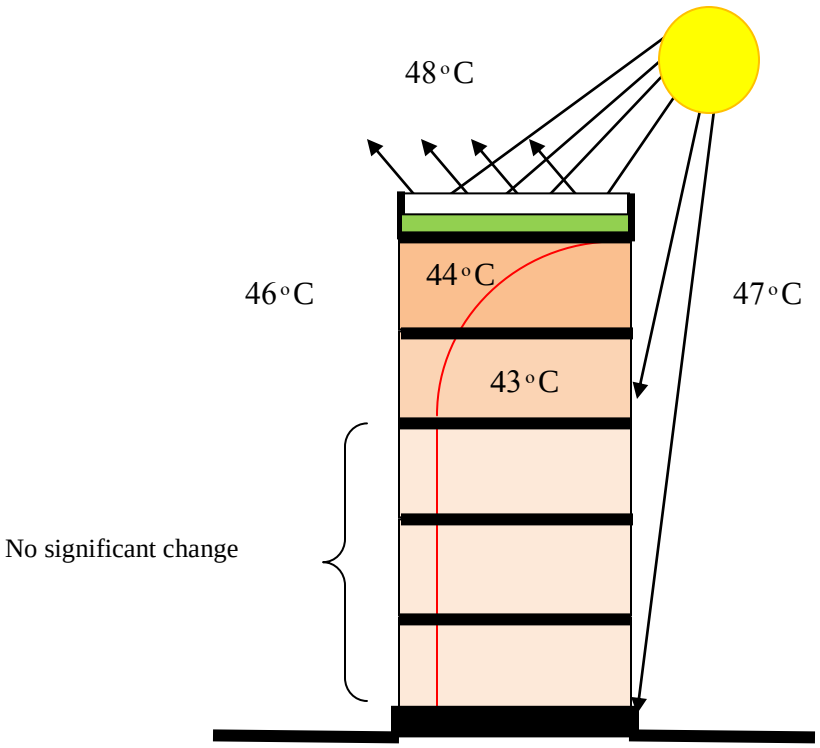


Figure 4: Indoor temperature profile resulting from greening a building's roof in conventional building without air-conditioning (A/C).

Note: (Sketch illustration by Expert M, 2010)

DELPHI ROUND 2

Introduction

This final round of the Delphi included 10 close-ended questions. The purpose was to reach consensus or determine agreements and disagreements among experts regarding some of the process and form-based urban design principles generated in the first round Delphi. I structured the second round of the Delphi as a close-ended style with the intention of maintaining panel stability; few experts in the first round complained about the length and intensity of the open-ended style design of the first Delphi instrument. I intended to generate consistent categories of data such as exploring agreements, disagreements, and preferences among experts on the panel and thus make the data management process concise as well as less time consuming.

The content of the second round questionnaire included 10 questions. In particular, experts were given the major design themes from the first round of Delphi to rank/prioritize with justification for ranking and selection of five most effective foundation design principles out of nine. Questions strove to identify site scale and building scale design specifics and details including density levels, height of buildings, and size of ideal urban blocks. Furthermore, I intended to discover the suitability and effectiveness of some design ideas and decision-making strategies such as incorporating inclusive housing, bike infrastructure, high density levels, and public participation within Dubai's cultural, political, and climatic context. Please refer to Appendix 2 for complete Delphi panel instrument.

In a general sense, every expert provided a complete answer to all questions. Forty-one experts participated in this final round, 30 of which contributed in both rounds one and two, and 11 of which participated only in this final round. These experts

provided valuable information regarding the development of sustainable form-based design strategies for a Dubai neighborhood. On the basis of their input, a framework combined with strategies, ideas evolved for an alternative urban design in Dubai, as well as in the region.

This final round of the Delphi asked experts whether they preferred to remain anonymous (referred to as a nameless expert research participant) or to receive public acknowledgement of participation (referred to by name and affiliation and compiled into a list of publically acknowledged participants) in the dissertation and in resulting publications. Appendix 10 includes a list of the contributors who preferred to receive public acknowledgement of participation. This list will be combined with any publication resulting from this research effort. To the experts who opted to remain anonymous I offered the opportunity for inclusion in the list if they decided to receive acknowledgment through sending a notification including their affiliations via email. To date, three additional experts later sent a request to be added to the list.

Analysis: Introductory

In this section, I organize my analysis into the following sub-sections: brief summary of first round results; adjustments of first round results; and the experts' responses of the second round Delphi questions including:

1. Ranking and selection of five most effective foundation design principles
2. Characteristics and aspects of urban compactness
3. A framework for an integrated urban design agenda for a Dubai neighborhood
4. Visualizing height and density in Dubai's neighborhoods
5. Size of Urban Blocks
6. Cycling in Dubai

7. Environmental performance of buildings
8. Inclusive housing
9. Public participation in planning processes

Brief Summary of First Delphi Outcome

The core question in this study is: Which form-based urban design strategies will effectively deliver greater environmental, social, and economic coherence in Dubai's neighborhood development?

The preliminary results of the first-round Delphi indicated that the following nine form-based urban design foundation principles would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai:

1. Compact development
2. Connectivity and multiple transportation options
3. Integration
4. Diversity
5. Green, open, and social nodes in the urban fabric
6. Tradition-based urbanism and architecture
7. Climate-sensitive urbanism and architecture
8. Eco-balanced design and planning
9. Adaptability

These nine core strategies interrelate and overlap with one another. The categorization of the experts' responses into nine form-based urban design principles reflects an attempt at organizing the data in a consistent and rigorous manner. The order of the nine strategies does not reflect a ranked preference identified by the researcher or the experts.

Adjustments of First Round Results

Before summarizing and synthesizing the last Delphi responses, a few additional recommendations and a number of concerns were raised about the first-round findings. These concerns were:

- The nine core urban design principles generated in the first round of the Delphi overlapped and had common characteristics with one another. In particular, some experts indicated a significant overlap between "tradition-based urbanism and architecture" and "climate-sensitive urbanism and architecture."
- Part of the experts' argument aimed to reconsider and to rethink "tradition-based urbanism and architecture," revising it to "culturally-relevant urbanism and architecture" (N, 2010).
- Additional comments were: (1) "Urban agriculture" as an additional strategy should be classified either under eco-balance design and planning or as part of green, open, and social nodes in the urban fabric; and (2) eco-balance design and planning "must include diversified renewable energy infrastructure, smart grid, and feed-in tariffs, planned to allow complete transition from fossil fuels use by 2030" (R, 2010).
- Some experts also indicated that it was difficult to distinguish between eco-balance design and planning and climate-sensitive urbanism. I argue that the difference is that the second one is predominantly based on passive solutions that do not require resources or complex mechanical operations, while eco-design applications are based on a circular, not linear, metabolic system that balances production and consumption through technological advances. Although both strategies are based on two different systems, traditional methods can be integrated with modern technologies with the intention of reducing long-term

ecological impacts, using resources more efficiently, and reducing economic costs.

Clarification: Culturally-Relevant Urbanism and Architecture

New core elements and criteria to include within this foundation principle are:

- Traditional forms of architecture and urban design in Dubai or the Gulf should not be considered as "a form of exterior decoration" (K4, 2010).
- The use of the word "culturally-relevant" should not be "conflated with architectural style." How the design is executed carries more significance, "the way that materials and proportions are managed, and the way that the design addresses and responds to the indigenous social values, cultural characteristics of the place, and privacy concerns" (K4; R, 2010).
- The emphasis should not rest on "the visual over the spatial and formal principles" that respond to climatic conditions, social norms, cultural values (K4, 2010).
- It is ineffective to copy the traditional design elements and qualities in a "starkly different context of contemporary Dubai" (e.g., Medinat Jumierah) without utilizing the functional, spatial, and cognitive aspects of historic design patterns (C, 2010).
- Within culturally-relevant urbanism and architecture, some fundamental design concepts and values such as "privacy-generating forms and courtyard urbanism and architecture" must be considered (N, 2010).

To have a more comprehensive definition of "culturally-relevant urbanism and architecture," the aforementioned strategies should be combined with the following elements and criteria specified in round one of the Delphi:

- It is vital to train and encourage local talent and architects to produce the next generation of architecture and urbanism in Dubai. This will distinguish Dubai and minimize reliance on imported consultation that, in many cases, produced an urbanism that holds no ties with the indigenous cultural norms and environmental conditions of the place (R, 2010).
- The utilization of local knowledge, experience, techniques, and materials will create a profound foundation for the persistence and protection of local culture.
- A sustainable Dubai should focus on fewer, smaller, iconic buildings that deviate from Dubai's "monumental weakness for monumentality" (D, 2010).
- A sustainable Dubai should emphasize a culturally meaningful transition between different spaces ranging from private residential units and semi-private garden courtyards to public spaces and Mosques (R2, 2010).
- A sustainable Dubai should "recuperate the identity of the site" (G3, 2010) and "honor the traditional forms of urbanism and architecture" (D, 2010). A sustainable Dubai should accentuate the influence of stories, memories, art, culture, religion, beliefs, histories, style, local talents and ideas, etc. on the design of the urban form, architecture, and people's movement and interaction. Lessons from the past are important to enhance civic identity, value, and a sense of pride and belonging. All in all, these measures would ensure a strong sense of place (G3; N, 2010).

Clarification: Climate-Sensitive Urbanism and Architecture

This foundation principle mainly relates to the vernacular methods of passive energy design and organizational patterns and forms that facilitate passive cooling, heating, and shading. As indicated in the first-round Delphi, a sustainable Dubai should

not ignore local and historic urban patterns and methods. Sustainable solutions related to material choices; correct solar-air orientation of urban forms and street systems; location, size, treatments, and distribution of openings; and building typology and massing should emerge from historically proven strategies. Technological advancements of course matter greatly, but the local knowledge of what worked in the past and why it succeeded is critical for understanding sustainable building solution remains vital.

This summary provides a clear ground to differentiate between "culturally-relevant urbanism and architecture" and "climate-sensitive urbanism and architecture." In short, culturally-responsive urbanism and architecture includes the traditional aspects and organizational patterns that affect human perception and cognition and the degree to which these forms achieve privacy, sense of place, social capital, and a strong connection with the indigenous values and cultural norms. Climate-sensitive urbanism and architecture, on the other hand, relate to passive and historically proven strategies that enhance comfort levels and environmental performance of the built environments. Although there is a distinction between both strategies, they overlap and correlate with one another because both incorporate many similar physical attributes, forms, details, and design patterns.

Ranking and Selection of Five Most Effective Foundation Principles

First, in this section experts were asked whether or not they consider the nine principles, listed below, to bear equal weight and effectiveness

1. Compact development
2. Connectivity and multiple transportation options
3. Integration
4. Diversity

5. Green, open, and social nodes in the urban fabric
6. Now: Culturally-relevant urbanism and architecture
7. Climate-sensitive urbanism and architecture
8. Eco-balanced design and planning
9. Adaptability

The experts' opinions, divided into agreement and disagreement, are shown in Table 25. The number of votes and percentages represent an accumulation of 41 experts' responses.

Table 25: Are the foundation principles equally effective?

Experts' Opinion	Number of Votes	Percentage (%)
Agreement (Yes)	9	21.95 %
Disagreement (No)	31	75.60 %

Experts' responses are divided into three groups: The first group's responses, including 31 experts, indicate that the nine strategies do not carry equal weight, and some are more effective than others; the second group's responses, including nine experts, indicate that the strategies are evenly weighted; and the argument of the third group, that includes one expert, specifies that there is no point or rationale in ranking or limiting the generated principles to five because

> sustainability planning is about achieving multiple objectives . . . So, this sort of reductionistic thinking has helped create our current problems; what's needed is a more multi-faceted, ecological understanding of situations (S4, 2010).

Second, experts where asked: If the listed nine principles do not have equal weight and effectiveness, what are the five most effective strategies for achieving socially, environmentally, and economically integrated neighborhoods in Dubai? (Experts were also asked to rank their selection in terms of effectiveness, ONE (1) being the most effective principle.)

Table 26 demonstrates the most frequently cited strategies indicated by the experts', based on their effectiveness for achieving socially, environmentally, and economically integrated neighborhoods in Dubai.

Table 26: Most frequently cited strategies by experts

Strategy	**Frequency**
Compact development	21
Connectivity & multiple transportation options	23
Integration	16
Diversity	14
Green, open, and social spaces in the urban fabric	16
Now: Culturally-relevant urbanism and architecture	11
Climate-sensitive urbanism and architecture	24
Eco-balanced design and planning	20
Adaptability	11

Table 27, on the other hand, demonstrates the frequency of the principles in order of preference, where the most effective strategy is ranked as number "1," the second most effective strategy as number "2," the third most effective strategy as number "3," and so on.

Table 27: Frequency of rankings of strategies in tems of effectivness by experts

Strategy	Ranking (1 being the most effective)					Total
	1	2	3	4	5	
	Frequency of rankings					
Compact development	13	4	3	1	1	21
Connectivity & multiple transportation options	4	8	9	1	1	23
Integration	2	3	3	3	3	16
Diversity	2	3	2	3	4	14
Green, open, and social spaces in the urban fabric	0	0	5	6	5	16
Now: Culturally-relevant urbanism and architecture	2	1	2	3	3	11
Climate-sensitive urbanism and architecture	6	8	3	3	3	24
Eco-balanced design and planning	3	3	3	7	4	20
Adaptability		1	1	3	6	11

In order to understand how these strategies are effective and important, we should examine how the experts ranked the effectiveness of particular strategies. For example, by interpreting Tables 26 and 27 above, compact development is cited 21 times, whereas connectivity and multiple transportation options are more frequently cited by experts, 23 times. But when looking at the distribution of rankings and preference, connectivity and multiple transportation options are considered effective or somewhat effective with the majority of rankings at number 2 and 3, while compact development is considered extremely and very effective with the majority of votes at number 1.

On the other hand, we have eco-balanced design and planning placed as one of the most frequently cited strategies, and yet when we look at rankings, its effectiveness ranks very low, with the majority of votes being at number 4 and 5. Climate-sensitive urbanism and architecture is cited 24 times, rendering it the most frequently cited strategy within the preference list. But when we look at the distribution of rankings in terms of

effectiveness, climate-sensitive urbanism and architecture, with the majority of its rankings sitting at number 2, is considered effective, but less so than compact development; the first one is ranked six times as number 1, while the second is ranked 13 times as number 1, making it the most effective strategy.

In the third part of this section, experts were posed the following question: Should the concept of Compact Development as it was described in the first-round Delphi and as applied to Dubai, include all of the other eight principles listed above?

Table 28: Does the concept of compactness contain all of the Delphi generated principles?

Opinion	Number of Votes	Percentage (%)
Agreement (Yes)	28	68.29 %
Disagreement (No)	12	29.26 %
Other	Neither yes nor no	

As indicated in the first round Delphi, the second round responses, comprising 28 votes out of 41 experts, confirm that the concept of urban compactness alone cannot generate sustainable communities (K3, 2010). For example, one may argue that compact developments exist in Dubai in the form of dense, mixed-use individual projects. However, these projects are in fact "insular," fragmented, disconnected, and not integrated with each other and the surrounding urban tissues (I, 2010). Another example is that the "Los Angeles Urbanized Area is considered the densest urban area in the U.S." (B1, 2010), but this does not make it sustainable in any way because its spatial arrangement and density is described as being disjointed and dysfunctional, with many commuters on the road and fewer people using mass transit. Thus, "the notion of compactness should be expanded beyond just physical density" (B1, 2010). A successful compact form not only requires moderate to high density development but also entails the

concepts of functionally, proximity, diversity of uses, and accessibility, all integrated with other aspects of sustainable urbanism (B1, 2010).

Compactness is an urban design model that organizes activities and design patterns in space, "but by itself will not be a catalyst for sustainable development" (R2, 2010). A development might be compact and dense but lack multiple and effective mobility options, diversity, integration, green spaces, and climate-sensitive design applications (R2, 2010). An expert argues that to establish a neighborhood that integrates ecological, social, and economic components, compact forms require the integration of the generated form-based principles with more public participation in the planning process (F2, 2010). "In a successful compact environment all the design aspects mentioned above [have] to be integrated" (A3, 2010). A city that is right and healthy "incorporates all of the principles above," and demonstrates these principles' mutual dependence on one another, reflecting a livable and sustainable built environment (A2, 2010). Experts' comments and responses ultimately show that compactness alone does not automatically or by "default" result in a good development (K2, 2010). Compactness could not accomplish something alone; to a certain extent its success depends on how well its design elements and patterns, as defined in the Round One Delphi, [1] integrate with the generated form-based foundation principles (A5, 2010).

For a development to be successful and sustainable, all of the panel-driven, form-based urban design ingredients are fundamental. In fact, an expert states that "it is

[1](1) Densification, a variety of densities in the urban fabric, predominately medium to high;
(2) Urban infill/intensification, an appropriate utilization of vacant lands;
(3) Proximity of housing to employment, amenities, daily uses, and services;
(4) A mix of uses distributed appropriately and preferably within short distances; and
(5) An urban management policy that restricts and manages growth, mostly related to city and regional scale.

impossible to design sustainable cities without taking into account all of the [foundation] principles listed above" (P, 2010) All of the tactics and strategies specified in the Round One Delphi demonstrate effectiveness and "holistic efficient design as they either prevent or reduce follow-up costs for repairs" (F1, 2010). Although, as verified above, some are more effective than others, none of them are mutually exclusive or work alone (A, 2010). Each of the principles yields a special merit and strength; a neighborhood that binds and integrates all of them together compactly would be labeled as a sustainable one "because all of its aspects are being considered, from social to cultural and economic to environmental" (A2, 2010).

The vast majority of the panel members (with 27 votes) argue that compact development integrated with the other principles is "the key" to sustainable urbanism, but a small number of experts (12) argue that it is not possible to combine everything. For example, not all of the foundation principles directly relate to compactness. In fact, green spaces in the urban fabric "could be seen as conflicting with compactness" (E2, 2010). But other strategies such as walkability, connectivity, and self-shading clearly relate to urban compactness (A; E2, 2010).

Integrating all design aspects might be seen as a more complicated target to attain within Dubai's neighborhoods (E, 2010). For example, Expert (M1) argues that ethnic and socio-economic diversity in Dubai could lead to cultural conflicts and hostility. In fact, in the Round One Delphi, an expert argued that this kind of diversity is not possible in Dubai or elsewhere (J; S3, 2010). The only segments of the population that might seek diversity are children and low-income classes, in order to achieve better living standards and good access to amenities and services (J, 2010). As a matter of fact, in this last round of the Delphi, 24 out of 40 experts argue that inclusive housing, incorporating the

working class within Dubai's neighborhoods, will not be widely accepted based on cultural, economic, and political grounds.

Compact development has been tested through decades of trial and error, and therefore relates to the context of Dubai; hence it should be implemented in a holistic and integrated approach with the other form-based strategies (K2, 2010). However, compactness is never the only approach for sustainable urbanism. Many other forms and typologies warrant consideration (F2, 2010). Urban compactness should be regarded as one of the several urban design models of sustainable urbanism (A3, 2010). In fact, Expert (A3) says that one of the best strategies for Dubai's sustainable development is ensuring that compactness is combined with "a pluralistic approach and is open to difference and inclusion." This as opposed to Dubai's current agenda which is characterized by limited possibilities, repetitiveness, and exclusiveness. In other words, a sustainable Dubai should resist absolute autocratic decisions; instead, it should promote open and multiple options (A3, 2010). The generated principles from the Delphi all look fine and effective, but others might be vital as well. It is not useful "to try to conclude that compact development = the 8 principles" (S4, 2010). A better statement would gauge the actual quality of the eight design principles; how they integrated with each other in the urban fabric; and how well they are arranged compactly, saving room for new ideas.

The discussion above reflects many ideas and areas of thought that lead me to fairly reassess, re-phrase, and take another look at the first round Delphi results regarding the most essential form-based urban design strategies that would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai. In order to provide a solid definition and framework about the characteristics, aspects, and physical dimensions that mostly result in an integrated neighborhood in Dubai, the following arguments, as defined by experts, must be considered:

1. All the generated form-based urban design strategies are fundamental. It is impossible to design sustainable neighborhoods without adopting and embracing those principles.
2. Some principles are more effective or important than others, but none are mutually exclusive or work alone; they integrally rely on one another. Their ultimate effectiveness depends on how well they integrate into the urban fabric, and especially arranged in a compact form.
3. Each of the principles has a special significance and impact; however, a neighborhood that integrates all of them together compactly with more public participation would be described as a sustainable and successful one.
4. Compactness alone does not automatically produce what we consider a sustainable neighborhood. Compactness cannot succeed alone; success depends on how well its principles are arranged, managed, and integrated with the other foundation principles.
5. The integration of the foundation principles does not always result in a compact development in spite of the fact that this typology is appropriate for Dubai or any other region, as it is commonly argued by the panel members.
6. The Round One Delphi defined "integration" as a foundation principle. However, the discussion and responses in Round Two indicate a greater feasibility to think about "integration" as a design agenda that brings together design principles and operationalizes them in a compact form or any other spatial arrangement. If this agenda is embraced, a more sustainable environment could be shaped.
7. In short, the essence of a sustainable neighborhood is based on the integrative nature of the foundation principles. For example, a compact form is not

sustainable one if it does not incorporate mix of uses, provide diversity of housing options, or its street patterns are not interconnected.

Considering the discussion above, a statement of a Dubai neighborhood that integrates social, economic, and environmental aspects can be defined as follows: For Dubai, the most sustainable neighborhoods emphasize more public participation in the planning process, connectivity and multiple transportation options; adequate diversity; green, open, and social nodes in the urban fabric; culturally-relevant urbanism and architecture; climate-sensitive urbanism and architecture; eco-balanced design applications; and adaptability, all integrated with one another in the urban fabric and arranged compactly (see Figure 5).

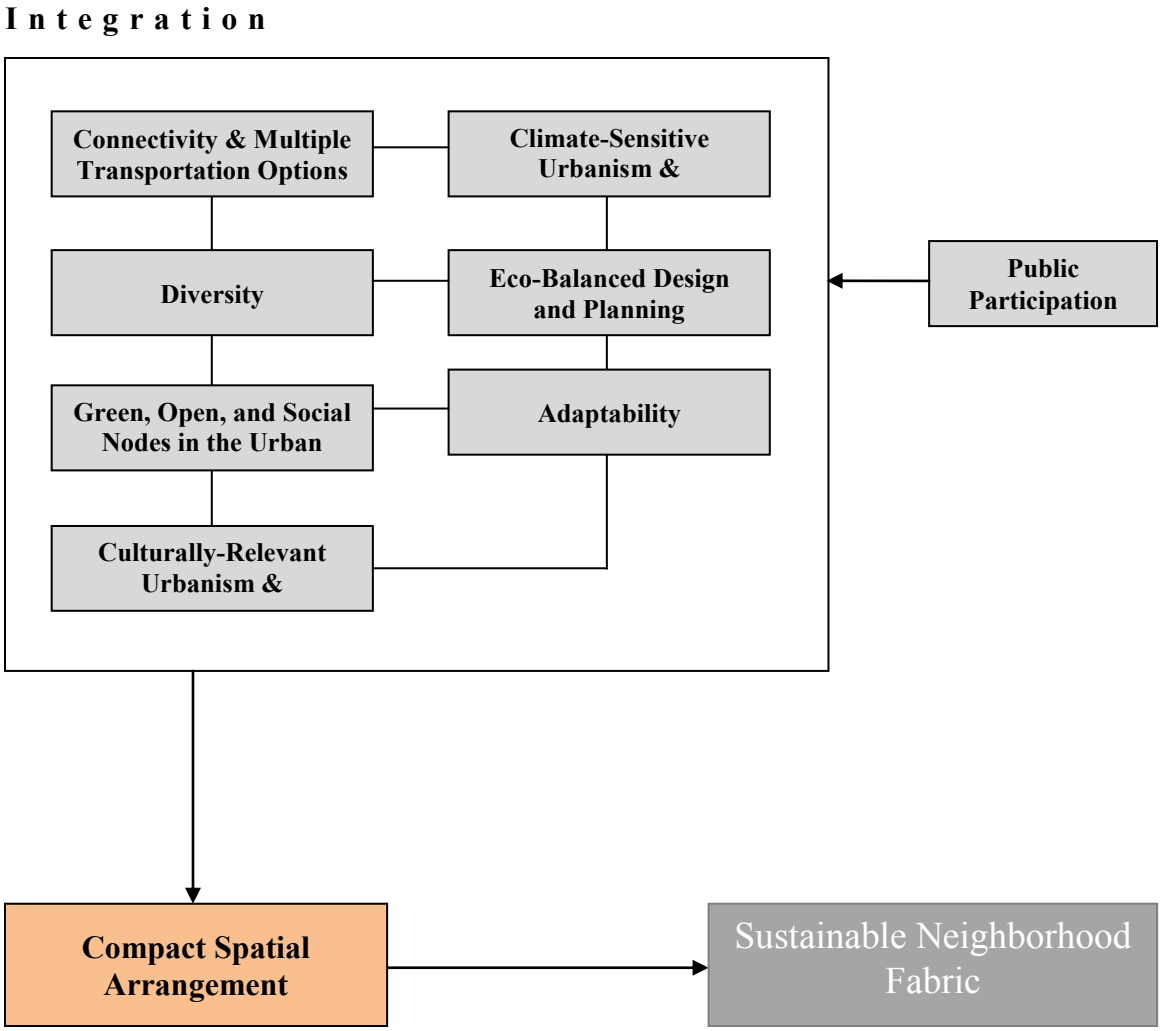


Figure 5: An integrated urban design agenda for a sustainable neighborhood in Dubai

Site and Building Scale Design Specifics

Visualizing Height and Density in Dubai's Neighborhoods

Determining the net density (defined as the number of residential units per acre) for a neighborhood is often driven by cultural values and norms, as well as by politics and market forces. In many cases, redevelopment proposals define densities lower than densities associated with compact development designs. In the first round of the Delphi,

the vast majority of experts on the panel suggested that compact neighborhoods should include a variety of buildings and density levels, ranging from moderate to high. Therefore, this section is designed with the intention to identify appropriate density levels and height limits for Dubai's neighborhoods.

In particular, this section asked experts to indicate an appropriate minimum level of residential density for the following development types in Dubai's neighborhoods: (1) detached single family units (one to two stories) and (2) multi-family units (low-rise buildings, two to three stories)?

Detached single family units (one to two stories):

This question proposed several density levels and experts were asked to choose the most appropriate minimum level of residential density for detached single family units (one to two stories).

Table 29: Experts' votes on density levels of detached single family units

Hint: (1 Hectare = 2.47 acre) (1 Acre = 0.40 Hectare) (1 Acre = 43,560 ft²) (1 Acre = 4046.82 m²)

Density Level	Number of Votes	Percentage (%)
3 Units per acre	2	4.87%
4 Units per acre	6	14.63%
7 Units per acre	14	34.14%
15 Units per acre	9	21.95%
17 Units per acre	5	12.19%

Table 29 continues

Other Recommendations	1- 6 to 8 units per acre 2- 3-5 units/acre in older neighborhoods and 7 units/acre in densely-built new neighborhoods 3- It is difficult to specify a rigid standard for density levels because this works against the principle of diversity and variety. 4- 10 units per acre (4,000-4,500 square feet lots with 60% lot coverage) 5- 4 units per acre if it is one story; 7 units per acre if it is two stories	

From the table, three units per acre represent the net density of Dubai's subsidized communities that were planned in the late 80s and early 90s with an average lot configuration of 100' X 150', with 60% lot coverage. Four units per acre represent the net density of Dubai's subsidized communities that were planned in the late 90s and early 2000 with an average lot configuration of 100' X 100', with 60% lot coverage. Fifteen and seventeen units per acre represent two standards: (1) Dubai's subsidized communities that were planned in the late 60s and early 70s with an average lot size of 50' X 50', with 100% lot coverage (see Figure 6); and (2) the density of Ebenezer Howard's "Garden City "concept. Howard, in his original Garden City, limited the net density to 15 dwellings per acre. However, the new standards of the Garden City planned by other designers limited the net density from 6 to 12 dwellings per acre (Jenks & Dempsey, 2005).

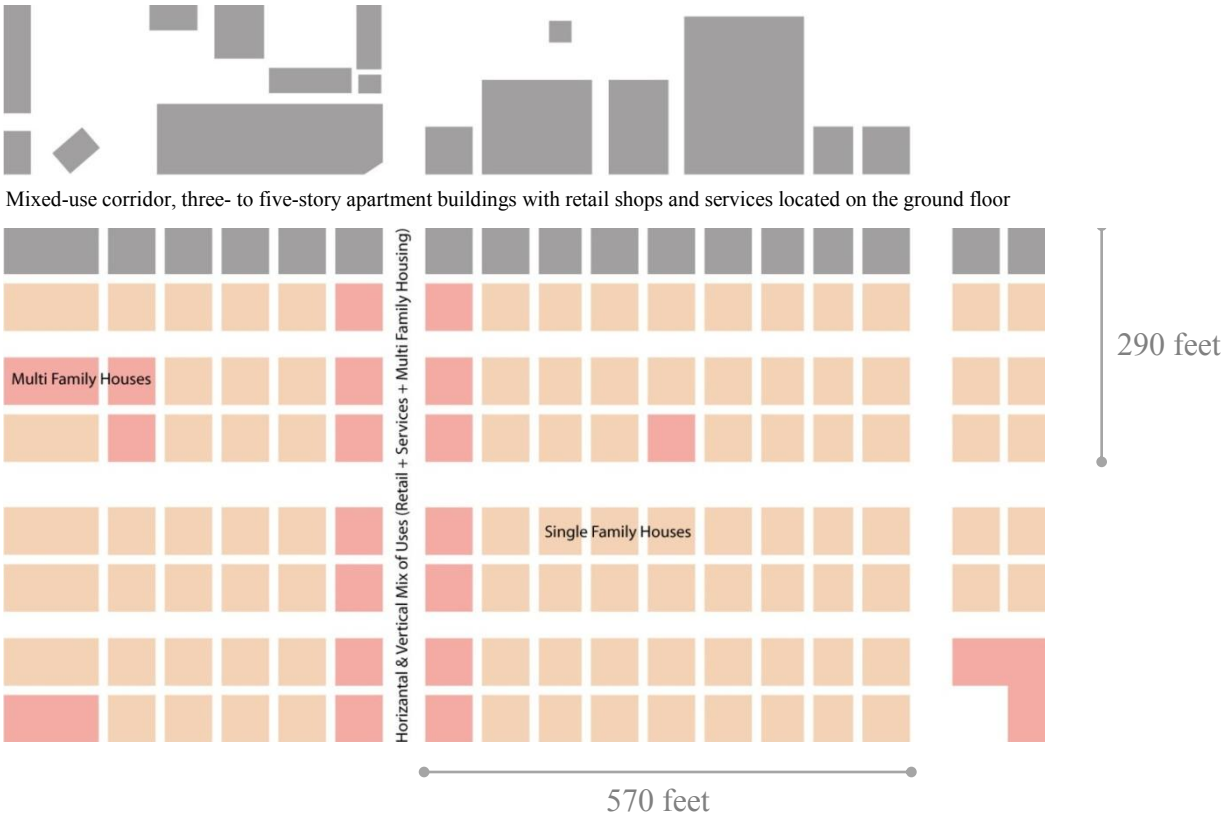


Figure 6: A subsidized neighborhood in Dubai, designed in the 60s.

Note: Lot configuration is 50' X 50' with 100% coverage. There is a 10' alleyway between the units. Amenities, services, and many daily needs such as bakery, grocery stores, restaurants, etc. are within walking distance.

The vast majority of experts recommend high density levels that completely deviate from the current standards in Dubai. Only a few experts selected a density level akin to current standards: two experts voted for 3 units per acre and six experts for 4 units per acre. A greater number of experts, a total of 14, suggested a minimum density of 7 units per acre. This number fairly corresponds to New Urbanism standards as well as to new standards of Garden City in which the net density is limited to 6 to 12 dwellings per acre. Fifteen units per acre, a density level that is equivalent to Howard's Garden City

and older districts in Dubai, is another high density level that is strongly recommended by the panel (a total of 9 votes). This will lead to a conclusion that a suitable minimum level of residential density for detached single family units (one to two stories) for new neighborhoods in Dubai should range from 7 to 17 units per acre. Seventeen units per acre are also perfect for rowhouse design, with shared party walls which often reduce cooling loads and promote social interaction (R, 2010).

One expert, on the other hand, argued that since "diversity" is defined in the Round One Delphi as a foundation strategy for socially, environmentally, and economically integrated neighborhoods, it might not be appropriate to have one rigid standard of net density. There should be variety and choice in the market as well as in subsidized areas. There should be larger lots for big families and people with the budget to afford building big houses, as well as denser developments (as suggested, 7 to 17 units per acre) for people with tighter budgets or for those who ask for that (F, 2010)

Another expert argued that if this assessment of Dubai's urbanism is going to be, in fact, successful, Dubai's local authorities must give serious consideration to re-evaluating the western building codes that require setbacks, etc. and prohibit the use of traditional courtyard dwelling types (N, 2010). The setback regulations reduce the density of the built-up area and generate extra cost and burden on owners required to build a boundary concrete wall (minimum seven feet high) around the lot. Instead, this expenditure can be utilized for "actual enclosure of internal dwelling spaces and promote insulated dwellings with five surfaces exposed to gain heat" (N, 2010).

Combining modern design standards with traditional housing types that are based on courtyards would both create "cooler microclimates" and build a sense of privacy for residents, a core principle for culturally sensitive urbanism (N, 2010). Courtyard typologies possess both environmental and social aspects and can create a unique urban

identity and image. However, this morphology has not evolved in many years and might not satisfy modern needs. Courtyards also add extra space to the floor and surface, which means more heat gain and subsequently a greater cooling load (K1, 2010). In addition, as the city expanded into the desert, many new neighborhoods are located next to sand dunes. Consequently, courtyards might allow sand, dust, and hot air indoors; thus, they might not work effectively during the extended summer season unless the courtyard is covered with a light structure or high performance glazing with a low U-value (1,1 W/m²K) and attractive solar and daylight properties. Furthermore, covered courtyard design must create a flexible system that opens when the weather is good and closes when the weather is hot and dusty. This will insure that the indoor climatic quality in terms of indoor temperatures will be close to optimal.

Multi-family units (low-rise buildings, two to three stories)

Table 30: Experts' votes on density levels of multi-family units

Hint: (1 Hectare = 2.47 acre) (1 Acre = 0.40 Hectare) (1 Acre = 43560 ft²) (1 Acre = 4046.82 m²)

Density Level	**Number of Votes**	**Percentage (%)**
7 to 15 Units per acre	7	17.07%
10 to 20 Units per acre	10	24.39%
20 to 30 Units per acre	11	26.82%
30 to 40 Units per acre	9	21.95%
Other	1- 50 units/acre 2- It is difficult to specify a rigid standard for density levels because this works against the principle of diversity and variety.	

The experts' responses regarding multi-family units (low-rise buildings, two to three stories) do not reflect a strong orientation towards a specific density level. However, it is clear from Table 30 that 7 to 15 units per acre, the lowest density level,

and 30 to 40 units per acre, the highest density level, received fewer votes than did other density ranges, a total of seven votes for the first and nine votes for the second. Other standards which I describe as moderate to high density levels for low rises (10 to 20 units per acre and 20 to 30 units per acre) received fairly high votes, a total of 11 votes for the first and 10 votes for the second. The experts' responses indicate that there is no solid orientation towards a certain density level, so perhaps a combination of all within a neighborhood design, each represented by a unique architecture or design solution, might be appropriate in terms of diversity and affordability purposes.

A number of design aspects and physical characteristics associated with low-rise, multi-family developments were also indicated by two panel members. For instance:

> 1. Double-loaded corridors with courtyards are an excellent multi-family solution for the region. Such design at 200' square can easily accommodate 20–30 units per floor. With ground floor services/amenities and two stories for the units themselves, and accounting for open space, 30–40 units overall seems a good approximate number (R, 2010).
>
> 2. Another design idea that encourages walkability and is culturally relevant but with different height limitation is a central garden courtyard cluster block concept. This design is based on a larger urban block size of 100m x 100m with peripheral residential units 4 to 10 stories with varying heights, textures, and massing, using either single-loaded or double-loaded plan types that will allow a very usable central court for natural ventilation, light and view for residents' usage. This would provide much-needed semi-private open space with appropriate landscaping and a sense of identity and community, such as is effectively used in Barcelona and a number of Mediterranean countries (N, 2010).

Heights

The first round of the Delphi generated a variety of responses:

1. Some experts were in favor of low-rise developments over medium- or high-rise developments since low-rise developments minimize heat gain and cooling loads. It is also argued that low-rise buildings reflect the most energy-efficient height, so

they can be cooled/heated passively. Such architecture brings people back down to the street level and encourages greater social interaction. However, low-rise developments are inefficient in terms of land, since they require more space as the population and city grow.

2. Other experts were in favor of low-rise architecture combined with medium- and high-rise buildings (max. 12 stories) with set-back above the third or fourth floor. The maximum height of "12 stories has proven to be the limit beyond which providing heating and cooling in a building through mechanical means becomes highly energy-inefficient . . . In addition, this model will help to achieve a more human-scale, pedestrian-oriented, energy efficient, transit-oriented city" (R2, 2010). Adding more details to this typology, an expert recommends an option that defines potential physical and morphological attributes that are "highly sustainable, encourage pedestrian movement and could be made culturally relevant. This is represented by four to ten story central garden courtyard cluster block concept based on a larger urban block size of 100m x 100m, such as those effectively used in Barcelona and a number of Mediterranean countries" (N, 2010).

3. Another group of experts favor high-rises.[2] They argue that, in terms of sustainability, it is more beneficial and environmentally friendly to build high-rises (more than 12 stories), because it can house a large number of occupants on a small plot, saving land. They also use energy and water resources in a more efficient manner. In addition, the shortage and price of land are major concerns in Dubai. Consequently, low-rise housing may not be affordable in the near future.

[2] According to Emporis Standards, a structure is automatically listed as a high-rise when it has a minimum of 12 floors (height more than 35 meters/115 feet).

In this section, the experts were asked if they would recommend a policy that caps building heights at 12 stories in Dubai's neighborhoods.

Table 31: Experts' votes on limiting building heights to 12 stories

Experts' Opinion	Number of Votes	Percentage (%)
Agreement (Yes)	24	58.53%
Disagreement (No)	16	39.02%
Other	Neither yes nor no	

Table 31 shows that the majority of experts (24 of 41) favor the capping of building heights at 12 stories in Dubai's neighborhoods. This indicates that most experts prefer a combination of both low- and medium-rise developments. In fact, an expert argues that few mid-rise developments in Dubai, such as Greens and Uptown Mirdiff, provide models of active neighborhood lifestyle and community interaction (A, 2010). In short, most of the panel members agree that there should be a solid restriction on building heights in neighborhoods, but this limitation should not be legislated across Dubai. Occasional energy-based high-rises can still be built as long as their construction is based on beneficial and functional grounds.

The 12-story cap allows both good density levels and vibrant pedestrian activity and movement (E1, 2010). The limitation also could make people more connected to their surrounding environment while conserving land resources (K, 2010). If 12 stories is the limit due to energy efficiency concerns, then it is reasonable and practical to restrict heights to 12 stories. It is very difficult to give good justifications for higher limits, "especially because of the implications for social sustainability" (E2, 2010). In addition to the energy efficiency considerations, buildings of more than 12 stories create a "Manhattan effect" which may possibly "dehumanize the urban landscape" (R2, 2010).

One of the experts argues that 12 stories still seems high, and that possibly a range of seven to eight stories as a limit is more reasonable for a neighborhood. The expert continues, "in addition to the height the plot ratio should be limited on a maximum of 3.0. This is the standard in German cities and it has been verified to be a moderate high density" (F2, 2010).

A moratorium on towers in new neighborhoods could create a pedestrian-oriented environment, the pattern that has succeeded in many Western and Middle-Eastern regions (I, 2010). Low- and medium-rise buildings create streets and fabrics more humanly scaled and generate cities that are for "people" (A1; A2; K4, 2010). This development typology allows development of community and an immediate connection between residents and their surrounding environment; a positive example in Dubai, once again, is the Greens (F1, 2010). Building higher than 12 stories without any current or future needs is only a "fevered race," showing power, identity, and image and is generally attributed to investment return and marketability (R4, 2010).

One of the major socially and ecologically conscious strategies for Dubai is the diversion from the "unsuitable global development style to the basics. [Basics here mean the vernacular, culturally and climatically responsive typologies]" (K2, 2010). Dubai and other Emirates must generate a sustainable model of desert living. The urban agenda of the last two decades was represented in super-tall buildings, wide and high-speed boulevards, and disaggregated urban fabric that eliminated the indigenous culture of the place. This development typology represents a symbol of disconnection between man and his environmental and cultural context. It would be wise as an alternative to "accept the desert as it is, and try to draw on the unique habitat in a way that Frank Lloyd Wright developed a completely new architecture in and around his Taliesin West in Scottsdale, Arizona" (F1, 2010).

Regulating heights play an important role in preserving "view corridors," protecting "the vitality of neighborhoods," and enhancing a sense of privacy, because high-rises in close proximity to low-rise residential dwellings might block ventilation, restrict daylight, and lower privacy levels. But neighborhoods also need some variety in heights (E, 2010). If all tall buildings' designs aim to be no taller than 12 stories, a repetitive and homogenous urban environment will result. Monotonous forms do not create a sense of identity, lack excitement, and the literature shows that an extremely homogenous pattern has some "climatic disadvantages" (A5, 2010). Therefore, regulations that limit heights should be based on growth scenarios, research, and precise data rather than on profit generation or "market-driven speculation" (K4, 2010). Moreover, development of tall buildings should be measured in terms of "land pricing" and land availability (R1, 2010).

To produce a diversity of places, it is not wise to cap building heights across Dubai. Allocating and selecting zones within the city or neighborhood fabric where the possibility of various heights (e.g., 1 or 2, 5, 12, above 12) for potential implementation provides a strategy that avoids monotonous forms while providing adequate diversity (M, 2010). Some places like CBD's and business districts may benefit from taller structures. However, "in the bulk of Dubai's residential neighborhoods such a cap may in fact be appropriate but should not result in a monotonous environment" (P1, 2010). Buildings higher than 12 stories should be targeted, form-based, performance-based, socially oriented, and environmentally efficient. Potentially, tall buildings in Dubai can be built where it would be "beneficial to the skyline, and where there is demand – along Sheikh Zayed Road for example" (I, 2010).

Some panel members do not totally oppose to the "occasional high-rise" (R, 2010) because they believe that "dogmatic solutions" (F1, 2010) or "rigid caps" might

possibly limit innovation and variety in design and architecture (S4, 2010). In fact, they argue that towers have a place in sustainable cities. High-rise buildings are a major development type, and vertical cities could adopt sustainable solutions (A8; G, 2010). A well designed tower might be more ecologically sensitive than a poorly designed low-rise development. Tall buildings have a smaller surface-to-volume ratio compared to low-rise buildings (F1, 2010). High-rise buildings also fit well in some areas for identity, image, and representative reasons or to enhance "visual orientation" (A3, 2010)

But for a place like Dubai that has major sustainability concerns, constructing extremely tall buildings should be not considered at all unless their design aims to be totally sustainable (repaying its embodied energy with passive and active energy consumption reduction techniques, correct orientation, insulations, BIPV, geothermal or other measures that reduce construction and maintenance costs) (A3; R; S4, 2010). If Dubai has a place for high-rise developments, the city should consider strategies of providing incentives for energy-based and correct design, rather than relying completely on codes that did not reflect any efficiency-based design in the last years (F1, 2010). Buildings taller than 12 stories can be efficient if Dubai maintains a strong policy agenda legislating environmental performance in high-rise buildings (S, 2010).

The downsides of high-rise developments as indicated by experts include the fact that tall buildings create unnecessary loads on the city's ultra-structure and infrastructure through adding more loads on water supply and sewage systems. High-rises also create spaces in which "a wind pocket could accelerate" (M2, 2010). Additionally, tall buildings create congestion, which would entail wider streets to avoid traffic during rush hours. High-rises also cause evacuation problems and require additional space for services (F1; M1, 2010). Most importantly, one of Dubai's major challenges at present is having too many unoccupied residential units, especially in towers. This issue has been intensified

by an urban agenda that focused on building several high-rises and iconic towers without having practical and functional reasons (I, 2010). After the recession, the oversupply of tall buildings grew increasingly apparent in Dubai; some sit vacant and the construction of many others halted completely (R3, 2010).

Dubai, like many other emerging cities, had an estimation of growth rates that does not reflect the same exponential forecast it had in the early 1990s (G3, 2010). After the decline in Dubai's economy and construction agenda, the shortage of land and land pricing are not considered major issues because real-estate's value shrunk and many areas previously allocated for mega developments are being re-evaluated. Besides, there are many unutilized lands, vacant lots, and deteriorated districts within the central city fabric that need development. Therefore, building high-rises based on the argument of land shortage in Dubai or of expensive real estate value all over Dubai truly lacks validity, especially nowadays. Therefore, diversity in building heights, with a mix of low- and moderate- rise buildings (max. 12 stories) interspersed with a few energy efficient high-rises, all integrated and organized compactly, can be the norm to promote more socially, ecologically, and economically responsive urbanism in the coming years (R3, 2010).

Finally, one of the experts argues that environmental performance is not only related to the question: Which range of building heights is more appropriate for Dubai? Educating people about right behaviors and correct lifestyle also matters. Studies show that "more than 60% of a household's total energy consumption can be based on lifestyle: services, food, tobacco, clothing and so on" (P, 2010).

Size of Urban Blocks

In this section, experts were asked to select an ideal length/range of urban blocks for a new neighborhood development in Dubai from the provided ranges in the table.

Table 32: Experts' votes on ranges of ideal urban blocks

Ranges of urban blocks	**Number of Votes**	**Percentage (%)**
200–270 feet	7	17.07%
280–350 feet	14	34.14%
330–400 feet	13	31.70%
380–450 feet	2	4.78%
430–500 feet	2	4.78%
Other	1- Midtown Manhattan model (264 by 900 feet) with alleys and street hierarchies. 2- The superblock ideas in Chinese cities.	

Table 32 shows an array of block size, ranging from short blocks (200–270 feet), to moderate block lengths of 280–350 and 330–400 feet, to large or superblocks (more than 400 feet). Most of the experts on the panel (including 27 votes, combining votes of option 2 and 3) suggest that an ideal range of urban blocks for new neighborhoods in Dubai should be moderate, not very long and not too short (K3, 2010). Potentially, this range (280–400 feet, or 85–121 m) is perfect for the length of urban blocks (N; R3, 2010). In fact, this length corresponds well with the compact development concept and also enhances connectivity and permeability (A5; A8, 2010). For example, blocks estimating around 330 feet (100m) are ideal (E2, 2010). A walk of around 330 feet to the next road is acceptable, flexible, and not excessive, especially if shade is provided (F2; R3, 2010). This range represents a two to three minute walking distance (G1, 2010). Walking speed is about 4.8 km/hour, which is equivalent to 262 feet/minute. In other words, it takes approximately less than three minutes to walk a block of 280–400 feet

long, a tolerable and very reasonable time for a healthy adult (A1, 2010). Block lengths within this range (280–400 feet) provide comfortable proximity to amenities and make walkability and accessibility more convenient and very preamble, thus lessening dependence on automobiles (A2, 2010).

The average of 280–400 feet also represents a distance that provides a degree of comfort related to the scale of the urban fabric and prevents redundancy in terms of street design and building façades (G1, 2010). In addition, urban blocks under 400 feet encourage a finer lot subdivision, allowing the potential of developing "architectonically varied" and active frontages (R2, 2010). This range is also ideal for walking and can contain many essential services. It can also create and contain a "human scale population density." Urban blocks within a range of 280–400 feet are also an idea supported by an expert's "research experience of good street patterns at both Alexandria, and Beirut" (K, 2010). From another experience, an expert on the panel argues that

> I have walked many blocks all over the world and I have tried to [recall] the ones that I have enjoyed: (1) comfortable walking block in Kuwait (Edayliah), block dimension 229 x 426 feet; and (2) comfortable walking block in London (Oxford Street Area), block dimension 328 x 393 feet (A1, 2010).

This range (280–400 feet) also has more corner lots, clearly a competitive advantage when compared to large or superblocks; corner lots often earn the moniker of preferred parcels because they have more economic value, frontage, and more connection with the street (M2, 2010). The 280–400-foot range is potentially appropriate for developing residential units (four–ten stories) with a semi-private central courtyard that could function as a very usable space for social interaction. This garden courtyard typology, that may vary in forms, masses, heights, and textures, also adds character and

identity to the space while providing view, natural light, and ventilation to the indoor spaces (N, 2010).

Blocks longer than 400 feet limit choices and place burden on traffic and pedestrian movement. Experiences with superblocks show that pedestrians lose patience and become intolerant when trying to find a place, address, or change direction. This kind of fabric is described as having less "permeability," a core quality of sustainable urbanism (R2, 2010). The extreme weather conditions in Dubai combined with social characteristics represented in circulation patterns and behavioral life styles calls for shaded and moderate distances between intersections in order to promote non-fueled modes of transport (S, 2010). But super blocks are very favorable to developers. Particularly, blocks longer than 400 feet create room for developers that insist on large lot configurations, which are typically favored by large businesses and that could lead to a couple of huge "corporate-type buildings along the street with massive frontages" (R2, 2010).

The concerns associated with the development and implications of superblocks demonstrate why the vast majority of experts advocate for moderate blocks such as "the Cerda Block in Barcelona [at] 370 feet (113 meters), which allows an optimal relationship between capacity [density] and connectivity" (E1, 2010). This paragon is also equivalent to Vancouver's grid system which, based on the medieval English measure known as a "chain," measures 66 feet (20 m) in length. In Vancouver, the length and depth of blocks and individual building parcels were derived from this basic unit of measurement. The typical street block forms a rectangle of four chains (264 feet) in the short side, and six chains (396 feet) in the long side with a 20-foot (6 m) service lane.

In order to further enhance walkability and pedestrian-friendly streets and promote more compact developments, seven experts on the panel suggest small blocks

(200–270 feet) (A&N, 2010). They argue that shorter blocks promote more pedestrian activity and respond to climatic conditions as they provide more choices and access (K4, 2010). Street culture, "vitality, and pedestrian interest" (S4, 2010) necessitates a huge number of "street possibilities that delineate a grid of streets and small blocks" (R1, 2010). An expert argues that the dimension of many European urban blocks measures approximately 235 x 235 feet. This standard originally comes from the "Roman gridiron system" and has been used again as a "partitioning system" in the reorganization of medieval cities. This pattern is still appropriate to modern cities. This system provides a choice to change direction more often (G3, 2010). The downside of small blocks (200–270 feet), on the other hand, is that smaller blocks limit diversity in development types and densities (M1, 2010), but provide a more human-based setting to the urban fabric; it is indeed "a tradeoff" (E, 2010).

It is generally known that urban blocks of 200–270 feet, which is roughly equivalent to the block size in downtown Portland, are better than blocks of 280–400 feet for connectivity and walkability. However, "not all blocks should be designed with the pedestrian in mind" (J, 2010). While it is proper to argue that 400 feet might be the limit on block length, an expert suggests that this should not become the norm (E2, 2010). In a neighborhood design, a rigid decision might prove problematic (F1, 2010). For example, an urban block in urban centers or for a high-rise development will be different than that of a small neighborhood with single family units and low- to mid-rise developments designed to promote walkability and to enable children to play on the street (E2; F1, 2010). Supporting the idea that there should be flexibility and variety of urban blocks depending on context and use, two examples seem to be significant:

> 1. The midtown Manhattan model (264 by 900 feet with alleys and street hierarchies). It is ideal to have short and long blocks and to break them with

service alleys. It helps with orientation and way-finding. The ranges listed above are too limiting and make no distinction between street hierarchies which is critically important (R, 2010); and

2. Compactly built cities that are found in China. In these cities, the superblock provides islands of relatively quiet and calm within even a metropolis such as Shanghai. Both the historic "li-long " urban residential architecture and the large-scale 6–10 story modern residential blocks organized along the traditional "li-long" street/alley system provide high-quality residential enclaves surrounded by wide arterials placed at 0.5 kilometer intervals or less. This works, however, because the density of the population creates an environment where the automobile can be relegated to secondary status to foot, the bicycle and public transit as means of movement. The relatively few automobiles that do penetrate the block must contend with narrow, congested streets and alleys, and can rarely travel faster than a few miles per hour. To qualify the 300–400 feet paragon, this would be the distance between entry points into the superblock, with major arterial intersections spaced at 1,500–2,000 feet (G1, 2010).

Although a certain level of variety in block size is recommended within a neighborhood design, it is commonly agreed among the vast majority of panel members that moderate blocks, not very long and not too small, within a range of 280–400 feet, are ideal for new neighborhoods in Dubai.

Cycling in Dubai

There are significant barriers to promoting bicycle use in Dubai. The cultural norms among natives discourage biking, while residents are more likely to use bicycles. Extreme summer heat also inhibits widespread bicycle use.

Given these cultural and climatic constraints in Dubai, experts were asked whether or not the incorporation of bike infrastructure (dedicated bike lanes and other easements like parking and zones where bikes are the priority) in Dubai's neighborhoods is appropriate and potentially effective.

Table 33: Experts' votes on appropriateness and effectiveness of cycling in Dubai

Experts' Opinion	Number of Votes	Percentage (%)
Agreement (Yes)	29	70.73 %
Disagreement (No)	12	29.26 %

Of 41 experts, 29 voted that bike infrastructure could certainly be effective and appropriate in Dubai. The other group of experts did not consider cycling as an appropriate and effective approach due to several cultural and climatic barriers in the region. The experts who asserted that bike infrastructure could be effective argue: (1) cultural norms certainly exist in the region but can change over time; (2) climate serves as a deterrent but cycling is conducive and beneficial during the half of the year when Dubai weather is pleasant; (3) cycling promotes physical activity and a healthy lifestyle; and (4) the demographic structure in Dubai is dominated by those residents from the Indian Sub-Continent and South East Asia who are accustomed to bikes in their own hot and humid countries.

As a recreational activity, cycling is somewhat used by children and young male adults, natives and residents. But a better adoption of bicycles would be to use them functionally perhaps as a primary and secondary mode of transportation to get from one place to another, to commute to school, or run some house errands (A, 2010). From the health and fitness standpoint, promoting cycling might reduce the high level of diabetes patients in the UAE that is ranked as one of the highest in the world (M, 2010). Cycling is in fact environmentally, socially, and economically sustainable. It is economically sustainable because people from all income groups can afford to buy at least one bike. It also serves sectors in the society that cannot afford the expense of buying a car or of paying for metro and bus fares (A5, 2010). Besides, bicycling is an "appealing option to save gas money and relief drivers from car maintenance burden" (R4, 2010). More

cyclists on the streets mean less energy used for transport, less air pollution resulting from heavy traffic, and less GHG emissions, mainly carbon emissions (M, 2010), making it environmentally sustainable as well. While it might not be socially accepted among local Emiratis due to cultural concerns, cycling has social advantages through the standpoint that cyclists experience the city and its people from a different view, directly, instead of from behind a windshield.

While it is true that the climate renders biking infeasible in Dubai during five months of the year, biking is very beneficial during the remaining months. Bikes are healthy, quick, lively, allow a totally different experience of the city, and require fewer parking spaces: "up to 10 bikes fit perfectly in the parking space taken up by one car" (G1, 2010), thus providing the biker the advantage of reaching his destination faster compared to an automobile driver (F1, 2010). An expert thinks that "bike infrastructure with shading strategies is an asset" for a Dubai neighborhood that is integrated and spatially compact (K3, 2010).

Some experts (12) argue that the incorporation of bike infrastructure in Dubai is not appropriate. Neither the natives' cultural norms nor environmental conditions (the heat, the dust, and humidity) will allow this strategy or culture to be easy and common. Dubai's current structure is already based on a highway system and broken street networks which make the distances between places quite far. Besides, the urban fabric is not dense, fragmented in most cases, and lacks many essential services and daily uses; therefore reaching any target only by using a bike would prove difficult (A5; M1, 2010). If bike paths integrate with public transportation modes like the Metro and bus systems, bicycling could emerge as an efficient mode of commuting during the half of the year of pleasant weather (A, 2010). For example, in many countries the integration of bike

networks with other transportation systems make it ideal for short- and medium-range destinations.

Even though widespread use of bicycles might face strong cultural resistance, especially from the natives (R3, 2010), bikes can still prove very useful in Dubai for short distances. One of the experts on the panel who currently lives in Dubai argues that biking can save him a lot of time in his daily commute to work. Every morning this expert travels to the third basement floor where he parks his car, drives the car up to the ground floor, and then drives a big detour to his workplace some 4.5km away only to park his car for a 100AED ($27.25)/month parking permit. By bike, the expert could travel the distance in a similar timeframe, incur dramatically less cost for parking and improve his personal fitness. Instead, he must go to the building's fitness room to get the exercise benefit he missed from the commute, which requires even more extra time (F1, 2010).

Even though some of the constraints mentioned above are legitimate and discourage bicycle use, most of the experts argue that bike infrastructure can still be accepted as a beneficial and effective strategy based on the following reasons:

First, the cultural values certainly warrant respect, but generally cultural norms evolve over time (F2, 2010). The availability of bike infrastructure combined with a strong campaign programmed to increase awareness and educate people about the significance of riding bikes can support cycling as an efficient mobility system and thus lead to a rapid change in lifestyle, instead of being pessimistic and doing nothing at all (A2; E, 2010). The citizens' dress both of males and females are not appropriate for bicycle use, thus making it a very unattractive option (R4; P1, 2010). However, some devised strategies, such as providing showers and changing rooms in the work place, could help make this more pleasant or attractive (as suggested by LEED) (R4, 2010).

Other experts wonder about the stability and steadiness of cultural attitudes and values. These values change quickly over time; they are not fixed. The Emirati culture is extremely conscious of new trends and technologies, including fashion, cars, food, etc (F1, 2010). Many Emirati students of one of the experts, Expert (F1), say they enjoy biking during summer vacations in Europe; they love cities such as London, Berlin, or Amsterdam where people find a free bike at almost every street corner. One of the panel members argues, "Why not try this?"

Second, the harsh climate in Dubai limits widespread bike use, but only for five months of the year. Besides, in summer many expats vacation to their original countries and most of the natives travel either East or West for long vacations (K3, 2010). An expert argues that "even if we were able to comfortably use bikes for six months of the year it would be a benefit" (R1, 2010). The argument that the climate in Dubai is dusty, hot, and humid in the extended summer months should not be used as a rationale for overlooking cycling because the weather in Dubai is not intolerably hot all year (F2, 2010). Qatar, which has similar climatic conditions, is designing a national system of shaded bike networks (F1, 2010). Appropriate shading strategies through light structure, building composition and massing, arcades, and trees along bike routes can solve many climatic issues (K2; S4, 2010).

Despite the seriousness of climatic conditions in some regions (i.e. extremely cold European cities and the rainy, hot, and humid Indian Sub-Continent), people still embrace cycling. In fact, some regions have massive networks of bike lanes combined with other mobility systems. For example, Amsterdam, Berlin, Copenhagen, and Stockholm are not suitable for cycling during winter months (November through March), but still those regions are well-acknowledged for their comprehensive bike networks. People do not bike during those months because the climate is harsh and roads are icy and slippery, and

thus very dangerous to bike. However, once the weather warms slightly, everyone returns to their bikes for the rest of the year (R2, 2010).

An expert who actually bicycles in Dubai states that:

> From November to April, bicycling is comfortable even during the day. Between May and October it is comfortable between the hours of 9pm and 7am. Compare this to a city like Buffalo, New York in which extreme winter temperatures and precipitation make bicycling very uncomfortable and even dangerous. November to March in the U.S. northeast is difficult for bicycling at any time of the day. So in terms of hours of available comfortable biking weather, Dubai is not really so bad. In fact, I would bicycle far more often in Dubai if I did not fear being run over by an automobile (R, 2010)

Third, although bicycling might not be acceptable among locals, they represent only a very small percentage of the population in Dubai (G, 2010). This means that with a well-designed bicycle routes, a large portion of the population will have the potential to employ bikes as at least a secondary means of transportation (A2; K4, 2010). Another factor from the Dubai demographics show that almost 60% of the residents hail from the Indian Sub-Continent and South East Asia, who actually are used to bikes in their own hot and humid countries. In addition, the topography in Dubai is "absolutely flat-ideal for cycling," if compared to those regions (N, 2010). Besides, the vast majority of this population segment does not own an automobile, so bicycles might be widely used and be very appealing to this demographic. At present, many workers in the port area and central Dubai tend to use bicycles to get to and from work; many delivery services very often use bicycles in neighborhoods since it is fast and convenient (R4, 2010). Making cycling convenient, easy, and safe from residence to workplace would greatly enhance the living standards of this large demographic segment in Dubai (P1, 2010).

Fourth, a local expert from the Emirates argues that "if cycling is safe on the streets, I think we will see more bicycles, at least 5 months of the year when the weather is pleasant" (R4, 2010). Another native expert states that "one of the major hindrances to uptake of bicycle use is safety. Dedicated bicycle lanes would allow for this" (S, 2010). Bikes might be an obstruction to traffic since each transportation mode has a different speed and a different circulation pattern and angle (G3, 2010). In order to make cycling safe and convenient for the public, several safety measures must be taken into account. First, conflicts between pedestrians' and cyclists' movements as well as cyclists and cars require resolution. There is a provision of having physically dedicated and separated bike lanes, although this might not be ideal when considered in terms of land and economic resources (E2; C, 2010).

An expert on the panel argues that "my research on older people in the outdoor environment shows that they are particularly fearful of bicycles, especially when cycle lanes are incorporated within footways" (E2, 2010). To create a safe and convenient environment for pedestrians, cyclists, and drivers, every means of transport should have adequate and different storage. It is better to incorporate bike lanes within the roadway, but this should be separated physically from the cars (E2, 2010). That is in regard to the bike infrastructure that is on the right of way, but spaces with dedicated bike zones should be seen rather as "shared zones, that is, when bikes are not used, the space becomes part of the pedestrian experience" (P, 2010).

In short, cycling could be effective and appropriate in Dubai neighborhoods based on the vast majority of experts' opinions. The introduction of such a mobility system could be approached gradually with progressive measures, tests, observations, educational campaigns, and government programs and incentives (E1; N, 2010). Eventually, alternative and efficient means of transportation, as complements to

automobiles, achieve popularity in the Gulf region (A1, 2010). The sensitivity and perception that cycling is a relational or lower-class activity will fade in the short term. The main question that is poised is: "Is Dubai interested in investing for the long term" (J, 2010)? An expert on the panel argues that "I am confident that if the Dubai government established an infrastructure for cyclists combined with bike promoting policies, incentive programs, many people (foreign residents and Emiratis) will start to use it because it simply makes sense" (F1, 2010).

Environmental Performance

In this section, experts were asked if they support a building code that legislates environmental performance based on the following: (1) Orientation; (2) Location and size of shading structures on buildings; (3) Location and size of windows

Table 34: Experts' votes on a law that legislates environmental performance

Experts' Opinion	**Agreement (Yes)**	**Disagreement (Yes)**
Orientation	33	8
Percentage (%)	80.48%	19.51%
Location and size of shading structures on buildings	33	8
Percentage (%)	80.48%	19.51%
Location and size of windows	30	9
Percentage (%)	73.17%	21.95%

The experts on the panel generally agree that these passive design indicators play a fundamental role to energy conservation and design of buildings and lead to better performance. The small percentage that did not support a building code legislating environmental performance based on the aforementioned parameters had few concerns. For example, codes and regulations might limit innovation, creativity, and aesthetics in building design, and might lead to "ill-considered" buildings that are a result of

regulations rather than intelligence in design (A8; K3; K4, 2010). In addition, the indicators above are right and desirable, but are "very limiting." So in addition to the three factors listed above, many other parameters are important and should be explored (B, 2010)

A better measure, as most of the experts agree, is to legislate and control environmental performance, rather than the physical dimensions, design, or architecture per se. Dubai should explore the minimum standards and should set performance-based parameters and indicators specifically tailored to the climatic conditions of the region, but at the same time the city should grant the designers flexibility and resilience to use their design ideas while conforming to any generated performance-based agenda. It is also suggested that incorporating performance-based criteria early in the design process can significantly reduce the running cost of buildings if compared with performance-based decisions made later in the project time line (Figure 7) (R4, 2010).

In addition to creating a performance-based design agenda for buildings, experts argue that educating people and setting policies and standards that necessitate transformation of wasteful and careless lifestyles and behaviors are also critical. Public programs that educate people about right behaviors and correct lifestyles matter greatly in energy conservation. Studies show that "more than 60% of a household's total energy consumption can be based on lifestyle: services, food, tobacco, clothing and so on" (P, 2010).

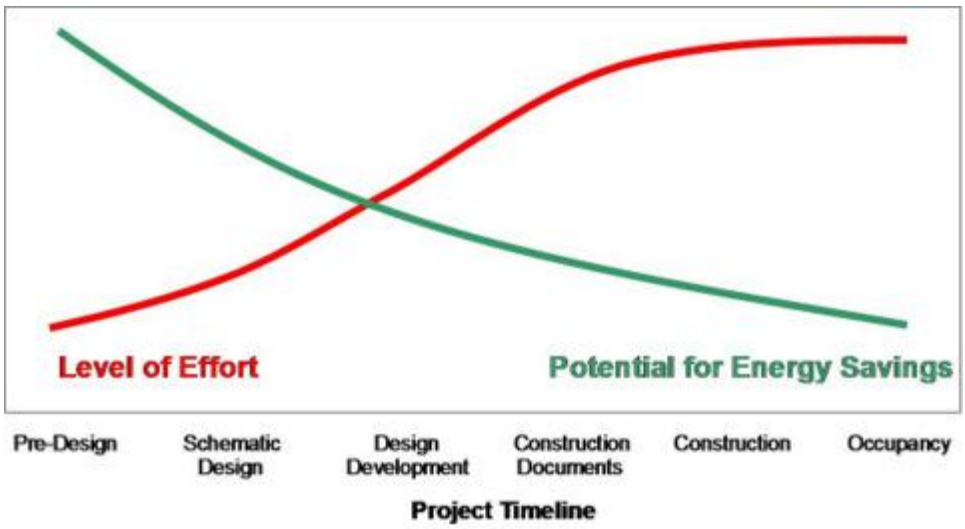


Figure 7: Level of effort, "cost" vs. potential energy savings through the project timeline.

Note: Figure provided by Expert (R4)

Based on expert opinion, rigid codes and prescriptive solutions limit creativity in design. As a result, expert preference was more oriented towards a well-established, performance-based agenda that limits energy consumption in buildings to a specific kW/m^2 or CO_2/m^2 or any other measure (A1, 2010). To gain efficiency, a performance-based requirement for each "building type" is recommended (e.g., not to exceed $200W/m^2$ for apartment buildings) (S, 2010). Nowadays in Dubai, electricity charges accrue in Kilowatts per hour (KW/h) and there is a tariff slab (categories) for expatriates, which starts from 20 fils per KWh. The rate is fixed for nationals, which is 7.5 fils per KWh. An expert argues that "energy should be more expensive and tiered based on use quantity of KWh/SM/YR." The expert recommends a system whereby 10 KWh/SM/YR establishes a low end base rate of 25 fils per KWh (currently set at 20 fils). Usage above that level would see serious increases in the per KWh rate upwards of 50 fils" (R, 2010).

Other factors and aspects identified by experts as critical ingredients and factors in the design of environmentally conscious buildings are:

- Limits that enhance the thermal comfort zone (A1, 2010)
- View and accessibility (A7, 2010)
- Natural lighting and shading (C, 2010)
- Standards that provide green spaces and integration with mass transit (C, 2010)
- Min + max percentages for openings and shading on facades (C, 2010)
- Exposure to sun and shadows on other properties (I, 2010)
- Wall and curtain wall sections (G3, 2010)
- Technologies such as double facades, heat mirrors, and smart windows (K3, 2010)
- Total heat gain calculations (N, 2010)
- Other aspects that have impact on quality of life such as privacy, and access to amenities and transit (N, 2010)
- Passive and traditional solutions which are fundamental for climatically responsive architecture and urbanism (A, 2010). This is an asset and design opportunity that has been neglected worldwide. According to Expert (R4), Ralph L. Knowles studied the effect of sun movement (daily and annually) and the building form on energy and movement rhythms. He extracted many strategies learned from vernacular and current urbanism/architecture outlining the importance providing shade when needed, and sun where needed in his books, *Sun Rhythm Form*, and *Energy and Form: An ecological Approach to Urban Growth*. From a real experience, Expert (S4) argues that he "[lives] in a passive solar home, and the performance difference between this and a relatively efficient conventional home is quite impressive."

Essentially it is more practical to establish a performance agenda tailored for the region and based on "technical, functional, aesthetical," environmental, social, behavioral, and economic aspects that educate the designers and the public, and also guide the design process and construction early in the project time span. Any performance criteria and guidelines must be articulated to the "needs and characteristics of the local area in terms of climate control, population habits, and socio-economic activity" (R3, 2010). For many years, Dubai did not enforce any energy efficiency guidelines. Now the city should re-strategize its urban agenda by enforcing more energy-based guidelines, while encouraging correct behavior and creativity in design and problem solving (F2, 2010). Dubai should boldly establish a research ground in this field, give incentives such as financial benefits for environmentally sensitive design, and use the built efficient cases, following the shift in policy, as a benchmark and paragon for developing criteria and design ideas for other buildings (F1, 2010).

A concern with how overall performance is achieved is one of the issues raised by few panel members. For example, an expert argues that all possibilities and convincing solutions warrant consideration. There are many strategies at different spatial levels; perhaps one answer might be the integration of most effective standards (E2, 2010). A door should be left open for people to come up with new tactics (F1, 2010).

Inclusive Housing

The vast majority of Dubai's residents are construction workers, as well as retail and service sectors workers employed in commercial stores, restaurants, and cafes. The lack of affordable and appropriate housing types for this segment of population caught the attention of international organizations, media, and press. This resulted in construction companies providing housing for their workers in labor dorms on the

outskirts of Dubai. Retail and other service workers, on the other hand, moved into Dubai's older districts closer to the central city. In these older districts, occupancy levels reached 30 to 50 people (mostly single) in a detached single family house of 2500 ft^2. This created ethnically segregated enclaves, amplified energy and drainage loads, invaded the privacy of many families, housed many illegal workers, and in some cases created zones with concentrated crime.

The first round of the Delphi suggested that Dubai's neighborhoods should be diverse, including a wide variety of incomes, ethnic and cultural backgrounds, and family types. However, most high and medium income people in Dubai prefer privacy and a family-oriented environment; they do not want to live in a neighborhood with a high concentration of construction and retail workers living in groups away from their families.

Given the cultural norms of Dubai, experts were asked if inclusive housing (incorporating housing units for the working class within neighborhoods) can be successfully implemented in Dubai.

Table 35: Experts' votes on inclusive housing

Experts' Opinion	**Number of Votes**	**Percentage (%)**
Agreement (Yes)	16	39.02 %
Disagreement (No)	25	60.98 %

Diversity issues in Dubai's built-up area are not only represented in several segregated working class enclaves, but also this issue holds relevance for low- and middle-income groups who often do not find suitable affordability ranges, price options, variety, and choice once it comes to housing. The urban form in Dubai is oriented towards a select portion of the population (e.g., tourists, citizens, and high-income

groups). It is also extremely driven by market forces and fast revenue generation rather than mixing tenures and housing types. This urban agenda has created ethnic and socio-economic enclaves and segregation. Many low- and middle-income classes live in adjacent cities for affordability purposes, and many locals have their own subsidized neighborhoods. Residents, including high- and middle-income classes, live in new mega projects like tower complexes, gated communities, islands, or themed projects, while a group of low-income class and migrant workers live in old districts and labor dorms.

Appropriate housing for migrant workers generally creates a problem in every culture and extends discussion beyond Dubai. But Dubai's real estate and financial booms have sparked serious criticism regarding its migrant workers' housing conditions, described as extreme segregation represented by (1) the lack of appropriate housing and living standards; (2) the lack of facilities and access, with most of this housing being in distant locations from the city; and (3) the lack of fair payment and strong policy and working laws. Dubai, in fact, was not prepared politically or spatially to accommodate the huge number of workers during the construction boom.

The panel recommendations regarding whether inclusive housing, incorporating housing units for the working class within neighborhoods, could be successfully accepted/implemented in Dubai show that the majority (25 experts) do not find this achievable due to cultural, economic, and political grounds based on a huge difference in value and cultural beliefs between different ethnic and socio-economic groups. The other group of the experts (with 16 votes) argues that inclusive housing could prove successful through intelligent design, architecture, laws, and gradation in neighborhood design. An expert argues that "given Dubai's history of multi-cultural existence" (S2, 2010), there exists a good potential to develop solutions and policies that support this "noble ideal" (G1, 2010).

Although it would be perfect to support inclusive housing in Dubai, there are some cultural, social, economic, and political grounds and realities that likely will throw up barriers. First, a place that mixes bachelor laborers with family groups will not be "acceptable and even marketable" socially or economically (J, 2010). Second, mixing the working class with families already proved inefficient in Dubai and in other regions in the Gulf. The interests, needs, values, social standards, and lifestyle of the working class are totally different than those of families (A1; A5, 2010). As an example, in the early '90s the influx of the working expatriates in Dubai's older districts forced many families to move to other neighborhoods as their sense of privacy, belonging, and safety deteriorated by the large accumulation of predominantly single laborers. The desire for privacy sits rooted firmly within the family structure, and large-scale accumulation of working class men without being controlled will certainly minimize privacy levels and living standards (P1, 2010).

Third, the real meaning of integration does not merely depend on mixing different people in one place; it is in fact based on a true and meaningful exchange of "interests and habits" among different ethnic and socio-economic groups or between the "hosting and the guest community" (G3, 2010). Even if bachelor workers and family groups physically share one neighborhood, there would not be any harmonious living patterns, communication, or social relations; instead, conflict and tension would build up among tenants (A7; K2; K3, 2010). Integrating people in one place while cultural and social realities render this infeasible might result in unsafe and "uncontrollable neighborhoods" and to a higher degree of antagonism and resentment (A8; G3, 2010).

Fourth, variety in neighborhood design is required, but this works within certain confines (G3, 2010). For example, social mixing could be applied between different socio-economic classes, but not between demographic segments with completely different backgrounds and income levels, like mixing workers with families or very poor

people with middle class, rich or ultra rich people (K, 2010). An expert states that sustainable cities also are relevant to social aspects and values of the place (A8, 2010). There is a lot of emphasis in sustainability design literature on providing a variety of choices, mixing people, and providing different housing types and rent rates, "but there is little evidence that this is beneficial, either for the most well off or least well off" (E2, 2010). An expert on the panel indicates that "we should not try to create [socially mixed] neighborhoods; everyone prefers to live among their own group. As German Chancellor Angela Merkel put it, "multiculturalism has failed" (G, 2010). Another expert bluntly argues that if the plan is to put residential neighborhoods next to labor dorms, "the answer is no," (K4, 2010). In fact, given the social hierarchy of most middle or upscale residents in Dubai, there would indeed be "fierce resistance" to class mixing (R2, 2010).

Fifth, it is generally known that a composition of different demographics and social structures can result in many benefits such as tolerance, respect, patience, friendships, and learning from each other; however, pragmatically this would not seem possible in Dubai (A2; F1, 2010). Unfortunately, the bulk of people's perception about the social mix at the present separates rather than integrates (F1, 2010). The stereotype surrounding the working class is that their presence means overcrowding, noise, reduction in property value, and less privacy and security, especially for children and women. Integration could never happen, and it could never be successful without a huge cultural and political shift in Dubai (R1, 2010). An expert argues that we should certainly encourage class integration and diverse neighborhoods; however, forcing this idea would mostly lead to failure and hostility (g1, 2010). Different demographics and different socio-economic groups have different beliefs, rituals, and value systems which do not necessarily mesh with each other but must garner respect (G1, 2010). As an example, unmarried workers and households simply demonstrate two demographics with totally

different patterns of daily life, attitudes, behaviors, interests, and values that often conflict with each other.

Sixth, there is a very small potential to build social bonds and integration with the current fragile and inconsistent demographic structure of Dubai. This issue raises the question of belonging and loyalty to a place (K4, 2010). The vast majority of people in Dubai are male workers from the Indian Sub-Continents and South East Asia whose presence is for a limited period of time (two years, more or less). It is difficult to argue that temporary residents would create benefits and add value to family-oriented and established neighborhoods (P1, 2010). Dubai is considered as a transient region in which workers' residency depends on immigration policies, employment, and the boom in construction and retail sector activities. Accordingly, it would not be appropriate to mix bachelors staying in the city on a temporary basis within a neighborhood based on family values and often considered a "home for generations" (F2, 2010).

Seventh, the high cost of living in Dubai would not facilitate class integration within the current housing stock because there is no less expensive alternative and choice within the city's well-established areas with an acceptable standard of living. Therefore, workers end up either in segregated labor dorms provided by construction companies in the city's outskirts or in congested deteriorated districts (A, 2010). From the employers' point of view, the rationale for housing all the workers in one place, away from the city, is cost-effectiveness (A, 2010).

Last, this kind of socio-economic housing diversity at a neighborhood level hardly ever exists in most cities worldwide (S3, 2010). It is a perfect ideal, "but flawed" in most regions (G1, 2010). The topic is indeed "globally relevant" and expands the debate beyond Dubai (K4, 2010). Inclusive housing is a complicated issue and it is "not easily done" (E, 2010). One of experts argues that "my real answer here would be that I don't

know" if inclusive housing is appropriate or beneficial for Dubai or elsewhere (E2, 2010). Another expert argues that this "is impossible; no single country has managed this" (K2, 2010). In practice and real life, this notion generally leads to serious problems and conflicts rather than creates equity or solves housing issues. In a sense, segregation forces itself by "default" whether "we like it or not," basically because variables such as likes and dislikes, income level, education, beliefs, lifestyle patterns, attitudes, ethnicity, cultural norms, political agenda, affordability, availability, cost and price options, market forces, housing stock, and many other factors build upon each other and control every aspect of class integration (K2, 2010).

The other group of experts (with 16 votes) indicates that inclusive housing in Dubai could be possible if serious actions take account the political, the public, and the design points of view. First, before accepting inclusive housing and forcing policies, there should be a persuasion campaign and programs that encourage people in Dubai to receive massive education and introduction about the fundamental principles of affordability, class diversity, and variety in housing types, choice, and price ranges (A2; P1, 2010). However, educational efforts related to integration, morals, and principles without policy efforts will not solve the problem.

Second, effective policies and initiatives require legislation when market forces and planning methods work against ethnic and class mix. Inclusive housing policies should be initiated to discourage the process and experiences of segregation. However, if social integration is "naturally occurring" within the city fabric, there is no need for an agenda of inclusive housing policies (B1, 2010). There are many political, planning, and public policy issues that have to be reassessed prior to any discussion of mixing different social and ethnic groups in neighborhoods (K4, 2010). Without good will to build a society with strong legislation that regulates minimum wages, working laws, and living

standards, the incorporation of different housing types for the working class in new neighborhoods or within the city's built up area will not be implemented and class segregation will continue along the similar and familiar path, as happened in the past (F2; I, 2010).

Third, Dubai must reconsider many aspects of its urban and political agenda, including the consequence of bringing large number of migrant expats into its fragile indigenous society (F2, 2010). Politically, a policy initiative that allows immigrant workers with low wages to bring their families should be implemented. Although this, on one hand, will further increase the imbalance between the natives and expatriates on a national scale, on the other, it might encourage the policy makers and city officials to think about affordable housing options with acceptable living standards for different socio-economic groups (A, 2010). An expert states that a single Western or Eastern woman will live in terror and worry about living next to a house full of workers. But if the workers could bring their families (wives and children), each living in their small apartment, then the women and other families from higher income levels would be less fearful (F1, 2010).

Fourth, from the design and planning point of view, class integration is technically possible (R2, 2010). It is in fact, a "design question" (B, 2010) that requires innovative design ideas and a transformation in traditional planning methods through introducing various models of housing typologies that are healthy, affordable, and appropriate (A3; F2; R, 2010). The design of those housing can also be implemented in a way that can be reused or adapted for other purposes. Careful consideration must be given in the detailed design of these housing models to maintain adequate privacy for families (E2, 2010). There should also be strict regulations to monitor overcrowding and

large accumulation of laborers, especially at street corners and nearby family residences (R2, 2010)

Fifth, the post-recession era could be seen as an opportunity to diversify housing types. For example, at present there is an obvious oversupply of housing stock in Dubai, as some sit vacant and halted construction midway. Since most of those housing units were planned to accommodate high- and middle-income residents, designers can take this situation as an opportunity to reconsider, diversify, and rethink dwelling size and potential occupants in many of these projects to create multi-class residential zones (C, 2010). Sixth, if the "after-work life" of the workers also improved through offering them good facilities, part-time jobs, and engaging them in activities, their integration in the city's neighborhoods might be accepted by the population over time (A3, 2010).

Seventh, this problem could also be approached through legislating good standards for workers' communities inside the city, as the Emirates of Abu Dhabi recently initiated (A&N, 2010). The objective of a socially appropriate and sensitive housing policy is to provide respectable and well-established housing, access, common facilities, and mobility options for all ethnicities and classes "within the city, but not necessarily within the same neighborhoods" (G1, 2010). The main target for Dubai is to avoid the "stark segregation" that happened in the past when companies positioned laborers housing in distant areas lacking facilities, services, access, and basic standards of good living. "The transportation and social costs of doing so are considerable" (P1, 2010). There is no question that this practice must be avoided; however, there is an issue about the scale and proportion at which multi-class housing should be provided within Dubai's neighborhoods (E2, 2010).

Lastly, class integration cannot move rapidly, but rather it should be considered gradually and with a lot of patience; it should involve planning through responsive and

"sensitive understanding of proximity patterns" of different ethnic and socio-economic incomes (N, 2010). If all of the aforementioned strategies and concerns were addressed correctly, successful implementation could follow over time (B, 2010)

A fairly good case of multi-class integration is provided by an expert on the panel. He argues that

> By looking at the midtown Manhattan urban block model (264 by 900 feet) with alleys and street hierarchies, it could be conceivable to design a gradation of socio-economic real-estate models within reason. A healthy plan may require a transition of two to three of these integrated blocks before the gradation could encompass the entire spectrum from investment banker to service worker and common labor. In Manhattan, there are places where you have on one side of a city block extremely wealthy individuals and corporate law firms in brownstone mansions and on the other side of the block you can find a low-income housing mid-rise. It is the street section and visual distinction that is the separating characteristic that satisfies the elitism of the former group and the geographic proximity which has the potential to provide benefits to the latter. This type of design requires high density in order to come off successfully (R, 2010).

Public Participation in Planning Processes

In this section experts were questioned if a participatory approach to urban design and planning can be successfully implemented in Dubai, given the challenges acknowledged below:

- The planning and decision-making system in Dubai is best described as a top-down approach where criteria for making decisions are not transparent to the general public; and
- The cultural differences between the natives (who are mostly private and are more trusting of planning decisions) and the residents (who are more accepting of and comfortable with open dialogue in a public setting) are extensive.

Table 36: Experts' votes on incorporating public participation in Dubai

Experts' Opinions	Number of Votes	Percentage (%)
Agreement (Yes)	28	68.29%
Disagreement (No)	11	26.82%
Other	Neither yes nor no This is a very complex topic that can't be answered in a yes-or-no fashion	

The majority of experts think that public participation is necessary and worth exploring in Dubai; however, some experts think that there are many constraints and barriers with implementing participatory approaches successfully in Dubai or elsewhere. In this regard, I classify the panel responses into two groups: (1) a group that indicates the ideals of public participation and strongly argues that a sustainable Dubai should connect with its society, engaging them in city development; and (2) a group that argues that while public participation holds importance, certain realities exist that make this process not successful in any setting; while in Dubai these elements become even more complicated. The following points, defined by experts, demonstrate several constraints that limit genuine and effective participation; some relate to Dubai specifically, while others are well-defined in planning literature and practice worldwide.

- The planning process and decision-making in Dubai is not transparent; therefore, there should be a fundamental reform of Dubai's totalitarian planning system by first structuring a solid planning council like that of its neighboring Emirate, Abu Dhabi, and then adopting a public participation strategy and policy agenda aimed to educate and engage the public gradually;
- Implementing this process is not an easy one; it needs time, tolerance, organization, trial, exploration, political will, and education, both on the public

and local authority level. Dubai, with its traditional top-down approach in planning, requires even more effort and endurance;

- Public participation does not only require political will but also it requires determination and enthusiasm from the civil society. If the public in Dubai believe that the top-down planning system operates as a good sponsor for people and decides fairly on behalf of them, then participatory approaches will make no sense.
- A big constraint of implementing public participation successfully relates to the definition of "public." There are several segments of the population in Dubai; the majority represents expatriate workers who hold no stake in the city or have little interest in the city's fate as they are temporary in nature, and stay for a limited period of time; besides, the expatriate laborers are less educated compared to other population segments.
- Another part of the difficulty related to the word "public" is that there are many publics in Dubai, each having different backgrounds, competing priorities, norms, values, interests, and beliefs that in most cases do not match. But this issue does not relate exclusively to Dubai. As a matter of fact, participatory planning in many regions basically operates within the limitations of multiple publics and the constraints of institutional arrangements, political power, and economic resources.
- Participatory planning is dominated by politics. The nature and reality of planning processes entail manipulation, unequal access, power structures in the political and public realms, and information dissemination in planning communication and discourse.
- Participatory approaches in any setting usually benefit just a select portion of population, usually those who yield the power or are familiar with power

configurations, and also people who have the loudest voice, determination, and will to participate throughout the process; therefore, participation might not be reflective of the general population, especially the groups with less interest, voice, and passion; and lastly

- There is always a problem related to morality, integrity, and competing priorities of people. For example, individuals in many cases do not consider the collective public interest, future generations, long-term implications, the environment, or the region as a whole; they mainly focus on aspects that affect themselves.

It is important to engage the public in city design and development by providing an adequate stream of information based on research, facts, evidence, what people need, best practices, and what worked in the past. Public participation is also an "educational measure" (P, 2010). It is very important to educate the public about different planning tactics and strategies; what planning involves; and what the impacts of proposed projects are expected to be on the cultural, economic, environmental aspects as well as on people's health and the city's wellbeing (E2; G1, 2010). Ultimately, there is no rationale to ignore the opinion of those who will use the developments (A7, 2010). The path towards the sustainable city cannot be disconnected from the civil society (R2, 2010). There should always be a dialog and a feedback loop between the public, experts, and city officials (A1, 2010).

A major benefit of participatory approaches in Dubai or any other region derives from converting the planning process and decision-making from exclusivity and technically focused to being more pluralist, social, and liberal by listening to multiple voices and understanding the importance of empowering communities to advocate, think, and plan on their own behalf. Inclusion is not only justified on ethical grounds, but also a

deeper understanding of diverse realities and needs that is absolutely essential for better plans and more effective implementation.

Many cities have incorporated public participation with varying success. It has been implemented in both wealthy and developed countries and also in the developing world with very poor residents, for example as Alejandro Averana did in Chile. Dubai needs a mandate from the government and society in order to implement a big step like this. Even though a participatory approach in any setting is typically complicated and takes more time in implementation, it is, indeed, "an exercise worth exploring" (K2, 2010).

Dubai is an emerging city experimenting with different strategies and methods in city design, and public participation is just one scheme that is positively worth a try (S2, 2010). An expert argues that if Dubai incorporated public participation, the outcome will only be positive (R, 2010). In fact, "if Dubai is to be a holistically sustainable city, it will have to contend with such strategies and develop workable policies" (N, 2010). Sooner or later, individuals will demand that their voices be heard; therefore, Dubai is in need of launching a strong public policy that accommodates this anticipated request (A1, 2010). Since the top-down approach is the tradition in Dubai, it may take some time to engage the public in planning (G1, 2010). In fact, implementation and reform in planning strategies will not happen at once, but if there is "a will there is a way" (F1, 2010). This process requires organization, frequent review, policy efforts, political will and action, social will, experiments, efforts, education, tolerance, determination, and time that might reach to decades of trial and error; it is, in fact, "not a one-off exercise" (P, 2010).

An expert argues that public consultation based on "Islamic ideas of shura"[3] could be ideal for Dubai. At present, the only way to hear public opinion comes through call-in programs on the radio (P1, 2010). The one place where the Emirati people and residents express concerns and disputes is the Internet and radio channels like Noor Dubai, Ajman, and Sharjah. Live radio broadcasts and online discussion forums are popular ways to freely express criticism, disagreement, and dissatisfaction. A scholar argues that the UAE has been pioneering in this type of "Internet and radio democracy" (Davidson, 2008). Most of the Emirate's municipal departments, ministries, and prominent decision-makers host interactive websites that provide electronic forums for discussion, criticism, feedback, and recommendations. Although these types of forums are active, widely appreciated by the public, and have fairly bridged the gap between the city officials and the public, still the state governor controls the decision-making. The people can express their opinions and concerns; however, they cannot make a direct change in planning decision-making processes because they do not have votes and are not empowered.

Public participation is currently being tried and explored in Abu Dhabi. The success of participatory approaches in Abu Dhabi shows that this might also prove possible in neighboring Dubai; "there is always a first time" (E, 2010). In Abu Dhabi, "public participation was experimented as an extension of the Diwan, where leadership sits with residents in direct conversation about their needs and of a Majlis, where community members engage with each other and discuss local issues" (A2, 2010, as cited in Lia Gudaitis, Al Manakh 2, 2010).

It is definitely an underestimation to assume that the local population in Dubai might not share interest in participating in a process that considers their needs and

[3] Shura constitutes a major cardinal principle in the Islamic perspective on socio-political organization and decision-making that requires public input and participation to reach a just and fair decision.

empowers them over time (R, 2010). The public should have the opportunity to debate, reveal their views and concerns, realize the city's issues, propose different design solutions and alternatives, generate involvement in the decision-making, and claim responsibility for their opinions. There are many "rungs" of the "ladder of participation" (K3, 2010). For the case of Dubai, implementing public participation can move through a series of "incremental levels" starting from consultation, dialogue, and exchange in which the power holders educate the participants, listen to them, support their voices, give them confidence, encourage teamwork and partnership, establish trust, promote their design and planning vision, and build social capital until it reaches higher levels of public involvement and empowerment in decision-making processes (K3, 2010). According to Expert (E1), "bottom-up and top-down approaches have to be combined" in planning processes. This indicates that power delegation should not reach the level of "citizen control" such that the public holds the absolute power and the majority of decision-making votes.

Building new neighborhoods in Dubai will certainly necessitate public participation in the future. For many years, the housing of the local population, in which the standards of living and land size remain very high, received great subsidies from the government (F2, 2010). But this might not continue along the similar path and the local authorities in Dubai might minimize the living standards by reducing the lot and unit size through time. In fact, the last three decades witnessed a reduction of lot sizes in subsidized neighborhoods. In particular, three units per acre was the net density of Dubai's subsidized communities that were planned in late '80s and early '90s, with an average lot configuration of 100' X 150', with 60% lot coverage. Four units per acre equaled the net density of Dubai's subsidized communities planned in the late '90s and early 2000, with an average lot configuration of 100' X 100', with 60% lot coverage.

In the future, Dubai may take interest in increasing its density through decreasing the size of the subsidized lots once again. This action might garner serious debate and criticism among the natives in Dubai. Therefore, the public should participate in discussions and decisions associated with "urban transformation" strategies and policies (A3, 2010). This would enable the public to be aware of the facts, reasons, and realities that drive the city's new policies and direction of urbanism. With no public involvement, the public will have difficulty accepting the decisions and regulations in regard to building high densities through reducing the size of housing units and lots (F2, 2010). Activating participatory approaches requires a lot of effort, time, resources, and organization to manage and to educate the public, but it is a must for Dubai, especially in the coming years (A5, 2010). Even if the beginning of participation is oriented towards natives, it will definitely change over time and include the residents who invested in the city or stayed for many years (K4; R, 2010).

When it comes to the implementation of urban policies, bold and "radical steps at every level of the society, culture, and governance" should be considered (R3, 2010). Without initiating a transparent decision-making system based on solid policy and public needs, rather than on market force and rapid investment return, public participation cannot be real in Dubai. Dubai needs a fundamental transformation of its authoritarian system that controls the planning processes and public policy (C, 2010). Big ideas like public involvement in planning require substantial regulatory actions through political and legislative processes; otherwise, it will never be adopted.

Public participation does not only require a political will and action, but also it requires determination and enthusiasm from the civil society. If the public in Dubai thinks that the current centralized system of planning decision-making is fair enough to function as a sponsor for people that decides on behalf of them, and if they do not see a

need for change because the officials who control the planning and decision-making are good decision-makers, good executers, good judges, and good assessors, then participatory approaches will make no sense in Dubai. The probability is that there will be many in the society who are "accustomed to and comfortable with" the planning officials who claim "to know better" than regular citizens. In Dubai, this portion of the public is usually closer to the government and they are "the representatives of rich corporations, not the people"; therefore, there will always be a top-down approach benefiting them at least in terms of planning (R2, 2010).

Part of the difficulty of implementing participatory approaches stems from the fact that the public in Dubai lacks a clear definition (I, 2010). Another part of the difficulty is that there are many publics in Dubai, each with different and competing priorities, norms, values, beliefs, and living standards (K4, 2010). There are Emiratis, expats who stay for short periods, expats who stay for long periods, expats who have already been in the city for many years and even decades, expats who are greatly invested in the city, and temporary migrant workers who stay for approximately two years (I, 2010). An expert argues that this is not a "unique problem." Issues related to large immigrant populations are common in many cities (F1, 2010).

According to some experts on the panel, it will be more viable to involve at first the Emirati nationals with a natural stake in the city, and then later the foreign residents based on years spent in Dubai or the UAE, and the amount they invested in the city (F1; K4; R, 2010). As for the temporary migrant workers, it will not be effective and practical to engage them in planning processes. The temporary nature of their stay in the city does not give them a sense of loyalty to Dubai and the UAE (N, 2010). As long as there is no mandate to adopt a regulatory agenda that legislates minimum wages and working laws, involving this segment of the public in city design "may not serve in the best interests of

the long term sustainability of the city" (S, 2010) because there is no reason for them to become "truly interested in the fate of the city" (R2, 2010). Another major difficulty related to this population segment is that migrant workers are less educated compared to other demographics (M, 2010).

Another constraint of participatory planning lies in that "genuine" and meaningful participation in decision-making and implementation is rare in any culture (J, 2010). Listening to the public and understanding their perceptions and needs are always important, but participatory planning is "not always reflective of the population even in more democratic societies" (G, 2010). In many settings, participatory approaches usually benefit a small group of people who have the strength, patience, and insistence to cultivate involvement in such processes (G3, 2010). In addition, many individuals mostly consider aspects that affect their own lives, not the collective public interest, the disadvantaged people, future generations, neighboring communities, long-term implications, or the health and well-being of the environment or the region as a whole (E2; S, 2010). A more effective and meaningful public participation can be achieved through expanding and equalizing the discourse; providing a better and richer atmosphere for communication, debate, and negotiation; and giving voice and power to excluded communities and interests.

Another limitation of participatory planning approaches lies in the intense domination that politics holds over the process (G3, 2010). Community-based planning involves multiple layers, interest groups, and institutions, and also deals with cases where power, risk, and level of meaningful participation typically are rare and highly unequal, labeling the entire process as "a matter of politics" (G3, 2010). In fact, issues of manipulation, unequal access, power relations in the political and public realms, and information dissemination in planning communication and discourse almost encapsulate

the nature and the reality of planning processes. In most common cases, the recommendations and visions of developers, city officials, the public, and experts conflict with one another. Therefore, the central target in this setting is to shift and open up discussion and information exchange to better balance conflicts generated by every party in the process.

In any geographic setting, decades of trial and solid work are required to make participatory planning more meaningful and effective (B1, 2010). Nonetheless, this approach is "still an ideal that can be aspired toward" (G, 2010). Dubai is not the only setting struggling with issues of unequally power relations and distortions. A pattern of distortions in information, politics, and contextual and uneven power structures that dominate and affect planning actions in public realms, public institutions, private agencies, and political organizations surly holds a prominent place in many municipalities (F1, 2010). The following two examples, provided in the Delphi, spell out this issue:

> 1. Stuttgart, Germany, is currently witnessing protest by the people against a new train station project (Stuttgart 21), which was planned for more than a decade primarily by experts and politicians, away from the general public. As projected costs exploded, and with the prospect of the inner city being turned upside down for years, an increasing share of the population wondered if the project was really worth it. Protests mounted and several experts believe that projects of such magnitude in Germany in the future may only be carried out with intensive *involvement* of the people (F1, 2010).
>
> 2. Another expert states that participatory planning is no substitute for good planning. Here in the USA in my career I have on more than a few occasions watched as professional planners stood back and permitted political elites to use the "participatory" approach to hijack the planning process and impose a poor plan on the community (G1, 2010).

Even though public participation in planning entails a complex process everywhere, and there might be additional complications in Dubai (S3, 2010), panel

members commonly agreed that this process truly plays a fundamental role in all senses and should be implemented, although it is a "long shot" (B1, 2010). For example, in the U.S. context, public participation did not occur over a couple of years, but in fact over decades of trials and experiments. Planning scholarship and practice constantly experience new methods, techniques, and paradigms that add to or change the conventional methods of thought in city planning and development.

In the U.S., for example, planning theory and practice have significantly changed over the last six decades as the field of planning has shifted from domination by the comprehensive rational model in the 1960s to more heterodox approaches incorporating pragmatism, incrementalism, and communicative action planning. Through different political and paradigmatic shifts, the field has transformed from having a predominant orientation towards physical design and comprehensive rational planning to being more integrative and focused on the social, natural, and physical organization of urban settlements at different spatial levels, ranging from local neighborhoods to mega regions.

The rational-comprehensive model lost ground due to prominent failures on the ground of the major planning and urban interventions in the 1950s and early 1960s, such as the building of an interstate highway system through vibrant urban neighborhoods, urban renewal, and large-scale, segregated, public housing projects. These failures reinforced the incrementalists' claims of over-reach but also put into relief the flaws of a top-down technocratic decision-making process that systematically excluded many communities directly affected by these projects. As a reaction to these top-down physical planning interventions, justified on technical/efficiency grounds only, Jane Jacob's writings and "theoretical foundations" and Davidoff's concept of advocacy planning gained wide prominence. Davidoff's model, for example, emphasized that physical planning activities must be based on a much deeper understanding of social and

demographic characteristics. The main point is that the failure of large-scale physical planning and transportation interventions, that were based on top-down approaches and technical grounds only, pushed planning decision-making, theory, and processes in new directions with advocacy and equity planning, and eventually the turn toward incrementalism and communicative action that fairly considers public input in the planning process.

The discussions and facts above about the transformation in planning practice and decision-making indicate that there should always be a first step and concentrated effort combined with political and social will, tolerance, and a "well coordinated" campaign towards making a change in public policy and decision-making processes (R, 2010). As it mentioned previously, if there is a will and determination, there is always a way to make a change.

Chapter 6: Government Interviews: Findings

INTRODUCTION

In this chapter, I present the findings from the interviews conducted with seven government officials. In these interviews, the government participants were asked to define constraints for implementing some expert-defined urban design strategies including: walkability, bike infrastructure, a macro-network of transit, interconnected street systems and short blocks, green and social spaces in the urban fabric, diversity of residential offerings, diversity of land use and building types, density levels, environmental design of buildings, and public participation in city design and development. The seven participants also were asked to indicate, from the aforesaid strategies, the five most important and influential strategies to the future development of Dubai. In addition, the government participants were asked to express their opinions about implementation opportunities and possible policy initiatives that might support the implementation of these proposed strategies.

MAJOR FINDINGS

The major findings in this chapter are organized in the following categories:

1. Constraints on implementation divided into central constraints and single, specific constraints.
2. Identification of most effective strategies
3. Opportunities for implementation.

Constraints

This research organizes the major interview findings related to major constraints that impose fundamental limits on the implementation of some of the Delphi generated urban design strategies in a hierarchal approach into two parts: (1) central constraints predominantly related to the dynamics associated with the political, administrative, and decision-making processes which limit implementation of the total number of urban design strategies identified by the Delphi experts; and (2) constraints that restrict the implementation of single, specific design strategies. In other words, beneath central constraints there lie several micro constraints that prevent implementation of individual strategies.

Central Constraints

Based on the generated data from all seven interviews, I defined eight central constraints that impose fundamental limits on the implementation of the aforementioned ten urban design strategies. The order of the constraints does not reflect a ranked preference identified by the researcher or the interviewees. The central constraints are listed below in no particular order.

1. Creating international image of global city; this led an explosion in mega-scale development that was radically different from earlier from of developments; priority was given to large-scale projects over small scale community details;
2. The lack of a central planning authority and a shift of power from the public agencies to certain quasi-government corporations after 2000 without creating a system that coordinates between the city's agencies and corporations;
3. The lack of a central and comprehensive framework that provides planning guidelines for controlling developments;

4. The rapid pace of development in the last decade and the concurrent lack of planning expertise and skills, and the lack of institutional and financial support and motives that allow public planners work effectively;
5. The lack of awareness related to urban design practices among public and private agencies; and insufficient urban design skills among local and expatriate designers;
6. Market forces that fuel competition between major city developers and an approach to development among city developers that does not emphasize coordination with city officials nor with each other; and
7. Ambiguous and non-transparent political and administrative processes that prevent implementation even following project approval.

Creating International Image of Global City

The first constraint that affected the implementation of most of the Delphi driven strategies is the change in Dubai's urban typology and regulatory agenda through time. Historically, the old Dubai, with its traditional urban forms and courtyard typologies was actually sustainable since it worked effectively with the local, economic, and environmental context of the city. However, the "adoption of Western codes in the early seventy's (1971)" that imposed rigid regulations like "setback and subdivision standards." These rules steered the urban patterns and development typologies from being culturally and climatically responsive toward low density development and an intensive use of automobiles. The urban fabric of the past was dense, compact, and more walkable because "the number of people and their needs and aspirations" were modest. The design of urban areas worked to suit people's social, environmental, and economic needs, which in most common cases were very simple and easy, and yet responsive to the place. Now

in modern days, the number of people and their needs and aspirations has dramatically increased, and the amount of "regulations, requirements, and bureaucracies became more complicated than the past."

Dubai's urbanism prior to oil discovery was compact as many other Arab settlements in the region. Historically, the Bedouin-Arab and immigrants possessed an astonishing knowledge and awareness of the potential of their particular culture and environment. Their wisdom and experience enabled them to dwell sustainably in their harsh arid climate, by directly taking into account the social characteristics and environmental qualities of the place. The word desert as defined in the western dictionary means "any place lacking in something." But Dubai's urban fabric before the discovery of oil was socially and climatically responsive.

When the United Arab Emirates (UAE) formed in 1971, the British political and military presence in the area reduced. Since that time, modernization combined with the application of Western principles and design regulations has emerged. For instance, Dubai adopted a "Westernized" code of building regulations that has since resulted in the abandonment of the traditional knowledge in city design and development (Tyrrell & Astridge, 2008). Modern Western principles traces their origins to within the temperate regions of the northern hemisphere; most of its ideas are greatly based on principles and design solutions made for regions that are seasonal and have different climatic and cultural conditions. When applied and replicated over time, this western model with a huge emphasis on the global image and real estate speculation in the twenty first century helped the development typology of Dubai shift from locally and culturally oriented in the '60s; to greater dependence on the Western codes that caused sprawl and low density developments in the '70s and '80s; to its current global orientation in which the urban

typology is dominated by mega structures, super highways, ethnic separation, and market force.

A government official interviewed argues that the change in Dubai's urban typology and morphology from the traditional fabric to the dependence on Western codes and on to the global era also relates back to the backgrounds of the designers and builders who developed the city. For example, the self-sufficient and integrated traditional fabric of historic Dubai reflect the influence of the Persian architecture and knowledge combined with the organic and private character of the Arab urban patterns on Dubai's urban morphology. The urban form of the '60s, '70s, and '80s on the other hand, demonstrate "the surveyors, technicians, and civil engineers influence." As they dominated the municipal council in Dubai, their technical and engineering background affected the city design. After that, in the '90s, the city adopted a development model massive in rate and scale and yet disconnected from the city's cultural and environmental context. The greater part of the urban and architectural design work of this era was outsourced, mostly designed and implemented by North American, Australian, East Asian, and European firms. The lack of indigenous talents and specialists in design led to an enormous collection of urban morphologies that have been collected from all over the world (Wiedmann, 2008). One interviewee argues that during the boom, there were simply not enough local specialists in the country to supply the demand. As a result, Dubai relied on international designers and firms. The main problem was that the outsourced specialists and designers involved in city development were not aware of the cultural, social, and environmental conditions of this region in the gulf.

Shift of Power

Another constraint affecting the implementation of most Delphi driven strategies is the shift of power and authority from the public institutions (mainly represented by Dubai Municipality) to private corporations. According to one interviewee, up until the year 2000 Dubai Municipality was in charge of city planning. Then the power shifted to semi-government corporations or what we call "developers." In 2000, private firms became authorities as well; "they had their approach, approval, and blessing from the Sheikh directly." These large scale projects were "successful when started on small scale," but when several corporations emerged in the market and the amount of projects started to grow up on "mega scale and get next to each other, they failed." The correlation between these firms was based on "competitions" and "conflicts" rather than "integration, coordination," and arrangement because each firm attempted and aimed to "stand bigger" than the other in the market.

The statements above are supported in statements made by Saeed Al-Muntafiq, head of the Dubai Development and Investment Authority, who said that the government runs Dubai as a private business entity for the sake of the private sector, not for the sake of the public or general welfare (Davis, 2007). According to a report published in *The Economist*, the competition between the quasi-government firms— predominantly Emaar, Nakheel, and Dubai Holding— kept them on their toes. Emaar built Burj Dubai, the world's tallest building. Then, Nakheel introduced its one kilometer tower that would beat Emaar's record. The government stood behind these companies, giving them the support, free will, and autonomy to overextend. The public institutions did not have any legislative power to assess their work or impose a policy agenda to ensure that their developments are coherent with each other, and with the city's social and environmental context (A New World, 2009).

These Dubai-based multinational real-estate developers, majority-owned by local and political authorities, create a very "authoritative mix of business and politics" that might be "prohibited" anywhere else, but makes them extremely forceful and "powerful" in Dubai (Zacks, 2007). This kind of government-private partnership, based on competition rather than collaboration or cooperation, Sahtouris (1998) describes as a "repeating pattern" in evolution "in which aggressive competition leads to the threat of extinction, which is then avoided by the formation of cooperative alliances." Partnership is viewed as a development toward ever greater integration; however, if a competing and conflicting relationship is the cannon among these corporations, then they would eventually self-destruct and vanish from the market (Sahtouris, 1998). During the economic decline most of the government-controlled companies that had strong local and political ties and were the powerhouses of Dubai's urban boom such as Nakheel and Dubai Holding lost ground and domination in the market, affirming Sahtouris's (1998) argument.

In one interview, a government official who is an expert in urban design and housing said that "I am afraid to say that the city gave too much of freedom" to the private entities. They were allowed to build whatever they want as long as they were "successful," and the term success in Dubai was mainly related to "profit generation and investment return." What Dubai lacked was a "solid criteria and guidance of measuring success" and controlling developments. According to one interviewee, success is not only connected to marketability and selling rates but also to social satisfaction, environmental quality, and cost implications.

A local authority interviewed argues that the planning guidelines enforced by Dubai Municipality are well-established and are approved by the "highest authorities in the city;" he continued "I can give you copies if you want; all documents are preserved in

my office." But unfortunately the planning department did not have the power and the authority over quasi-government corporations that emerged during the boom. As a result, the urban growth was unsystematic, rapid, and "chaotic." The town planning department in DM have a group of planners, yet a small group (five planners), but have at least a minimum of "20 years of experience." They all are educated from most "prestigious schools." They are good "brains" in the planning department but with "no power." But, to experience action and witness implementation, knowledge and education are not enough. Planning should be an "authority itself," not only a small department within "30" other departments in Dubai Municipality.

As argued by one interviewee, developments that were under Dubai's Municipality control had to follow the agency's well-established requirements. However, during the boom, investors with a bad faith intention "rushed" to receive the free zone title exemption from public agencies standards and requirements. Once developers receive the free zone title, they are required to comply with different standards that are designed and enforced by two private entities (JAFZA and TCOM). One interviewee argues that these private entities "do not impose strict" and "well-established" requirements and regulations on developers as the public institutions do.

A government official interviewed argues that we cannot develop a city in a "coherent way" with multiple authorities; there should be only one "commander" in the city. Private entities "look always for profit and minimum expenses not good planning." He continues, investors usually take the "easiest path" that requires minimum set of rules. The majority of big developers prefer to receive the "free zone title" to work with minimum restrictions, great flexibility, and more freedom instead of waiting "several months" to meet the public agencies requirements and receive the permits. One interviewee argues that we cannot create "a sustainable city" without having an organized

planning council that manages, arranges, and controls the multiple authorities in Dubai. Not having a strong and central planning authority resulted in "so many problems" that are not "easy to solve now."

Lack of Coordination

Lack of "coordination, integration," and arrangement between the authorities in Dubai represented in several public institutions and multiple quasi-government corporations is defined by all interviewees as a major constrain that imposes huge limits on the implementation of the experts-driven urban design strategies. One authority interviewed argues that the whole planning process in Dubai is "new." Before 2000, the rate of urbanism in Dubai was small in scale and size with only a small number of projects scattered throughout the city. The large developments, or "mega era" started 20 years ago, around 2000; Dubai is really an emerging city which grew quickly and beyond all expectation. A government planner interviewed argues that Dubai Municipality "is not responsible" with what happened in the booming period because the agency did not have "power over" developers who were investing in the free zones. Everything was based on "individuals' preferences and market demand;" developers were building according to minimum standards and "their own preferences and rules." The participant continues, we cannot build cities like that; "city building is not only dependent on developers experience, preference, and economic aspirations." In order to build a good place, Dubai should establish "an integrated and central planning authority" that has power and yet embraces coordination, planning wise regulations, and institutional arrangements.

All interviewees argue that a major problem in Dubai is that there are several planning authorities and development organizations in the market. Even worse, the strategies and priorities of these entities "do not integrate" with each other. There is no

"one" planning body that "legislates strategies" and "overrules" the multiple authorities. Each one of these authorities and organizations work within their "own" development framework and agenda. The lack of coordination between these joint ventures and Dubai's public sectors like Dubai Municipality and Dubai's Water and Electricity Authority created patchwork of themed cities that do not respond and integrate with one another and the surrounding environment. Another government participant argues that coordination and arrangement only occurs through a committee called "Sharaka" (the Arabic term of partnership) that links the planning department in Dubai Municipality with other private agencies such as Nakheel. The official stated that planners waste a lot of time to deliver and negotiate their planning thoughts and ideas with different private agencies that are already supported from "top authorities." With a sense of frustration, the interviewee continued, "Talking about this fact is hurtful and very disappointing."

The lack of a Central Planning Framework

All interviewees stated that the lack of a central and comprehensive framework that provides planning guidelines for controlling developments is major constraint in Dubai's urban and policy agenda. One interviewed government official believes that a main constraint that imposes fundamental limits on most of the Delphi generated strategies is "the lack of planning guidelines." Planning regulations and standards in Dubai are very "rigid" and in fact not "enforced" in many cases. Dubai needs a set of "innovative" and effective planning guidelines that applies to all sort of developments. There must be design blue prints or "benchmarks" so developers can follow to generate "a coherent city fabric." If Dubai has a solid planning system with a well-established regulatory agenda, even the planners who do not have "long experience in city design" can benefit, learn, and enhance their knowledge from the application of these guidelines.

One of the scholars argues that Dubai grew rapidly and randomly not only because of the concern about oil depletion or the conservative top-down political mechanism in city planning and design, but also because of the Dubai's relaxed approach or the "soft stuff" represented in: "the lack of planning regulations, and the liberal social environment" (Molavi, 2007). The majority of authorities interviewed (four out of seven) argue that the attempt to become a global city as fast as possible has opened the door for every kind of investor who faced very relaxed standards and requirements. This statement is asserted by Molavi (2007) who argues that with no corporate or income taxes, a top-notch banking system, "a relaxed building and planning regulations," and a market norm that favors selling and profit; Dubai embodies the old Sheikh Rashid's motto "what is good for the merchants is good for Dubai" (p. 103). According to one interviewee, during the boom everything was "emerging too fast;" experts and agencies did not have time to think, explore, assess, and research. The lack of an effective regulatory agenda led to a rate of development that is rapid and enormous both in scale and in volume. Today, however, the economic deficit which resulted in scaling back on many projects created a great opportunity for the private and public institutions to take pause and to consider the future by readjusting and reassessing their development framework and priorities.

Rapid Pace of Development and Lack of Expertise

The rapid pace of development in the last decade and the concurrent lack of planning expertise and skills, and the lack of institutional and financial support and motives that allow public planners to be effective are defined by four interviewees as other fundamental constraints on implementation. According to a couple interviewees, Dubai expanded largely and rapidly; the city needed huge amount of "planners" to handle each area. Everything in Dubai was moving very fast, the staff did not have the "time"

and “tools” to think appropriately. Within this pace of development, Dubai needed talented and skillful staff, not all of them, but at least “few” within every agency.

Part of success in city design depends on how the planners think and work, and in what atmosphere. A government planner interviewed argues that most of the planners in the planning department in DM are thinking critically and effectively, but there are “only four or five planners.” A bigger team with “motivation, authority, and institutional support” is needed. The official stated the worst part is that in their communication and work with other agencies, they “do not communicate with planners.” Instead they deal with “administrators” who cannot understand their language or appreciate their planning ideas.

In one interview, a government planning agent expressed his feeling with frustration and aggravation when told me: “look at this paper; it is here on my desk to verify if the map of this land is correct.” He continued, “This shouldn’t be my duty; my task is to think, brainstorm, and prepare strategies and tactics for the city. A drawer man or an administrator can do this job for me.” Planners conduct studies in this department mainly on an individual basis and “personal initiatives.” In most common cases, higher authorities do not support, appreciate, or promote our work and ideas. Once again with a great sense of disappointment, the official said “planners are not getting their right in Dubai so far.” Dubai does not even have the “basic foundations of planning authority and work.”

Lack of awareness related to urban design practices

Two government planners interviewed argue that another major constraint that puts limits on implementation of most of the Delphi generated strategies is that urban design skills are missing in practice. The planning unit in Dubai Municipality has few

experts in architecture and planning; however, experts in urban design that "tie" the two fields together are missing. There was a local Emirati who was a "Columbia" graduate and an expert in urban design and architecture, but unfortunately the agency "let him leave." The official stated, this expert was "the mastermind" in urban forms and physical design. Based on the official's argument, what Dubai and the planning unit need is more "urban designers;" otherwise the city will never "progress" and succeed in place making. The statements above are asserted by another interview who argues that designers and officials in Dubai should most importantly appreciate urban design elements and qualities.

One interviewee emphasizes the argument that urban design as a profession "never reached maturity in Dubai." Because the application of urban design principles was absent in practice, the resulting end product became an urban form that is fragmented, disconnected, and "chaotic." Some people mix between urban design and planning. Urban design provides details, color, physical elements, 3D massing, texture, linkages, human spaces, etc. This level of details, especially at a neighborhood scale, does not exist in Dubai. Examples of urban design practice could be seen in some regions in the Gulf. Kuwait for instance, has something called "Building Facades Committee." This committee wields the power and authority to force developers to follow several urban design rules related to color, street elements, materials, space design, linkages, heights, street frontages, billboard design, etc.

Non-transparent Political Decisions

As defined by three of the seven interviewees, ambiguous and non-transparent political and administrative processes that prevent implementation even following project approval are another central constraint on implementing the experts design ideas. Two

interviewees argue that many planning ideas receive approval but then "disappear" during the implementation process due to several reasons: (1) planning as an authority is "very weak," the decision-making in Dubai is not "planning-oriented;" (2) city planners have a feeling of an unrelenting "struggle" in dealing and negotiating with officials who do not have planning backgrounds or do not appreciate planning ideas; (3) many planning proposals receive approval from the planning unit and general director of DM, but then "disappear" through administrative processes by "allocating" the work to another department or agency that does not even have a background about the underlying principle of the idea; (4) some ideas do pass through the administrative procedures but then "higher authorities" call to halt the execution; and (5) the planning unit in DM does not have the communication skills and power to market its ideas through the implementation process.

One interviewee argues that planners in DM regularly explain their planning ideas and proposals through discussions and presentations; usually their ideas pass through and receive approval and appreciation from the planning unit staff and general director of DM. However, once it comes to "implementation" they suddenly receive a letter stating: the planning department is no longer in charge of this idea; it has been "allocated" to another department. One interviewee argues that in most common cases our work gets allocated to other units or agencies that do not even have an idea or background about the basis of the work and its objectives. One interviewee said that "we do receive preliminary approvals, but we do not experience implementation." He also stated that even the head of the planning unit does not know why these ideas "die rottenly" and get allocated to other departments or agencies.

During one interview, a government authority discussed with me a real case in which one of the proposals that received an early approval died during the

implementation process. The planning department purported to introduce a "neighborhood watch strategy;" DM approved the idea but then it was stopped. The official stated, "I really do not know for what reason." The planning department wanted to designate a week to educate the public in neighborhoods about the different aspects and attributes of this idea. The proposal even received approved by the general director of DM, and yet not implemented. The official continued with frustration and disappointment that whoever stopped this idea does not have the "flame that we, planners, feel from the inside." The interviewee said that most of their planning ideas generated in the planning unit "die" through the implementation process because they encounter rigid bureaucracies and procedures. In most situations, public planners deal with government and private sectors officials who do not have any planning and urban design backgrounds.

In another interview, a government official said that

> I have enjoyed discussion with you because we both speak the same language, which is a design and planning language. But if we have a third person with us that does not have a planning background or does not [appreciate planning,] our talk will be [odd and very strange] to him/her.

The official stated that this is what town planners usually face when they present their planning work and efforts to other departments and agencies. When the planning unit resides within another "30 departments in the agency," planning ideas and work will not be given priority for implementation. This statement is asserted by another interview who argues that the planning department in DM is "lost;" the unit should have a "very strong" institutional power to "enforce" its ideas and reach its objectives within the existing government system and framework.

It is generally claimed by all interviewees that planning "does not exist" as an authority in Dubai. In fact, planning is a small "powerless" department. The whole

"authorization" system in Dubai is not "planning-oriented." Most of the planning ideas the general director of DM cheerfully approves but then they disappear during the governance system or implementation process. In all seven interviews, interviewees insisted on one explicit term: "planning authority." Interviewees argue that power should be "delegated" to the planning unit in DM, or Dubai should establish a central planning agency that overrules all private and public agencies involved in city design. The decision-making system in Dubai is "multi-dimensional, not transparent, and very heavy." The proposed solution involves initiating a planning agency that has control and power, and this agency should be directly connected with the "Sheikh" and highest authorities, as Dubai's neighboring emirate, Abu Dhabi, established. The planning unit already has many well-established proposals, studies, and ideas to create good places, but still require "more staff" coupled with "legislative power." One interviewee argues that planner's next "battle" is related to "communication and marketing policy." The battle is "how to market" and enforce the planning ideas and requirements discussed above among the planning unit itself, the public in Dubai, and the highest authorities.

Micro-Constraints

Walkability (Pedestrian-friendly environment).

The results of seven interviews reveal that the following constraints restrict the implementation of a pedestrian-friendly environment in Dubai:

1. Dubai is a car oriented city, spatially designed to facilitate and prioritize automobiles over pedestrians.
2. Many metro stations do not connect with pedestrian facilities;

3. Dubai's land use system is based on the development of segregated uses, not mixed-use developments, which makes facilities and daily destinations far from residential uses, and thus not walkable.
4. The hot weather in Dubai places a major constraint on walkability almost half of the year;
5. Peoples' behavior, attitude, and preference predominately orient toward private mode of transport; Dubai residents are described as "car-oriented people."
6. The minimum requirement of R.O.W (60 feet) restricts the implementation of friendly and narrow shaded streets that promotes walkability.
7. The design and control of the R.O.W is not under the town planning authority, but the RTA ,which prioritizes technical and engineering aspects over design and place making aspects;
8. The extensive use of asphalt in every street psychologically encourages car movement and awards dominance to vehicles over pedestrians.
9. Cost and budget to maintain the sidewalks and landscaping is another constraint, especially in projects developed by public agencies.
10. The lack of dedicated space for pedestrian facilities both in public and private developments.

A government official interviewed argues that Dubai is "a car-oriented city." The "entire structure" of the city is designed to "promote automobile use." In fact, the city's structure with its large projects of road expansion and widening, multi-lane freeways, and high speed roads are all in all planned to prioritize and "facilitate car use." According to one interviewee, the "level of motorization" in Dubai is high and greater than the average in most international cities. The rate of car ownership in Dubai is among the highest in

the world; it is even higher than its neighboring Emirates. There are almost "570 cars per one thousand people" in Dubai. This extreme rate of car ownership and utilization in Dubai is attributed to social prosperity, availability of various finance options, and financial capability of people. The statements above are asserted by another interviewee who argues that in Dubai "priority" is given to automobiles over pedestrian infrastructure and mass transit. According to one interviewee specialized in urban design, that the "asphalt" texture used in all streets "physiologically" encourages people to drive instead of walking or cycling.

According to one interviewee, if Dubai wants to embrace walkability, it should "limit" the utilization of cars and "enhance the public transit ridership." If Dubai plans to promote walkability it must expand its public transit networks and facilities, and vice versa. The public transportation system is weak and inefficient in Dubai. Many of the current metro stations are not accessible and not well connected with pedestrian facilities. In Dubai, if people would like to move around the city or to make multiple trips, they mainly use their private automobile because an integrated public transit system is not an option. Public transport share of the entire mode of transportation in the city is "6 to 7 %," but the RTA is targeting to increase this rate to "30% in 2020" by building more Metro lines, tram lines, and feeder bus systems, integrated with each other and all linked and accessible by pedestrian facilities.

Another major constraint on walkability is that destinations and daily uses in Dubai are located within long distances from where people live. The current land use system does not promote mixed use development and diversity, but rather promotes separation and mono-functional uses. People do not walk in Dubai because destinations are "within long distances," mainly "reachable by car." There is a problem with how different uses and services are distributed and located from where people live. One

interviewee argues that if Dubai wants to promote walkability, people should be able to walk to their destinations "shortly, comfortably, safely, and easily." But, if the plan entails building services and daily amenities like mosques, grocery stores, and schools far from residences, it should also include a convenient and efficient macro-system of public transit within neighborhoods, connecting residences with services. If this idea is implemented, transit stops should be within a maximum of five minutes walking distance from where people live.

All interviewees concurred that the hot climate in Dubai is the "biggest" constraint on walkability. A local planner interviewee argues that even if Dubai incorporated walkways in neighborhoods and made transit stops within short distances from where people live, the summer heat would substantially limit walkability. According to one interviewee, the hot and dusty climate in Dubai affected people's travel "attitude and behavior." Because the weather is very extreme in Dubai, walkability is not "taken into consideration" or at least not taken seriously when "neighborhoods are planned." The majority of people in Dubai prefer to use their cars because, quite simply, no one enjoys an uncomfortable walk in heat, dust, and humidity. The very harsh climatic conditions in Dubai prompted the city to design air-conditioned pedestrian walkways known as "bed ways" in high density areas (e.g. especially around the metro stations); once implemented, these protected areas will help people to not "suffer" and "enjoy walking" in summer.

The aforementioned statements are affirmed by another interviewee, specialized in transportation and mobility systems, who argues that even if the weather is good for walking five or six months during the year, and even if the walkways are shaded and interconnected, walkability will still be a major concern during the hot season, especially if the walking distance is more than "500 meters/1640 feet." The official stated walking

beyond “500 meters is unacceptable; around 500 meters is acceptable; from 200 to 300 meters (656 to 984 feet) is very acceptable.” There are some new standards and guidelines that regulate walking distances in Dubai. For example, facilities and green spaces should be within “400 meters” or less form where people live. Even the locations of mosques are planned to be within short distances, a maximum of “200 meters” from residences. According to a government planner interviewed, “we do not expect that a man will walk to a mosque of 2 km away from his house even though he is very faithful.”

Another government official interviewed argues that the climatic conditions in Dubai places major limitations on walkability, but yet walking in hot regions are considered to be safe and not dangerous if compared to cold regions. The snow in those regions makes walking risky and dangerous. In fact, people might slip, fall down, and get injured. In many cases people should wear special shoes, multiple layers, and heavy cloths. Walkways, streets, and entrances must be cleaned frequently from snow, another inherent burden. In contrast, cold weathers limit walkability, but not as seriously as hot weathers do. In cold regions it is dangerous to walk and people might suffer to reach their destinations, but in hot regions people suffer, and also get agitated and “sweaty” so once they reach their destination they will feel “embarrassed” to meet with others unless they “shower” and change their clothes.

A government official interviewed argues that walkability also relates to “biological aspects of human being.” Most of the population segments in Dubai can walk very comfortably during five months in the year. However, some people like the “Indian community” can walk most of the year, even in summer. Their “bodies” can accept the heat because they walked in their home country most of the year, even during the hot and humid season. The local and Western people bodies, on the other hand, cannot survive

the heat because the Western are used to cold and temperate climate and the locals are used to move around by cars.

In 2007, The Road and Transportation Authority (RTA) emerged as a partner to Dubai Municipality in designing the road networks and transportation system. The agency approved what is known as the "road section" or the right of way (R.O.W.) which includes sidewalks, bike lanes, landscape, car lanes, and parking. The agency required a minimum R.O.W of 60 feet and a maximum of 80 feet including: 2 meters/6.5 feet for bikes; 2 meters/6.5 feet for pedestrians; space for greenery; space for infrastructure lines; and one or two sides for on-street parking. These standards received approval and it is supposed to be a "MUST" in future projects but ironically the 60 and 80 feet right of way is currently dedicated for cars and median islands; there are no shaded pathways, trees, or bike lanes within the street section as it was proposed and approved by the RTA. The interviewee did not provide any explanation of why these standards are/were not enforced in neighborhood planning and design.

According to one interviewee, the emergence of the RTA as an independent agency led to many design and management related conflicts with the planning department in Dubai Municipality. As an example, the priorities of the RTA are totally different than the town planning priorities. The RTA's main goals center on ways to reduce congestion and car demand on streets through designing more roads and highways, imposing tollgates, and expanding the public transit systems. However, the town planning concern and priority strive to create an urban setting where people can "walk, relax, entertain, and live." In order to solve some of the conflicts between the two agencies a government official interviewed suggested that the RTA should be responsible for the design and implementation of "major, metropolitan, or national roads;" while the "local streets" and roads with a "speed limit of less than 60 KM" should be allocated to

the planning unit in DM because the RTA does not have "the experience and design capability to create pedestrian friendly streets." In fact, their design team mostly consists of engineers, surveyors, and technicians.

In contrast to public developments, some private developments in the free zones incorporated shaded pedestrian pathways and amenities. These private developments usually require service fees to maintain their community landscape and facilities (Figure 8). In contrast, public projects such as subsidized housing districts do not include any shaded pathways because the national housing districts are based on the "rigid RTA standards that require super blocks and a minimum of 18 meters/60 feet right of way, mostly utilized for car lanes," and median islands. However, some older national housing districts that were planned in the '60s and '70s such as "Al-Rashdiya and Al-Satwa" incorporated some design ideas that promote walkability like narrow shaded streets, narrow and shaded alleyways, and a mixed-use retail corridor where people can walk, live, work, and shop.

There are some efforts to make the subsidized neighborhoods more walkable and green, but this attempt and change in strategy is not coming from the governments' side but from the residents' efforts themselves (Figure 9). Ironically, one interviewee noted that recently DM initiated a project called "Eco-walk," the use of steel structures with water sprays along major walkways in high density areas such as Sheikh Zayed Road to provide shade and lessen air temperature through the employment of sprayed water. From the interviewees' point of view, this project is "not ecological at all" because any structure built with a material that captures sun like steel or aluminum is not considered ecological. Furthermore, the water spray is good for hot and dry regions, not Dubai with its humid climate. The official continues, having a lane of trees is definitely more ecological than having steel structures in providing deep shadows.

Figure 8: Tree-lined walkway in a private development.

Note: Photo provided by a government official interviewed (2011)

Figure 9: Shaded alleyways in a subsidized neighborhood designed and planted by some residents.

Note: Photo provided by a government official interviewed (2011)

The last constraint that imposes major limits on implementation of walkable areas is "space." As indicated by one interviewee, it is "so difficult" to deal with private investors and developers. For them space for public facilities (e.g. sidewalks, bike lanes, and parks) means "lose of lands and thus profit." Pedestrian infrastructure is not "marketable" and "unacceptable" from the private investors' point of view. Investors want more subdivisions and "land parcels" for selling and more development opportunities. There is a market force "absolutely" with no solid planning system that controls the private developments. The official continues, Dubai should deal with this issue by initiating a "regulatory planning system" that imposes guidelines and requirements on developers.

As for the subsidized neighborhoods, space is also considered as a major constraint. In fact, one interviewee argues that subsidized neighborhoods come under the "same umbrella." The government's main priority and agenda in the design and planning of these neighborhoods are "fewer lands for facilities and more lands for housing." In these national neighborhoods, "budget and cost" are also defined as constraints. The government already controls all services and infrastructure expenses in the design of the national housing areas; therefore, any additional cost allocated to amenities and pedestrian facilities would place a huge financial burden on the government.

According to an interviewed government official, Dubai understands the importance and general quality of walkability but the (1) long distance between different uses is an issue; (2) cost of building and maintaining the sidewalks is an issue especially with the recession; (3) the hot climate is an issue; (4) the lack of design and planning guidelines that control developers is an issue; (5) and the lack of integration and connectivity between the public transit system and neighborhoods is an issue. Recently the RTA adopted walkability and proximity as additions to its agenda. Within the future

TOD centers, walking from different uses to transit stations will be within a diameter of no more than 400 meters/1312 feet. The assumption is that a distance or a radius of 300 to 400 meters (984 to 1312 feet) is walkable but going further than this distance would be very long, especially with Dubai's climatic conditions. Since this distance might still be a burden on many people in summer, the RTA is planning to provide air-conditioned walking paths known as "bedways" to make walking more comfortable. The RTA's future target is to make sure that areas around stations will be walkable as well as comfortable for people to enhance walkability rate, people's health, awareness, and also the rate of public transit ridership.

One interviewee argues that walkability must be embraced as the Emirates is one of the highest regions where people are diagnosed with "diabetes;" in fact many records indicate that the UAE has the world's "highest" diabetes rates per capita. One interviewee specialized in traditional urbanism and architecture argues that nowadays many people walk and exercise, especially "around parks," but this is not enough, Dubai should have a comprehensive network of pedestrian infrastructure within its urban fabric.

Bike Infrastructure

Most of the government officials interviewed (five out of seven) argue that the major constraints on walkability also apply to bike infrastructure including

1. The hot weather.
2. The high rate and dominance of private automobiles.
3. The rigid regulations that are mainly designed to facilitate car movements through the provision of building freeways and multi-lane roads.
4. The social preference or attitude that is oriented towards private mode of transportation.

5. The developers preferences as many preserve the majority of lands to be developed as housing and commercial uses without offering a space within the R.O.W for walkways or alternative and clean mode of transportation.
6. The distance between different uses that is often long; and the land use system basis centers on segregation and separation, not on mixed-use development.
7. In addition to the aforementioned constraints that also put limitations on walkability, all interviewees argued that the cultural perception of the public, especially the local population, is itself a major barrier on widespread bike use as many people believe that cycling is not appropriate for everyone; it is generally more appropriate for the working class.

A local authority argues in his interview that "distance to work" and other daily destinations impose fundamental limits on widespread bike use. In order to make cycling more efficient, different uses in Dubai should be mixed, integrated, and designed to be within short distances, especially from where people live and entertain. In Dubai, cycling is more appropriate for "sport, recreational, and short distances," but not commuting to work. It is really difficult to use bicycles as transportation to work. For example, the vast majority of locals live in areas like Jumierah and Al-Barsha, far away from their workplaces in the central city. One interviewee said that "I live in Jumierah and work in Dubai Municipality; if I bike to work it will take me at least couple of hours. Besides cycling is unsafe and I might be possibly hit by an automobile while cycling."

Cultural perception or thoughts about cycling is another major constraint defined by six interviewees. Many people in Dubai think that bikes are for the poor and low class people. According to one interviewee specialized in planning and mobility systems, bike infrastructure is not taking all the "attention" in Dubai because many people, especially

the locals, consider cycling as only proper for the "workers, delivery services, and labors," but not "everyone." In Western countries, people from different economic classes use bikes. Even "directors and chairman's" use bikes in their daily life; however, in Dubai even a "regular inhabitant" does not use it. This statement is affirmed by one government official who found by some observations that many middle and high income Western people in Dubai use bikes within their neighborhoods even with their families and kids.

Given bicycles' reputation as transportation of the low class people and workers, many people in Dubai believe that bikes degrade their social status and level of prestige. This level of thought imposes significant barriers on widespread bike use. However, this perception might change gradually. One interviewee believes that bikes might be adopted wieldy within the "next four or five decades." But it is too early to argue that the indigenous population, especially the "women" will accept cycling easily. In fact they might not consider it at all. Safety, summer heat, local clothing, people's mentality, and cultural norms impose major barriers on this particular population segment. It is also early to argue that the locals, Arabs, or international groups will use bikes "widely" if facilities are provided. There is still a "resistant to change" due to climatic, land use, cultural, and socio-economic reasons.

However, if Dubai provided good bike facilities, it may foster encouragement for people to experience bikes as a replacement for cars for "short distances or even for training, exercising, or recreation." One government official interviewed believes that everything goes according to the social structure, the social habit, and the "social composition" of the society. When a city plans to incorporate such a system, it should think about the target population. Dubai has huge ethnic groups from the Indian Sub-Continent and South-East Asia who cannot afford car expenses and are already

accustomed to "cycling in their original country." Therefore, introducing cycling for those groups, which represent almost 50% of the total population, would not qualify as something "new" to them. According to one interviewee, bluntly "50 to 60%" of these ethnic groups will use bikes "without constraints." The argument above is asserted by another interviewee who argues that if Dubai provided bike infrastructure, the majority of ethnic groups would certainly use it because (1) they use bikes "widely" in their own countries, so they are physically, mentally, and physiologically prepared to bike; (2) and their "body" and genetic nature are already used to heat and hot climatic conditions, so the hot climatic conditions would not be considered as a major constraint.

All officials interviewed concurred that cycling is very important and Dubai is moving towards implementing bike infrastructure, but it is still in its early stages, or perhaps a little bit "behind the schedule." There is a master plan for bike networks in Dubai and in some areas this facility has already been implemented such as "Al-Reqa Street" and along beaches and some parks. In the future there will be areas with special lanes dedicated only for bikes, and other areas where cyclists will share the path with either pedestrians or automobiles. As claimed by most interviewees, there will potentially be more bike infrastructure in the coming years in spite of the several constraints listed above.

A Macro-network of Transit

The interview data reveal two different opinions. First, a group of officials (4 interviewees) argued that there are no major constraints associated with developing a macro-system of transit. The RTA already has a "phasing strategy" to implement a comprehensive multi-modal public transit system. So, implementation merely relates to time and budget allocation. In contrast, another group of officials (featuring three

interviewees) argued that many constraints restrict the implementation of this strategy. For example,

1. Density, demand, and ridership coupled with growth rates are some variables that control the implementation of transit systems. The rail agency takes these variables into account to avoid issues of low-ridership, underutilization, and extra budget needs.
2. Currently, Dubai's development priorities in terms of infrastructure expansion are suspended due to the low growth rates resulted from the deficit in economy.
3. There are financial, budget, and cost related issues. The big question from the government standpoint is "how much" the system is going to cost. The government of Dubai will not build a multimillion system unless it is verified to be "profitable and economically oriented."
4. Incorporating trams in Dubai's road networks requires organization, adaption, diversion of infrastructure lines, and redesign of traffic patterns and movement, especially if the trams are designed to share the lane with cars. All of these require huge budget and long time span.
5. Roads with shared tram/car lanes might result in traffic chaos and conflict since people in Dubai are not used to having shared modes of transport in the R.O.W.
6. Land acquisition for any rail project is a major challenge.
7. The decision making process in Dubai is not centralized in one planning agency, but it is "dispersed" among different public and private agencies, resulting in conflicts, contest, and scaling back of rail projects.

Four government officials argued that no major constraints restrain the incorporation of trams in Dubai's urban fabric. Dubai currently is studying and

developing a master plan to integrate tram networks with other public transportation modes. This study will identify the future tram lines that will serve many neighborhoods and high density areas. Initially the RTA launched Dubai Metro, which serves a city wide scale, and currently a comprehensive network of trams that will serve a macro-scale level is under development. For example, one of the tram lines, "Al-Sofouh tram," which serves "tourists' areas and high density areas," is under construction. Having an "integrated and multi-modal" public transit including the metro, trams, buses, and marine transportation is within the vision of the RTA. This project is already "under process" and the RTA has "a phasing strategy" for implementation. It is only a "matter of time" and budget allocation to implement this vision.

On the other hand, one interviewee argues that the "rate" and trend of development in the next years and the "priorities" of Dubai in terms of infrastructure development and growth place fundamental barriers on the implementation of this strategy. Decisions about public transit systems, which system of transit (heavy rail, bus, or light rail) has more feasibility, usually derive based on growth rates, population density, and demand. Before the RTA decides which system is more effective and feasible, the agency uses various modeling, simulation, forecasting, and analytic tools to study demand and ridership rates. This transit model, run by RTA engineers, connects the potential transit lines and stops to different surrounding neighborhoods and based on the outcome (the expected number of users), the engineers decide which system is proper for integration with the city-wide rail system (the bus, the tram, or the light rail).

For example, to implement a metro system, the ridership expectation should at least be "10,000 riders per direction per hour." Less than this rate, trams and buses would be more feasible and effective. For example, if the expectation is "5,000 riders" per hour per direction, trams would be more feasible than heavy trains. But if the expectation is

"below 5,000" riders (around 2,000 to 3,000 riders), buses would be more feasible than trams. In general sense, "demand, ridership, and also cost" comprise the important factors that influence the decision-making. It is much more expensive to have trams instead of a regular bus and it is more expensive to have a metro system than trams.

In the Al-Sofouh area where density is high and projected ridership rests around 5000 rider per hour per direction, the RTA opted to bring in a tram system. The tram will connect with the private rail in palm Jumierah and also with the red line of Dubai Metro. In the future, this tram line will also extend along Jumierah Street, which has a high to moderate level of density and services.

A new macro-transit system might also warrant consideration in Dubai, the Personalized Rapid Transit (PRT). Up to now, only two firms in the area offer this technology, a British and a Korean company. Now the RTA is studying whether such a system would be "feasible" in Dubai. Currently, the "cost" is a big constraint for implementing this system. It usually costs "five or six times" more than a tram system. The PRT can carry up to "4000 people per hour." People can have a car every "two seconds." In the car, once you "punch" your destination, the car will "not stop" until you reach your target area.

Other major constraints as defined by interviewees are financial, budget, and cost related issues. A local authority interviewed argues that when the decision-making relates to infrastructure and service expenses, the big question from the government point of view is "how much the system is going to cost?" The government in Dubai will not build a multimillion system unless proves to be "economically oriented." This system "should be profitable," otherwise it will not be implemented. A major question floating in this case is: is the government in Dubai "economically coherent" to pump in all of these transportation services during this period of financial deficit? Dubai has "scaled back"

many of its proposed developments during the recession. Besides, population and urban development will not grow "exponentially" as originally projected. Therefore, it wouldn't be wise to build such heavy infrastructure if projections indicate it will be "underutilized." Some important questions regarding the implementation of this strategy are: Is this system going to be "economically viable" during this period of economic deficit; is it going to be built only as a "showcase," or it has "functional and economic aspects;" and is it expected to be "profitable?" Trams are one of many services provided by the government such as education, health, and infrastructure; therefore, the government will not take a step forward in implementing this strategy as long as it is economically infeasible.

Due to budget and cost concerns, the RTA predominately utilizes "feeder buses" as a macro-transit system rather than trams or light rails. According to one interviewee, Dubai Metro is a limited system and it does not serve the entire city, but as a solution stations are supported by a system of feeders in the form of shuttle buses. These buses move between the stations and high density residential areas. One interviewed government official contends that so far Dubai Metro operates and serves the city, but the shuttle buses rarely connect the stations with a neighborhood scale development; instead, the bus networks mainly serve high density areas like major corridors, the central city, the old districts, and major employment areas.

Dubai is currently relying on feeder buses because bus lines are flexible, can be designed and incorporated easily, do not require construction and installation, and cost less than trams. Furthermore, the network can be modified and expanded with great flexibility over time. Buses can also respond to changes in land use, density, demand, and traffic levels. For example, if demand and ridership has increased in a certain area or line, additional buses can join the fleet and respond to this increase. One interviewee offers

that a major problem with the bus system, on the other hand, is the recent employment of ultra-long buses that double the coach size. As the traffic in Dubai is horrendous, the utilization of double deck buses is more practical since they do not require so much space in movement and parking. In some areas, for example neighborhoods where density level is low, "mini-buses, smaller shuttles" are considered convenient, comfortable, and efficient. Although buses are more flexible than trams in terms of operation, installment, and cost, trams are still more environmentally responsive since buses emit noise and pollution.

There are also many obstacles of employing trams in Dubai's existing street network. For example, the whole patterns of traffic movements like turning left and right need redesigning; this might result in traffic chaos since people in Dubai are not used to having shared modes of transport in the R.O.W. Incorporating trams or trolley trucks in Dubai might also require readapting streets and diverting service and infrastructure lines and thus requiring cost and budget. One interviewee argues that in Dubai tram lines should be physically separated from car traffic to avoid motor/tram conflict and thus accidents.

Another major restriction on implementing tram systems in Dubai relates to land acquirement. One interviewee who specialized in transportation planning argues that generally with any metro project, "land acquisition" is a major challenge. No matter what the city does, the transit lines will certainly pass through somebody's land. In this case, the city must meet with the property owners, negotiate with them, convince them, and give them compensation or an alternative solution such as providing them a new land in a different location. During one interview, a government official said that he had just finished a meeting with people from Sama-Dubai (a quasi-government firm). The RTA actually has a depot (control, service, and maintenance center) for Al-Sofouh tram in

their property, and they were requesting the RTA to relocate the depot. The firm was offering the agency an alternative location because they would like to develop the land in question as a water feature. The RTA's response was simply it is impossible to "guarantee" this because the contractor has already started the design details for the depot. The official continued, it took the RTA "two years of negotiation" to acquire the land in question. It is impossible to trade it for another land now.

During the negotiation the RTA met with the firm multiple times in order to explain the positive upsides of the tram system. For example, having a tram system within their project will allow people more access to the site and reduce congestion, and people can reach several destinations and focal points within the development and within the city without driving their cars. A real case study asserts this fact; for example, a lot of people use the metro to go to the "Emirates Mall." The connection from the metro to the mall is very convenient because there is no need to leave the station in order to access the mall; an air-conditioned path connects the station with the mall. The mall benefitted greatly from the increased traffic generated from locating the station in their territory. At present, the ridership of this station greatly exceeds any Dubai station by "10,000 to 12,000 people per day."

"Land acquisition" is a big issue and represents one of the major concerns that public institutions face, especially in large scale transportation projects. When interviewed, a local official declared that public agencies in Dubai learn from previous experiences and incidents. For example, at present lands should be secured from the early stages of any infrastructure project. Quite simply, without land secured, contractors cannot start construction. In fact, contractors and consultants cannot receive the NOC's (Non-Objection Certificates) from the public agencies to start construction unless land ownership is secured.

One interviewee argues that currently two major constraints restrict the integration of multiple transportation systems in Dubai. First is the "financial crisis" pushing back many infrastructure facilities; second is the decision making process "dispersed" among different entities and thus projects are not being "implemented as planned." All officials interviewed asserted that the decision-making power should be "centralized" in one planning agency. Cities cannot be developed in a coherent way with three different yet separated agencies; "the worse is that two of which are private." One interviewee said that he never experienced during "20 years of experience" in multiple regions of having a private entity (like JAFZA and TCOM) with a "massive institutional power that are in charge of 90% of the developments in the city."

During one interview, I told a government official of my talk with one of the authorities in the government who said that the power and authority will once again be delegated to Dubai Municipality as it was before the boom; it likely will transition in time because the majority of private entities lost ground, credibility, and power during the crises. The interviewee's response was "do you know, it is too late now, but it is never late to do something good like this." He continued, "Without a strong planning agency, every day passes in Dubai is considered a loss."

Short blocks and interconnected street systems

Interview results reveal that Dubai did not adopt short blocks and interconnected street systems in city and neighborhood design because:

1. The town planning department considers that pedestrian accessibility in neighborhoods is maintained through a layer of connectivity called "Sikka," the Arabic term of alleyway, between every ten land parcels (1000 feet or more) (Figure 10).

2. The grid system increases the R.O.W serving the land parcels. This in turn increases the infrastructure cost and decreases the number and size of lots per block and per neighborhood.
3. The interconnected street system with its multiple intersections may lead to serious traffic chaos and accidents because the norm in Dubai is that drivers are not accustomed to stop signs. In fact, a stop sign is considered by many people as "slow down."
4. Dubai is an automobile-oriented city in which most of the road designs have with fewer intersections and multiple lanes to facilitate car movements and to accommodate high speed traffic.
5. There is also a "design and preference" related constraint in which many designers believe that an interconnected street system (particularly the grid system) is very "industrial" in terms of shape and has no aesthetics components.

One interviewee argues that the position stating that Dubai does not provide good connectivity in neighborhoods has to be verified and corrected. He stated that it is difficult to argue that Dubai is not taking connectivity into consideration once it comes to street patterns. Connectivity in Dubai's neighborhoods is maintained through the use of sikkas (alleyways). The long blocks couple with a system of alleyways for accessibility purposes. For every "10 plots" there is a sikka defined as a "pedestrian walkway and connection facility" passing through the long blocks to ease connectivity and enhance accessibility to services and different uses (Figure 10). My response to the official's claim was: do you consider sikkas that are in most common cases areas where dust and sand accumulate, generally not paved, and are very dark at night and thus unsafe a good connection strategy?

The official responded, “Not really;” this depends on the design of sikka itself and what type of building is overlooking the place. I also explained to the official that the issue with the long blocks in Dubai not only related to pedestrian connectivity but also to car movement. In other words, supper blocks lead to longer driving time and thus more CO_2 emissions. Many international cities like Barcelona, Portland, and Vancouver use the interconnected systems which proved practical and successful. Urban design literature and the Delphi design recommendations suggest that an ideal urban block should not be more than 400 feet. However, Dubai blocks are designed to be very long and impermeable, meaning less connectivity and fewer choices both for pedestrians and for drivers. This in turn increases the walking and drive time and also results in air pollution.

Figure 10: A typical Dubai neighborhood designed after the 90s.

Note: The density level is of 3 to 4 units per acre. It appears that there are two alleyways in the figure; the first one is almost 510 feet away from the collector street, while the second one is around 990 feet away (Google Earth, 2011).

In all seven interviews, I presented two street diagrams to the officials. The first demonstrated an interconnected street system and the second represented an existing street system in Dubai that is based on long blocks. One interviewees' reaction towards the diagrams was

> visually when I look at these two diagrams I can claim that if the road networks make "20%" of the second diagram (the long blocks), it surely make more than "35%" of the second diagram (the interconnected system), and this means more infrastructure cost and less lands designated for development in the interconnected pattern. Bluntly, the priority in the current planning system is providing more spaces for land parcels for housing purposes and less for streets and pavements.

Another interview argued that the planning department undertakes a design agenda that deviates from short blocks and interconnected street systems because of several economic concerns, land availability, and utilization issues. In particular, an interconnected street system means more streets and pavements and which further leads to (1) an increase in infrastructure cost and service expenses due to the increase in the R.O.W serving the land parcels; and (2) a reduction in available lands dedicated for development and investment.

One interviewee defined plot size as yet another major constraint. The size of land parcels influences the street layout. For example, if the land parcel is big in size, it will be difficult to adopt short blocks. An interconnected street system is more practical when land parcels are small in size. But with Dubai's current lot configuration (10,000 ft^2), it is really difficult to have an interconnected pattern; short blocks mean fewer lots per block and, thus, per neighborhood. For example, a block of 300 feet in length might accommodate only three villas surrounded by streets from all directions. So, decreasing the number of lots and increasing the percentage of streets work against the city's

preference and direction in neighborhood planning that designates the vast majority of lands for residential uses.

A government official interviewed claims that not having short blocks with its many intersections in Dubai also related to "safety concerns." With many cross intersections, the rate of accidents might increase because traffic will come from four directions. Therefore, for safety purposes Dubai adopted a street system that has "minimum" intersections. True, this system provides less connectivity and choices and result in "longer walk and longer driving time, but it is safer." The interconnected street system with its frequent stop signs is very dangerous because typically people in the UAE interpret stop signs as "slow down not stop." Therefore, the city incorporated a street pattern with "fewer intersections" and perhaps more curves to reduce traffic related issues. Some interviewees claim that the grid system with its "straight forward and linear patterns" leads to higher speeds and thus it is unsafe.

According to one interviewee, it is really difficult to educate everyone about traffic rules and signs because Dubai attracts many people from all over the world; and most of them work in the construction and retail sectors and often lack education. Therefore, from the "government standpoint," the most effective way to ensure people's safety is to design the street network in a way that "minimizes traffic incidents." One interviewee argues that the only feasible place of having intersections in Dubai is on major streets like "collectors and arterials" where intersections can be controlled by traffic lights.

One interviewee maintains that every street pattern has pros and cons. Some people think that the interconnected system is good; others prefer loops, curvilinear patterns, tree-like streets, or even cul-de-sacs. Each pattern "has its own strength and each has its right place in the city." In the central city and the central activity and density

zones, it is better to adopt an interconnected street system to reduce traffic, pollution, and crowded conditions. With short blocks people have more connectivity options and more choices to move around; a good example is “Barcelona.” Other networks (not necessarily the interconnected system) can be used in areas that are further way from the central city like the suburbs or exurbs. A combination of all is encouraged; however, it is more effective to provide “more choices” to people when it comes to street design. Planners should not make people “walk or drive long distances.” As of now, Dubai incorporates alleyways (Sikkahs) in neighborhoods for connectivity purposes, but the problem as defined by one interviewee is that most city planners have no experience in: (1) “designing” good quality alleyways that promote walkability; and (2) “locating” the alleyways in proper locations.

One interviewee, a specialist in transportation networks, contends that there might not be a problem or constraint on the implementation of short blocks except that some planners or developers “prefer” the use of loops and curves over the typical interconnected pattern. So, it does not have to do a lot with constraints but mostly with “planners’ and developers preferences.” Many designers and investors interpret short blocks and interconnected street systems as “rigid and industrial” in shape and, thus, having “less aesthetic components” than other curvilinear shapes.

The issue of preference in design is affirmed by one interviewee who introduced a case of two major developments along Sheikh Zayed Road. Both projects were planned and designed by the same firm. But the street system in project (X) was totally different than project (Y), and, although contiguous, there was no connection or access between the two developments. This reflects the fact that during the planning work every designer had a different design “preference” than the other. The official continued, “I don’t think that both designers have even talked to each other.” Upon completion of the two projects,

the residents could not move between the two communities unless they drove outside their community to the Emirates Road (a major highway), and then select a local street to finally reach the other development. It might take 10 to 15 minutes of driving between the two adjacent developments. In order to solve this problem, the RTA built a road parallel to the Emirates Road, passing through both communities, for accessibility and connectivity reasons.

Green, open, and social spaces in the urban fabric

The interview data indicate fundamental barriers on implementation of green areas in Dubai's neighborhoods. For instance:

1. Water is defined as a major constraint by one interviewee.
2. Street design and R.O.W. is not under the town planning authority, but under the RTA. The problem is that the RTA's planning and design work is based on technical efficacy, engineering, and quantitative models and analysis oriented towards solving traffic related issues. The design of green spaces and shaded pathways requires talents in urban design and landscape architecture, not engineers and surveyors with their technical backgrounds.
3. Lack of environmental awareness and education among the public, officials, and designers in Dubai.
4. Prosperity, "excessive welfare," and the hot weather that prevents a lot of residents to use the outdoor public facilities, especially in summer.
5. Lack of planning guidelines, standards, and regulatory framework that control developments.
6. "Top authorities and developers" often interfere with planning decisions causing diversion and manipulation in the implementation process.

7. The construction activity in Dubai mainly focuses on mega structures, not small scale community details and facilities such as neighborhood streets, parks, and shaded pathways.
8. Space is defined as a major constraint. One interviewee argues that there is a lack of plots dedicated for public parks and open spaces, compared to other international cities. For example:
    a. Private developers dedicate the vast majority of lands within their projects for profit generation uses such as residential, commercial, and office spaces. In contrary, the government dedicates the vast majority of lands within the subsidized neighborhoods for local housing.
    b. There is an issue of incorporating green areas in the central and old districts of Dubai because of the scarcity of lands, high density of the built up area, high real-estate value, and the existence of several cemeteries.
    c. Large scale infrastructure projects such as freeways, major arterials, roads widening, and service lines utilize a lot of space and thus prevent the incorporation of greenery within neighborhoods.
9. The government cannot afford the expenses of maintaining an extensive amount of landscape and greenery in the subsidized areas because:
    a. The land parcels are already subsidized and granted for free to the local population.
    b. The local residents are not required to pay service or maintenance fees; in fact, for so many years (until January 2011) locals were free of charge from water bills.

c. The government is already loaded with infrastructure and service cost, as well as other neighborhood development expenses, so more greenery means additional financial burdens on the government.

An interviewed local authority maintains that a predominant challenge in having an interconnected system of social spaces and parks and developing shaded pathways in neighborhoods is the scarcity of water resources in Dubai. Since the weather stays hot and precipitation levels are extremely low, water demand for green spaces will usually be higher in Dubai compared to regions that have moderate, cold, or tropical weather. The main source of water used in irrigation is potable water, which requires a great deal of cost and expense. On the contrary, another interviewee argued that water is not "a major constraint" on implementation since Dubai has a wide and good system of utilizing "treated and re-circulated" water for landscaping purposes.

A good strategy to save water is utilizing architectural elements like arcades, building compositions, and shading structures alongside trees for shading purposes. In fact, for aesthetic qualities, there should be "diversity in "shade" and "frequent changes in scenery." Another strategy uses plant materials (e.g. treed, softscape) that are suitable and tolerant to Dubai's environmental context. The landscape department in DM has a lot of experience in defining specific plant elements indigenous to the region, which are well-suited to the climate and require less water and maintenance. For example, there are several green spaces within the city's urban fabric represented in huge urban parks and landscape within the right of way.

In some private developments like the "springs," landscape and green areas are well-designed because residents pay an annual service fee to maintain the area. Some private communities incorporated shaded greenways and small pocket parks functionally,

but others utilized the landscape as a marketing or showcase element to sell an exclusive living environment. For example, many private corporations reduced the amount of public facilities such as schools and greenery and capitalized on office, commercial, and residential spaces, and other kinds of uses that generate profit and income. Developers mostly consider lands as "ultimate profit generators;" therefore, they often show a lot of "reluctance and hesitance" in providing services and amenities within their projects.

A government official interviewed argues that developers in most cases dispute with the government agencies over providing public amenities (e.g. schools, clinics, mosques, and daily services) within their lands. The official stated, in many cases private developers were "more powerful" than the public institutions themselves. This "granted freedom" resulted in not providing sufficient services within many private projects. The problem is even "worse" in free zone areas where regulations are relaxed; developers have more freedom and are not required to follow the city's guidelines and regulations. As an alternative, developers in the free zones follow regulations that are very "relaxed" and developed by two private agencies: projects developed by Nakheel are approved by JAFZA and projects developed by Dubai Holding are approved by TCOM.

In the subsidized neighborhoods, there are other sorts of implementation constraints. One interviewee specialized in land use planning argues that a major constraint on incorporating more greenery in local neighborhoods is "space." A major concern is that the public agencies are controlled by "size, housing needs, and land availability." It is really difficult to implement green and social amenities on "large scale," especially within the existing planning framework that prioritizes housing (especially large single family houses) over amenities. This statement is asserted by another interviewee who submits that usually the areas initially dedicated to green spaces in the planning process "get allocated for housing" over time. This happens in an effort to

accommodate as many locals as possible within one neighborhood and thereby avoid the development of new neighborhoods requiring additional lands, budget, resources, and time.

In addition, governmental budget constraints cannot afford the expenses of maintaining an extensive amount of landscape and greenery in the subsidized areas, as local residents do not defray the cost of the services they consume. Besides, the large number of infrastructure projects, especially roads widening, and space for DEWA (Water and Electricity) cables and pipes limit the number of green spaces. Furthermore, as the Road and Transportation Authority (RTA) with its large workforce of engineers and technicians control the design of the R.O.W, priority in work often goes to solving traffic and congestion problems over the design of shaded pathways and small pocket parks. One authority interviewed argues that authorities in Dubai do not really understand or appreciate urban design elements and aspects in practice. In order to build a coherent urban fabric which includes various social and green spaces and shaded pathways, the city must first believe in the significance of urban design strategies and principles in practice such as incorporating high density standards, mixed-use development, pedestrian infrastructure, and social nodes in the urban fabric.

Two interviewees proffered that there is issue of finding a space for incorporating green spaces or social nodes in the "Central Business District or Dubai's old districts." Within the old areas of Dubai lands are scarce, gross and net density levels are very high, and real estate value is very expensive, and mostly privately owned. Besides, there are "a lot of lands" developed or dedicated for burials (Figure 11). Religiously, it is prohibited to build over a cemetery. To combat this issue, the planning team in DM introduced two solutions. The first proposal included some ideas like (1) utilizing a small portion of land around the existing cemeteries for art, galleries, and a place where people can get

together to celebrate ceremonies like "Al-Aid prayers;" (2) utilizing the cemeteries concrete fences as a gallery wall or art component; and (3) providing a walking and exercise paths with trees and landscape along the cemetery's boundary wall. The second proposal of developing open spaces within Dubai's old districts was "readapting" schools playgrounds and facilities to be "shared" with the surrounding neighborhoods after school hours. The planning team in DM implemented one pilot study in "Al-Wuhaida School," located in one of the old districts. A government official interviewed claimed that this design scheme was "a successful one" and it could be "replicated" in other places within Dubai's old districts.

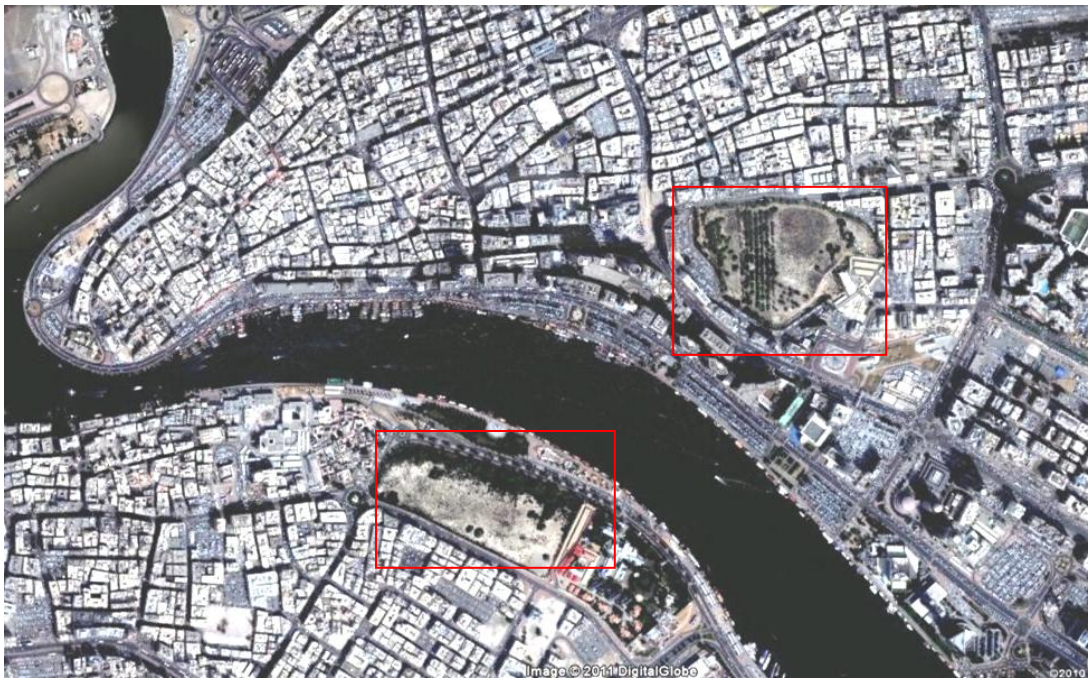


Figure 11: Dubai's old, central area.

Note: This central area with its dense urban fabric and the creek, divides the city into two parts. This dense fabric put major limitations on designating some spaces for green areas. The open and undeveloped lands in this part of the city are mainly represented in two cemeteries as outlined in the figure (Google Earth, 2011).

Diversity of residential offerings, inclusive housing

This question aimed to determine problems and constraints of having a Dubai neighborhood that accommodates a mix of ethnicities and socio-economic groups, without discrimination. The authorities questioned defined a variety of implementation constraints ranging from socio-economic constraints, to political, market forces, and cultural concerns. For example:

1. In Dubai mixing the expatriates with the local population does not exist on a "big scale" because the government subsidizes the citizens' housing in exclusive zones that are predominately planned and subdivided as single family units for the locals.
2. It is not socially and culturally acceptable to mix the local and expat families with the workers who are often single. Interviewees argue that this kind of mix raises safety, privacy, and identity related concerns;
3. There is also an issue of preference and desirability. People usually live in areas where diversity is accepted, tolerated, and where they can openly and freely intermingle and congregate with each other and with other population groups.
4. Market forces and availability of affordable, diverse choices in the housing stock place major barriers on social mix as people prefer to live where they can afford. That the market orientation in Dubai focuses on the needs and the desires of high income groups creates a major issue.
5. In general the planning system and policy as well as the market operation in Dubai are oriented towards "segregation between" different ethnicities and socio-economic groups. For example, the whole planning system in Dubai supports the idea of separating the national districts from the non-national residential areas. In addition, the planning work in Dubai is structured to separate the working class in

specified zones away from families. Moreover, the market operation in Dubai is deeply oriented towards selling luxury life styles that suit the needs and desires of the high income groups.

One interviewee puts forth that social mix or housing diversity is a very "complex" strategy to implement. Housing diversity in Dubai connects with three different "social compositions." The first is related to the local housing; the indigenous population has special needs such as identity, privacy, and aspirations that need preservation. The "design typology, size, and housing style" of the locals is different than the expatriates. The locals mainly prefer to live in detached single family units accompanied with service blocks on large lots. Local families are often big in size and need a lot of space to accommodate their social and cultural needs. In fact, the planning department in Dubai is ordered and structured from "top authorities" to respect the cultural norms and desires of the indigenous population.

One interviewee argues that mixing the expat with locals does not exist in Dubai on a "big scale" because citizens' housing is subsidized by the government. Every local by "default" receives a land from the government. It is indeed a matter of how the "planning system and policy" in Dubai operate. In the subsidized neighborhoods lands are predominantly subdivided for single family units, only for the locals. In most common cases, the government does not allocate lands within those areas for expatriates housing who usually live in apartment buildings or townhomes. According to one interviewee, there is still an intangible element embedded in the culture that makes local people "uncomfortable" having apartment buildings next to them, overlooking their property. The worst case scenario is if "single people" are living in those buildings. There is a major "social resistance," especially from the indigenous population, of accepting a

development typology that is different than villas (detached single family houses) within a neighborhood.

In one interview, a local authority indicated a case study that reveals a major deficit in land use planning of "Al-Barsha." In a certain area of this subsidized neighborhood, locals were granted a strip of lands; just at the rear of their properties another strip of land was allocated for private development as hotels and apartment buildings. At present, the buildings, perhaps five to ten stories, "overlook" the locals' properties diminishing their sense of privacy and quality of living. The official said that mid- or high-rises should "never" be designed in close proximity to single family units and low-rises. It is possible to incorporate mid-rises within a neighborhood but not "adjacent" to low-rise buildings.

One interviewee argues that the government in Dubai should embrace the idea of choice and diversity in housing types in the coming years. Many expatriate families and young professionals, including the locals, "accept" the idea of living in townhouses or apartment buildings, especially in the early stages of their professional life. One local official interviewed said that "I personally know many Emiratis live in apartments." This official lives in "Mirdiff," a mixed used community, and he has many local neighbors who live in duplexes or apartments. In order to promote housing diversity and social mix within Dubai, the planning team in DM suggested a program aimed to grant the locals housing units (either an apartment or villa) within the mega developments as an alternative of the subsidized neighborhood program. However, this proposal received a strong "opposition" from the government without indicating the reasons. The interviewee attributed this resistance to the fact that the whole planning system in Dubai supports the idea of "separating" the national housing from non-national residential districts.

As for the second social composition, the expatriate families, their living environment is controlled by the market. Market forces and availability of affordable and various options in the housing stock impose fundamental limitations on the expatriates' housing choice. The market offers a collection of housing types ranging from villas to town houses to apartments and studios. People decide where to live based on their "economic status, affordability, and availability" in the housing stock. According to one interviewee, if your income is high, you can live in very prestigious and well-established community, but if your income is moderate or low you will end up living in an area or unit that you can mostly "afford."

One interviewee who specialized in housing contends that part of the housing problems in Dubai is that the market offered housing much "lower" than demand causing a dramatic increase in rental rates. Internationally, rent should not be higher than "20 to 25%" of the household income. In Dubai rent in many cases took "100%" of the family's income. Consequently, many people moved from Dubai and lived in "neighboring Emirates like Sharjah and Ajman". There is an affordable housing program for the locals, but it is very small in scale; only families with special cases (e.g. widowers, divorcees) benefit from the program. For the expat families, on the other hand, housing affordability is controlled by the market and developers.

One interviewee argues that diversity of housing types is indeed a matter of "politics." Diversity involves allocation, distribution, and organization of different functions and uses in space and "allocation of resources is an academic definition of politics." This official thinks that diversity intervenes with the market and government norms in Dubai and this has a twofold meaning. First, most of the private developments in Dubai, especially in the last 15 years, were mainly oriented either towards the needs and desires of the middle and high income groups or the ultra-rich. In fact, the majority of

investors did not even allocate a small portion of their developments for the low income groups. The second face of the market, on the other hand, lies within the following question: who should be responsible for building affordable housing? The response as indicated by one interviewee is "of course the government or employments." Because affordable housing is not considered a huge investment or profit generation asset from the government and employments point of view, "minimum and lowest standards" are often used in the design and construction of these projects. In terms of location, the situation is even worse. Most of the affordable housing projects lie far away from the major attractions and central areas.

All interviewees concurred that most families resist having single workers and laborers (defined by one interview as the third social composition of Dubai's population) in one area. Two interviewees argue that in discussions about diversity, a very important point should be clarified: the nationals in Dubai do not have any problem with having an "expatriate family" living in their neighborhood. However, both local and expatriate families do not accept having workers and laborers living in their neighborhoods or even accessing their neighborhood facilities.

The vast majority of Dubai's residents are construction workers, as well as retail and service sectors workers employed in commercial stores, restaurants, and cafés. The majority stay in Dubai on a temporary basis. According to one interviewee, from 2002 to 2008, the working class represented almost "50%" of the total population. The lack of affordable and appropriate housing types for this segment of population caught the attention of international organizations, media, and press. This resulted in construction workers living in labor dorms provided by construction companies on the outskirts of Dubai, in areas such as "Al-Quasis, Al-Muhesina 4, Al-Quze, and Jabel Ali." Retail and other service workers, on the other hand, moved into Dubai's older districts closer to the

central city. In these older districts, occupancy levels reached 30 to 50 people (mostly single) in a detached single family house of 2500 ft^2. This created ethnically segregated enclaves, amplified energy and drainage loads, invaded the privacy of many families, housed many illegal workers, and in some cases created zones with concentrated crime.

The working class usually live in subsidized labor dorms or the old deteriorated districts due to several reasons: (1) their accommodation and living expenses are subsidized by their employers; (2) as workers income is very low, they could never afford living in a regular house or apartment unless rental expenses are shared among several individuals; (3) it is more convenient for the retail sector workers to live in the old districts that are well-served by mass transit and services; it is also more convenient for the construction workers to live in labor dorms, most of which sit located near the industrial sites; and (4) the planning system and the culture in the UAE resist the mix between families and workers who are mostly single in order to avoid social tension and safety related issues. In fact, most high and medium income people in Dubai prefer privacy and a family-oriented environment, and do not want to live in a neighborhood with a high concentration of construction and retail workers who live in groups away from their families. One interviewee argues that "preference and choice" are two variables that affect the degree of social mix because at the end different socio-economic and ethnic groups prefer living in areas where (a) diversity is accepted; (b) difference in social activities, rituals, and norms is respected and tolerated; and (c) conditions of social interaction and congregation between different ethnicities is encouraged, respected, and yet protected.

According to one interviewee, "it is not proper" to mix workers who are often single and come to the country for a short period of time in neighborhoods with families. Examples from history prove that this mix is inappropriate and result in safety issues and

social conflicts. For example, areas like "Al-Satwa or Al-Rashideya" which were planned for the nationals back in the '60s and '70s were deteriorated due to the influx of the legal and illegal immigrants. Many families moved out because they lost their sense of privacy, safety, pride, appreciation, and attachment to the area.

It is not easy to bring single people (especially workers) and accommodate them in a neighborhood originally designed for families. From safety and cultural standpoint, this idea is completely unacceptable because workers create noise and cowed conditions, disrespect privacy, and raise safety concerns. A local authority argues that it is very necessary to "keep distance" between the working class and families to avoid problems such as "rubbery, conflict, and sexual assault." The majority of interviewees claim that "this segregation will continue as is; there will not be any change in the planning system; workers will always be segregated from families." However, all interviewees stress that workers and laborers should be provided with good living standards and efficient access to services, amenities, and mass transit, and Dubai has recently implemented many good examples of housing that accommodates the working class.

Lastly, in one interview, a government senior urban planner said that it is unfair and improper to segregate different communities from each other. We are all human beings and we live in the same city, so we should "share" benefits and facilities because segregation leads to prejudice, inequity, and "hate" among inhabitants.

Diversity of land use and building types

Both diversity of residential offerings (the previous strategy) and diversity of land use and building types are known as diversity indicators or measures. In fact, the majority of officials (five interviewees) responded to both strategies simultaneously. Some

implementation constraints on having neighborhoods become places where there is mixed-use development as revealed by interviewees are:

1. The land use system in the subsidized neighborhoods is structured and regulated to allocate the vast majority of lands for housing purposes, particularly detached single family units;
2. There are cultural and privacy concerns as many locals do not feel comfortable of having mid- or high-rises such as an apartment or office building next to their private residences.
3. There is also a concern that mix-use development in neighborhoods creates noise, traffic, and crowed conditions with large concentrations of workers and single people who might use the neighborhood facilities. This might threaten families' sense of privacy and the ability to feel safe moving in the neighborhood.
4. As the city's planning authority did not have control and power over developers during the construction boom, especially in the free zone areas, many private developers showed reluctance and hesitance in incorporating a range of different uses (e.g. schools, clinics, places of work, recreational uses, mosques, and different housing types) within their projects. Investors often prioritize residential, office, and commercial spaces over services and community facilities to maximize the rate and pace of profit and investment.

One interviewee declares that diversity of uses within Dubai depends on the type of development. For example, some areas in Dubai are developed exclusively for the locals and others are dedicated for investment. The local neighborhoods are solely designed and subdivided as low density residential zones for the citizens combined with a centralized service center that includes educational, health, and recreational amenities.

According to one expert questioned, mix of uses is emerging in Dubai but "not within" the national housing districts. The national housing policy of Dubai is to designate a land to every national citizen as a subsidy. As a result, the majority of lands within the subsidized areas are subdivided as detached single family units. As the government's priority is to house as many locals as possible within a single neighborhood in order to avoid the infrastructure cost and service expenses of building a new area, mixed-use development does not occur within the local neighborhoods on big scale.

Furthermore, incorporating mix of development typologies and uses within local neighborhoods raises several cultural and social concerns. For example, a local authority interviewed argues that "for privacy purposes," it is not approximate to have villas (1 or 2 stories) adjacent to tall or mid-rise buildings. Buildings taller than two stories can interrupt the sense of privacy of single family units. Therefore, for social and cultural reasons, building heights within the subsidized areas are often "capped to two stories."

In contrast, lands in investment zones are sold in the market or granted for development. In these areas, known as the "Free Zones," two private entities (JAFZA and TCOM) maintain control of permit issuance, rather than the town planning authority. Because the mega corporations were given "too much of freedom and control" which overruled the public institutions, a kind of power and authorization granted by the "top authorities" in Dubai, most of their projects were developed as either gated communities, business or specialized districts, or tall residential and office buildings that are similar to each other, lacking essential services and facilities such as schools, healthcares, and mosques. According to one interview subject, the worst element stemmed from that the government in Dubai granted developers a "higher degree of power and freedom" defined as dominance, or "supremacy" over the public agencies in projects that were exclusively

designed for the rich such as the "mono-functional developments" represented in several gated and golf communities as well as the island projects.

Density Levels

Each of the expert interviewees stated that reducing the subsidized lot configurations might lead to tension between the citizens and public institutions. Socio-economic and cultural norms impose critical limitations on densification and land size related decisions. Some major barriers on effective implementation of this strategy as explained by interviewees are:

1. The public agencies in Dubai do not have the experience in communication skills to market its planning ideas; as a result, it would not be an easy task to persuade the citizens about the experts' recommendation that the current amount of land for a single family house (10,000 ft^2) is too big and should be replaced by a smaller land area, approximately (6,200 ft^2), in order to conserve energy and reduce expenses associated with providing infrastructure and services to homes.
2. There will be a strong social resistance to densification. The locals in Dubai will not accept the idea of reducing the granted land area because
    a. Any reduction in lot sizes means an economic "loss" and a reduction in people's social standing and living quality.
    b. Local families usually are big in size and have several social, traditional, cultural requirements that necessitates "space."
    c. As the living standards and average per capita income in Dubai are high, people's "expectation" in terms of living space and quality is high; the government should respond to this expectation and desired interest.

d. In general sense the social standing, rank, and "prestige" as well as the wealth in Dubai are measured by the size of lot and house.

e. A house is not only considered an enclosure where people live but also a major "asset" and a means for investment that last for many generations.

A government official interviewed argues that "acceptance" from the local population will be a major challenge to increasing density levels. For many years the government of Dubai is granting the locals lots of 10,000 square feet; therefore, it would be very difficult to lower this grant. Historically, the subsidized land area was gradually reduced from 15,000 to 12,000 and then to 10,000 square feet (or less) due to "scarcity of lands." During the boom, planning authorities decided to cut down the size of the subsidized lands to "save lands for investment." As development and real estate demands increased, the majority of lands within the city were allocated to public-private corporations for investment purposes. According to one interviewee, this gradual reduction in land areas garnered serious criticism from the indigenous population in which contest and reactions were mainly expressed through the local press and live-radio broadcasts.

One official interviewed claims that any planning decision that aims to reduce the area of the subsidized lands will certainly disappoint locals and make them "very mad" at the government. Therefore, public officials in Dubai should seek social approval above all else if the city reaches a decision to increase its density levels through providing smaller lots. Dubai should "worry" about the citizens' reaction and sense of dissatisfaction that might result from any densification strategy within the subsidized neighborhoods. Perhaps an open dialogue between the authorities and citizens in public discourses, hearings, and community workshops to educate and negotiate with the

citizens would prove helpful to provide details and explanations about the implications, benefits, and consequences of high density levels.

One authority interviewed argues that since the lands are free of charge, people will never be interested in smaller lots. However, if they are paying for it or buying it from the market, they might even be satisfied with "5,000 square feet" because the real estate value in Dubai is very expensive. Actually, when I asked one interviewee about implementation constraints on reducing the lot sizes from 10,000 to 6,200 square feet as suggested in the Delphi, his response was: "you are digging in a subject that will be presented in "Jan 4th, 2011" by the planning unit to the general director of Dubai Municipality. A study conducted by DM suggests reducing the lot sizes to "7,500 ft²" in the new subsidized neighborhoods. The official said that this lot size does not deviate far from 6,200 ft² as suggested by the experts in the Delphi as an appropriate density level for future neighborhoods.

As "land reserve" is one of Dubai's main concerns, the proposal suggests providing the locals a minimum land area of 7,500 square feet. With smaller lots, set back regulations will be "relaxed;" and height limits will be "modified" from two to three stories maximum. If the locals prefer bigger lots, they should "pay" for it. An additional 7,500 square feet will be provided for people who can afford to purchase it. This would bring the total land area to around 15,000 square feet. Half the size is government subsidized while the other half is offered in the market for those who relatively need bigger lots. One interviewed expert argues that Dubai should take a land-saving action in order to protect its resources for the future generations. If Dubai continued granting the citizens 15,000 or 10,000 square feet, "after 10 or 15 years" there might not be enough lands and capacity within the city structure to accommodate the future population.

Part of my discussion with the public officials was to determine whether or not it would be reasonable to correlate the lot size with family size and income (i.e. granting larger lands for big families). One local authority maintained that it might not be fair to link the size of the subsidized lands with the "socio-economic status" by providing bigger lands for locals who can build bigger houses or for locals with bigger family size. The economic status of families is not a stable benchmark; it can change from time to time. They might be poor today and rich tomorrow. When their economic status increases, they might ask the government for a "bigger space" than they previously would have been awarded. . The same could also hold true for the opposite case, if their wealth disintegrated. In contrast, one interviewee argues that it is possible to connect the lot size with family size. For example, the city can set up a minimum land area for each family member such as a "1,000 square feet for each individual." So a family with six members earns the right to receive a minimum lot area of 6,000 square feet.

However, it should also be considered that a small family may be a newly married couple that will have children in the future. So, different considerations and factors have to be taken into account when the government grants and allocates land to citizens. Many of family sizes live within the UAE, some big, others small, and many live in extended families. The majority of interviewees agree that it is difficult to connect family sizes and income levels with the granted lot size. However, the proposal of subsidizing 7,500 square feet and offering the parallel land size in the market might be a "fair decision," but yet this should be discussed with the locals because they are the users.

All interviewees argued that smaller lots might not suit the citizens' cultural and social norms. The first social constraint on high density levels stems from the large size of local families; therefore, they need a "big space" to live comfortably. Furthermore, in the UAE when adults marry, they usually share the same house with their parents for

several years. They either live in the same villa or in a detached unit on the same land. As a result, locals in most cases need space not only for their children and but also for their children's children. In addition, some traditions and cultural norms such as hospitality and exchange of visits require a number of spacious rooms and with sufficient space to separate the female and male visitors.

The second socio-economic constraint is that the per-capita personal income of most of the locals in the UAE is high; therefore, people will "not be satisfied" with lands less than 10,000 square feet. This land size, considered "high" in terms of quality and standard of living, has been in the system for many years; therefore, cutting it down to 7,500 or 6,500 square feet will "raise serious objection and criticism" among the citizens. Throughout history, whenever mankind held greater riches, they, in turn, desired bigger lots with big houses and gardens. The average per capita income in Dubai is around "$40,000," a great deal of money compared to some rich and developed countries where the average per capita income does not exceed "$25,000." One interviewee argues that somehow it is really difficult to provide smaller lots in a city where the living standards and average per capita income are high and people's "expectation and desire" in terms of living space and quality is also high. As a result, the government should maintain this high quality of living to avoid any sense of dissatisfaction and frustration among the locals.

The third social constraint on high density levels relates to the way in which the Dubai community perceives density and land size. In particular, measurement of the "social prestige" in the Emirates to a degree pertains to the size of the lot and house. In one interview, a government official specialized in housing said that, to be frank, the "social standing or reputation" of families in the Emirates links deeply with the size and scale of property; this culturally rooted thought and perception "indeed" place a "big

barrier" on any densification strategy. One interviewee contends that people like to brag about their houses; in fact, many love to show their "big houses" on their "large lots" to others; this has always been an issue in Dubai. The statements above are asserted by another interviewee who argues that in Dubai housing and lot size are a "symbol of status." People express their "wealth, lifestyle, standing, and social rank" through their property and living structure. As a result, these norms and traditions represent something that "the government should respect and accommodate." While discussing this issue with a North American expert specialized in urban design, he said that this situation also exists in the United States. Particularly, he argued that in many cases wealth and social status in North America are measured by how far is your house located from the street.

The fourth major constraint, as defined by one public official interviewed, is that every individual in the Emirates believes that a property (either a land or house) is an "investment and asset" that transcends many decades and generations. In a general sense, the best method of managing capital is to invest it as a real estate asset and housing is always defined to be the "best asset." If locals receive a big land grant and they possess the financial capability to build a big house, this investment will benefit not only their coming children, but also their children's children and the government itself. Historically, people advised Sheikh Rashid, the former ruler of Dubai, that it is not wise to sell properties in the market to the expatriates. His response was "when they leave the country and their properties are physically attached to them then disagree with the system."

A local authority interviewed reasons that for the local population, "losing land area is considered a major loss." Scaling down from 15,000 to 10,000 square feet in the past years "did not please many locals." Density related decisions must be combined with a phasing strategy, "education, and awareness." The problem arises when the planning

department in DM lacks the ability and the skills to "market" its ideas and strategies to the public. However, the government in Dubai had a very careful understanding, keen discernment, and the capacity to make a wise judgment and right decision when it reduced the lot sizes gradually, step by step, over a couple of decades.

According to one interviewee, it is true that for the "general welfare," Dubai should scale back the granted lot configurations; however, people should "physiologically prepare" for these kinds of decisions. To educate the locals on this matter, public agencies should make some efforts and progress on the "communication and educational levels" by interacting with the public through the press, media, or directly through workshops and "discussion sessions." With an organized campaign explaining the nature and reasons of densification strategies, people might understand and thus believe in the potential benefits of high density levels. It is not difficult to deliver the message to the public, especially the young professionals, due to the considerable cultural evolution in Dubai over the past two decades. The old culture of strict orientation toward "traditional and tribal thoughts is no longer;" Dubai has now new generations that are "highly educated and open for dialogue" and exchange of ideas.

Interview data show that in order for the government to increase the density levels and reach its target, the city planners and decision-makers should capitalize on public involvement and participation through open dialog, negotiation sessions, and workshops amid to explain the following:

1. Bigger lots mean "loss of land resources" for future generations.
2. In "financial capabilities" terms, smaller lots is an economically feasible decision because:

a. Bigger lots mean "higher" construction cost, especially the construction of the "boundary wall" that is made of concrete and required by law to be at least seven feet in height along the entire land parcel.

b. Smaller lots mean less energy consumption, fewer expenses for the government and users, and "less finance, debts, and loans." For example, smaller lots result in lower infrastructure cost and service lines expenses per plot and per neighborhood and thus less financial burden on the government. A government official claims that reducing the lot size from 10,000 to 7,500 square feet would benefit both the city and the citizens. The city could potentially save "20 to 30%" of infrastructure cost, and property owners could save the similar amount of the "construction cost."

c. As the cost of living in Dubai is already high and may continue to rise in the coming years, many citizens will not be able to spend huge amounts of money on building a big house on large lots. Therefore, reducing the lot size is an economically viable decision.

3. In planning terms, smaller lots mean a good opportunity of having more parcels for green spaces, amenities, and services within a neighborhood;

4. In design and aesthetics terms, high density and smaller lots have more "aesthetic qualities" than larger lots and low density developments.

5. In regulatory terms, an additional floor and a relaxation in setback regulations will compensate smaller lots. In human and social terms, high density levels can potentially strengthen the level of social relations and interactions within a neighborhood. As claimed by one interviewee, high density rates with close knit houses "tie people's heart, spirit, feeling, and sympathy to each other as one bond."

One official interviewed argues that densification and intensification strategies should be compensated by (1) relaxation of building regulations and construction requirements; and (2) an enhancement in the quantity and scale of green areas, amenities, and services with a neighborhood. It is indeed "a trade off and priority issue." To achieve this, the planning department in DM established an idea that revitalizes the concept of "Al-Freej," defined as an integrated, dense, and socially oriented traditional neighborhood. The idea aims to reduce the lot sizes and encourage compact development while increasing the rate of social and green spaces. Instead of developing long and impermeable blocks subdivided predominantly for housing, the planning team initiated a "design module" that includes 15 to 20 villas arranged in an organic shape integrated with a central green space called "Al-Freej Plaza." In this model, the lot size reduced from 10,000 to 7,500 square feet and utilized the rest of lands as a shared green area that serves each planning unit. The common green areas of every planning unit is also designed to be connected with each other through pedestrian pathways and bike lanes that are totally isolated from car traffic. In February 2011, local news revealed that the authorities in Dubai approved the construction of 50,000 housing units based on Al-Freej concept.

Environmental design of buildings

Interview data reveal many implementation constraints on the application of performance-based criteria; however, five interviewees argued that in order to define further details and reliable data, the question should be asked to the officials in Building Permits and Regulation Department in Dubai Municipality because the town planning unit mainly takes charge of planning, not building, scale strategies. A local authority

interviewed argues that it is "a benefit" for Dubai to "enforce" environmental design of buildings. The general director of DM and the highest authorities in Dubai are pushing forward this idea. The green agenda has not gained approval yet, but it is in the final stages. DM could easily enforce and control because the agency has the tool of enforcement: the "issuance of building permits."

Although the application of performance-based principles is supported by the highest authority in Dubai, interviewees defined several economic, regulatory, climatic, scale, and timing obstacles that place fundamental limits on this strategy. For example,

1. From the public and private sectors as well as the public standpoint, green technologies are costly.
2. A lack of cash and finance options during this period of economic deficit, led the government in Dubai not to attempt enforcing any new criteria on developers; instead, it is relaxing its building and construction regulations.
3. The scale of green application is a major implementation constraint especially if it applied on large scale developments.
4. The harsh climatic conditions in Dubai require a huge amount of energy supply and demand for cooling purposes during the long summer season. One interviewee estimates that the current Emirates energy system that utilizes natural gas is "more efficient and cheaper" than alternative sources of energy. This holds true even for the long run, if compared to other regions with low oil reserves (e.g. European countries).
5. As the green building standards launched in 2008, shortly after the boost in construction, the majority of interviewees and many commentators argue that timing is improper. It would have been more effective to think about this strategy

before the construction boom (in 1998), not right after the completion of hundreds of structures (in 2008).

A major constraint on this strategy is that developers find the implementation of green technologies "costly," especially during the recession. Now every entity (whether it is public or private) looks forward to "cutting down not adding expenses." Environmental design of buildings is perceived as "a financial burden" although it might be "beneficial" for both the city and developers in the long run. For example, the government "is already loaded" with cost and expenses related to "services and infrastructure." Private corporations, on the other hand, mainly focus on "cutting expenses" and saving money combined with "rapid profit and fast investment return."

Second, one official interviewed believes that the public agencies in Dubai are not eager to "impose" new regulations on developers due to the lack of cash and finance options in this period of economic drawback. The guidelines and regulations of green building standards are almost "completed yet not approved." Because many developers have shortage of financial resources and many others are relocating their businesses to Abu Dhabi, Qatar, and Saudi Arabia, Dubai is relatively "relaxing the implementation and enforcement" of this strategy .

Third, one authority interviewed argues that "size and scale of development" is a major constraint on the implementation of green applications. Due to lack of cash, expertise, expenditures, and incentives, it lies outside the investors' priority and interest to adopt green strategies within their projects, especially if the scale of the application is large. However, the implementation of green standards is still perceived as an obstacle even if the application is small in scale. For example, "Individuals" find the incorporation of green standards within their private residential structures such as villas or low rises as

"expensive." To affirm this last statement, the implementation of green roof policy was not fully considered and enacted due to the high cost "estimated at AED 150,000 per villa an equivalent of US$ 40,760" (Expert M, 2010).

Fourth, one interview subject claims that whatever materials, passive systems, or technologies used within Dubai's harsh geographic and environmental conditions, will still require a huge energy supply and demand for air-conditioning, especially from May to September. In fact, a record indicates that almost "70% of power consumption" in the UAE is articulated to cooling requirements; this requires a great deal of energy supply that might not be efficiently or substantially secured by green energy sources.

Fifth, according to one interviewee, it is relatively considered very late to apply and to enforce the green strategies now. Dubai has built hundreds of structures in the last two decades ranging from low-rises, to mid-rises, to enormous amount of high-rises without incorporating any performance-based criteria. It would have been more reasonable and practical to think about this application right "before" the construction boom not afterwards. For example, the enforcement of green roofs has "dramatically failed" because (1) it is difficult and expensive to "maintain" greenery on roofs; (2) the application and "construction" of this strategy is very expensive; and (3) building roofs in Dubai are already "filled with machinery that is difficult to relocate."

According to one interviewee, if Dubai enforced any performance-based criteria on new structures in the future the standards have to be designed and considered from the "early design stages of the projects time span." One government official interviewed argues that "elements of education" that target the public and developers and incorporate training programs and workshops also play a very vital role in "marketing" this strategy. This aspect is asserted by another interviewee who claims that the "idea of learning and phasing strategy" is very important to widely disseminate the positives aspects of green

technologies. The implementation of green strategies has to be done step by step through an "incremental" approach coupled with a strong "media and educational campaign" as well as "incentives" for developers.

Abu Dhabi has already introduced its comprehensive performance-based criteria known as "Estidema Initiative;" however, the green agenda in Dubai still sits waiting for approval by the authorities for implementation. The frustrating point is that why there should be separate standards for each city in the UAE. Cities in the UAE share similar climatic conditions, similar construction techniques, and all operate under a unified political system. So, there is no reason or rationale to pay many consultants to generate a separate standard for every city; the UAE can hire only one consultant with the aim of developing "one agenda" that can be implemented in all cities.

According to one interviewee, achieving green is not only related to applying green technologies to building design and envelop, but also it relates to the origin and source of energy from which electricity is generated. The official stated that it is better to think about green as a city-wide issue not only as a building scale issue. If Dubai associated the bigger scale clean system with a performance based strategies that targets smaller scale details and individual buildings, the outcome would definitely be an "integrated system" of energy conservation.

Public participation in city design and development

All officials interviewed affirmed that there is a huge benefit of involving the public in city design and development. For example, one interviewee argued that Dubai should "embrace" participatory planning approaches in community design and development. The officials in Dubai should create venues of dialogue, interaction, discussion, and communication opportunities with the public to "hear" their opinions and

respond to their needs and ideas. Interviewees believe that public participation in planning could be very successful in Dubai, but under one condition: The public should not be given "full power and control" or the majority of seats in the decision-making process. It is more effective to take participatory approaches on a gradual and incremental level starting from mere consultation and discussion sessions to a point in which the public can take part in the decision-making process.

The majority of officials (five interviewees) argued that participatory planning can be implemented successfully in Dubai; however, the city should make some efforts on the "political, organizational, educational, and communicational levels." The path towards an effective public participation process is not an "easy one," especially in Dubai where there are major political, social, and organizational constraints and pressures. From the political side, the decision-making in Dubai is characterized by top-down style in which decisions are made rapidly and transition of power could not easily be granted to the public because any change and modification of the political system originally comes from the government itself; usually the government in Dubai does not like "interference" with its decisions.

The arguments above are asserted by another interviewee who argues that decisions about public participation or collective decision-making approaches in Dubai are "politically rooted in two different scales: the national and local policy systems." He continued to say that the implementation of participatory approaches extends discussion and authority beyond the "local municipal administration." For a long time the planning decision-making system in Dubai or the Emirates has worked as a top-down model. According to one interviewee, a major constraint of implementing participatory planning in Dubai is that the city "makes decisions very fast," and these decisions come from "top authorities;" therefore, involving the public in decision-making will run against the

massive history of Dubai's centralized approach and will "slow down" the decision making process. In addition, public opinions might "interfere" with the government's decisions and usually authorities in Dubai do not like intrusion and infringement with decision making.

The lack of a central planning authority in Dubai poses another political or organizational constraint. During the construction boom, the power shifted from the public agencies to certain quasi-government corporations without creating a system that coordinates between the city's agencies and private corporations. As a result, every authority had different priorities and development agenda that "do not meet" with each other. There was no "one" planning body to "legislate strategies" and "overrule" the multiple authorities. Each of those authorities and organizations was working within their "individual" development framework. For example, the quasi-government corporations' priority was mainly based on competition in the market and profit generation.

During the recession, the private agencies lost ground in the market and the government lost its belief and trust in the semi-public corporations. As a result, one agent predicts the power gradually will shift once again, but this time to the public agencies. However, the problem still remains unresolved. If Dubai adopted participatory planning approaches in city development and design: which agency would handle and govern the public involvement in planning matters (the public agencies, the quasi-private corporations, both, or a new central planning agency)? One interview maintains that this is a critical unanswered question.

The last political and organizational constraint as defined by two interviewees is that the public institutions in Dubai lack the expertise, communication skills, human approach, and authority to "market" their ideas and interact with the public effectively. One interviewed party argues that people shouldn't look at the municipality as an entity

that only “imposes regulations and fines, or an agency that makes the public lives difficult.” Instead, the municipality should be perceived as an institution that “serves and listens to the public.” But unfortunately, Dubai did not succeed to “market” this thought.

According to one interviewee, public agencies should build relations based on “trust and respect” with the public. Institutions in Dubai are still very “rigid” in their communication with the public. One of the top priorities of the Sheikh is to “enable” the public to freely “interact” with the institutional authorities. However, the agencies in Dubai still do not have the implementation tools such as knowledge, authority, communication skills, and also expertise to market and implement this strategy. Public participation is “a very difficult and delicate subject;” therefore, Dubai needs people who already have experience, knowledge, communication abilities, negotiation techniques, and organizational skills for an effective and meaningful application of participatory planning methods.

The social constraints, on the other hand, are mainly associated with the public “desire, “interest, and wish” for participation. Interview data indicate that implementation constraints on public participation vary between locals and expatriates. One local authority interviewed argues that the majority of the indigenous population does not have the “desire and interest” in participation because their living standards are fairly good and they “trust” the city’s decisions in planning matters. The statement above is asserted by another interviewee who argues that the locals in Dubai are “not really interested” in public participation; it is not really of their interest and desire “at the moment” because they generally are living well and in a good condition. One interviewee said that it is not a matter that the public are “asking” to participate and the system in Dubai is “not allowing it.” The “interesting part” is that the town planning authority has an intention and plan to incorporate participatory planning approaches in the future. This explains that

the initiative or first move is coming from the government side not the public. The official continued, people in Dubai are not "fighting or asking for participation" because engagement and involvement in decision making processes were not part of their lives and culture. Besides, the vast majority of locals "trust" the government and they believe that it is "operating well."

Another interviewee claims that the public in Dubai do not find participation to be "important or necessary, at least currently" because the welfare and the amount of services provided to the locals are relatively good and not influenced by any extraordinary or unexpected decisions from the government. Most of the locals at present time live in a good environment and there is not really "an acute" urban problem that stimulates their interest and enthusiasm towards public participation. However, the local population might find this notion "appealing or essential" when "competition" starts; when "policies" change; and when their living standards change by new policies.

Three interviewees argue a lack of interest and desire in public participation also prevails among the expatriate population, which is attributed to several reasons. First, the living standards and quality of life of many expatriate groups are reasonably good. Second, many expatriates, especially the working class, stay in Dubai on a temporary basis as their residency is dependent on their employment status; accordingly, they have no real incentive or motivation to be involved in Dubai's fate and condition. This argument is asserted by another interviewee who says that as most of the expatriates do not have a "permanent residency" and their stay in Dubai depends upon their "job" (if they lost it, they should leave), there will be no "physiologically" related reasons, desires, and aspirations among the expatriates to participate. One interview argues that expatriates during their stay in Dubai have many "obligations and priorities" to address, such as supporting their families and enhancing their living standards in their original country,

rather than participating in planning processes. According to one interviewee, since the living circumstances of the expatriate communities are not "stable or secured" in Dubai, the opportunities of implementing public participation are more "open to the local population than the residents."

Third, as many expatriates and even locals buy properties (e.g. for living, investment, or a vacation home) from the open market and since most of the major corporations provide their customers with detailed drawings and renderings, buyers have no substantial motivation to participate in the design and planning processes. The market and developers use many tools and technologies to show the buyers and consumers how their unit will look like from the inside and outside. The 3D aspect of planning and urban design made the decision-making and selling "quicker." But, if the market does not detail the characteristics and specifications of the development in various formats and representation techniques, buyers will not be able to decide and make an immediate judgment; therefore, they might be slightly more "eager and open to participate."

All interviewees concurred that public participation should be "legislated" in Dubai. For example, one interviewee argues that "no plan for an area should be approved without consulting the public because they are the users." There is a British quotation that says: the essence of public policy is "no legislation without representation and no power without authorization." A government official interviewed argues that it is unfeasible to think that participatory planning will provide the public with "all" of their desires, but it is possible to think that this notion will provide the public with what they need in "a good and better way."

Interview data generally reveal a general agreement among all interviewees that to enhance the quality of life in Dubai, the city should "listen" to the public and take their "consideration into account." But at the same time they believe that, if implemented

effectively, there should be "a limit of citizens' power" in public participation. Initially the public should not be granted a high degree of "freedom and authority;" rather, a consultation role would be reasonable and sufficient. The city can incrementally grant the public some seats in the decision-making processes later on as appropriate. As proposed by few interviewees, a first step is to create organizational councils in neighborhoods. Dubai has a city-wide council, but not community level boards. The town planning authority established an idea of creating a community council in every neighborhood which includes representatives elected by the residents on an annual basis. However, this proposal was not implemented; it was approved by the authorities in DM but then disappeared during the final approval processes for reasons unknown.

The spirit of participatory planning methods in the form of community workshops and design charrettes, in which the public can participate with the stakeholders and authorities in community design and planning processes, does not exist in Dubai. The public or the stakeholders interact with the city mainly when there is a bargain, contest, or compensation cases and I describe this kind of public involvement as "dispute resolution or negotiation, not real participation."

Identification of Five Most Effective Strategies

I organized the responses about the selection/prioritization of five most influential strategies on the future development of Dubai into four groups: (a) the first group of respondents, including three officials, prioritized five strategies as requested during the interview; (b) the second group of respondents, including two officials, indicated six strategies, more than required; (c) the third group, including one interviewee, defined only four strategies, less than required; and (d) the last group which includes one respondent argued that all strategies are "evenly weighted" and must be taken into

account by the government because there accumulation and presence in the urban fabric build up what we call a "an integrated sustainable approach." This statement is asserted by another interviewee who already prioritized the five most effective strategies. The official argued that it is very difficult to "prioritize" some strategies over others and it is difficult to "neglect" any one because all strategies are linked and interconnected to each other. In fact, "the integration of all strategies" is necessary to create a good living environment. These statements confirm some experts' responses in the Delphi. Another major comment from this interviewee is that "context" is very important. The prioritization and selection of strategies should be "responsive" to the environmental conditions and cultural aspects of the place.

In this section, due to the small number of interviewees, I included all four groups in my analysis. In order to understand how these strategies are effective and important for the future development of Dubai, we should examine the frequency of selection from the most-recommended strategy to the least-recommended strategy. For example, by interpreting Table 37 below, walkability and density levels are cited five times, being the most frequently cited strategies. But when we look at other strategies in the table, it appears that a macro-network of transit; green, open, and social spaces in the urban fabric; and diversity of land use and building types are also cited very frequently (4 times each), indicating the second set of most frequently cited strategies. In contrast, we have bike infrastructure; short blocks and interconnected street systems; diversity of residential offerings; environmental design of buildings; and public participation in city design and development as the least frequently cited strategies. Bike infrastructure is cited only once, being the least recommended strategy, and the other strategies were cited twice each.

Table 37: Five most effective strategies by interviewees

Design strategy	Frequency of citation
Walkability	5
Bike infrastructure	1
A macro-network of transit	4
Short blocks and interconnected street systems	2
Green, open, and social spaces in the urban fabric	4
Diversity of residential offerings, inclusive housing	2
Diversity of land use and building types	4
Density levels	5
Environmental design of buildings	2
Public participation in city design and development	2

In this particular section, the majority of interviewees did not detail their selection of the top five design strategies. However, few (three out of six) attributed their selection of the five most effective strategies to the following reasons:

1. Density is important to support transit systems, retail and commercial spaces, and social interaction in neighborhoods. High density level could result in potentially lower infrastructure cost and service lines expenses per land parcel and, thus, per neighborhood. The budget savings could in turn be utilized to enhance the volume and quality of community facilities.
2. A macro-network of transit integrated with the existing metro system could possibly increase the rate of car-to-transit conversions coupled with a huge reduction in the level of pollution and demands on roads. Trams will also efficiently serve the population segments that do not own a car.
3. It is good to have everything (e.g. housing, places of work, recreational areas, educational facilities, and health services) in one area. It would be ideal if people's houses were next to their job, daily needs, and services. This will reduce the number and duration of daily trips, promote walkability, and reduce pollution

levels. Diversity of uses within neighborhoods will create spaces where people can breathe, meet, relax, shop, exercise, and practice rituals. For example, green spaces are indicated as a very significant strategy that stimulates social activities and community interaction.

4. Bike infrastructure received the lowest votes because some interviewees think that the culture in Dubai, especially the current local culture, will not accept bikes.
5. An Interconnected street system was among the least cited strategies. Some interviewees believe that there is no need to adopt an interconnected street pattern as connectivity in neighborhoods is maintained through the use of Sikkas or alleyways.

Opportunities for implementation

Interview data about the implementation opportunities of the experts' driven strategies reveal three different positions. Position one indicates that strategies such as walkability, bike infrastructure, and macro-network of transit are already included within Dubai's long-term structural plan, but the city has a phasing implementation strategy and budget problems. So, it is only a matter of time and budget allocation to see more walkable areas, bike infrastructure, and mass transit within the city, but not per se within a neighborhood scale development. Position Two indicates a strict position, as all interviewees argued the difficulty of implementing strategies such as ethnic diversity, mixed-use development, or inclusive housing as the cultural, social, and traditional norms of the local population impose huge constraints on implementation. Interviewees argue that diversity and housing related strategies require tolerance and understanding of different cultures from the social and political standpoints. In fact, these two particular strategies require social acceptance and policy arrangement all over the world not only

Dubai. Position Three, on the other hand, indicates that strategies such as connectivity, green areas, public participation, and environmental design of buildings require a comprehensive set of regulations and guidelines, developed and enforced.

Following are some policies and recommendations suggested by the interviewees to support/carry out the implementation of the Delphi generated strategies:

First, a framework for measuring success: previously, DM was in charge of the planning work and development strategies in Dubai. Then, during the boom or when developers took power and a place in the market, the government had a sort of "tendency" to create investment opportunities by relaxing and reducing the regulations and laws to "minimum levels." As claimed by one interviewee who works in the town planning authority "I am afraid to say that the city offered too much of freedom to investors who came from all over the world." Developers build whatever they wanted as long as they were "successful," as measured by "profit" venture return. The "criteria of measuring success" sadly were not legislated and adopted in Dubai to control and provide guidance for developers. What one interviewee argued was what Dubai needs is a "solid criteria and guidance for measuring success" and controlling developments as the term success is not only related to marketability but also to social aspects, environmental quality, users satisfaction, and cost implications.

Second, setting up a foundation for a central planning authority: one government official interviewed argues that Dubai should have one planning agency that sets up strategies, enacts policies and laws, generates development guidelines, and controls developments. Ironically, most public and private agencies label a unit "planning" without having a system or institutional arrangement that coordinates between these dispersed and disintegrated units. All seven interviewees affirmed that in the future Dubai

should only have “one” planning authority named as the “Greater Dubai Planning Authority” or “Greater Dubai Planning Council.”

One interview contends that in order to be successful in the future; all development authorities in Dubai should be controlled and managed under “one umbrella, one vision, and one kind of planning authority that is a central one.” This approach would potentially be: (1) “the most successful way” to implement the proposed urban design strategies and; (2) the most successful technique to at least “eliminate” some of the drawbacks and shortcomings of the previous urban growth agenda and policy. There should be an integral, central, and solid “vision and framework” that ties all the development authorities and priorities together.” Adopting this approach could certainly save a lot of “capital, time, and effort.” Furthermore, power dynamics and configurations will be concentrated and thus not dispersed among several agencies, and growth related decisions and will be “clear and transparent.”

Third, setting up an educational program teaching planners different communication skills and information dissemination techniques: one interview reasons that “terminology, language, and communication techniques” are very important in the planning work. According to a government official interviewed, authority should not be perceived as an entity that holds “power and control” over the public and developers. Instead, agencies authority should be perceived as a power that respects and responds to the public needs and aspirations. This kind of power should be utilized and directed towards preparing “strategies, conducting studies, enacting policies,” listening to the public, educating the public, organizing guidelines and frameworks, and controlling implementation. Authority should also be perceived as a kind of power that requires agencies to operate as “technicians, communicators, and experts” in order to disseminate

the technical information and furnish a knowledge ground that guides and educate the public.

Fourth, embracing urban design strategies in practice: one interviewee argues that to effectively implement the Delphi proposed strategies requires fundamental "specialty and organization." The term specialty refers to the argument that "no work" should gain approval without embracing elements and strategies of "urban design" in practice. The organizational element, on the other hand, is twofold: (1) no planning department should be without an urban design unit and specialists; and (2) no planning department should be without authorization and legislation power.

Fifth, reducing dependence on outsourced design work and skills: One interviewee argues that Dubai should obtain an "architectural and urban identity" that is culturally and environmentally relevant and likely designed by the local talents and experts. In the future, Dubai should not totally rely on outsourced and imported design work and talents. Local population should receive education in order to produce the next generation of urbanism and architecture. In order to attain this vision, urban design, planning, and architecture education should be promoted and supported by the "top authorities" in the UAE. Dubai should aim for a level and detail in urbanism, so whenever a spectator sees or observes a structure, he/she must realize by his/her "heart and vision" that this area is located in Dubai. Perhaps, this level of urbanism requires "50 years" of work, preparation, and experience with trial and error.

Last, changing developers' perceptions through education, media, and incentives: Dubai should have a program and policy agenda aimed to change developers' "perception," level of thought, and main concern which in most common cases prioritizes profit and selling rates over place making and sustainable design.

One interview argues that before the boom, the planning department in Dubai was planning in a good way. However, the emergence of quasi-government corporations that usurped the authority from Dubai Municipality caused outrages as well as urban, environmental, economic, and social emergencies in the city. Accordingly, as claimed unofficially by one government official interviewed, all authorities and power will be delegated to the public institutions in the future as the mega firms lost ground and credibility during the recession.

As part of the new urban model, in 2007 the town planning authority asked the top authorities in Dubai for a plan that coordinates between the public and private agencies. The request included a suggestion of having one planning agency. A consultant was hired to work in this project for two years; however, the outcome and recommendations were not approved by the authorities in Dubai due to several concerns. For example, the question of "who will be the central planning authority" was not defined appropriately. Another major limitation was that the consultant did not take into consideration the "interconnection between the ruler, tribal system and decision-making power." Furthermore, the proposed study was not taken into account because the hired team did not solve the issue of how the giant corporations which, with their huge resources and workforce, are developing the larger parts of the city could be controlled and linked with the public agencies.

One interviewee argues that the ultimate power and authority in Dubai at present time rests with the "Executive Council" which includes "five committees." One of these committees is the "infrastructure and environment committee" which is in charge of the urban growth and quality of life. Several public institutions are involved in this committee including DM, RTA, DEWA, Aviation, Dubai Land Department, and Dubai Marti Time City.

According to one interviewee, the future urban agenda of Dubai includes five plans. The hired consultant will prepare the first four plans while the town planning authority will prepare and organize the last phase of the plan. The first four phases will focus on strategic planning related topics such as population growth; urban growth; economic forecasts; land availability; infrastructure expenses; integration between public transit and land use; distribution of community facilities and services; spatial planning guidelines and strategies; and lastly strategies for decision-making processes for effective implementation which must define the planning authority (i.e. which agency will hold the authority and power; is it going to be one central planning bureau; or there will be multiple bureaus and in this case in which fashion they will operate?) The fifth part of the plan, on the other hand, is an "urban management" or "place making" plan that includes planning and design details related to zoning, place making design tactics, and development control plans and regulations. The town planning authority and team will exclusively prepare and design this part of the strategy.

Chapter 7: Surveys, Public Opinions: Findings

INTRODUCTION

In this chapter I analyze survey results. In the first part, I present the major and most significant findings. In the sections that follow, I provide more detailed analyses of the results indicating the respondents' preferences and opinions of single, specific design strategies. The survey was intended to: (1) identify the public opinion about ten design ideas for Dubai neighborhood that have suggested by an international and local panel of experts; (2) understand how the public valued and prioritized the suitability of the proposed design strategies; (3) identify the potential benefits and troublesome challenges associated with each strategy; and (4) identify the public opinion about the five most important design ideas that will most likely improve the quality of Dubai's neighborhoods, as defined by the panel of experts.

MAJOR FINDINGS

A total of 151 subjects (UAE citizens + residents) participated in this research effort to determine the public opinion about design ideas for Dubai neighborhood, as suggested by an international and local panel of experts. Out of 200 surveys distributed in Dubai's public agencies, 151 surveys were returned, indicating a response rate of (75.5 %). A mixture of local male (52 individuals), local female (53 individuals), expatriate male (38 individuals), and expatriate female (8 individuals) responded to the survey.

In the general sense, I argue that the majority of qualitative responses provided by the participants tend to be similar, reflecting a strong commonality, agreement, and shared thoughts between all participants' groups. The categories I delineated for the

qualitative responses are as follows: the potential benefits of each strategy, constraints and challenges, and recommendations.

I organized and classified the findings into three different groups of respondents: group 1, group 2, and group 3. I organized the first group based on the survey respondents who rated design strategies as "very important." Compiling the responses of "very important" into a single group reveals the most highly valued design strategies among research participants. This group consistently rated walkability, green and social areas, mixture of land use and buildings, environmental design of buildings, and interconnected street systems as "very important" design ideas for Dubai neighborhood development (refer to Table 38). It is important to note that I did not include the survey response data from expatriate females in this group due to the small sample size.

Even though the majority of local females, local males, and expatriate males rated the aforementioned five strategies as "very important," for two design strategies (walkability and green areas in the neighborhoods) there appears to be a fairly significant difference between local and expatriate respondents. Almost (70%) both of local male and female participants rated walkability and green areas as "very important," but (94%) of expatriate male participants rated the same strategies as "very important."

The other respondents, on the other hand, did not consider these two strategies very important because: (1) the weather in the UAE stays extremely hot most of the year; the time span during the year in which the public can walk comfortably is very limited; (2) people in Dubai meet most of their daily needs by cars or through "delivery services," so there is no need or motivation to walk; (3) few local participants argue that green and recreational facilities should be located a distance from residential areas because they cause traffic, crowds, and noise; and (4) a local female participant who works in (Dubai Municipality, Public Parks and Horticulture Department) argues that it is not feasible to

increase the amount of green areas in neighborhoods because people use these facilities only in winter and an extensive amount of greenery also increases maintenance and irrigation expenses for the government.

Group 2 includes local females, local males and expatriate males. I did not include the survey response data from expatriate females due to the small sample size. This respondent group considers bike infrastructure, housing choice, network of trams, and public participation less a priority than the strategies enumerated in Group 1. This group was also organized to analyze response differences between men and women. For example, the design strategies rated "very important" by most local and expatriate male participants included bike infrastructure, housing choice, network of trams, and public participation. In contrast, the majority of local females rated the same design strategies as "somewhat important" (refer to Table 39).

It is important to note that these local female ratings are not significantly different from the other sub-groups. Also significant, for three design strategies (bike infrastructure, housing choice, and public participation), there appears to be no significant difference between local female respondents who rated those strategies as "somewhat important" and those who thought they are "very important."

Respondents in Group 2 (both male and female) did not provide gender-specific explanations for their ratings. Therefore, based on these data I cannot precisely explain the variance between male and female ratings. However, my interpretation is that the majority of local females rated the aforementioned strategies as "somewhat important" because: (1) the local culture, traditions, and clothing place fundamental barriers on widespread bike use among the local female population; (2) the diversity of housing choices or social mix creates crowed conditions with large concentrations of workers and single people who might threaten the sense of privacy and the ability to feel safe moving

in the neighborhood; (3) the majority of local females, in general, do not favor or prefer the use of public transit due to the crowds, excessive waiting time and exchange between transit stations, co-mingling between men and women, and the inefficiency of public transit for multiple and chain trips; and (4) the local female population has less tendency and interest in participating in open discussions and workshops compared to the male groups due to their family and work-related responsibilities, their more sensitive disposition, and their discomfort in public discussions based on cultural traditions of sex roles.

Group 3 includes local females, local males and expatriate males. In this group I compared survey responses among these sub-groups. I did not include the survey response data from expatriate females in this group due to the small sample size. My analysis revealed a variation among these three sub-groups. The majority of local females (47.1%) rated increasing the level of density through reducing the subsidized land size as "not important at all", while (40.3%) of local male participants rated this strategy as "somewhat important." Thirty-nine percent of the expatriate male responses, on the other hand, rated increasing the level of density through reducing the lot size as "very important." It is also important to note that (42%) of expatriate male respondents considered this design idea as "somewhat important," while a significantly smaller number (10.5%) thought that this idea is "not important at all" (refer to Table 40).

Given the limitation of my qualitative data as most of the participants' comments tend to be broad and quite similar, with no particular deviation between all sub- groups, I cannot precisely explain this variation in ratings. However, I can explain why the majority of locals rated the reduction of land size as "somewhat or not important at all," while the expatriate rated the strategy as "very important." I argue that this deviation between the citizens and expatriates is not attributed to the reason that citizens prefer low

density developments more than expatriates, or expatriates prefer high density levels. Rather I attribute this difference to the reality that grants of subsidized lands only go to the local population. Thus they would certainly prefer to maintain their large land parcels over smaller lots, whereas the expatriates showed interest towards high density levels because they do not directly benefit from government subsidies.

FINDINGS IN DETAIL

GROUP 1

There is consistency and agreement among all sub-groups (local male, local female, and expatriate male) in which the majority rated walkability, green and social areas, mixture of land use and buildings, environmental design of buildings, and interconnected street systems as "very important" design ideas. The analysis of the responses is structured along three main lines: the potential benefits of each strategy, constraints and challenges associated with every strategy, and possible design recommendations. The categorization of the results and responses into this form reflect my best attempt at organizing these data in a consistent and rigorous manner.

Table 38: Group 1 ratings of design strategies

Walkability (Pedestrian-friendly environment)				
Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses		14 (26.4%)	39 (73.5%)
Local Male		1 (1.9%)	13 (25.0%)	38 (73.0%)
Expat Male			2 (5.2%)	36 (94.7%)
Green areas in the neighborhood				
Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses	1 (1.8%)	11 (20.7%)	41 (73.5%)
Local Male		2 (3.8%)	11 (21.1%)	39 (73.0%)
Expat Male			2 (5.2%)	36 (94.7%)
Mixture of land use and buildings				
Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses	1 (1.8%)	17 (32.0%)	35 (66.0%)
Local Male		3 (5.7%)	9 (17.3%)	41 (78.8%)
Expat Male		3 (7.8%)	7 (18.4%)	28 (73.6%)
Environmental design of buildings				
Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses	5 (9.4%)	16 (30.1%)	32 (60.3%)
Local Male		3 (5.7%)	11 (21.1%)	38 (73.0%)
Expat Male		2 (5.2%)	9 (23.6%)	26 (68.4%)
Street systems				
Scale		Impermeable system & long blocks		Interconnected
Local Female	Responses	11 (20.7%)		40 (75.4%)
Local Male		10 (19.2%)		37 (71.1%)
Expat Male		5 (13.1%)		33 (86.8%)

Walkability

Survey responses verify that the vast majority of participants including 73.5% of local females, 73.0% of local males, and 94.7% of expatriate males think that walkability is a "very important" design idea with many advantages and potential benefits; it should be encouraged in the future development of Dubai's neighborhoods. On the contrary, a smaller number of participants including 26.4% of local females, 26.0% of local males, and 5.2% of expatriate males think that walkable areas are "somewhat important." One local male participant argues that walkability is "not important at all."

Potential Benefits

The collective participants' qualitative responses indicate that many social, environmental, health, economic, religious, and safety benefits associate with walkability. As indicated by a local male participant, a pedestrian-friendly environment incorporates both aesthetics and civilized elements. Walkability maintains people's physical and mental well-being and health, and results in a vibrant and sustainable environment. Fifty-seven participants (22 local males, 16 local females, and 19 expatriate males) stated that an attractive and walkable environment potentially increases the rate of physical activity and fitness and reduces the rates of obesity, diabetes, blood pressure, blood cholesterol, and diseases. Walkability also reduces the use of cars, especially for short destinations, which contributes to the provision of clean and healthy environment.

Furthermore, 19 respondents (6 local males, 8 local females, and 5 expatriate males) said that the frequent presence of pedestrians on streets reduces crime rates and increases surveillance and opportunities of social interaction and friendship "formation." According to an expatriate male participant, pedestrian infrastructure with shaded streets integrated with some facilities such as retail stores, cafes, parks, and mosques, all sited

near to where people live reduces the need to drive, invites a healthier and family oriented lifestyle and more importantly makes a neighborhood into a vibrant and exciting place and not just an urban housing area. Pedestrian infrastructure also serves the people who cannot afford to own a car.

A local female participant argues that because many people spent most of their time in home watching TV or playing video games, it is essential to integrate walkways in neighborhoods to give the residents an opportunity to enjoy the outdoor spaces and to meet their daily needs without driving cars. One participant surveyed stated that using cars is neither economical and nor environment friendly. Having walkways and services close to residences will encourage people to walk the short distance instead of driving, which will result in a reduction in noise level, congestion, gasoline consumption, transportation expenses, and pollution. A local female surveyed stated that not having walkways in our neighborhoods "forces us to use cars and thus increase the rate of health problems, expenses, and pollution." A different local female participant offered that not everyone likes to use automobiles extensively. She continued,

> as for me, I like to meet my daily activities walking to my specified destination in order to breathe fresh air, do my daily walking exercise, and at the same time be environmentally friendly by reducing the amount of carbon dioxide in air.

An expatriate male participant says that walkability is very important; in many cases we cannot reach our destinations due to the "horrendous traffic" in Dubai and "lack of car parking." One respondent says that being able to walk to short destinations saves people a lot of time and effort needed for other important matters like "raising children." In fact, any strategy that increases the degree of accessibility and connectivity to services and facilities is desired by the public (Expatriate male, 2011).

Walkable neighborhoods also promote an active and dynamic life style and encourage people to use the outdoor spaces more often, thus reducing dependency on cars, demands on roads, and water and energy consumption in buildings (Local female, 2011). Walkable neighborhoods also create opportunities for social interaction and gathering on streets, parks, mosques, and recreational spaces (Local female, 2011). As people in Dubai are typically socially oriented, walkable neighborhoods create opportunities to be frequently engaged with others (Expatriate male, 2011). Three local females believe that walkable areas increase the attractiveness and physical appearance of a neighborhood; enhance the organization and quality of people's daily activities and circulation patterns; and promote "friendship, communication, and peace" among residents. According to a local male participant, walkability constitutes a "fair" design strategy that serves a lot of population groups that do not own a car and also the disabled and elder people who cannot drive but can shortly walk.

In Dubai most of the inhabitants work long, hard hours and get little exercise; therefore, any opportunity to walk in a good environment should be encouraged (Expatriate male, 2011). A pedestrian-friendly environment is an "indicator of good planning" (Local male, 2011). Walkability is a "basic need" for any neighborhood (Local male, 2011). Walkability will make the public "satisfied and proud" of their neighborhood (Local female, 2011). Walkable areas reflect the "concern of the government towards its citizens" (Local female, 2011).

One respondent argues that since daily life in Dubai is hectic, busy, and full of commitments, there should be walkways in neighborhoods as walking is a form of exercise that enhances people's physical and mental health (Expatriate male, 2011). Thirteen participants (4 local males, 3 local females, and 6 expatriate males) stated that walkability has a positive impact on human psychology, mental and psychological health,

and human performance and activity level (Local male, 2011). Walkability potentially reduces stress levels and simplifies people's daily life and movement to allow greater devotion of mental effort (brain and behavioral functions) toward "work, family matters, production processes, and educational and cultural thoughts rather than being spent in a stressful heavy traffic," behind the windshield (Expatriate male, 2011) .

Respondents stated that dedicated pedestrian walkways provide high degree of safety for different ages especially the children and elderly. Twenty-seven participants including 12 local males, 7 local females, and 8 expatriate males asserted that a specified and spacious footpath will play a critical role in avoiding vehicle vs. pedestrian accidents. A dedicated space for every transportation mode creates an organized environment, especially in terms of pedestrian/vehicular circulation. One participant said that "pedestrians should walk safely; we do not want to be hit by a car" for going to a mosque, park, or grocery store (Expatriate male, 2011). A female participant believes that if dedicated walkways are available, people will be protected from traffic accidents and thus encouraged to walk, bike, and exercise more often. Dedicated footpaths would enable the young and aged groups to walk safely and securely to many destinations, especially mosques (Local male, 2011). According to a common and fundamental Islamic fact, the reward for people who walk to mosques is much greater than who those drive because on each step you take to a mosque, you receive a reward (Local female, 2011). She also stated that any person who prefers driving over walking to mosques is missing an easy way to gain great rewards.

Constraints

A small group of participants, on the other hand, stated that walkability does not suit Dubai's climatic and population behavioral aspects. Survey responses reveal that 14

out of 53 local females, 13 out of 52 local males, and 2 out of 38 expatriate males rated walkability as "somewhat important," whereas 1 local male participant rated walkability as "not important at all." Participants who indicated that walkability is somewhat or not important at all based their opinions on the following two arguments: (1) the transportation system in Dubai is car oriented, predominantly designed to facilitate vehicular movement, not pedestrians; and (2) the weather in the UAE is extremely hot most of the year; the time span during the year in which the public can walk comfortably is very limited; ironically, people can only walk during the winter, which is very short.

Other participants' concerns attribute to the arguments that people in Dubai can get most of their daily needs through "delivery services," so motivation to walk plummets. In fact, the very hot climate in Dubai limits most people; they cannot walk longer than 10 minutes per day most of the year, so it is not feasible or cost-effective to incorporate walkways within neighborhoods. Furthermore, Dubai already has good walkable areas around urban parks. Therefore, dedicating and requiring walkways at every street seems unnecessary; it increases the infrastructure cost. Lastly, incorporating restaurants, retail stores, and other services within walking distances in neighborhoods will cause noise and congestion that will disturb the residents.

Recommendations

Some participants stated that in order to make walkability effective and successful in Dubai, the following design recommendations should be taken into account in neighborhood design:

1. It is very important to locate services, amenities, and daily destinations such as retail and grocery stores, restaurants, and mosques within short walking distances to promote walkability and to discourage car use.

2. The extended summer season in Dubai does not encourage long walks, so destinations must be designed within close proximity to where people live.
3. Walkways should be integrated with trees to provide shade and filter the air from dust and carbon emissions.
4. Walkability might be more useful in big neighborhoods or neighborhoods where the density level is high rather than smaller neighborhoods or areas with low or moderate density.
5. Walkability is very important and considerations should be given to the services and programs along the sidewalks.

Green Areas in the Neighborhood

Survey responses reveal that the majority of sub-groups including (77.5%) of local females, (75.0%) of local males, and (94.7%) of expatriate males think that the provision of green, open, and social spaces is a positive, a "very important" design idea with many advantages and potential benefits, and it should be encouraged in the future development of Dubai's neighborhoods. This group of respondents argue that neighborhoods should have several interconnected parks, shaded pathways, all designed to be within walking distances from where people live.

On the other hand, a smaller number of participants including (20.7%) local females, (21.1%) local males, and (5.2%) expatriate males rated green areas as "somewhat important," while only three local participants in total (2 males and 1 female) rated this design idea as "not important at all." Out of those participants who rated green areas as "somewhat or not important at all," four respondents reasoned that Dubai has a proper number of parks and people use these facilities mostly in winter; therefore, the strategy is somewhat or not at all important. By looking at the demographic information

of those participants, I attribute this claim to the fact that three out of the four respondents live in Jumierah, a neighborhood with a considerable amount of very accessible of social, retail, and green spaces.

Potential Benefits

Survey data reveal that green areas within neighborhoods have many benefits including: (1) psychological and mental advantages as greenery brings joy and happiness and relaxes peoples' mind, body, and vision, and reduces pressure and stress levels; (2) health benefits as people can exercise more often and thus reduce obesity and diabetes rates; (3) social benefits as greenery enables people to meet with each other throughout the day in winter and after sunset in summer; (4) educational benefits as greenery enables the public to learn about different types of landscape elements and their potential benefits; (5) aesthetics and financial benefits as parks make neighborhoods more attractive and boost the real estate value of the surrounding properties; and (6) environmental benefits as green areas filter and absorb dust and pollutants that are highly concentrated in air, increase the level of oxygen, enhance the quality of air, decrease the level of noise, contain and reduce the effect of Dubai's harsh climate (the blazing sun) during most of the year, reduce the urban heat islands effects, and provide habitats for birds and other organisms. All in all, green areas within neighborhoods create a healthy and clean environment.

According to one respondent, Dubai should increase the rate of green spaces and reduce the "rate of desertification" through increasing the percentage of parks, gardens, and playgrounds in neighborhoods. Dubai in the last years experienced a massive boom in the built-up area not symbiotically integrated with a landscaping strategy (Local male, 2011). This statement is made by a local female participant who believes that Dubai has

many buildings but few green areas. She stated that increasing the level of greenery in the city will certainly create a balance between "urbanization and nature" (Local female, 2011). Greenery is deeply integrated with people's life and behavioral patterns. It is an amenity that should not be ignored or separated from the urban fabric and people's life (Local male, 2011).

Participants who rated this strategy as "very important" stated that green areas are one of the most important aspects of a neighborhood. An expatriate male participant says that by "default greenery is expected to be loved by all." Having somewhere to take your family to relax and exercise makes a "true neighborhood" not just somewhere you live (Expatriate male, 2011). Survey data show that greenery invites a healthy life style; protects individuals from fatal diseases like pressure and nervous tension; provides pleasure, relaxation, and comfort; reduces work pressures; and stimulates individuals to exercise and walk more often. Greenery creates places where families and friends can meet and gather in their free time, maintaining and preserving the traditional and cultural values of social relations. Green areas within neighborhoods could potentially impact the usual way of life in Dubai that is spent mostly indoors, either in malls or homes (Local female, 2011).

A local female participant says that greenery promotes well being and is "synonymous with life," and more greenery leads to a "peaceful and happier" neighborhood. Visually, neighborhoods with parks, playgrounds, and shaded pathways have more aesthetic qualities and "look much better" than neighborhoods without social and green spaces. According to a local female participant, shaded pathways protect the pedestrians from the extreme sun heat during summer time and thereby encourage walkability, exercise, and physical activities.

Thirty-eight respondents (12 local males, 7 local females, and 19 expatriate males) stated that green areas play a major role on people's mental and psychological relief and enhancement. Green areas provide a refuge space where families, kids, and different age groups can breathe, cope, relax, practice different activities, celebrate, or even grief openly. Green areas could positively change people's life style, activity level, and mental health while reducing the bad effects of pressure and stress on people by reducing the level of "psychological burdens," especially during the workdays. This potential enhancement of people's mental and psychological feelings could in turn increase the level of productivity, efficiency, and tranquility (Expatriate male, 2011).

The above statements are asserted by an expatriate male participant (2011) who stated that parks and social spaces are the "lungs of the city." Parks provide people a "mental, spiritual, emotional, psychological, and physical balance and relief." As greenery reduces tension on the populace, there is no way for stress and pressure to build up and "accumulate" in a way that affects people's "productivity and thoughts." Greenery could build a productive and balanced society at all levels, a society with "less anxiety and nervous tension."

As indicated by many participants, green areas' should be easily and quickly reached by foot (Expatriate male, 2011).Families should not need to travel a long distance to find a park. Parks within neighborhoods fabric and most importantly within short distances will encourage walkability, social gathering, and activity (Local male, 2011). This would reduce demand on roads, energy and gasoline consumption, and thus reduce air pollution.

However, according to a local female participant, parks are usually located beyond walking distance from where people live. In fact, many people in the UAE suffer from obesity and diabetes; the majority of people does not walk or exercise due to the

lack of green areas and playgrounds that could be reached easily. If Dubai adopted an interconnected system of green spaces planned to be easily accessible and quickly reached by foot, it would encourage people to meet and to use the outdoor spaces more frequently.

A local male participant asserts that many social, environmental, and economic benefits are associated with having parks and playgrounds in close proximity to where people live. From the environmental and economic standpoints, parks adjacent to housing areas would save families' time, effort, travel time and expenses, and congestion problems than if they were to drive to distant parks for the same purpose. From a safety standpoint, families consider neighborhood parks a safe and suitable environment where kids can enjoy, play safely, and practice their activities. Most visitors will be people who live in the area, and possibly acquainted with each other. This will dramatically reduce many safety concerns or any socially related issues such as crime, rubbery, mugging, and theft in these facilities.

Constraints

In this section I have divided the responses into two groups. The first group, which includes four participants, indicates that Dubai already established a proper level and plenty of green areas, so there is no need for an increase in green spaces. This statement contradicts with the opinions of the vast majority of participants who support the provision of more green spaces within Dubai's neighborhoods.

For example, a local female participant says that "honestly I think there are good and appropriate numbers of parks in Dubai." Another participant claims that this strategy is not important at all since Dubai has a "proper" number of parks and people "mostly use these facilities in winter." Other respondents say that Dubai has "plenty" of green areas,

parks and entertainment centers including (major parks, community or local level parks, playgrounds, and shopping centers). By looking at the demographic information of those participants, I found that three out four live in Jumierah, an area with an extensive amount of public facilities including two major parks; an open linear beach that extends alongside the area; several entrainment centers; a mixed use corridor that houses many cafes, restaurants, and retail stores; and a pedestrian path that extends along the mixed-use corridor.

The second group, which includes three participants, conversely indicates several limitations on incorporating more green areas in neighborhoods. First, a local female participant argues that it is not cost effective to increase the amount of greenery since people use these facilities only in winter. Second, it is not recommended or appropriate to have big recreational facilities within residential areas. These facilities should be in specified zones a distance from where people live because they generate traffic and noise (Local female, 2011). Third, an extensive amount of greenery might lead to a dramatic increase in maintenance and irrigation cost for the government.

Recommendations

Some participants stated that in order to make green and social amenities in a Dubai neighborhood effective, vibrant, and commonly used, the following design recommendations should be taken into account in neighborhood design:

1. People usually use parks on daily basis and perhaps more in holidays and weekends. Having these amenities within short distances will reduce the number of car trips and accordingly reduce energy and gasoline consumption (Local male, 2011).

2. It is good to have multiple parks within the same neighborhood in order to reduce congestion and overcrowd conditions in holiday seasons (Local male, 2011).
3. It is also important to have dedicated parks for the kids and female population (Local male, 2011).
4. Parks in most cases should be integrated with playgrounds and sport facilities such us fields, bike lanes, and running tracks to enhance people's wellness and physical fitness (Expatriate male, 2011).
5. Dubai should increase the level of playgrounds within its urban fabric. The overcrowding particularly affects the number of public playing fields for sports such as football; currently people have to hire pitches at tremendous personal expense (Expatriate male, 2011).

Mixture of Land Use and Buildings

Survey results reveal that the greater part of participants including 66.0% of local females, 78.8% of local males, and 73.6% of expatriate males rated mixture of land use and buildings as a "very important" design strategy with many potential benefits that should be encouraged in the future development of Dubai's neighborhoods. Other participants, conversely, including (32.0%) local females, (17.3%) local males, and (18.4%) expatriate males rated diversity of uses as "somewhat important." Only seven respondents in total think that this design idea is not "important at all." These respondents stated that diversity of uses, including the integration of housing, places of work, retail stores, restaurants, and schools, create several problems such as noise, disturbance, traffic, and crowded conditions in the area; this might reduce the sense of privacy and calmness in the neighborhood.

Potential Benefits

Survey data reveal that mix of uses within a neighborhood can: (1) create a "complete and self-sufficient community;"(Expatriate male, 2011) (2) lead to a "vibrant" (Local female, 2011) neighborhood with high living standards; (3) increase the "sense of belonging" (Local male, 2011) and attachment among the residents towards their neighborhood; (4) increase the level of comfort, efficiency, and convenience; (5) encourage people to use public transit systems that connect different services and uses; (5) promote people to embrace healthy behaviors like walking to services close to their homes; (6) and reduce demand and pressure on roads by reducing the number of daily trips made by vehicles, especially to service centers located outside the neighborhood area and thus reduce stress, traffic, air pollution, and transportation cost.

Providing all of these amenities in one localized area is very important for promoting a good living environment, for reducing the need for driving, for making the area livable and enhancing the "true meaning of an urban neighborhood" (Expatriate male, 2011). One participant states "it would be nice to have everything around us and easy to go to; life will be easier and more convenient" (Local female, 2011). A local male surveyed argues that diversity of uses refer to "an efficient utilization of lands." Diversity enhances accessibility and creates more flexibility in terms of movement between different uses. Diversity of uses could also increase "investment opportunities" and competition between investors within residential neighborhoods; this, in turn would enhance the type and quality of services and amenities (Local male, 2011). According to a local male participant, Dubai should not only provide a variety of uses within its neighborhoods, but also it should be accessible and easily reached by foot or public transportation. There is a group of people who prefer to walk or use mass transit over cars and another group who even do not own a car or have a driving license.

Having all services within residential neighborhoods could reduce traffic on streets, at both local and city-wide level. This strategy will make people's daily trip shorter and easier since they wouldn't be required to travel outside their neighborhood to meet their needs. A local female participant stated that diversity of uses and buildings could make a neighborhood more attractive and appealing. Having services close to where people live will encourage walkability and discourage car use. For example, having educational facilities within residential areas will encourage families to send their children to the schools within the area, not far away from where they live. This strategy will "ease" residents' daily circulation patterns and movement. According to a local male participant,

> if our houses are close to schools, we would not be required to prepare our children two hours before classes start. This takes a lot of energy and effort from both families and children. The participant continues, our kids usually reach school and their energy is already consumed.

Public agencies must promote and foster an environment suitable for living through a mixture of uses, which is interpreted by one participant as "elements of support for the convenience of people and their families" (Local male, 2011). As of now very few areas in Dubai accommodate a mix-used development approach; therefore, people must drive outside their own neighborhood to meet their needs. The traffic levels in Dubai always stay very high, and not having essential services within the same area wastes a lot of time while increasing the number of daily trips and pollution levels (Local male, 2011). A local female surveyed argues that Dubai should "embrace" the notion of diversity of uses within residential neighborhoods.

An expatriate male participant argues that the concentration and centralization of services in one place create an imbalanced condition in traffic flow and circulation

patterns by creating more pressure and demand on one particular area than the others. Therefore, if public transit and shaded pathways serve different services and uses, and are sited properly in multiple locations, it will resolve problems associated with an excessive demand on one area that might not have the capacity to accommodate many consumers.

Constraints

While diversity of uses and buildings is rated as a very important strategy by the majority of all sub-groups, a small number of participants demonstrated some concerns with implementing this strategy in Dubai. For instance, three participants stated that combining residential uses with places of work result in traffic, overcrowding, and noise. Five participants, on the other hand, stated that integrating commercial uses such as restaurants, cafes, and retail stores with housing lead to congestion, noise, disturbance, safety problems, and unbearable accumulation of the working class within neighborhoods. Although 12 participants supported the idea of locating schools within residential areas, one respondent stated that this notion will result in horrendous congestion, traffic incidents, noise, and pollution caused by cars and school buses.

According to an expatriate participant, mix of uses is "ideal," but does not warrant implementation across Dubai since many families prefer a high degree of privacy and calmness (Expatriate male, 2011). Only one participant indicated an extreme position by arguing that mixture of uses makes life easy and convenient, but it is not very important as people "don't have to travel far" to meet their needs in Dubai (Expatriate male, 2011). Upon examining the background information of this participant, he lives in the central part of Dubai where there is a high degree of services and diversity already in use.

Although survey responses show that the idea of combing residential uses with places of work is acceptable, a local male surveyed argued that mix of uses is important

but ultimately it is better to put places of work away from housing to avoid noise and congestion in the area. To affirm the previous statement, another local male surveyed argues that it is better to not combine places of work with housing based on the idea that people should at least travel out of their neighborhood to experience other areas within the city.

According to a female participant, not all uses are appropriate for residential neighborhoods. For example, clinics must be adjacent to where people live to quickly respond to emergencies. However, it is not wise to incorporate restaurants and retail stores within a neighborhood because this will cause traffic, noise, disorder, security problems, and will build up areas and zones where labors accumulate. This statement is affirmed by other four participants who argue that commercial and business uses should be segregated from residential and educational uses to avoid noise and congestion.

Another major constraint on diversity is defined by a local female participant who argues that it is inappropriate to "generalize" this strategy across Dubai since many people prefer a calm neighborhood with a strong sense of privacy over a busy, dense, and diverse neighborhood. The participant continues, neighborhoods exclusively designed for housing are good for those who prefer a great sense of privacy; search for silence, tranquility, and calmness; and are able are able to meet their daily needs and move from one place to another by their private cars.

Recommendations

Some participants indicated that the concept of diversity is important but taken alone, especially in Dubai, is not enough. They say in order to make diversity more effective, successful, and socially acceptable in a Dubai neighborhood, the following three recommendations should be taken into account:

1. Diversity is a good strategy but it is better to avoid integrating places of work with residential uses to avoid congestion and traffic in the area (Local male, 2011).
2. Mixture of uses within neighborhoods will enable the residents to meet their daily needs easily. But the typology of services and uses should suit the needs of the residents occupying the area. For example, if the area is planned for the locals, the type of services and amenities should satisfy the needs and requirements of this population segment (Local female, 2011)
3. It would be ideal to have all services in one area. But if there is no variety in land use, then "easy access" to public transport is very important (Expatriate male, 2011).

Environmental Design of Buildings

Survey results indicate that the greater part of participants including (60.3%) local females, (73.0%) local males, and (68.4%) expatriate males think that environmental design of buildings is a "very important" design strategy with many potential benefits and should be encouraged in the future development of Dubai's neighborhoods. In contrast, a smaller number of participants including (31.1%) local females, (21.1%) local males, and (23.6%) expatriate males think that environmental design of buildings is "somewhat important," while only 10 respondents in total believe that this idea is "not important at all." They argue that there are troublesome challenges to implementing this strategy including construction cost and design preference issues.

Potential Benefits

Survey data show that high energy demand and carbon emissions have environmental and economic consequences; therefore, buildings must be designed to save

energy and to increase comfort level. A local female participant says that buildings in Dubai should be tailored to the climatic and environmental conditions of the place. According to an expatriate male participant, it is an "ultimate priority" to address the level of comfort, air flow, city heat buildup, and energy consumption in a city with an extremely hot climatic condition. As the UAE has one of the worlds "highest rates of power consumption per capita," environmental design of buildings warrants truly serious consideration (Local male, 2011).

In a general sense, the cumulative participants' responses indicate that environmental design of buildings (1) improves and enhances the relationship between the natural and built; (2) improves the quality of life; (3) enhances the public health and comfort level; (4) reduces energy consumption and demand; (5) reduces harmful emissions and pollutants in air; (6) reduces the degree of earth temperature and urban heat islands effects; (7) reduces the intensity of thinning and depletion of ozone layer; (8) provides a wide range of possibilities and research opportunities for the utilization of renewable energy sources; (9) delivers power more efficiently and without any disruption during peak load hours; (10) reduces the operating expenses and running costs (e.g. electricity, water, and heat) especially in the long term; (11) reduces the global warming impacts; (12) increases the public environmental awareness and education; and (13) provides opportunities to discover the potential benefits of natural resources (e.g. water, vegetation, and materials) in design.

According to a local female participant, global warming impacts, massive urbanization, road widening projects, highway construction, population growth, and excessive car usage all contributed to the increase in temperature, pollution, and energy demand in Dubai in recent years. For example, one participant claims that it is not possible to see "Burj Khalifa," the tallest tower in the world, from a distance because the

air pollution by carbon emissions coupled with pollutants from car exhaust, the single greatest polluter, work together to obscure it. Therefore, any idea that reduces pollution and promotes the use of clean and alternative sources of energy should be "embraced" in Dubai.

A local female participant stated people should apply different techniques to increase the level of ventilation and decrease the level of direct solar heat in their homes. According to a local female participant, it is not new for Dubai to have an environmentally and climatically oriented neighborhood designed to capture Northern Sea breezes, to provide adequate amount of shade, to enhance natural ventilation, and to reduce direct solar heat. Dubai's traditional and historic buildings, characterized by its close knit houses, courtyard typologies, and windrowers, were based on these design qualities and tactics.

According to an expatriate male participant, investigation and research focused on energy conservation methods and techniques should be "a set up target" for Dubai. In theory, the price of energy will increase and the amount of natural resources, namely fossil fuel products, will shrink due to population explosion, urbanization, automobile ownership, natural disasters and hazards, wars, and industrialization. As a result, Dubai should consider developing a plan for resource efficiency and energy conservation aims to push the entire society towards energy management and energy intensity reduction strategy to avoid any economic, environmental, and energy related emergencies and crises in the future.

Constraints

While the idea of environmental design of buildings is rated as a "very important" strategy by the majority of respondents, few individuals showed some concerns with

implementing this strategy in Dubai. Although their responses were limited and narrow, some comments display some valuable insights. For example, four participants argue that the application of this strategy is expensive and might require additional budget over the typical construction cost; therefore, developer will not favor it. One participant says that this design idea is "very favorable, but the cost matters; no one would pay a huge sum of money, especially during the recession" (Expatriate male, 2011). Another participant states that the success of this idea will depend on "expenditure, whether the implementation cost is expensive or reasonably priced" (Expatriate male, 2011).

Other two participants (Local male; Local female, 2011), on the other hand, argue that designers and developers preferences and choice in terms of design style, use of materials, and orientation might also place major limitations on the application of passive and active design solutions. In addition, few participants (2 local male and 1 local female) indicate that Dubai's climatic and environmental conditions also place major restrictions on the implementation of this strategy. For example, capturing breeze only applies in winter and it would never work most of the year, especially during the long summer season with its high level of humidity and the polluted, dusty, and hot air.

Recommendations

Some respondents' stated that the following recommendations could potentially promote the application of green building technologies in Dubai:

1. Benefitting from the diffused (indirect) sun light during the daytime in order to lessen dependency on artificial sources can help save energy (Local male, 2011).
2. In order to go further with environmental design of buildings, Dubai needs a comprehensive agenda that includes guidelines, standards, and laws that promote/enforce the application of green standards (Local male, 2011).

3. This very important idea needs a strong educational program to educate the developers as well as the staff in public and private agencies (Local male, 2011).
4. One participant argues that the focus should be on solar energy. This idea shall be made mandatory by authorities when issuing permits for building construction (Expatriate male, 2011). A local female participant argues that it will be very smart to benefit from what "nature give us, the sun and wind."

Street Systems

Survey responses demonstrate that most of the participants including 75.4% of local females, 71.1% of local males, and 86.8% of expatriate males prioritized short blocks and interconnected street systems over the existing street system in Dubai based on long, impermeable blocks. There is a general agreement among most respondents that the interconnected street system has many potential advantages and it warrants more attention in Dubai's future development. However, a small number of participants including (20.7%) local females, (19.2%) local males, and (13.1%) expatriate males preferred the current street system over the interconnected pattern. They argue short blocks and interconnected street systems might significantly increase the rate of traffic incidents due to the large number of intersections. In addition, the interconnected pattern increases the infrastructure cost and service expenses as it requires more streets and pavements to serve parcels than the long, impermeable street system. This drawback is interpreted by few respondents as an "ineffective utilization of land."

Potential Benefits

Survey data reveal that the interconnected street network (1) is pedestrian oriented (encourages walkability); (2) connects different uses with each other and thus increases connectivity and accessibility levels; and (3) enables people to simply move around and

reach their destinations easily, shortly and without complication. According to a local male participant, the interconnected street system is safe, "straightforward, and easy to use since it is simple and very organized." According to local male participant, the street systems in Dubai are complex, unsafe, inconvenient, and very long with few options to change direction. This makes finding a particular destination difficult and time consuming. Traffic is intolerable and many places are not easily accessible. This contributes to additional driving miles, stress, tension, confusion, loss of direction, waste of time and effort, gasoline consumption, and pollution.

A local male participant says that it is much easier to move around and "navigate" in a neighborhood that has an interconnected street network. This could cut "unnecessary moving around" and enable the pedestrians and drivers to simply find an address or destination. An expatriate male surveyed stated that the grid system is "friendlier, safer," and more efficient than the long impermeable system since it provides "wider and multiple choices of direction you wish to go." The grid network could also enhance the sense of road-safety, order, and management because road speed limit could possibly be controlled within "low to moderate" levels due to the frequent number of intersections.

A local female participant stated that the interconnected street network has the potential to "make my life, my family's life, and all resident's life easy, comfortable, safe, less complicated, and convenient." Another female participant noted that the interconnected street system provides a good "sense of direction and place if you lost your way, you will find a way out very easily." Another advantage of this system stems from the small block size that makes the built structures closer to each other which creates a socially and environmentally oriented neighborhood (Local female, 2011).

Constraints

Although the majority of respondents' prioritized the interconnected street system over the long block system, four respondents stated that the grid system contains many negative aspects. For example, two participants indicated that the interconnected street systems are very dangerous and unsafe. With the large number of intersections, the rate of accidents and conflicts between vehicular and pedestrian movements might drastically increase at the intersections. An expatriate male participant argues that it is true that the grid network would enable you to find your destination easily, but this aspect is of less import in residential neighborhoods because "most of the streets users are the residents who live in the area, and they recognize the place very well."

According to five participants (3 local males, 1 local female, and 1 expatriate male), the interconnected street system consumes much more lands for streets and pavements than the existing street system in Dubai. A local male participant argues that "I prefer the interconnected street system, but I would question how much lands for development are lost?" Another participant argues that the grid system looks more systematic and very simple to use; however, more streets means less lands for investment (Local female, 2011). The above constraints are asserted by expatriate male and local male participants who stated that more streets and pavements mean more maintenance cost, more infrastructure expenses, smaller lot configuration, and less efficiency in land use, meaning less land and space devoted for development and investment.

According to an expatriate male participant, the grid network is not "cost-efficient" because it increases the infrastructure cost and service expenses due to the dramatic increase in pavement and street numbers for the same or even smaller number of future residents in a neighborhood (Expatriate male, 2011).

Recommendations

One respondent indicated that the following recommendation should be considered in order to enhance connectivity not only within a neighborhood but also with the surrounding urban fabric:

1. The neighborhood street system needs connection and integration not only within the neighborhood itself, but also with the surrounding urban fabric (Expatriate male, 2011).

GROUP 2

This group contains four design strategies (bike infrastructure, housing choice, network of trams, and public participation). Survey responses indicate that these strategies are less prioritized among research participants when compared to the strategies listed in Group 1 (walkability, green areas, diversity of uses, green building applications, and interconnected streets). This group's compilation also aimed to analyze response differences between men and women. Survey results reveal a level of variation, although not substantial, between the male and female ratings. Particularly, the majority of local and expatriate males rated bike infrastructure, housing choice, network of trams, and public participation as "very important" design ideas. On the contrary, the majority of local females rated the same design strategies as "somewhat important" (see Table 39). These ratings reveal that the design strategies in group two rated differently among participants than the design strategies in Group 1. Similar to Group 1, the organization of the responses in this group is structured along three main lines: the potential benefits of each strategy, constraints and challenges associated with every strategy, and possible design recommendations. The categorization of the results and responses into this form reflect my best attempt at organizing these data in a consistent and rigorous manner.

Table 39: Group 2 ratings of design strategies

Bike infrastructure				
Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses	5 (9.4%)	25 (47.1%)	23 (43.3%)
Local Male		8 (15.3%)	19 (36.3%)	25 (48.0%)
Expat Male		2 (5.2%)	16 (42.1%)	20 (52.6%)
Housing choice				
Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses	16 (30.1%)	21 (39.6%)	15 (28.3%)
Local Male		6 (11.5%)	19 (36.5%)	23 (44.2%)
Expat Male		10 (26.3%)	10 (26.3%)	15 (39.4%)
Network of trams in neighborhoods				
Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses	13 (24.5%)	24 (45.2%)	16 (30.1%)
Local Male		12 (23.0%)	15 (28.8%)	24 (46.1%)
Expat Male		3 (7.8%)	14 (36.8%)	21 (55.2%)
Public participation in neighborhood design and development				
Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses	10 (18.8%)	23 (43.3%)	19 (35.8%)
Local Male		8 (15.3%)	20 (38.4%)	23 (44.2%)
Expat Male		5 (13.1%)	12 (31.5%)	21 (55.2%)

Bike Infrastructure

Survey results show that 47.1% of local female participants rated bike infrastructure in neighborhoods as “somewhat important.” Similarly, 43.3% of the same sub-group rated this strategy as “very important,” indicating no existing significant difference between the two ratings. In marked contrast, 48.0% of local males and 52.6%

of expatriate males rated this design idea as "very important." Only a small number of respondents (i.e. 9.4% of local females, 15.3% of local males, 5.2% of expatriate males) rated this design idea as "not important at all." They argue that cycling does not suit Dubai's climatic conditions and cultural norms. In addition, many respondents argue that cycling is very dangerous and unsafe, especially within Dubai's street networks that are designed mainly for vehicular movement and high speed traffic.

Potential Benefits

Survey data indicate that cycling could potentially control the level of pollution through reducing carbon emissions, gasoline consumption, and traffic congestion and this in terms might lead to an urban environment that is clean and high in quality. A couple of local female participants say that as the number of car users and gasoline price in Dubai increase, it is vital to consider alternative modes of transportation, and "cycling is indeed an important one." According to a local male participant, bikes are categorized as a "very small" transportation mean in terms of size, volume, and weight if compared to cars or buses and thus can be "used and parked easily anywhere without requiring a lot of space."

According to a local male participant, bike lanes within a neighborhood create "a sense of awareness" for a healthy lifestyle as bikes enable people to exercise more often and thus enhance their physical appearance and health. Another research participant rated bike infrastructure as a very important design idea because: it invites "a healthier and family oriented lifestyle," promotes fitness, reduces the need for vehicle use, and is "absolutely more fun" than cars. The participant also stated, there is "no greater pleasure" than being able to take out a bicycle with your family in "a safe environment" (Expatriate male, 2011). Another local female participant who believes that cycling in neighborhoods

could be “very exciting” and many people would “enjoy it” as long as it is safe and convenient affirms this argument.

Forty-four respondents including 20 local males, 15 local females, and 9 expatriate males stated that in order to improve and promote bike ridership among Dubai inhabitants, bike lanes should be physically “separated” from other traffic modes. According to some respondents, dedicated bike lanes play a critical role in organizing and avoiding conflicts between different circulation patterns (e.g. cars, bikes, and pedestrians). Moreover, dedicated lanes for cyclists could protect cyclists from accidents, encourage people to bike and exercise more frequently, increase the rate of car to bike conversion for short trips, and ultimately lower the level of congestion, pollution, expenditures, and vehicular demands on roads. According to an expatriate male participant, with special bike lanes, residents will make of the facility and avoid their motor vehicles especially for short distance purposes.

A local male participant says that as the rate of traffic accidents in Dubai is high and as many drivers do not respect the speed limit and traffic signs, a “physical separation” between bike facilities and other transportation modes is “a must.” A local female participant stated that people in Dubai do not often bike (or do not bike at all) because their lives might be threatened by the heavy motor vehicles operating on the same roads. In fact, one participant says that bike use in Dubai is very dangerous and should be avoided as long as there are no special lanes designed for cyclists. Another participant echoes this concern regarding bicycle use when she asserts that if bike lanes and facilities are designed to be safe, easy, and convenient, people will bike more often without being concerned to be “hit or run-over by a car” (Local female, 2011).

An expatriate male participant says that many people in Dubai have “a perception or think” that bikes are mainly for the workers and low income groups. In fact, there is a

general agreement among most respondents that bikes use in Dubai predominately falls to male workers from the Indian-Sub Continent. Since Dubai has no dedicated bike lanes, those groups end up "cycling with traffic" which make both driving and biking very dangerous and annoying. The laborers unfortunately, in most common cases, do not follow or use bicycle safety measures and tips. An expatriate male participant thinks that for safety purposes, it is very important to "at least" provide a physically separated bike lanes in areas where the workers from the Indian Sub-Continent and South-East Asia live because bikes provide much-needed and affordable transportation option to laborers and workers.

Constraints

Even though several survey respondents indicated that bike infrastructure within the urban fabric could potentially reduce the level of pollution, traffic congestion, and enhance the physical well-being of people, a considerable number of respondents (i.e. 11 local males, 8 local females, and 9 expatriate males) noted that bike infrastructure will be underutilized because of (1) the hot climatic conditions in Dubai; (2) the cultural norms of the natives; (3) the safety concerns; (4) the behavioral nature of the inhabitants that prioritizes cars over bikes even for very short trips; (5) the perception in which many believe that bikes are for the working class; (6) the fragmented spatial structure that mainly facilitates car movement and segregate services and facilities from residential uses; and (7) the budget concerns related to the cost of infrastructure. The indicators above led to a behavior that prefers a gasoline-powered vehicle over bikes simply because it is faster, easier, safer, and more convenient. For example, a local male participant argues that we cannot use bikes to commute to work or travel from one place to another since the climate is very hot in Dubai. In addition, the services and amenities

in the city are not located within short distances. Consequently cyclists might bike long distances which places a huge limitation on widespread bike use.

According to a local male participant, bikes might be problematic and not be widely accepted among the UAE nationals, but the expatriates might use this facility frequently and perhaps even daily basis. A local male participant claimed that the majority of locals are not physically and physiologically prepared to use bikes. He mentioned that many natives do not even have the "interest" to cycle as the hot climatic conditions, the cultural norms, and the local clothing put many limitations on bicycle use, especially among the local female population (Local female, 2011). A Local female participant stated that bicycle use among the native population might only ever garner acceptance by the local male teenagers and the kids. Another female participant stated that bicycle use in the Emirates carries age and ethnic group restrictions, perhaps mostly accepted by the majority of working class, a small group of Western residents, and male teenagers (7 to 18 years old). Another participant further asserts this claim when she says that bike infrastructure will mainly benefit the "foreign residents, especially the working class," but not to the natives (Local female, 2011).

The fiscal budget clearly provides another fundamental constraint on widespread bike use in the Emirates. A local male participant stated as the number of bike users in Dubai is very small, dedicated bike lanes will be "economically unfeasible." As an alternative, the cost of providing bike infrastructure can be subsidized by providing other combined facilities within a neighborhood such as "parks and walkable areas." The argument above is asserted by another participant who said that in the Emirates, bicycle usage is not very popular, so the idea is impracticable and not cost-effective (Local female, 2011).

Recommendations

Some participants stated that in order to promote cycling and to increase the rate of ridership among the population in Dubai, the following design recommendations warrant consideration:

1. For safety purposes, it is vital to have dedicated lanes for bikes. This will reduce the conflict among different mobility systems.
2. Simply providing the facility is not sufficient, it should be organized and regulated (Local male, 2011).
3. Bike lanes belong in places with high volumes of bicycle users (Local female, 2011). As many respondents agree that bike facilities carry importance for low scale people, unilateral implementation across Dubai will not apply. It is more appropriate to have bike lanes in areas where the working class live and in zones where traffic is low to avoid traffic incidents (Local male, 2011).
4. It would be more helpful to make bike facilities free or inexpensive since the vast majority of people who use bikes in Dubai come from the low income group working in construction, grocery stores, laundries, restaurants, and delivery services. Those people use bikes on daily basis to commute to work or deliver to residents' daily needs (Local male, 2011).
5. This proposal should be combined with "educational programs" that demonstrate how the public can use this facility in an easy and safe way. Without education and awareness, the system will "fail" (Local male, 2011).

Housing Choice

Survey responses show that 39.6% of local female participants rated housing choices as "somewhat important," 30.1% rated the strategy as "not important at all," and 28.3% thought that bikes are "very important." These survey responses reveal generally

no substantial difference between the three ratings. On the other hand, 44.2% of local males and 39.4% of expatriate males rated housing choice as "very important." On the contrary, a small number of male respondents (i.e. 11.6% of local males and 26.3% of expatriate males) rated this design idea as "not important at all."

Due to the sensitivity of this design idea, the quantity and quality of the public responses to this strategy were extensive and more widespread than any other strategy. Many people in Dubai perceive the idea of housing diversity, particularly mixing the working class and bachelor laborers with families in one neighborhood, as problematic and culturally inappropriate. Survey responses provide a good amount of details and explanations reflecting the pros and cons of diversity in housing types. The results demonstrate that the participants' thoughts and opinions are divided into three groups. Group 1 one responses (32 respondents) indicate that many potential benefits associate with diversity of housing types. For example, availability of different housing options creates "a fair and modern society" that responds to the needs and desires of different population segments. Group two, embodying the bulk of responses (41 respondents), indicate that diversity of housing types are important, but mixing families with workers will lead to conflicts, crime, and socially related issues; therefore, there must be a separation between the working class and families. Group 3, represented in 3 respondents, shows a very strict and conservative approach to diversity. Respondents stated that any mixing of the locals with expatriates should be avoided due to the differences in cultural norms, priorities, and beliefs.

Potential Benefits

Twenty-three participants (10 local males, 7 local females, and 6 expatriate males) stated that a range of housing options contribute to the provision of a residential

area that is fair, convenient, and accessible to all population segments. A local male surveyed argues that to build "a fair society," different housing types combined with proper amenities and services should be provided for all population segments without discrimination. According to a local female participant, implementation of this idea not only will show that Dubai accommodates the "rich to live in," but also will also market Dubai as an adequate living environment for a wide range of socio-economic classes despite the differences in ethnicity and income level.

A local male surveyed noted that housing choice is a very important design idea because it could create a coherent and harmonious living environment for different ethnic and socio-economic groups. An expatriate male participant stated that this type of diversity involves many "principles and moral standards" such as justice, fairness, and equality between different segments of the society. The participant also said, if planned and designed properly, in a way that does not cause any hardship to families and yet respects the specifics of every culture and ethnicity within the city, this idea might be successful.

According to an expatriate male participant, without any doubt this strategy will enhance the quality of life, increase the level of satisfaction and equality, and reduce the sense of disparity and prejudice between different socio-economic groups. Easy access to adequate housing will enable people to obtain a unit that suits their desires and income level and thus avoid debts, long commuting, and transportation costs (Local male, 2011). Another potential advantage associated with this design idea stems from the opportunity diversity creates to learn a wide range of "languages, traditions, and cultures" (Local male, 2011).

Constraints

Although a considerable number of respondents from all sub-groups (32 participants) indicated that housing diversity comprises an important design strategy, the majority (41 respondents) stated that working class housing should be isolated from that of the expatriate and local families. Situating the working class in specified zones away from where families live is essential to avoid crime, security, and social related issues and conflicts. However, the respondents agree that within the same neighborhood, different housing options like multi-story structures can provide for different family groups, but not singles and workers.

A local male participant argues that the idea of social or housing mix will predominantly satisfy the working class because they will benefit from access to neighborhood amenities and services. The other socio-economic groups, on the other hand, will not accept this mix due to cultural, religious, economic, and behavioral differences between the two groups. A local female participant puts forth that this housing arrangement does not suit Dubai's indigenous culture and will undoubtedly compromise the security and safety of neighborhoods. The idea of mixing families with workers and singles in one residential area is indeed very "dangerous for the society at all levels" (Local male, 2011).

According to a local male participant, to avoid social problems and to achieve an ultimate sense of privacy, families should not be mixed with workers in one area. An expatriate male reasons that mixing family residences with that of bachelors "will not yield any benefit, in fact it may result in law and order problem." For safety and privacy aspects and in order to maintain a "peaceful atmosphere," it is better to accommodate workers and families in separate areas. It is "uncomfortable and inappropriate" for families to live in neighborhoods where workers accumulate (Expatriate male, 2011). It is

also inappropriate to mix construction workers with retail and service sector workers; as one expatriate thought this would lead to "social issues, theft, and sexual assaults." Basically construction workers are "foreign men and often single," so putting them in the same environment with retail, café and restaurant workers which are "predominantly female" will lead to lots of problems.

To affirm the perception that mixing single workers with families in one area is socially unacceptable in Dubai, a local female surveyed said that "I agree with the idea of having different types and sizes of houses within neighborhoods, but I disagree with having bachelors and low paid workers living in the same area with families." If implemented, this idea will drastically increase the number of crimes, conflicts, and social assaults; parents will feel uncomfortable, worried and "frightened to send their children to use the public facilities." According to a local female participant who lives in "Al-Quasis 3" where many workers from Pakistan, India, and Asia live, "we never allow our children to play outside the house for safety reasons." In the past, this participant was dynamic and very active person; she was able to play in the neighborhood with other kids from similar social group. But now in this neighborhood, her children do not have the opportunity to play outdoors due to the large accumulation of the working class in the area.

A more strict and conservative approach to diversity in housing types is defined from another group of participants. In particular, three respondents noted that Dubai composition consists of a wide range of ethnic and socio-economic groups with various aspirations, traditions, religious beliefs, priorities, and cultural backgrounds that do not meet with the local traditions in most common cases. Accordingly, if the city did not separate the local communities from the expatriate groups, conflicts and problems will occur because the citizens' backgrounds, generally privacy oriented and culturally

responsive, totally differs from the vast majority of expatriate groups who are often from India, Pakistan, and South-East Asia. This statement is even asserted by an Indian participant who argues that I disagree with diversity of housing types because this strategy generally leads to "disorder, unrest, and conflicts" due to the differences in human nature and behaviors, cultural norms, priorities, and interests. According to a local male participant, the expatriates should not live in the same area with the locals to "avoid interactions at all scales, from cultural to religious."

Recommendations

As Survey responses revealed that 67 respondents showed major concerns about mixing different housing types and ethnic groups in one neighborhood, some participants argued that the following recommendations could potentially make diversity more effective and socially acceptable among the public in Dubai:

1. It is good to incorporate diversity of housing within a neighborhood but under one condition: Each ethnic and socio-economic group should be separated from the other (Local male, 2011).
2. This very important idea must incorporate several conditions: (a) all population segments can live in the same area but each segment should be within a specified zone, not mixed with each other; (b) the vast majority of lands should be allocated to local housing; and (c) the number of local population should be more than the expatriates in the area. These conditions are important to avoid social conflicts and crises within the area (Local male, 2011).
3. For privacy requirements, mid- and high-rise buildings should not be located next or adjacent to houses or low-rise buildings. Situate low-rise developments in one area and the apartment buildings in another area (Local female, 2011)

4. In order to create an "integrated society," an adequate "access" to facilities and services should be provided for every socio-economic group (Expatriate male, 2011).

Network of Trams in Neighborhoods

Survey results show that 45.2% of local female participants think that a macro-network of transit in neighborhoods is "somewhat important," while 30.1% think that this design idea is "very important." On the other hand, 46.1% of local males and 55.2% of expatriate males rated this design idea as "very important." It is also important to note that a small group of respondents (i.e. 24.5% of local females, 23.0% of local males, and 7.8% of expatriate males) rated this design idea as "not important at all."

Potential Benefits

I found that the quantity and intensity of respondents' comments and explanations about incorporating a macro-network of public transit in neighborhoods generally distributed along two major aspects: potential benefits and constraints. Survey data show that trams in neighborhoods have many potential advantages such as (1) reducing demands on roads; (2) reducing traffic congestion; (3) reducing gasoline and energy consumption; (4) and enhancing the quality of air. However, other survey responses indicate several challenges and constraints associated with this strategy including (1) the high level of dependency on automobiles; (2) the behavioral aspects of the population which prioritize automobiles over mass transit or walking even for short distances; (3) and the tough climatic conditions.

While organizing and analyzing the data, I found a clear indication that 67 participants (i.e. 26 local males, 21 locale females, and 20 local expatriates) think that trams in neighborhoods could potentially reduce the escalating density of cars on roads;

downsize car related expenses; enhance the level of accessibility to "city center, metro stations, and other major attractions;" reduce CO_2 emissions and traffic congestion and, thus, enhance the quality of air; improve the quality of life; enable people to run their "daily errands easily and shortly;" all terms leading to an attractive and organized environment.

A local male participant stated that in the coming years, Dubai should "expand" its public transit networks including the metro and tram lines. He also said that, most of Dubai's urban areas should be linked and served with an efficient public transit system. In order to promote walkability and increase the rate of public transit ridership, the metro stations and tram stops should be within "walking distances" from where people live and work (Local male, 2011). There is no benefit of building transit lines if stops are located far away from where people live, work, shop, or entertain. Many people do not use the current metro system due to the fact that the stations are "not located in close proximity" to the residential neighborhoods, especially the subsidized ones (Local female, 2011).

An expatriate male participant says that "any strategy that reduces road traffic hasgot to be a good thing." With trams, emissions and travel expenditures can be reduced and people can be connected with several destinations within a neighborhood or the city (Expatriate male, 2011). According to an expatriate male participant, this design idea could possibly reduce pressure and demand on roads, enhance traffic flow and movement, and thus successfully reduce the current traffic problems and jams in Dubai. This system would truly benefit those who do not own a car or cannot afford taxis to travel; enhancing public transit networks and services will significantly serve this population segment (Expatriate male, 2011). Trams also add an "aesthetic" dimension (local male, 2011) and could potentially "attract investments" and generate profit especially in high density zones and along transit lines (Expatriate male, 2011).

Constraints

Survey responses indicate many social, cultural, environmental, spatial, and behavioral constraints that place fundamental barriers on the utilization of trams in Dubai. An expatriate male surveyed indicates that the vast majority of population in Dubai (especially the locals) will not use this system. This statement is affirmed by another participant who argues that the "local culture and perception" surrounding public transit systems is considered a major constraint on the effective implementation and utilization of this design idea. In particular, some families do not accept the crowed or "the mix" between male and female on buses or trains; others consider public transit systems transportation modes for the workers and low income groups. Besides, the "size" of local families is big; they regularly "travel with their kids, carry a lot of bags," and make multiple trips to various destinations; therefore, using a private mode of transportation offers greater convenience and greater comfort for those groups than mass transit can provide.

The vast majority of people in Dubai does not use the current public transit system because the existing service lines do not exactly or precisely take the users to their destinations (Local male, 2011). Since the spatial structure of Dubai is fragmented, people using trams will also be required to walk long distances or use another transportation mode to reach his/her final destination (e.g. home, work, services, and facilities). As the long summer season might preclude walkability and while the expense of using multiple transportation modes almost "equal" the operating costs of private cars, to increase utilization the incorporation of trams' service lines and stations must integrate with the existing metro lines near where people live, work, and entertain (Expatriate male, 2011).

A local female participant argues that a macro-network of transit is not considered as an important design idea due to the high level of motorization in Dubai. The wide range of financing options that facilitates car ownership; the hot climatic conditions that discourages walking; and the city's spatial structure that is built in a way that prioritizes and facilitates cars over pedestrians and mass transit promoted a behavioral stance that is leaned towards an extensive use of automobiles.

Two locale male participants think that residential areas are small in scale and do not necessitate mass transit services. They argue that trams could be more effective in a city-wide scale not a neighborhood scale development. A local male and local female respondent stated that trams might cause nuisance and discomfort for people in the area during the construction which might last for several years. Lastly, two local female participants claim that there is no need for trams because the current metro system with its two lines (the red and green lines) and multiple stations are well-extended along the city and its stations are "accessible to everyone, everywhere." The demographic information of these two participants revealed that the first one lives in an area well-served by the metro, while the second one does not even live in Dubai, indicating a biased response.

Recommendations

Two participants stated that the following recommendations could potentially advance and create more effective public transportation systems in Dubai:

1. It might be more efficient to dedicate the cost and planning efforts associated with the construction of trams towards a regional or national train system (Local male, 2011).

2. Stations should be built very close to where people live and work; service lines should pass through areas of high traffic, density, and activity level (Expatriate male; local male, 2011).
3. It is important to educate the public and draw their attention to use clean and alternative modes of transportation over cars (Local female; expatriate male, 2011).

Public participation

Survey results reveal that 43.3% of local female respondents rated public participation in neighborhood design and development as "somewhat important," while a smaller number of participants (35.8%) rated the design strategy as "very important." This indicates that there is no significant difference between the two ratings. Conversely, 44.2% of local males and 55.2% of expatriate males rated this design idea as "very important." Only a small number of respondents represented in 18.8% local females, 15.3% local males, and 13.1% expatriate males rated this design idea as "not important at all."

Potential Benefits

A local male participant stated that people in Dubai must have an opportunity to "express" their ideas and opinions in community design. The public could provide insights and ideas more "culturally and socially relevant" than the experts' and officials who base their decisions merely on technical backgrounds, political aspects, and market forces. This statement is affirmed by an expatriate male participant who says that public participation could probably reveal areas of "shortages and weakness" in design decision-making that are not considered or measured carefully by the "specialists and decision-makers."

The public vision, opinions, and thoughts carry a great deal of importance because they are the users who will live in these neighborhoods for several years; therefore, they must participate to improve their life style and living environment; it is after all "their living environment." If "organized correctly," public participation awards the public an opportunity to express their ideas explicitly and participate with the organizers in discussion sessions and feedback loops, a higher level of user satisfaction and acceptance could be attained and a considerable amount of design solutions could be generated (Expatriate male, 2011). A collection of suggestions and design ideas can be produced from the public involvement in community design. These suggestions could be used to assemble a platform that includes a variety of design opinions and ideas for "future research and innovation" (Local male, 2011). This statement is asserted by another participant who thinks that public participation could potentially generate a wide range of socially, politically, and culturally related ideas for building a neighborhood that is "unique, attractive, and widely accepted among the public" (Local male, 2011).

Community workshops and discussion sessions create an open communication environment where the public can interact, communicate, and exchange their thoughts with each other and with the city's officials and specialists (Local female, 2011).This increases the social ties and relations between the participants, increase the level of awareness among the public, and enhance their educational backgrounds about design and planning matters. The dialogue between the public, city officials, and technicians could potentially encourage the locals and residents to "freely and honestly express" the difficulties they face in their living environment (Expatriate male, 2011).

A couple of participants say that a common rule in "marketing" dictates providing the product or service according to the consumers and users preferences in order to reduce marketing expenses and increase the level of selling, "satisfaction," and

efficiency. The same rule applies to the notion of public participation because the public involvement in community design will enable the officials and designers to "deeply and directly know what the public needs and desires" and this in terms could be reflected on the community's design and planning (Local female; Local male, 2011).

Constraints

Respondents who rated public participation as "somewhat important" based their responses on the fact that several constraints and troublesome concerns are associated with the employment of this idea in Dubai. In particular, survey data reveal that design and planning matters should be left to the specialists because the vast majority of the public in Dubai are not prepared, specialized, or qualified; therefore, their contribution might lead to problems and wrong decisions, especially in technical related decisions. According to an expatriate male surveyed, there is no harm to listen to the public opinions, but at the end community design and planning are "more of specialists work." Designers, engineers, and planners are "fully aware" of neighborhood design requirements and what people need, so it is "not important" to involve the public (Local male; expatriate male, 2011).

Survey responses also reveal that diversity and variety of opinions might increase the level of "confusion and disorder" in decision-making because "preferences, priorities," and opinions change from a person to another. A local female participant argues that many individuals in the UAE might "spoil the process" by prioritizing their own benefits and interests over the community's benefit. In this case, the public participation outcome might benefit a particular group not the majority; therefore, it is more practical and beneficial to "let the government and experts" plan because they are specialized and know what works better.

Recommendations

Some participants stated that that the following recommendations could enhance the effectiveness and suitability of public participation to Dubai's social and political culture

1. It would be beneficial to learn from international experiences and trials, particularly from regions that achieved success in the organization and implementation of public participation (Local male, 2011).
2. Not everyone should participate in community design; priority should go to those who have the "interest and enthusiasm" (Local male, 2011).
3. It is possible to take the residents opinions. However, in the subsidized neighborhoods design and planning, the opportunity should "only" be given to the locals (Local female, 2011).
4. The public role should be merely "consultation." People should be able to express their opinions and ideas freely, but with "organization and control" from the government. (Local male, 2011).
5. As a form of participation, it will be good to launch an online discussion forum for suggestions and opinions (Local male, 2011).
6. As a form of participation, a well-designed, self-administrated survey distributed among the public might be a good idea (Local female, 2011).
7. A monthly forum of "local appointed persons" to educate the public at a community level about planning and design matters could enhance the feasibility and effectiveness of public participation outcomes (Expatriate male, 2011).
8. Decisions and recommendations should be subjected to feasibility studies, environmental impact assessments, and cost analysis (Expatriate male, 2011).

GROUP 3

In this group I compared survey responses among these sub-groups (local females, local males and expatriate males). My analysis reveals variation among these sub-groups. The majority of local females (47.1%) rated increasing the level of density through reducing the subsidized land size as "not important at all," while (40.3%) local male participants rated this strategy as "somewhat important." On the contrary, 39% of the expatriate male respondents rated increasing the level of density through reducing the lot size as "very important." Also worthy of note, 42% of expatriate male respondents considered this design idea as "somewhat important," while a significantly smaller number (10.5%) found this idea "not important at all" (refer to Table 40).

Density Levels

Survey results reveal that some participants believe in the potential benefits of high density levels, while the majority of participants (mostly locals) think that high density levels do not suit Dubai's social and cultural traditions. Respondents who generally found high density levels very important and have many advantages provided narrow and small amount of explanations to support their claim. In contrast, participants who disagreed and thought high density levels not important at all provided an extensive amount of comments. Like Group 1 and Group 2, the organization of the responses of this group is structured along three main lines: the potential benefits of high density levels, constraints and challenges associated with density, and possible design recommendations. The categorization of the results and responses into this form reflect my best attempt at organizing these data in a consistent and rigorous manner.

Table 40: Group 3 ratings

Scale		1 Not important at All	2 Somewhat important	3 Very important
Local Female	Responses	25 (47.1%)	11 (20.7%)	13 (24.5%)
Local Male		17 (32.6%)	21 (40.3%)	13 (25%)
Expat Male		4 (10.5%)	16 (42.1%)	15 (39.4%)

Potential Benefits

Although a considerably large number both of local males (40.3%) and expatriate males (42.1%) rated increasing the level of density as "somewhat important," while a slightly smaller number of expatriates (39.4%) rated the strategy as "very important," I assert that the quantity and quality of data explaining the benefits and virtue of high density levels and smaller lots sizes remain limited and very narrow. In fact, the qualitative data are not extensive and do not reflect the aforementioned rates because the majority of participants' comments concentrated along the downsides and troublesome challenges of high density levels.

The participants' responses indicate several potential benefits of reducing the land area of the subsidized lots. In particular, 19 respondents (7 local males, 5 local females, and 7 expatriate males) stated that (1) smaller lots will help the city to allocate lands for a larger number of locals (local female, 2011); (2) smaller lots will potentially increase the level of population and built up density (Expatriate male, 2011); (3) smaller lots will provide more properties per area and will lower infrastructure cost and service expenses (Local male, 2011); and (4) smaller lots will "save lands" for a variety of uses within a neighborhood such as community facilities (Local male, 2011).

A local female participant says, "I totally agree with this idea because local families occupy large lots, more than they need." A local male participant concurs and

argues the current lot size is "bigger than what people need;" households do not utilize the lands in an "efficient way;" they build their private villa and a service block on a small portion of the land and pave the rest for their cars. This design idea is important since lands might not be available for the future generations. In addition, life is becoming very expensive in Dubai, so this idea makes a lot of sense because a smaller lot means a "smaller house, and thus less construction cost (Local male, 2011)." Another participant asserts this argument by stating: the size of the granted land should be reduced in order to provide an opportunity for a bigger portion of the population to receive lands whether now or in the future (Local male, 2011). Another local male participant maintains that his perspective dictates that the government should reduce the lot size to save energy. The current lot size is big, resulting in energy and water consumption, infrastructure and service expenses, and loss in national prosperity and belonging.

Constraints

Survey responses show an intensive and extensive degree of criticism and resistance among local participants about reducing the subsidized lot size. For instance, a local female participant states that the proposal of reducing the granted land area is "arbitrary and unjust." She argues that "I do not think that the experts who participated in the study are even from Dubai or are aware of the local traditions, and the living nature and aspects of the Emirati family. This proposal will drastically fail; the proposal is indeed ineffective, thoughtless, and culturally insensitive by all meanings."

Participants' opposition and concern about this strategy is attributed to several grounds. First, Dubai has vast land areas that are not utilized or taking advantage of, so there is no rationale to save lands (Local male, 2011). Second, as the UAE has a considerable amount of wealth and capital and as the citizens represent the lowest rate of

the total population (almost 20%), reducing the living standards and quality of life through reducing the size of the granted lands is unreasonable (Local male, 2011). Third, many participants believe that high density levels will lead to a neighborhood "condensed and congested" with traffic and people and therefore unlivable (Local female, local male, 2011). Another group of participants argue that this design idea is not important at all because reducing the lot size will increase the number of houses within an area and this will consequently increase the population density and crowd. A local male participant argues that this idea is not accepted at all levels. The current lot size of 10,000 ft^2 is suitable for a villa of 4,500 ft^2, with 10 ft. setbacks from all sides, a service block of 1,000 ft^2, a small garden for the kids, and an outdoor setting area. The participant continues, "We really do not want to live in small boxes close to each other."

Fourth, the majority of participants agree that cultural aspects and family size in the UAE requires space. A local female argues that the majority of natives will resist this idea, especially that local families are big in size, requiring spacious living environment and high sense of privacy. Some traditions and cultural norms such as hospitality and exchange of visits require a number of rooms that are spacious and of sufficient quantity to separate female and male visitors. Space is also needed for a garden, swimming pool, car parking, vegetation and raising animals, outdoor setting area, and service blocks to accommodate the servants, kitchen and cooking facilities, and perhaps some relatives or family members.

Fifth, survey data show that the current standard, 10,000 ft^2, suits Dubai's "culture of privacy" (Expatriate participant, 2011). In fact, a local male participant noted that the current lot size gives the residents a "good and appropriate" sense of privacy. He also stated that people can live "comfortably and happily" within this size without being "disturbed or intruded" by their neighbors. An expatriate male surveyed says that "in my

opinion, I prefer a house in a big lot and distant from my neighbors" in order to have a good sense of privacy. A local male surveyed says that a lot of 10,000 ft^2 "maintains" the sense of privacy and enables me to build my house which is my "private kingdom." Another factor that indicates the participants' opposition to the reduction of lots sizes is attributed to the argument that big houses on big lots are attractive, appealing and have many aesthetic qualities. Big lands give houses a pleasant appearance and also a bigger opportunity to show the "art of interior and exterior design (Local female, 2011)."

The natives in Dubai are not psychologically prepared for the idea of smaller lots because the majority of locals live in big houses with high living standards; therefore, the idea will not be socially acknowledged (Local female, 2011). Another major concern as indicated by some participants is that the subsidized land is not only a space that houses the locals, but it is considered as an asset, investment, and a source of financial security that lasts for many generations. Therefore, cutting down this grant induces a sense of deprivation and financial insecurity among the locals. A In confirmation, a local male participant added that the granted land is an "asset, investment, and a source of confidence and security" not only for the parents but also for their children while they are "alive and after their death."

Although the aforementioned responses show a variety of details, justification, and opinions signifying a feeling of dissatisfaction and disapproval about the smaller lots, I argue that this disagreement's main attributes stem from the fact that local families need a "big living space." According to a local female participant, the experts who participated in the study did not consider the cultural and traditional aspects of the native people. In the UAE people believe in and value the concept of living together and having a big family. Locals who receive a land of 10,000 ft^2 plan their future in advance so that their

children and grandchildren can live with them in the same property. A local female surveyed stated that

> I prefer to have a big lot because in many cases our children get married and live in the same property requiring an extension of the original villa or building an adjacent unit, so we need big lands

A local female participant said that the proposed space, 6,200 ft^2, is very small and the Emirati people will not accept that because the size of the indigenous families continuously grow in size. If smaller lots suit young couples or small families in the first years, it might not accommodate the growing family members after another six or seven years; the landowner would not have the opportunity and space to expand his structure within the new lot configuration that is considerably small. The family would need to search for more space (a bigger house or land) to suit their size and needs.

According to an expatriate participant, it would not be feasible to answer a question related to the local population; however, this participant totally believes that the size of the granted lot should suit the "cultural aspects of the place." Another expatriate participant says that although "I do not receive this grant, I disagree with this design strategy." This participant also added that reducing the lot size lacks practicality because this land will be occupied and utilized by multiple generations through time, the grandchildren and grand grandchildren. In fact, it might take several years to take the ultimate advantage of the entire lot. At the beginning, the landowner builds a structure that suits his family size and needs, then local families gradually expand the built up area within the lot to suit the needs of their children and their children's family.

Smaller lots allowing the owner the opportunity to build on the entire land does not work with the lifestyle to which Emirati people are accustomed (Local female, 2011).

For example, if implemented, property owners will be required to build their houses without a boundary wall and this might conflict with many cultural and traditional behaviors of the Arab families such as privacy (Expatriate male, 2011). Furthermore, if the government provided smaller lands and allowed the owner to build on the entire land, families could not design a small garden or a playground for the kids (Local male, 2011). In addition, as the majority of Emirati families have multiple cars, smaller lots cannot accommodate several parking spaces. A great number of cars do not reflect a luxurious life style; however, family sizes in the UAE are big and they live together; typically every individual who works owns a car (Local female, 2011).

Recommendations

Some participants noted that the following changes in building/planning regulations and codes should be taken into account if the government plans to increase the level of density in the subsidized neighborhoods:

1. To be just and fair with every citizen, the subsidized lands should be "equal in size" regardless the family size in order to avoid any sense of inequality and disparity among the local population (Local male, 2011). A local male argues that connecting the granted lands with family size will lead to "exploitation, oppression, and a sense of dissatisfaction" among many local groups.
2. The process of land distribution should be based on some rules. For example, the smaller lot size (6,200 ft^2) can be granted for free, but if a citizen would like a bigger lot like (10,000 ft^2) he/she should pay additional fees for the difference in size. The government can also provide some incentives for those who prefer smaller lots. For example, smaller lots can be provided in areas that are close to the central city, while bigger lots sit in distant areas (Local male, 2011).

3. If the government intends to reduce the lot size in the future, it should relax and amend its building codes by allowing the users to expand vertically, adding an additional floor (Expatriate male, 2011).
4. The experts' suggestions would be effective and feasible if designers developed a new housing prototype that suits the social and cultural needs of the local families, the ones that were discussed above, within the smaller lot configuration (Local female, 2011)
5. Property owners should not be permitted to build on the entire land because this will threaten the private green areas associated with every residence (Expatriate male, 2011).

IDENTIFICATION OF FIVE MOST EFFECTIVE STRATEGIES

In addition to the rating questions, survey respondents were asked to identify the five most important design ideas that will most likely improve the quality of Dubai's neighborhoods. Out of 151 participants, 116 responded to this question including (45 out of 53 local females, 36 out of 53 local males, and 35 out of 36 expatriate males.) Table 41 demonstrates the strategies in terms of citation frequency (how many respondents prioritized a strategy as one of the five most effective strategies).

To understand how these strategies are valued and prioritized by the participants, we should look at the frequency of citation from the most-recommended strategy to the least-recommended strategy. For example, by interpreting Table 41 it appears that walkability and green areas in the neighborhood are the "most frequently" cited strategies by all sub-groups. In contrast, survey results reveal that network of trams in neighborhoods, public participation, and high density levels are the "least frequently" cited strategies among all sub-groups. Due to the limitation of my qualitative data

imposed by the respondents who did not explain their selections, while others did not provide specific reasons with their selections noting "please refer to my explanations and comments in the rating questions," I cannot explain this level of consistency and agreement across respondents. For similar reasons, I also am unable to explain why the priorities of the three sub-groups in the selection of the five top strategies were different from one group to another.

Therefore, with the purpose of providing a clear and solid indication about the five most frequently cited strategies, I summed the sub-groups responses into one group. Compiling the responses into this group reveal the design strategies more prioritized and preferred among research participants. By interpreting Table 41 once again, it appears that the cumulative responses of all sub-groups clearly reveal the five most frequently cited strategies. In particular, green areas in the neighborhood is cited 103 times, making it the most frequently cited strategy; walkability is cited 96 times, thereby earning the title of second most frequently cited strategy; environmental design of buildings is cited 61 times, being the third most frequently cited strategy; interconnected street systems is cited 58 times; mixture of uses and buildings is cited 48 times, and so on.

This finding confirms the findings of the rating questions as the majority of participants rated the same five strategies as "very important," verifying that survey respondents valued these design strategies more than the rest of the strategies in Dubai's neighborhood development. It is also important to note that in the rating questions high density levels was rated as "somewhat/very important" by the majority of expatriate males (31 out of 35 participants) , and yet when looking at the frequency of citation, this strategy is listed as the "least recommended" cited strategy by the same sub-group.

Table 41: Five most effective strategies by survey respondents

Design Strategy	Frequency						Sum	
	L.F		L.M		E.M			
	n	%	n	%	n	%	n	%
Walkability (Pedestrian-friendly environment)	38	84.4	29	80.5	29	82.8	96	82.7
Bike infrastructure	20	44.4	11	30.5	15	42.8	36	31.0
Green areas in the neighborhood	41	91.1	31	86.1	31	88.5	103	88.7
Housing Choices	13	28.8	14	38.8	18	51.4	45	38.7
Mixture of land use and buildings	23	51.1	11	30.5	14	40.0	48	41.3
Environmental design of buildings	18	40.0	21	58.3	22	62.8	61	52.5
Network of trams in neighborhoods	16	35.5	11	30.5	10	28.5	37	31.8
Interconnected street systems	20	44.4	19	52.7	19	54.2	58	50.0
Public participation	16	35.5	16	44.4	8	22.8	40	34.4
Land size for a single family house – Villa	16	35.5	15	41.6	5	14.2	36	31.0

In this chapter, survey responses demonstrated that respondents prioritized in their ratings and selections of the five most effective strategies: (a) green spaces in the urban fabric, (b) walkability, (c) interconnected street systems, (d) environmental design of buildings, and (e) diversity in uses and building types. Less of a priority were: (a) bike infrastructure, (b) inclusive housing, (c) macro-network of transit, and (d) public participation. Survey responses also reveal that high density levels are the least valued strategy among the local population, indicating a significant cultural opposition to a compact urban form, a core sustainable design strategy.

In many ways, public responses to housing diversity and compact development reflect NIMBYism[4] in the U.S. But, the public in Dubai expressed different kinds of

[4] NIMB is an abbreviation for "not in my back yard"

challenges and oppositions since NIMBies, as compared to issues, protested in the United States. But, another similarity exists between people's preferences and reactions to high density both in the U.S. and Dubai context. Density, in fact, has been a debatable and sensitive issue in urban design literature and practice over several decades. In general sense, both my research data and some studies in the U.S. context indicated that still people desire large lots and low density neighborhoods. Nonetheless, other studies, conducted in Metro Portland, unearthed a growing demand for higher density close to shopping, transit, and public amenities (Chapman & Lund, 2004). However, no study in the UAE addresses such growing tendency towards high densities mixed with amenities and services.

In a general sense, survey data revealed that many respondents clearly grasp the potential benefits of these design strategies yet others point to the cultural, climatic, and economic barriers of implementing the strategies in Dubai. This chapter detailed how understanding the cultural context before prescribing a design intervention plays a critical role This revisits the argument that sustainable design should be approached on case by case basis as cultural values and preferences change from a place to another.

Chapter 8: Synthesis

INTRODUCTION

In this section I synthesize experts, officials, and public responses to compare responses across research participants. This section allows me to identify and assess agreements, disagreements, and competing priorities between the three groups. Out of this analysis I identify the relevant political, cultural and environmental issues associated with the areas of agreement and disagreement, as well as competing priorities. Then I introduce future actions and recommendations addressing key cultural and political challenges for the future implementation of some prioritized design strategies. Last, I look at a particular neighborhood in Dubai and propose some design strategies and policy initiatives framing a new urban vision for Dubai.

In order to understand agreements, disagreements, and preferences among research participants, I organized aggregated responses into two summary tables. The first table shows the five most effective design strategies as cited by all groups. Strategies in the table are ranked in order of frequency of citation from the most recurrently cited strategy to the least. The second table, on the other hand, demonstrates overlaps and disagreements between all groups in a color coded fashion. My analysis is synthesized into five major parts: (1) agreement and disagreement across all groups; (2) agreement and disagreement between experts and officials; (3) agreement and disagreement between experts and the public; (4) agreement and disagreement between public and the officials; and last (5) recommendations for future development.

Table 42: Five most effective design strategies as cited by research participants (Experts, officials, and public)

Rank	Experts	%	Public	%	Officials	%
1	Climate-sensitive urbanism	58.5	Green and social spaces in the urban fabric	88.7	Walkability	71.2
2	Connectivity includes walkability / macro-network of transit / bike infrastructure / interconnected street systems and short blocks	56.1	Walkability	82.7	High density levels	71.2
3	Compact development includes moderate to high density levels / mix of uses and building types / etc.	51.2	Environmental design of buildings	52.5	Green and social spaces in the urban fabric	57.4
4	Eco-balanced design	48.7	Interconnected street systems and short blocks	50.0	Macro-network of transit	57.4
5	Integration / Green and social spaces in the urban fabric	39.0	Mix of uses and building types	41.3	Mix of uses and building types	57.4

Table 43: Overlap and disagreements between research participants

Strategies	Experts	Public	Officials
Connectivity			
Walkability			
Short blocks and interconnected street systems			
Macro-network of transit			
Bike infrastructure			
Compact development			
Moderate to high density levels			
Mix of uses and building types			
Environmental design			
Climate-sensitive urbanism			
Eco-balanced design			
Diversity			
Inclusive housing			
Mix of uses and building types			
Green and social spaces in the urban fabric			

Agreement between all groups: The majority of participants in all groups cited a strategy as one of the five most effective strategies in neighborhood development.

Agreement between all groups: The majority of participants in all groups did not cite a strategy as one of the five most effective strategies.

Agreement within one, or between two groups: The majority of participants in one or two groups cited a strategy as one of the five most effective strategies.

Agreement within one, or between two groups: The majority of participants in one or two groups think that a strategy is less valued than other strategies, thus not cited as one of the five most effective strategies

AGREEMENT AND DISAGREEMENT

Agreement and Disagreement Across all Groups:

Data reveal four areas of agreement among all research participants (experts, public, and officials). First, the majority of participants in all sub-groups cited three strategies as part of the five most effective strategies (walkability, mix of uses and

building types, and green and social spaces in the urban fabric.) Second, the majority of participants in all sub-groups failed to list inclusive housing as part of the five most effective strategies.

First, upon consulting the tables above, it appears that all three groups did not consider inclusive housing an effective strategy. It is important to note that the majority of research participants in all three sub-groups are not against diversity in housing types, providing various living opportunities for a wide variety of incomes, ethnic and cultural backgrounds, and family types. Instead, they are apparently against housing the working class including construction workers, as well as retail and service sectors workers employed in commercial stores, restaurants, and cafes in neighborhoods where families live. Following is a table that shows experts' responses to inclusive housing based on their origin and place of residence. By interpreting the findings, it appears that the experts who are from or live in the UAE or the region (19 out of 24 experts) mostly oppose inclusive housing, referencing lack of cultural acceptance in their responses. In contrast, most of the international experts (10 out of 17 experts) voted yes for inclusive housing, noting that the strategy is a design challenge and could be adopted gradually and with concerns.

If we look at the responses of the government officials, on the other hand, it appears that no one prioritized or valued inclusive housing, matching the responses of the local and regional experts. Although the qualitative responses of the public did not favor inclusive housing (housing the working class in neighborhoods where families live), the ratings do not significantly reflect this fact (please refer to results in the survey chapter). This deviation between the ratings and qualitative comments points to the fact that the public did favor diversity in housing types, but did not favor the idea of inclusive housing, providing options for the working class to live with families.

Table 44: Experts responses based on origin and place of residence to inclusive housing

Experts	**Votes: Inclusive housing**	**Total**	
		No	Yes
UAE nationals: 5 experts	4 voted (no) – 1 voted (yes)	4	1
Experts live in the UAE: 13 experts	9 voted (no), and 4 voted (yes), 1 from Pakistan, 1 from Germany, and 2 from U.S	9	4
Experts who are from or live in the Gulf or the Middle East: 6 experts	5 voted (no), and 1 from Italy who lives in Kuwait voted (yes)	5	1
Experts from North America, Europe, and Australia: 17 experts	10 voted yes (7 of which are U.S. experts), and 7 voted no (3 of which are from U.S.)	7	10
Total: 41 experts	**Local, regional, and international**	**25**	**16**

Based on an understanding of cultural practices in residential neighborhoods that value household privacy, I speculate that participants did not select inclusive housing as one of the preferred strategies because of perceptions that large concentrations of single workers in a family neighborhood will prove problematic. These problems may include: (1) hostile relationships among neighbors; (2) senses of privacy threatened; and (3) threats to families' perceptions of neighborhood safety, especially for women and children.

Literature about Dubai references a major problem with the working class population as related to the "bachelors" who occupy the city's old national districts or who live within the old city center, employed, in its service and retail sectors. According to some estimates there are about "500,000 bachelors" living in Dubai. Many of them have spouses and families that cannot come to Dubai, due to the immigration policy and affordability issues (Elsheshtawy, 2008). The boom in construction, service, and retail sectors which basically began in the mid '90s brought large groups of expatriates from India, Pakistan, Bangladesh, and Philippine. As the city didn't have sufficient

infrastructure and appropriate housing to accommodate this large demographic segment, many occupied the older national housing districts like Al-Satwa and Al-Rashidiya, which were originally designed for the citizens in the late ‘60s and ‘70s. Today, due to large accumulation of workers in these areas, they are often described as large slum zones.

Al-Satwa, for example, was originally planned in the late 1960s by the government through the vision of Sheikh Rashid to provide housing for approximately 3,000 local families. But today, this community with its close knit residences (50 x 50 ft plots), which accommodated a vibrant community in the ‘70s and ‘80s, is partially eroded and vacant. This area is physically and socially isolated from the new downtown corridor along (Sheikh Zayed Road) where the upper class live. This new downtown area with its contemporary high rises only sits a few hundred feet away from the fractured and deteriorated community, Al-Satwa. However, a major arterial street, several parking garages, and surface parking separate the two districts. This section of Dubai demonstrates a strong example of class segregation and ethnic prejudice.

In the late ‘90s, Dubai Municipality planned new areas for the nationals in Dubai such as Al-Barsha and Al-Mezhar. Accordingly, many citizens moved to those suburbs and leased their houses to low-income workers. Although the lands were subsidized in those new neighborhoods, many UAE families could not afford the construction cost of a new residence and, thus, stayed in the area among the working class. In other cases, many households, whose ancestors migrated from the Persian coast and Zanzibar and had no valid national identity documentation, often born in Dubai and known as the “bedoon,” also remained in the area. Both groups still suffer from the expatriates who created different ethnic and cultural enclaves, which I describe here as little India or Philippine (Elsheshtawy, 2008).

According to Elsheshtawy (2008), many Filipinos, Indians, Pakistanis, and Bengalis settled in Al-Satwa since it is fairly affordable, even though work in zones much further away. Al Satwa today has a distinctive commercial corridor including various ethnic supermarkets, restaurants and shops selling a variety of products both to expatriates and to natives. One zone with its dynamic commercial strip is known as "Little Manila." This active corridor, officially known as Al Hudaiba Street, extends from the Iranian Hospital to Al-Satwa Road, is known by Filipinos as Dubai's "Little Quiapo" after Manila's busiest commercial district. Message boards advertising accommodation "For Filipinos" reflect the racial spirit of the district. This strip in the late '80s and '90s sat posed as a dynamic retail and commercial corridor serving the natives and residents without orientation towards a specific ethnic group. The dramatic influx of the South-Asian community transformed the area into an ethnic urban setting that predominantly serves this particular group. Today, Al Satwa offers a slice of home for thousands of Filipinos, Indians, and Pakistanis where they socialize in restaurants offering authentic Filipino and Indian food or while shopping in a number of ethnic supermarkets and retail stores (Elsheshtawy, 2008).

My family, as an example, had an experience that echoes the transformation of Dubai's old areas from family-oriented neighborhoods into places where singles and ethnic groups live together. Many families who lived in Al-Satwa, for example, suffered from large accumulation of labors on streets and alleyways. I observed that the occupancy level in this old district reached around 20 to 30 workers per house of 2,500 ft^2. This restricted people's sense of safety and privacy. For example, my family members, especially the children and females, did not feel safe walking in the neighborhood, even for very short distances. Furthermore, conflict and hostile relation between families and tenets from the working class remained a constant. Our relatives

and friends who lived in other areas did not feel comfortable visiting us; they did not feel comfortable walking from the parking area to our residence while large number of labors are setting on streets and around corners watching their movement.

In 1995, a study conducted by Dubai's Municipality's Planning Department reported the social and urban issues in Al Satwa detailing its deterioration and lack of safety. The report also defined the positives aspects of the area represented in strategic location, high real estate value, and huge potential for future development, a development that aims to bring the citizens once again back to the area. Other reports published in local newspaper (e.g. Al-Bayan and Gulf News) also indicated how such neighborhoods that once housed the indigenous populations have become unsafe zones where workers, illegal immigrants, and singles live. For example, a report published in Al-Bayan, a local newspaper, revealed several incidents of attacks on people, theft, robbery, and murder in Satwa. In one report, the residents of Satwa pointed out that these incidents threaten their safety and occur repeatedly. In fact, this statement is affirmed by an authority from Dubai Police who argued that incidents in this area are problematic and occur frequently (Ghadeer, October 11, 2006).

This report also demonstrated that some of the singles and workers, unable to find shelter or work, chose to live and sleep in an "abandoned post office" in Al-Satwa area. The newspaper published photographs of the abandoned building showing the dirt in the building and another picture of a man living in without immigration documents suffering from diseases prevented him from working (Ghadeer, October 11, 2006).

The report concluded that the reasons for these social and safety concerns are attributed to two major reasons: (1) mixing the single workers with families which occurred by through time without intentionally planning for that; and (2) neighborhoods urban morphology. First, individuals who inhabit this deteriorated area (Satwa) are not

educated, often bachelors; their income status is very low; and their cultural norms, values, and beliefs significantly differ from the local culture in Dubai. Second, the morphology of the area, characterized by its multiple alleyways occupying 20 hectares, approximately 13% of the area, is described in the report as a "suitable hideout" for criminals, illegal workers, burglars, and those who wish to cover up their actions (Ghadeer, October 11, 2006).

In addition to the findings in the previous chapters which indicated the cultural impropriety of mixing single workers with families, one expatriate resident surveyed noted a very important point in regard to social mix in Dubai. He stated that it is also inappropriate to mix construction workers (predominantly male) with service and retail workers who are often female. This response may likely reflect the commonly held perceptions that this kind of demographic mixing leads to "crime, safety concerns, social problems, and sexual assault." Although the majority of research participants did not highly value the notion of inclusive housing (particularly mixing the workers with families), they mostly concurred that the working class should be housed within the city, not necessarily within the same neighborhood, in appropriate housing with good living standards and efficient access to services and mass transit.

Second, a considerable number of participants from all three sub-groups (39.0% of experts, 57.4% of officials, and 88.7% of public) selected green, social, and open spaces in the urban fabric as one of the five most effective strategies. Research data reveal that each neighborhood should have an integrated system of parks and green corridors, all networked within the urban environment and intensely programmed, intensely developed, and accessible by foot and other clean transportation options.

Third, if we consider mix of uses and building types as part of the diversity design strategies (and not part of the Compact Development design strategies), interpreting the

tables above reveals that experts do not agree with the public and officials; the experts did not select diversity (and thus mix of uses and building types) as one of the five most effective strategies. However, if we consider that mix of uses is associated with compact urban forms then all three groups do prioritize mix of uses and building types.

A large number of research participants (51.2% of experts, 57.4% of officials, and 41.3% of public) justified prioritizing mixed-use developments within neighborhoods because diversity in uses (e.g. locating different uses such as shops, places of work and worship, schools, social amenities, and entertainment facilities within short distances to where people live) support a sustainable and healthy lifestyle. This includes facilitating daily life operations and reducing private transportation needs while concurrently reducing pollution levels and promoting walkability.

Public planning officials in Dubai are restricted by the existing land use system and subsidized housing programs. For example, in the national housing districts mix of uses is very limited or perhaps centralized in one location as the majority of lands in these areas are predominantly designated for low density residential settlements and uses. The land use system in the subsidized areas prioritizes the idea of housing as many locals as possible in detached single family units. This land use scheme led to a city structure that segregates residential uses from services and facilities. Therefore, the urban fabric in the subsidized areas is not sufficiently dense or sufficiently compact to enable pedestrians to walk to essential services, indicating that private cars serve as the primary mode of transportation within neighborhoods.

Fourth, research data indicate that the majority of research participants emphasize walkability. For example, officials cited walkability as the most effective strategy, while experts and public cited the same strategy as the second most effective strategy for achieving socially, environmentally, and economic integrated neighborhoods in Dubai.

This indicates a strong emphasis on pedestrian accessibility and human scale experience of sustainable development. However, if we look at the reality of Dubai's urban morphology, it appears that Dubai is an automobile dependent city spatially fragmented with multiple disconnected centers and linked by major arterials and multi-lane freeways. This morphology, according to Graham and Marvin (2001:269), is described as a form of "geographic distancing and biased infrastructure development."

Based on urban design literature that defines a walkable neighborhood as a place where services and amenities are located within short distances, maximum of five minutes walking distance, Dubai at the city scale and the neighborhood scale is not considered to be walkable. The street system in Dubai is not based on short blocks and interconnected patterns. This means that walking is difficult and cars are the central mode of transportation even for very short trips. Pedestrian infrastructure could never be found in the subsidized neighborhoods. Walkability is only promoted in the old central city because of its compact, dense, and yet preamble fabric (Elsheshtawy, 2008). Few projects developed by government-private corporations such as Dubai Marina, Jumierah Beach Residence, and the Arabian Ranches where residents pay mandatory service and maintenance fees also incorporated pedestrian pathways, but yet people cannot walk from one development to another since developments are not contiguous. This implies that the majority of people in Dubai, especially the locals, do not have the facilities and infrastructure that promote walkability and human activity in their neighborhoods.

This makes me question, why Dubai in its planning framework did not emphasize an easy and inviting environment for people to walk, in spite of the fact that officials in the RTA and DM valued walkability more than any other strategy. My answer is as following: besides the constraints on walkability discussed in the interview section, I argue that the officials who appreciated and valued walkability in interviews have a good

planning knowledge, but yet do not possess power. The problem comes from the lack of authority and support of the government to implement changes; the ultimate power in public and semi-private institutions is allocated to "established families, elite, and prominent individuals" (Davidson, 2008) who in many cases do not have knowledge in planning or urban design practices.

This leads me to wonder about how the officials in their work faced restrictions either with budget limitations, climatic constraints, bureaucratic administration, or politics. Or, alternatively, perhaps decision-makers did not embrace and value walkability in neighborhood development or did not understand the importance of walkability in the past. As the public highly prioritized walkability, it also would have been very efficient to provide the public the opportunity to participate in the planning work to express their preferences and opinions because at the end they are the users.

Agreement and Disagreement between Experts and Officials

Research data reveal two areas of agreement and three areas of disagreement between experts and officials. First, the majority of officials interviewed and experts surveyed cited macro-network of transit and high density levels within the five most effective strategies for achieving an integrated neighborhood. Second, the majority of officials interviewed disagreed with experts in three main areas. Particularly, officials did not prioritize short blocks and interconnected street systems, bike infrastructure, and environmental design in their selection of the five most effective strategies.

Both experts and officials valued high density levels in Dubai's neighborhood development; however, this agreement is based on two different priorities and thoughts. The experts think that moderate to high density levels could lead to a compact form with many social, environmental, and economic benefits. For example, compactness

maximizes integration and permeability, minimizes surface exposure to solar radiation, reduces heat gain and cooling load, maximizes shading, provides greater opportunities for social interaction, and minimizes walking distance and commuting time, and, thus, reduces pollution levels. In contrast, officials prioritization of high density levels mainly relates to economic matters such as reducing of utility and infrastructure cost. In fact, during the seven interviews, no official mentioned the term compactness or pointed to the environmental advantages associated with high densities. Besides, only one out of seven interviewees acknowledged the potential social benefits of high density levels. In particular, the official who is specialized in traditional Arab urbanism and architecture stated that high density levels can potentially strengthen the level of social relations and interactions within a neighborhood as close knit houses with narrow shaded pathways and alleyways provide an opportunity for people to meet more often on the street and public spaces than lower density areas where houses are set far from each other and from the streets.

If we look at the differences in preference between experts and officials, it appears that officials did not prioritize bike infrastructure, environmental design, and interconnected street patters in their voting of the five most effective strategies. This can be attributed to several reasons. First, officials feel that cultural and climatic barriers place fundamental constraints on widespread bike use, especially among the local population, leading to potential difficulties and less feasibility of implementation. Second, although experts cited climate-sensitive urbanism more than any other strategy and also highly prioritized eco-balanced design and planning, officials found environmental design important but not within this period of economic collapse. The government is attempting to minimize (not maximize) design requirements and regulations on developers to once again promote the construction activity and real estate

industry. This really points toward understanding the cultural traditions of a city and different populations within the city. It also perhaps points to the economic realities of primary concern among practitioners and less of a concern among academics who don't work in government jobs.

Third, the majority of official interviewed (5 out of 7 officials) did not value interconnected street systems as this pattern increases the R.O.W, while concurrently increases the infrastructure cost and decreases the number and size of land parcels per neighborhood. Officials, for the most part, favor super or long blocks over short blocks because the first system requires less road coverage to serve parcels than short blocks. They also argue that short blocks restrict diversity in parcel configurations and building forms inside the block. Furthermore, officials believe that pedestrian accessibility in neighborhoods is currently maintained through the use of alleyways in a range of one alley per 1,000 ft. more or less. In addition, officials argue that short interconnected blocks may result in serious traffic chaos and accidents as the drivers in Dubai are not accustomed to stop signs. Last, few officials think that interconnected patterns look very industrial, and thus unappealing.

It is important to note that how and where officials were trained and educated influenced their responses. For instance, two out of seven interviewees who appreciated interconnected street systems were trained in North America where traditional urban design strategies combined with new urbanism principles prioritize interconnected systems over impermeable systems. But the rest of interviewees, who did not value street connectivity, received their training in the UAE and Europe. Interviewees do not argue that all types of interconnected patterns look industrial, but they mainly perceive the gridiron or rectilinear patterns, the most common form of interconnected street systems, as unattractive. This perception relates to the aesthetic appreciation of urban design

strategies related to street patterns. Urban design literature stresses the fact that not all interconnected streets systems are rectilinear in form. The gridiron patterns are very common in most North American downtown areas. However, Condon (2010) lists three interconnected streets patterns that are not gridiron including the "radial pattern" as it appears in Paris and Washington D.C., the "informal web pattern" as it appears in the layout of Cambridge, Massachusetts, and the "wrapped grid" in which street curves matches the landscape contours.

I anticipate that the government in Dubai will not adopt an interconnected street system in the design of new neighborhoods, at least currently or in the next decade, due to budget and financial constraints. As indicated by all interviewees, the government's ultimate priority in neighborhood design will be directed towards reducing the cost of infrastructure, and accommodating as many natives as possible within one neighborhood. Interviewees claim that this approach in neighborhood design could be achieved through two ways: (1) increasing the density level by reducing the subsidized lot size from the current configuration of 10,000 ft^2 to at least 7,500 ft^2; and (2) maintaining the system of long blocks that could potentially contain more land parcels per block and per neighborhood. Long blocks require less road coverage to serve parcels, resulting in less infrastructure and utility cost.

Agreement and Disagreement between Experts and Public

Research data show two areas of agreement and three areas of disagreement between experts and public. First, the majority of public and experts surveyed prioritized short blocks and interconnected street systems and environmental design of buildings in their selection of the five most effective strategies. Second, the majority of public surveyed disagree with experts as the first group did not value high density levels, macro-

network of transit, and bike infrastructure in their selection of the five most effective strategies.

Both the experts and public surveyed agree that interconnected streets systems are a very important strategic element in neighborhood design and planning. Both groups agree that interconnected streets patterns are straightforward, very systematic, and easy to use and perceive. Furthermore, both groups believe that the interconnected system is pedestrian oriented (encourages walkability); is transit-friendly; enhances accessibility and connectivity; and enables people to simply walk/drive and arrive to their destinations easily and shortly. The statements above are asserted by Condon (2010) who argues that impermeable streets are "bad" for pedestrians, and are lengthy and circuitous. Besides, many urban design studies demonstrate that New Urbanism's concept of five minutes walking distance covers more grounds in interconnected systems than dendritic impermeable systems.

Both experts and public also prioritized environmental design for neighborhood design. Experts selected climate-sensitive urban and architecture and eco-balanced design and planning as part of the five most effective strategies because they understand the potential environmental, economic, and social benefits of passive and active systems in design. In contrast, the media campaign in Dubai that continuously and excessively addressed the potential benefits of environmental design to the public, only in terms of energy conservation through the application of green standards, made many of Dubai residents aware of this strategy. Consequently, the majority of participants surveyed rated this strategy as very important and as part of the five most effective strategies.

When examining the disagreement between the experts and public, the majority of public did not prioritize bike infrastructure, high density levels, and macro-network of transit within neighborhoods. In fact, these strategies were valued less than any other

strategy on the list. First, bike infrastructure is not highly prioritized among the public due to two major constraints: Dubai's cultural norms and hot climatic conditions. If we delve deeper into the Delphi data, it appears that the majority of Emirati experts (4 out of 5) share with the public similar thoughts. In particular, local experts argue that bike infrastructure does not suite Dubai's' environmental and cultural context. For example, local clothing and traditions restrict cycling, particularly among the women population. Some experts argue that cycling is culturally inappropriate for local females of any age, and this norm and tradition will never change. But other experts argue that it is not feasible to base planning decisions on a tiny percentage of the population as Dubai accommodates diversity of groups from different regions.

It is true that the local culture in the UAE is conservative in nature and put major barriers on cycling, but many Western or even Arab or Muslim populations do not share with the locals their norms and values. For example, if we look at the survey responses, it appears that the majority of expatriate males considered bike infrastructure as very or somewhat important (please refer to table below).

Table 45: Expatriate males' responses to bike infrastructure

Demographic	**Responses**		
Expatriate Males	**Not important at all**	**Somewhat important**	**Very important**
Indian Sub-continent	2	6	5
Arab	0	7	13
Western	0	3	2
Total	2	16	20

More than 50% of the population in Dubai comes from the working class, originally from the Indian Sub-Continent and South-East Asia, who are used to bike in their original country. As indicated in the Delphi and interview chapters, people from

those regions are physically, physiologically, and mentally prepared to bike even in hot and humid climatic conditions. The vast majority of this demographic group does not own a car, so bicycle lanes would make cycling appealing to them. In fact, survey responses confirm that this demographic segment significantly value cycling as out of 13 respondents from the Indian-Sub-continent, five considered bike infrastructure very important, six as somewhat important, and only two participants as not important at all, pointing out that cycling is unsafe and very dangerous in Dubai.

Even though survey data reveal that 48 out of 105 participants of Local males and females considered bike facilities very important, 44 as somewhat important, and only a small group (13 participants) considered this strategy as not important at all, some experts and public surveyed indicated that bike lanes will not be widely used among the local population in Dubai. In particular, they argue that bike infrastructure would mainly appeal to limited local groups such as the children and male teenagers. As a result, it is not economically feasible to design bike paths in the subsidized neighborhoods where the locals live because the utilization of this infrastructure will be very limited. Many locals surveyed argue that it is more economically viable and socially reasonable to incorporate other amenities like shaded pathways and high quality public facilities within neighborhoods as alternatives to the provision of bike infrastructure.

Public responses in terms of high density levels also deviate from the experts design recommendations favoring moderate to high density levels over low density. Experts argue that in order to save energy and infrastructure cost, the size of the subsidized lots in Dubai should reduce from 10,000 ft^2 to 6,200 ft^2 (this indicates an increase of density levels from 3 to 7 units per acre). Many participants surveyed think that the experts who participated in the research have an abstract knowledge about the specifics of the local Emirati culture, thus, their proposal is considered arbitrary and

inappropriate. I argue that this argument might be significant because if we look precisely at the experts responses for an appropriate or acceptable level of residential density for detached single family units, it appears that the majority of local Emirati experts preferred low density levels. In particular, four out of five experts selected three to four units per acre, while only one selected high density level, 15 units per acre (equivalent to the density metric in Howards' garden city concept). It is also important to indicate that no one from the five local experts selected compact development as part of the five most effective strategies for achieving an integrated neighborhood.

It is also important to note that two U.S. experts who are aware of the local Emirati norms as they conducted a lot of research in Dubai also voted for low density levels, three to four units per acre. Only one U.S. expert who lives in Dubai voted for 15 to 17 units per acre, matching the vote of one local expert. Interestingly, both experts have practice and research in green technologies, building scale details, and energy conservation. The votes of the other experts on the panel mainly ranged from seven to fifteen units per acre, moderate to high density levels. But what seems to be important is that five out of ten experts, who are from or live in the U.S., voted for seven units per acre, equivalent to the New Urbanism's minimum density standard.

Urban design literature indicates that within every city around the globe, population and built-up density varies from a neighborhood to another. This variation in density and size of living space is usually controlled by six factors: (1) market forces; (2) housing policies and programs; (4) land use and regulations; (4) cultural norms and needs; (5) affordability, what people can afford; and (6) what individuals and families are willing to pay (Kriken, 2010). For example, in the UAE, cultural norms of the indigenous population necessitate space, which is defined by the public surveyed as big lands with large houses. For example, in many cases male adults "get married" and live in the same

property with their parents requiring an extension of the original villa or building an adjacent unit in the same lot. With the current building codes and setback regulations, this extension could not be built unless the land parcel is big (around 10,000 ft^2). Local families also need space because some traditions and norms such as hospitality and exchange of visits require a number of rooms that are spacious and dual in quantity to separate the female and male visitors. The disparity between experts and public responses in regard to density also attributes to the fact that the natives in Dubai do not only consider the subsidized land as a living area, but also as an asset, investment, and a source of financial security that lasts for many generations, and yet cutting down this subsidy will raise a sense of deprivation and financial insecurity among the local individuals and families.

Findings also show a third area of disagreement between the experts and public. Particularly, the majority of public surveyed did not select the incorporation of trams within neighborhoods as part of the five most effective strategies. Survey data attribute this variance to the fact that the majority of population in Dubai, especially the locals, do not favor or prefer the use of public transit due to the crowds, excessive waiting time and exchange between transit stations; co-mingling between men and women (females do not feel comfortable to intermingle with males, especially during rush hours); and local families usually travel in big numbers with their kids and baggage and make multiple trips to various destinations (e.g. schools and running errands); therefore, it would be much more convenient and more comfortable for those groups to use their private cars than to utilize mass transit.

Some experts on the panel affirmed the last constraint "inefficiency of public transit for making chain trips." They argue that individuals and families in Dubai can easily reach to a favorite shopping mall or their work place along Sheikh Zayed Road, or

in Jabal Ali or the old city center, but with the current metro lines they could never take their kids to school before going to work, or buy groceries and run some errands while coming back to home. My personal experience echoes the idea expressed by some of the experts. I live in Trade Center 1, along Sheikh Zayed Road. I have a transit stop merely five minutes walking distance from my apartment. My transit access card is in my wallet, fully charged but never used it because I believe that the mass transit system in Dubai is a very limited system, at least as it stands currently. It may be efficient for a single one trip to one location, but not multiple trips. Therefore, it is much more practical and convenient to use your private car to move around and to meet your daily needs and requirements.

Agreement and Disagreement between Public and Officials

Research data reveal one agreement and two disagreements between public surveyed and officials interviewed. First, the majority of public and officials selected mix of uses as part of the five most effective strategies. Second, the majority of public surveyed disagree with officials in two points: (1) public prioritized interconnected street systems and environmental design in their selection of the five most effective strategies, but officials did not; and (2) public did not value high density levels in their selection but officials did, corresponding to the experts responses.

FUTURE ACTIONS

Out of this analysis I identify some recommendations and potential actions for the development of future neighborhoods in Dubai concerned with the following strategies: inclusive housing, green areas in the neighborhoods, diversity of uses and building types, connectivity, and high densities. Some of these recommendations come directly from

research participants, while other recommendations I modified to address key environmental and cultural aspects of Dubai.

In many ways, the design strategies prioritized by research participants reflect ideals about what sustainable development entails. Yet, Dubai is a unique place, with deeply held cultural traditions and extreme environmental conditions as well as a unique political and governance structure. Determining culturally and politically feasible approaches for the future implementation of the prioritized design strategies requires careful assessment and cognizance of Dubai's unique characteristics.

Recommendations for Inclusive Housing

Due to cultural traditions where families value privacy and where privacy is perceived as a desired characteristic of a "good" neighborhood, I recommend that worker and laborer housing be segregated from family-dominated neighborhoods. These worker neighborhoods, similar to the family neighborhoods, should have sufficient amenities and infrastructure to ensure that these neighborhoods reflect key tenets of sustainable design. Lack of privacy for Dubaians relates to increases in crime and reductions in safety. These perceptions take deep rooted in cultural tradition related to residential house design and the spatial organization of homes within neighborhoods. I argue that housing laborers and workers as an agenda for sustainable development in Dubai is culturally and politically feasible only when such housing is isolated from family centered neighborhoods.

Sustainability literature which defines the "ability to fulfill psychological needs" including sense of safety and security as a critical factor for improving social sustainability and enhancing residents sense of attachment to a neighborhood only serves to affirm this argument (Chan & Lee, 2008). Corbett and Corbett (2000) also noted in

their studies that individuals and families prefer to stay in areas where crime, conflicts, and vandalism are absent and where their privacy is protected.

Recommendations for Green and Social Nodes

The implementation of green spaces in the urban fabric currently is problematic. Major changes need to happen to allow for the design of and planning for the kinds of green and social spaces envisioned by the research participants. I recommend three strategies that potentially could enhance the quality, distribution and regulation of green and social spaces with the goal of improving people's experience of and engagement with the urban fabric.

First, I recommend changing the currently fragmented and impermeable street system model into an interconnected system. Research participants (predominantly experts and public surveyed) identified that altering the system of green spaces in the city to be more connected through an interconnected system of shaded green paths is a prioritized design strategy. Yet, in order to achieve this strategy, Dubai should take on a concurrent modification in the street system from its current fragmented patterns into more interconnected patterns that provide bigger potential for connectivity, permeability, and accessibility.

Second, I recommend designing a diversity of park types, with differently sized parks associated with different uses and users. My recommendation is based upon the recognition that both environmental and cultural issues are associated with the provision of green spaces in neighborhoods. For example, as the local culture in Dubai is conservative, it is vital to designate certain days in the week or even specific parks, playgrounds, and sport fields only for females and children. This will create an open and safe atmosphere where women can freely meet, socialize, and practice activities and

favorite sports without being intruded upon by males. It is also important to note that parks and social spaces should be sited within proximate distances to housing to enable families, particularly women and children, to walk easily, shortly, and safely to their destination.

Third, I recommend designing a dual system of service lines that re-circulate and refine the grey water for irrigation purposes. The scarcity of water poses the environmental issue here. While one interviewee noted the importance of recycling water in Dubai, one other participant disagreed. Many reports define that water scarcity is an issue in the Gulf region where desalination is a main source of water. However, recycling and re-circulating of grey water is not consistently identified by the research participants as an important component to the collection of design strategies. This reflects a critical gap in the initial identification of design strategies by the panel of experts. Yet, there is ample documentation of water scarcity in Dubai, and so I propose that a design strategy which addresses water scarcity is important.

Recommendations for Diversity and Networked Systems

Dubai's urban policy agenda and market operation are generally oriented toward the planning of isolated uses, segregating mixed-use developments from housing, especially in residential neighborhoods. While research data reveal that a mix of uses and building types is culturally accepted and prioritized, the status quo planning actions appear to place major barriers on diversity. For example, in subsidized neighborhoods, planning practices separate residential use (mainly represented in detached single-family houses) from mixed-use developments. In most common cases, multi-family residential settlements and basic services that can supply residents' needs (e.g., supermarkets, grocery stores, administrative services, schools, parks, and healthcare facilities) are

located in one place, either in the center or at the edge of the neighborhood, and are mainly accessible by private cars. I describe this practice as an excessive concentration of uses and services in a single central location or one territory.

To integrate housing with multiple land uses and to achieve the concept of proximity to necessary services, mixed-use development should not be approached as a centralized system, but as a decentralized networked system. The main uses mentioned above might be sited in a number of locations distant from each other, yet networked by shaded pedestrian pathways, cable car or mini-bus lines, and local car routes. Planning for multiple centers within walking distances from housing promotes walkability and relieves congestion, as traffic will not be concentrated in only one service center. In combination with this proposed land-use strategy, a neighborhood should also include a mixed-use transit corridor where high density levels and diversity are encouraged.

Figure 12 is a conceptual diagram showing how different systems and functions can be placed according to the concept of polycentricism within a neighborhood-scale development. It is important to note that the rectilinear or square representation of the diagram does not reflect any particular meaning or design preference. Rather, the figure shows only one possible conceptual way for networking different systems and uses within a neighborhood.

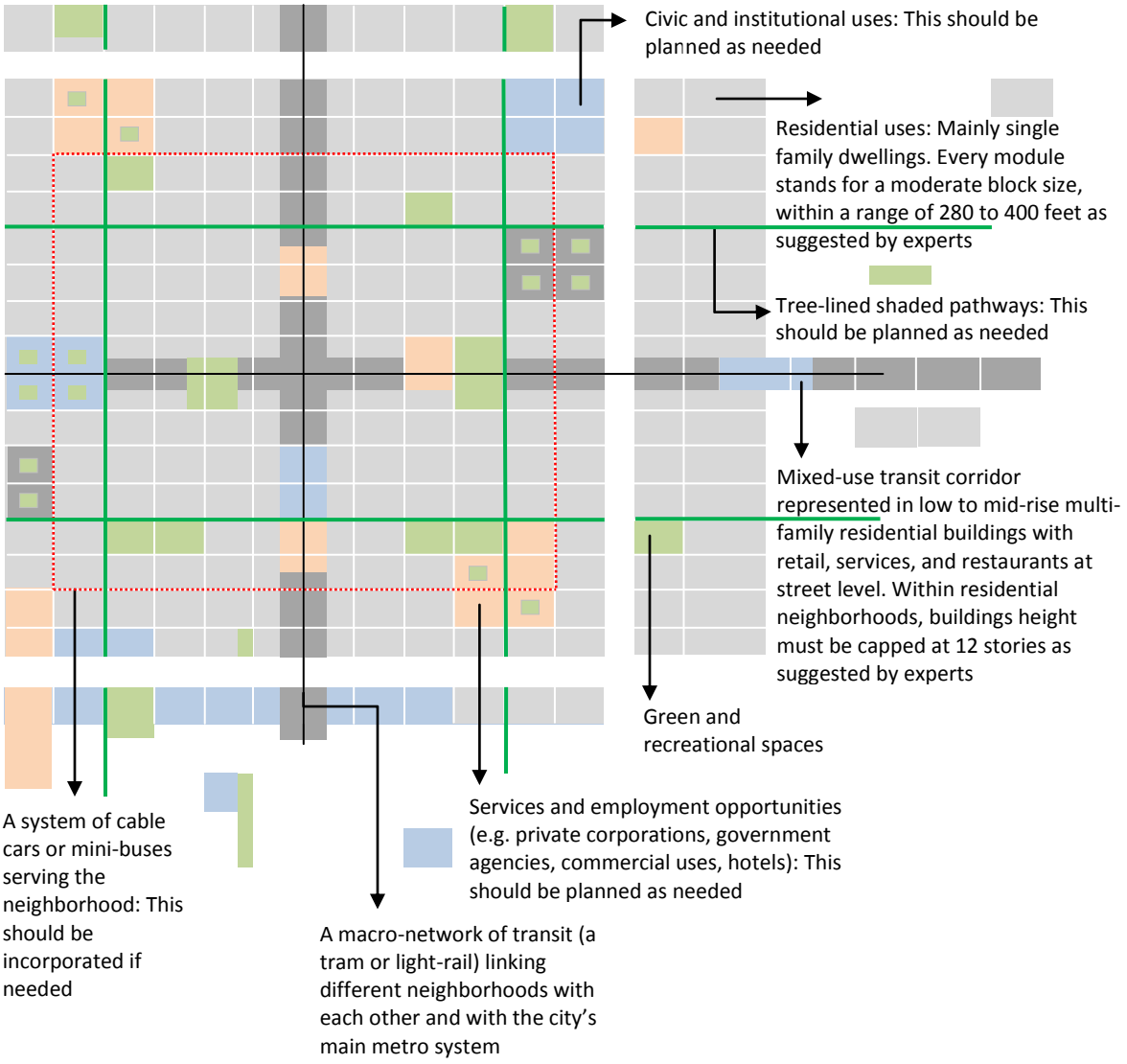


Figure 12: Network of systems within a neighborhood

Note: The new system suggests distributing different uses and systems along transit corridors and in a number of locations, distant from each other, but yet networked by shaded pedestrian pathways, local car routes, and cable cars or mini-bus lines.

The morphological aspects presented above reflect how different systems and uses can be integrated within a single neighborhood. It is of paramount importance to think about neighborhood responses to sustainable development within the context of the

larger city. An important question is: What are the various uses and relationships that could be functionally networked in Dubai to facilitate thinking about sustainable urban forms at the city scale? For example, it is vital to talk about the relationships among different residential neighborhoods or between housing and employment centers as networked systems for Dubai that could tie together in different patterns. This refers to patchwork urbanism, where different urban patches have distinct flavors and functions, and could possibly play different roles in citywide sustainability.

Figure 13 illustrates some of the important networks that have emerged in my analysis to facilitate thinking about the relationships among neighborhoods, systems, and the city. The linearity of the diagram and the square module do not entail any particular meaning, but rather show a schematic for how different urban patches can be integrated in a citywide-scale context.

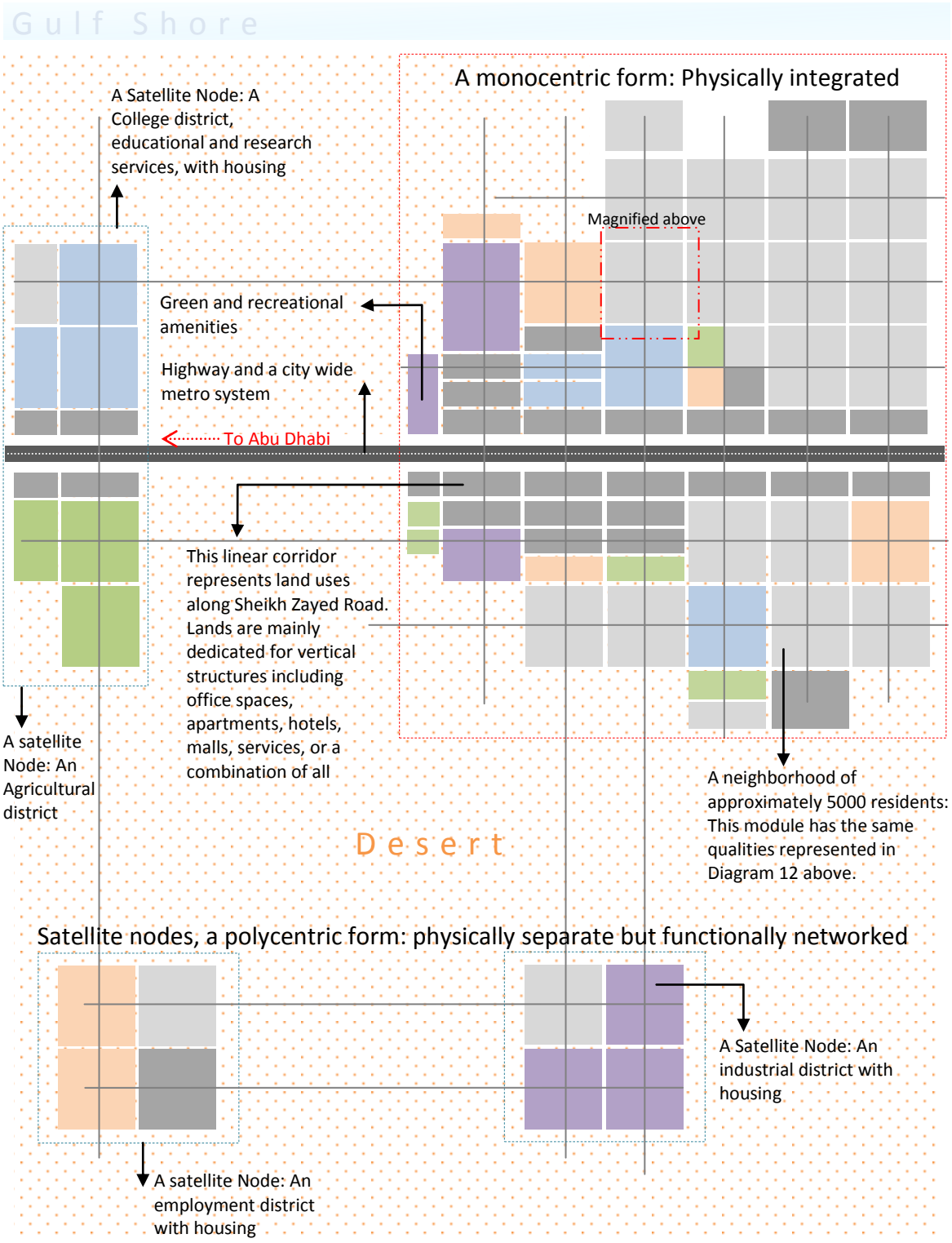


Figure 13: Network of systems with the city context

Figure 13 shows a series of systems in two different ways: a monocentric urban system to the right and a polycentric urban model to the left. The monocentric form organizes a series of uses (e.g., residential, institutional, recreational, commercial, industrial, places of work) in one large urban agglomeration that is dense and contiguous. This form has many potential benefits, such as saving land resources and infrastructure costs. The ultimate strength of this form appears if different urban patches are programmed efficiently, are networked with a multi-modal transit system, and are governed correctly. However, in many cases, serious thought must be given to the ability of monocentric forms to cope with rapid and massive population and urban growth. For example, mega cities in many regions suffer from congestion, population explosion, and environmental deterioration. Therefore, scholars found it critical to think about new, sustainable city forms or new ways to pursue urban expansion. For example, the physical attribute of this new model does not need to be a massive, single urban structure; instead, it may be dispersed and separated into small urban nodes or satellite districts, networked with one another and with the larger city fabric. This system, known as polycentricism, appears physically detached, but functionally integrated and organized around a monocentric city (Faludi et al., 2002).

The downside of polycentrism appears when people misunderstand it to mean fragmentation or sprawl. The counter-balancing argument emphasizes that the concepts of integration, connectivity, and inclusion are fundamentally important in polycentric urban patterns (Jenks, Kozak, & Takkanon, 2008). The main question remains: Which urban system delivers greater environmental, economic, and social coherence on a citywide or regional scale? Based on my research outcome, I anticipate that the success of the polycentric or the monocentric approach in city design depends on the context in which design and planning are happening. In other words, the proliferation of cities

demands a careful assessment of local context and specifics, including evaluation of environmental conditions, geographic nature, political and cultural aspects, economic forecasts, and growth demands. The question stated above is indeed a very critical area of research worth exploring through different case studies from around the world, as both forms contain merits and downsides.

Recommendations for Transit and Street Systems

I recommend replacing Dubai's current transportation system that is primarily based on super-grid, coarse network with few intersections, and multi-lane highways with an interconnected street pattern. Dubai's current road networks are neither pedestrian oriented nor transit friendly, leading to higher VMT (vehicles miles travel), longer travel time, and high emissions. This transportation system is based on post WWII North American model which prioritizes private automobiles over pedestrians and mass transit. This statement is affirmed by Expert (B) who argues that the transportation networks in Dubai have been based on "a western model of car first, then fit the other systems in around it."

I argue that this transportation system should be swapped with a hierarchical and integrated network of public and personal modes of transport. But yet the systems should be physically separated from each other. For example, the majority of public argue that cycling is very dangerous; therefore, bike traffic should physically be separated from pedestrians and car traffic. Furthermore, as the residents in Dubai are not accustomed to rail systems operating on streets, I argue that macro-network of transit represented in trams or light rails should not share lanes with cars or buses to ensure traffic safety. Particularly, the new transportation model in Dubai (including both personal and public modes) should be designed as following:

1. First, in this system shaded pedestrian pathways and bike lanes might form the first web of connections. The next private network might be an interconnected systems of local streets represented in short blocks ranging from 300 to 400 feet. The wider system in terms of both length and width would be the car traffic routes outside the neighborhood perimeter, leading to major highways and binding different neighborhoods with each other.
2. Second, a hierarchal network of public transit system should integrate and interconnect with the aforementioned personal modes of transportation. This mass transit system should be divided into two levels going from cable cars or mini-buses serving the local streets to a network of trams along mixed-use corridors. The cable cars will connect residents with the transit corridor as well as neighborhoods own services and amentias. The mixed-use transit corridors represented in the system of trams, on the other hand, will possibly connect residents with different neighborhoods and with the city-scale metro system.

Experts on the panel and urban design literature specify that this kind of concentrated, walkable, mixed-use neighborhoods and transit corridors integrated with diversity of uses and high density levels will lead to a vibrant neighborhood structure oriented towards social interaction, walkability, and transit use. However, the cultural norms and hot climatic conditions of Dubai will place major barriers on walkability and transit systems. For example, in general sense it is culturally inappropriate for the local women, specially unmarried, to walk in neighborhoods or use mass transit unless she has a company (e.g. walking/riding with female friends or any family member). Furthermore, as the climatic conditions in Dubai are extremely harsh, walking from houses, schools, place of work, services, parks, and stores to neighborhood tram stops would take no more

than five minutes. In addition, the pedestrian-based facilities and transit stops must be highly protected from sun heat.

Although there are several cultural and climatic constraints on walkability, I argue that since all research participants including (experts, public, and officials) greatly valued and appreciated walkability, authorities in Dubai should carefully respond to this important finding by addressing and regulating the elements of physical activity and walkability in new developments. Many reports indicate that Dubai has high rates of people who suffer from cardiovascular problems, blood pressure, and diabetes due to lack of movement and activity. A study by British Medical Association found that for every hour you spend cycling or walking, you add more hours to your expected healthy life time; and for every hour you spend in your car, you are subtracting hours from your expected healthy life time (as cited in Pucher & Buehler, 2008). I argue that if the planning authority in Dubai is really has concerns about the public health, it should respond to this call, which in fact hails from the government itself.

It is also important to indicate that as there are several cultural barriers that restrict widespread use of bikes among the local population, I consider that bike infrastructure will be more feasible and more effective in neighborhoods where the Western, South-East Asian, Indian Sub-continent, and the working class populations live than the subsidized neighborhoods where the local population lives.

Recommendations for High Densities

The deviation in preference between the public and officials, and between the public and experts where the public prioritize low density developments while the officials and experts value high densities can be attributed to several factors. In particular, experts believe that compact development with its dense structures is the most

appropriate spatial organization that suites Dubai environmental conditions. Officials, on the other hand, think that high density preserves land sources and reduces infrastructure cost. While experts and officials prioritize high densities, the public (especially the local population) undervalue this core strategy of sustainable development.

A careful assessment and awareness of Dubai's unique cultural norms and values are required to make compact neighborhoods socially feasible and highly accepted among the public. In my opinion the following strategies could potentially enhance or change the public concern with and perception of high density levels.

First, Dubai should incorporate participatory planning approaches in neighborhood design and planning. Community workshops and public discourses where all three segments (the public, officials, and professionals) can come together to think about future forms of neighborhoods and discuss about the impacts and implications of density may adjust the public negative perception and opinion about high densities.

Second, Arabic cities have a rich history of adaptation and culture co-evolving, and cities like Dubai was originally designed based on sets of norms that governed density and growth. One such norm was newly married males would build on the existing structure of his parents' land. This indicates that densities of housing and population were not static, but increased over time as families grew. This kind of practice is culturally and economically rooted as families in the UAE value the concept of living together, and perhaps young adults cannot afford a house or an apartment rent at the early stages of their marriage. Therefore, this particular cultural practice or pattern of housing densities must be framed as a regulatory mechanism responding to cultural needs. Currently, married males built randomly on their parents land parcels with no particular policy regulating this expansion. There should be some design tactics and policies that could promote adaptability; that is, promote the intensity of densities over time. One potential

approach would be rethinking city's building codes and planning policies by reducing the size of the subsidized lands, relaxing the setback requirements (mandatory 10 ft. from all sides), and thus compensate the reduction of land size with an additional floor (allowing property owners to build three levels instead of two, and perhaps four levels in very special cases). This revision in building regulations has cultural relevance as it honors and responds to the public main argument that Emirati families need space, and thus large lands.

I argue if high density levels are not valued among the public in Dubai, the social dimension of sustainability as indicated in sustainability literature will be threatened. Density is a very sensitive and problematic issue in urban design theory and practice; what it may portray as a socially feasible and appropriate density level varies by location, culture, and demography. Therefore, Dubai should consider several approaches to educate the public about the potential benefits of high densities. One of these approaches could possibly be the involvement of public in neighborhood design and planning. The last chapter gives more detailed speculation about two counter-arguments: how public opposition to density places a major obstacle to sustainability; and how not addressing the cultural norms and social desires in neighborhood design and planning could jeopardize the social dimension of sustainability.

APPLICATION: ENVISIONING A DIFFERENT FUTURE FOR DUBAI

In this section I look at a particular neighborhood that needs attention, and propose some design strategies to deal with the most pressing issues in the area. In many ways, I am trying to envision a different kind of urbanism for Dubai, and to demonstrate what that future might look like (in terms of design) and how that future might be

tolerated by the public and also be regulated (in terms of governance systems, regulations and policies).

In the last years, many central neighborhoods in Dubai experienced deterioration, safety problems, and the dominance of the working class. For example, Al-Satwa, a low-rise community shown in (Appendix 1), was originally planned in the late 1960s by the government to provide housing for approximately 3000 local families. This area incorporated some design ideas that promote walkability, such as narrow shaded alleyways, and a mixed-use retail corridor where people can walk, live, work, and shop. In the 1990s, this community with its close-knit residences (50 x 50 ft. plots), which had accommodated a vibrant community in the 1970s and 1980s, was partly fractured and vacant.

This area is physically and socially isolated from the new downtown corridor along Sheikh Zayed Road, also shown in (Appendix 1), where the rich and high-income people live. This new downtown area with its contemporary high rises and the highest real estate value in Dubai is only a few hundred feet away from the deteriorated area. A major arterial street and several parking garages and surface parking separate the two districts from each other. This section of Dubai shows a strong example of class segregation and ethnic prejudice.

In the late 1990s, Dubai Municipality planned new areas such as Al-Barsha and Al-Warqa with bigger lots (150 x 100 ft.) for the natives. Accordingly, many citizens moved to those suburbs and leased their houses to laborers and low-income workers who were mainly from India, Pakistan, Bangladesh, and the Philippines. As a result, this area transformed from a family-oriented neighborhood into a place where singles and ethnic groups live and crimes concentrate. Families who remained in the area and could not

afford to move out suffered from the large accumulation of laborers, and this in turn threatened their sense of privacy and their ability to feel safe moving in the area.

In 1995, a study conducted by the Strategic Planning Section in Dubai Municipality reported the social and urban issues in Al Satwa, detailing its deterioration and lack of safety. The report also defined the positive aspects of the area represented by its strategic location, high real estate value, and huge potential for future development, which would bring original/former citizens back to the area.

In particular, the local municipal authority conducted several surveys and observations explaining the morphology and physical attributes of the area, the land use system, the building conditions, and the housing types, including the shacks that are built of wood and metal corrugated panels. These statistics and information are summarized in the following tables:

Table 46: Land use in Al-Satwa

Use	Residential	Mixed	Commercial	Services	Roads/ Alleys	Vacant	Total
Areas/Hectare	50.8	10.5	1.5	7.2	62	18	150
%	34	7	1	4.7	41	12	100

Table 47: Building types in Al-Satwa

Buildings Type	Buildings 1 Storey	Buildings > 1 Storey	Villas	Traditional Houses	Corrugated Sheet Houses	Others	Total
Building #	138	42	30	1350	311	25	1897
%	7.3	2.2	1.6	71	16	1.3	100

Table 48: Buildings conditions in Al-Satwa

Buildings Condition	Good	Average	Deteriorated	Total
Building #	291	1135	471	1897
%	15	60	25	100

In summary, the planning department report listed the social and the morphological characteristics of the district, as it appeared in 1995, into the following main points:

- The area has one of the highest densities in the city and houses a variety of nationalities. The total residents are 21,000 and the average density is 170 people/hectare.
- Al-Satwa incorporates a vibrant mixed-use strip that accommodates street-level retail stores, services, ethnic restaurants, and apartments and offices in the higher levels.
- The area has a high percentage of roads and alleyways, which are estimated to comprise 41% of the area.
- The alleyways occupy 20 hectares, approximately 13% of the area.
- There is inappropriate graffiti in many of the hidden alleyways (Elsheshtawy, 2008).
- There is a lack of green and open spaces.
- Most traditional Arabian houses are deteriorated.
- The deteriorated houses have created ethnic enclaves and hideouts for illegal immigrants.
- There are 424 houses built of metal corrugated sheets that are not suitable for living and suffer from critical safety issues.
- The area is ranked as a high-crime and drug-dealing zone due to its socio-economic status.
- The influx of the working class changed the social and spatial identity of the area.
- The average occupancy of one house is around 20 to 30 people or greater; almost 6 laborers live in one room (10 x 10 feet).

- Many lands are vacant because many houses were demolished because some occupants did not have any source of property ownership, or they were shacks, which are against the city's building regulations.

The final conclusion in the report indicated that Al-Satwa is physically and socially fractured, disaggregated, not functional, and not livable due to its ethnic enclaves and deterioration. The area is currently located adjacent to a contemporary urban corridor along Sheikh Zayed Road and a vibrant neighborhood from the west; therefore, a new master plan is essentially required to save the area from further deterioration. The Planning Department eventually hired a consultant to redesign the area. The consulting office introduced an alternative plan intended to bring the citizens back by providing larger land configurations, opportunities for investment, green spaces, and additional amenities.

However, as most of the planning work is done in Dubai through the provision of government/private firms, this plan was frozen and the entire district was allocated to Meraas, a new governmental/private agency, in 2007. Detailed plans have been announced; the area will be turned into a luxurious development with skyscrapers and artificial water canals. This scheme indicates that the development is another mega-scale project that holds no ties with the region's climate and culture. Once the firm took charge, it started knocking down the buildings (see Appendix 1). Many expatriates moved to the surrounding areas such as Al Jafiliya, Al Bada'a, and Al-Karama. Additionally, all native people who had sources of property possession were compensated. However construction did not begin as Dubai took a significant hit in the recession. Due to the global economic decline, the project was postponed indefinitely.

The last section of (Appendix 1) demonstrates a personal observation of the site during its peak occupancy by expatriates and during the demolition process.

In this section, I take Al-Satwa as a case study and propose some design tenets that reflect a different kind of future for Dubai, and demonstrate what that future might look like though a small-scale design approach that totally deviates from Dubai's colossal weakness for mega-scale urbanism. This indicates that my approach reflects an integrative and cohesive design theme, aimed to "heal" the fractured and disaggregated nature of this particular environment. This also indicates that urban projects must progressively be a therapy that concentrates more on social, environmental, and cultural qualities of the place. The design work of this neighborhood was done in 2007 as part of my Master Design Study. Professors Simon Atkinson and Dean Almy mentored the study. I am integrating some findings from my master's project into this research because of two reasons: (1) the master's findings reflect some of the key design tactics suggested by experts on the Delphi panel; and (2) the findings reflect how diversity and gradation in neighborhood design can be approached in a culture where integration, diversity, and choice are rare.

A very important question that this case study addresses is: How can this neighborhood be retrofitted to include programs, housing, and public spaces designed for different kinds of people? Perhaps social tolerance is an issue of concern for the government and natives; therefore, proposing both design and policy strategies to deal more effectively with the issue of proximity patterns between singles and families, and between different ethnic groups, would be useful in demonstrating a different future for the city that is more socially sustainable.

My approach to this case study entailed three different concepts (programs, proximity, and polices), or what I call the three Ps. Proximity delineates the concept of

compactness; it is in fact the most important quality of compact urban forms. It is crucial to provide a proximate relationship between housing, employment, services, transit, and public spaces. One scholar stated that a compact urban form is a place big enough to provide a variety of uses and small enough to promote walkability and interaction between residents. Programs refer to the combination of uses and housing types. A neighborhood should not be designed as a mono-functional area, predominately residential. Rather, it should incorporate a variety of systems and mechanisms, networked and integrated facilitating household's daily life and operations. Polices refer to two types of regulations: (1) the ones that regulate the public and their interaction with space; and (2) laws that regulate the built-up environment, buildings and social spaces.

Part of my design scheme is intended to bring the original native residents or their children back to the area. The housing typologies serving this demographic group are planned to be subsidized single-family units occupying the same lot configuration (50 x 50 ft.). However, I modified height limitations allowing residents to build three stories instead of two. I also modified building codes allowing residents to build courtyard housing, which is currently prohibited in Dubai by the Building Department in Dubai Municipality. The design agenda also entailed different housing choices for the expatriate population, such as providing the option to reside in apartment buildings located along major collector streets. In order to further promote class interaction or even congregation, multi-family housing was also sited in some locations where subsidized single-family units are concentrated.

These multi-family structures were regulated and vertically zoned as follows: (1) retail stores, cafes, services, and restaurants at street level; (2) office spaces in the first level; and (3) housing in the subsequent floors; height was capped at 5 stories. In order to avoid a large concentration of workers in the area, the number of residents per apartment

unit was capped and regulated. For example, the number of occupancy in a one-bedroom apartment was not allowed to exceed 4 residents. In addition, a large concentration of single workers for long periods of time and without reason in alleyways and at street corners was banned and regulated. The provision of providing different housing options in the neighborhood, a practice that runs in opposition to the status quo planning actions in Dubai, aimed to enable different incomes, family types, and demographic groups to reside in the same area with the natives. This also enables the majority of the working class employed in retail and service sectors such as stores, cafes, and restaurants to live in the same area where they work, yet be strictly controlled with the occupancy level rules mentioned above.

Envisioning a new kind of urbanism for Dubai is not an easy task, especially when the goal is to house different ethnicities and incomes in one area. Integration and exchange of habits might not occur, but this design case study offers a significant potential for congregation and mix, especially in public spaces and institutional buildings. For example, mosques, libraries, schools, streets, and urban parks are places where different people and their children come together without being concerned about class, social status, or ethnicity. For that reason, I incorporated a central library, institutional uses, and a central mosque integrated with a garden where residents can meet and interact at least twice per day. I also proposed a large urban park that combines two different morphologies: the neighborhood and the downtown area, which houses a number of skyscrapers in a linear form, expressing the modern city. My plan also involved designating certain streets for only pedestrians, such as Ciclovia in Bogota, at least once weekly during the time of year when Dubai weather is nice, in order to promote active street life, interaction, and congregation between different classes and ethnicities. This allows residents or even strangers to walk, cycle, eat, picnic, buy, sell, entertain, talk, sit,

assemble, see and been seen, and experience life on the streets. This in turn can teach the public civic tolerance and respect and thus make people feel more comfortable with interacting and congregating with different classes.

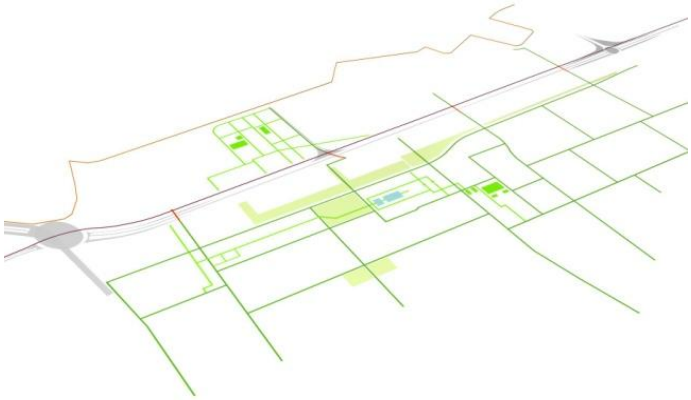
The aforementioned programs and design strategies aim to bring together the locals who will reside in the subsidized dwellings, the expatriates who will reside in the apartment buildings, the working class who will work or live in the area, and the rich who already live in the skyscrapers, in the central park area or the pedestrian-oriented streets. For the convenience of different groups, the design agenda regulated and programmed the central park during the week as Dubai culture involves deeply held traditions that are sensitive to male and female interactions in public parks. For example, two days during the week were exclusively dedicated to the female population; another two days for men; and the remaining days for families. This is in fact a common practice in Dubai and allows women to practice different activities and use the sport facilities without being watched or interrupted by men.

This proposed design agenda reflects the concept of compactness, particularly the densification and intensification of inner city fabrics that are vacant, underutilized, deteriorated, and disaggregated. It is important to note that most of the key design tenets suggested by experts on the Delphi panel are reflected in the design of this neighborhood. However, the design of this neighborhood mainly demonstrates one possible design scenario aimed to bring a wide range of classes and incomes in one location to effectively address the concept of social tolerance and perhaps make diversity respected, regulated, and thus potentially accepted in Dubai. From the political and economic perspectives, the main concern with this proposed design scenario lies in the fact that Dubai is known with its superlative architecture and massive urbanism, soaring in height and scale and reflecting a position of power, dominance, and primacy in the region. Therefore, fitting

into a “modest paradigm” or small-scale urbanism could be questionable in the context of the city’s ego and approach.

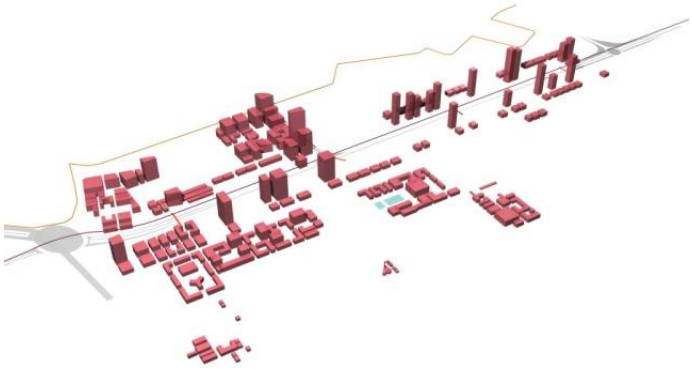
The following are some diagrams and 3D drawings reflecting the design of this neighborhood:

Figure 14: Integration of systems



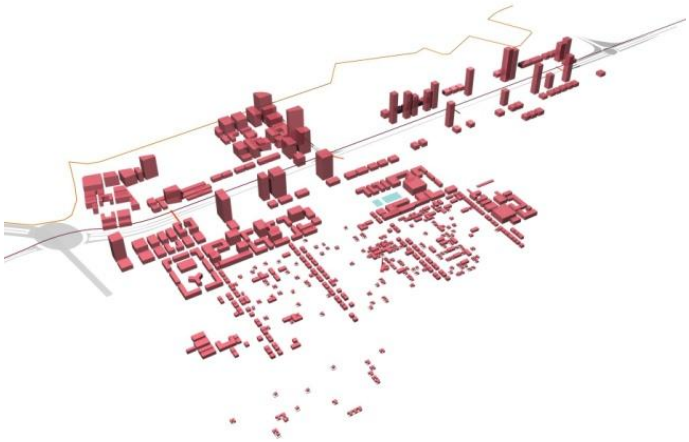
Proposed green systems

Integration with the existing green areas

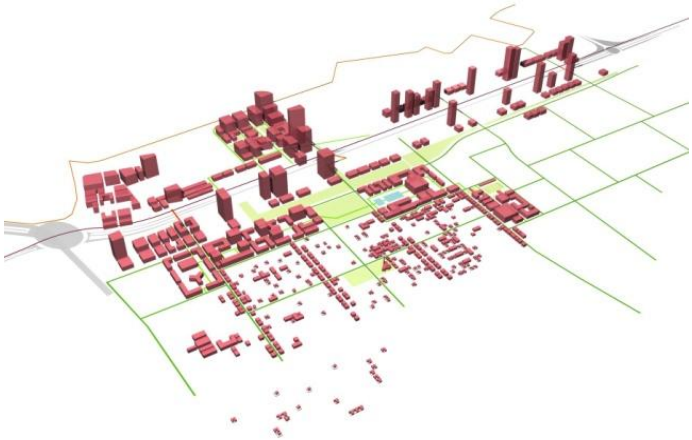


Infill system: New high-rises along the highway; institutional and public buildings in the neighborhood

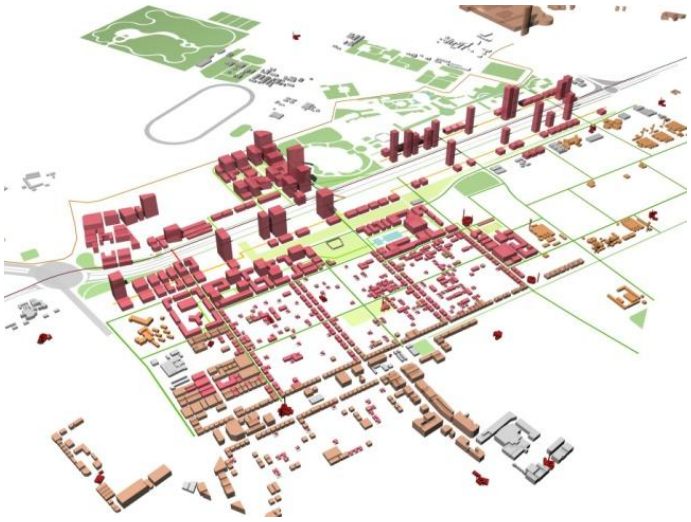
Infill system: Multi-family apartment buildings along collector streets with retail and services at street level. The buildings provide housing and operate as major connecters promoting active street life



Infill system: Multi-family housing options scattered in several locations



Integration of green and buildings



Integrating the new systems with the existing dynamic mix-used corridor, represented in orange

Integrating the new systems with the existing downtown, stretched along the highway

Integrating the new systems, this time including the single-family dwellings, represented in gray, with the surrounding environment

Figure 15.1: An integrative approach, a new vision for Dubai

Figure 15.2: An integrative approach, a new vision for Dubai

Chapter 9: Conclusion

INTRODUCTION

This last section organizes my discussion around two major parts. First, I present a summary of main findings. Second, I discuss obstacles and challenges to different aspects of sustainability; list a possible solution; and suggest potential future research questions that my findings point towards.

SUMMARY OF FINDINGS

This dissertation identifies sustainable urban forms, design principles, and strategies for a Dubai neighborhood. My analysis of the Delphi indicates that for Dubai, the most sustainable neighborhoods are those that emphasize more public participation in the planning process, connectivity and multiple transportation options; adequate diversity; green, open, and social nodes in the urban fabric; culturally relevant urbanism and architecture; climate-sensitive urbanism and architecture; eco-balanced design applications; and adaptability, all integrated with one another in the urban fabric and arranged compactly. These ideal practices mainly apply to new neighborhoods, yet strategies such as a macro-network of transit, walkability, intensification (developing on vacant lands), and green spaces can potentially be applied to existing neighborhoods.

I argue that the urban design principles supported by the Delphi are acknowledged and valued widely in urban design literature and practice; they have universal applicability. However, my research emphasizes that the uniqueness of government structure, economy, cultural traditions, and environmental conditions require that these universal strategies or design ideals readapt to the local conditions and particularities. In other terms, the principles can be applied worldwide, given that implementation and

prioritization of the strategies will diverge by a location's specific factors, including local environmental conditions, local political structure, cultural norms and beliefs, geographic context, and social composition. In a way, the design principles defined in this work confirm the conceptual framework developed in the literature, which included three urban design schools: physicality, cognition, and vitality. However, my findings guide me to revise the framework, suggesting that sustainable development depends on the context in which design and planning are happening. In other words, sustainable design solutions must be locally relevant, and this local relevance is about addressing and being sensitive to the cultural practices, environmental conditions, and political contexts of Dubai (see Figure 16).

The aforementioned statements are asserted by Kriken, Enquist, and Rapaport (2010), who argue that sustainable urban form principles and strategies, defined in his work and urban design literature, can be applied globally, but implementation and techniques will vary by "local climate, local culture, and geography." The aforementioned statements are also affirmed by Stephen Wheeler through a short and informal discussion via email, in which he wrote that:

> Khaled, I will caution you that a truly sustainable approach to development in the Emirates, as elsewhere, must be holistic, including many other elements besides design. Social policy and population policy will be particularly important, and should be considered along with design. (June 10, 2010).

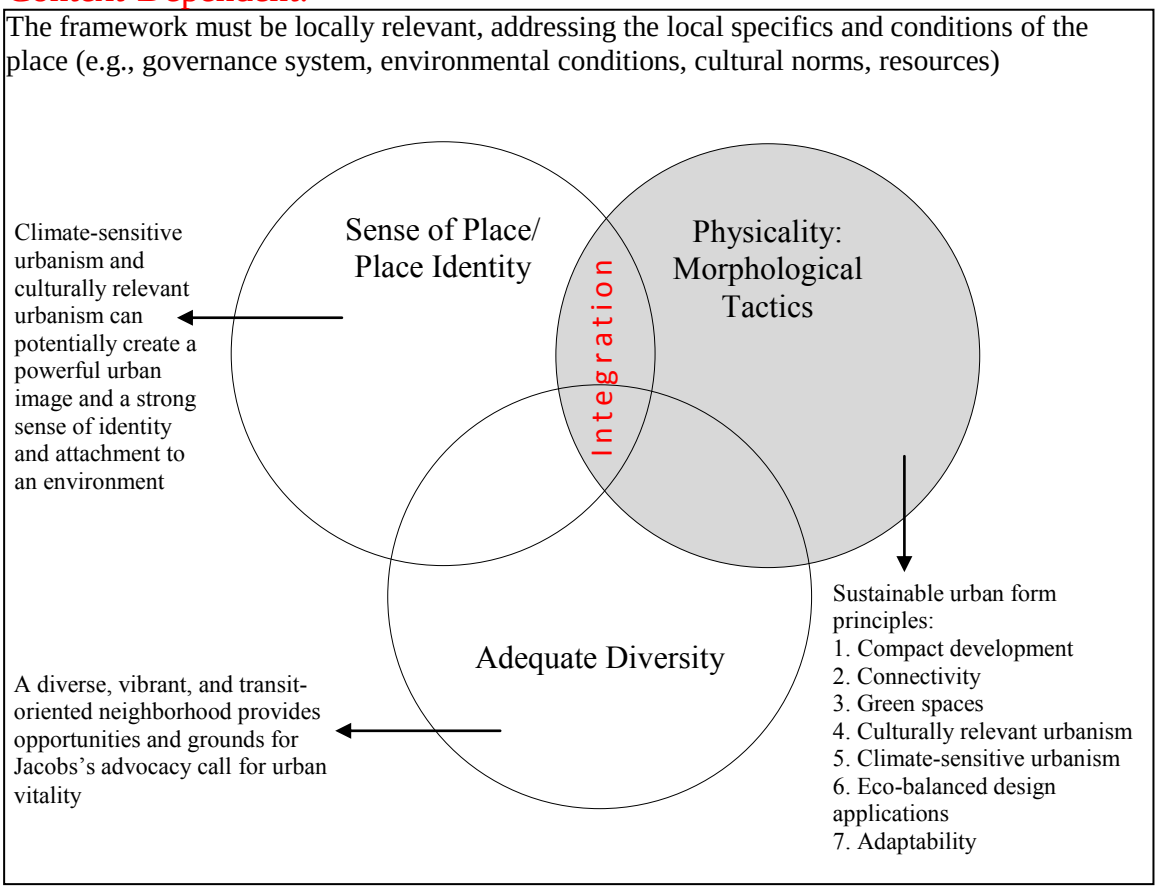


Figure 16: A modified version of the conceptual framework.

If we refer to Table 49, which shows my findings compared to two previous studies, it appears that there are several connections between my findings and some principles listed in earlier works; the previous studies almost define similar strategies. However, the design principles identified in this dissertation appear to be more comprehensive, including a greater set of principles (form-based and process-oriented strategies). Due to the uniqueness of Dubai, the implementation of the strategies will be different as compared to implementation strategies developed in other places. The urban design tenets presented in this research attempt to provide multiple urban design strategies and solutions for an integrated neighborhood within Dubai's context, while

being potentially applicable to other similar places in the region. As indicated by the Delphi experts, the generated strategies overlap and interconnect with each other, but when taken as one integrative agenda, they potentially create a hope for a sustainable environment.

Table 49: Community-based urban design strategies as defined in this research and the literature

Research Findings	**Literature / Previous studies**	
	Condon (2010)	**Jabareen (2006) (Peer Reviewed)**
Compact development		Compactness
Connectivity and multiple transportation options	Interconnected street systems. Walkability. Connection and proximity of employment to housing.	Sustainable transport: (walkability, cycling, and public transport)
Integration		
Green, open, and social nodes in the urban fabric	Integrated system of parks	Green spaces in the urban fabric. Greening
Diversity	Diversity of housing types. Accessible mixed-use corridors.	Diversity
Culturally-relevant urbanism and architecture		
Climate-sensitive urbanism and architecture		Passive solar-design, energy saving through the passive systems
Eco-balanced design and planning		
Adaptability		
Public Participation		

In addition to the Delphi technique, I also collected survey responses from local and expatriate residents in Dubai and conducted interviews with Dubai government

officials. The survey responses reveal that the public surveyed significantly value and prioritize: (a) green spaces in the urban fabric, (b) walkability, (c) interconnected street systems, (d) environmental design of buildings, and (e) diversity in uses and building types. Less of priority were: (a) bike infrastructure, (b) inclusive housing, (c) macro-network of transit, and (d) public participation. Survey responses also indicate that high density levels are the least valued strategy among the local population, indicating a major social resistance to increasing density as a sustainable design strategy.

Interview data, on the other hand, specify two kinds of constraints that impose major limits on the implementation of some of the Delphi generated urban design strategies: (1) central constraints that predominantly relate to the dynamics associated with the political, administrative, and decision-making processes which then limit implementation of the total number of urban design strategies identified by the Delphi experts; and (2) constraints that restrict the implementation of single, particular design strategies. For example, some central constraints as defined by public officials interviewed are: (a) market forces that fuel competition between major city developers; (b) an approach to development among city developers that does not emphasize coordination with city officials nor with each other; (c) the lack of awareness related to urban design practices among public and private agencies; (d) the lack of a central planning authority; and (e) a shift of power from the public agencies to quasi-government corporations. On other hand, Dubai's extreme climatic condition provides a textbook example of a constraint that curbs the implementation of pedestrian-friendly environment and bike infrastructure, single specific design strategies.

My experience with the research participants (experts, officials, and public) responses indicates that experts took a more "systems" oriented approach as compared to the public and officials in defining and prioritizing the urban design principles. Experts

forged connections between multiple systems and strategies. They took an integrative and holistic approach in their thinking. In fact, experts affirmed that each of the urban design principles carries a special significance; however, a neighborhood that "integrates" all of them together would be described as a sustainable and successful one. The major distinction between the experts and other participants (officials and public) is that experts were oriented towards an integrative approach in their responses and thinking whereas the public and officials were more oriented towards single-issue or reductive thinking, evaluating and prioritizing a strategy on an individual basis rather than making connections with the other strategies.

OBSTACLES, RECOMMENDATIONS, AND AREAS OF FUTURE RESEARCH

In this section I discuss two major obstacles challenging different aspects of sustainability. I also introduce a recommendation on how to encounter the obstacles, and then list potential areas of future research. Cultural resistance, as defined in my research and in urban design literature, to high density levels represents the first obstacle that places fundamental barriers on the development of compact neighborhoods, a core principle of sustainable urban forms. My research findings and some urban design studies demonstrate that people prefer low density developments over dense urban settings. It is important to note that people's satisfaction with and appreciation for their living environment is a core social sustainability indicator. Therefore, enforcement and implementation of high density compact neighborhoods in Dubai where there is a strong public resistance to compactness will lessen people's attachment to and appreciation of their home and neighborhood. This will challenge and make the social dimension of sustainability vulnerable. To resolve this issue, I recommend educating the public about sustainable development strategies using participatory planning approaches. Having

recommended public involvement for this unique obstacle to sustainability, I find that the following areas of future research are very significant within Dubai's context (a) exploring culturally appropriate and acceptable forms of public participation; (b) exploring new housing typologies that revitalize the concept of traditional housing forms; and (c) exploring the possibility of amending current building codes and regulations related to the heights of single family housing.

Having explained that, the introduction of participatory planning approaches within Dubai's context runs in opposition to how planning is practiced and how decisions are made. Dubai has a long history of a centralized (top-down) approach in planning. In this system, all power configurations are known and yet controlled by few prominent individuals employed in public and private agencies. As described in sustainability literature, this kind of centralized political mechanism presents a major obstacle to sustainable development. As a result, to resolve this issue, same as the proposed above, I recommend involving the public in city design and decision making by using different approaches of participatory planning. The planning processes and decision-making in Dubai is often described as vague, lacking transparency and justification; therefore, public participation may increase accountability and transparency about how planning decisions are made in Dubai. Although the specifics and qualities of public participation run beyond the scope of my research, I introduce at the end of this chapter: (1) a schematic diagram of a potential participatory planning framework for Dubai; and (2) potential areas of future research which aim to explore different ways of making public participation in the planning of Dubai culturally meaningful and politically feasible. A schematic diagram representing the major challenges to sustainability, the proposed recommendation, and areas of future research are presented in Figure 17, below.

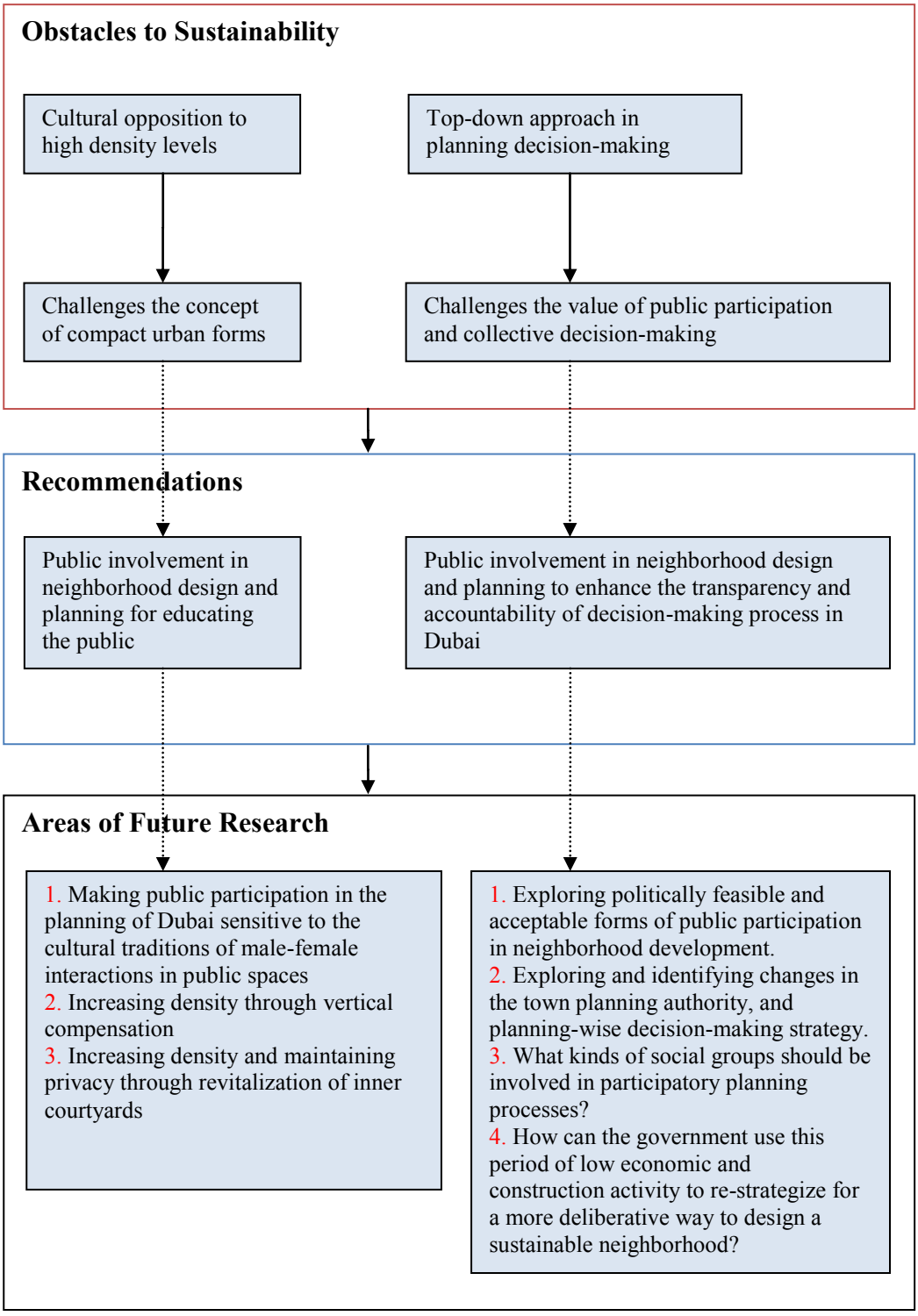


Figure 17: Obstacles, recommendations, and future areas of research

Cultural Opposition to Density

Although the generated framework from the Delphi provides a significant foundation for constructing a neighborhood that is socially, economically, and environmentally coherent, I argue that an urban setting designed according to the Delphi generated strategies cannot be considered totally sustainable if it is unattractive or unacceptable to the people who live there. This statement is asserted by Jones, Jenks, and Bramley (2010) who argue that a sustainable environment must be a place where people have a "desire and interest" to live. I emphasize the relationship between urban form and social acceptability as survey results show that establishing high densities in Dubai, as recommended by experts surveyed and officials interviewed, may face social resistance and, thus, make people less satisfied and less attached to their living environment.

Experts in the Delphi argue that the current level of density in Dubai's subsidized neighborhoods is very low. They argue that the current standard of three to four units per acre should be modified to a minimum of seven units per acre. Experts believe in the virtue of density as moderate to high density levels minimize the use of resources such as land and infrastructure expenses. High densities may provide an opportunity for people to meet more often on the street and other social spaces than low density areas allow. They also believe that a high density neighborhood contains low density suburban developments or what is known as sprawl, reduces car dependency, promotes walkability, supports public transit systems and neighborhood facilities and businesses, and is aesthetically more attractive than sprawled communities.

Government officials in Dubai also believe in the merits of density. They argue that higher densities minimize the cost of infrastructure and service provision and potentially maximize the human relations between residents. However, the local

population in Dubai disagrees with both experts and officials, preferring lower densities (maintaining the current configuration of three to four units per acre) due to cultural and economic reasons. Survey respondents argue that they do not want to live in a "condensed, congested, and overcrowded community." They argue that experts do not grasp the specifics of local Emirati culture as families need a "big" living space with a "big" yard. They maintain that high density levels create congestion in the area and lessen the privacy of their yard, indoor living environment, and around their homes. Additionally, high densities represented in smaller land parcels have less real estate value than larger lots and this in turn is perceived as an economic loss for many local families and individuals. All in all confirm that the local residents surveyed prefer low density developments represented in large land parcels over high density neighborhoods.

When we look at the urban design literature, it appears that from a wide range of urban form elements, density with regard to its "social impacts" and implications has been widely and extensively investigated (Bramley, Brown, Dempsey, Power, and Watkins, 2010). Several studies indicate that the public in general "prefer" low density developments. For example, a study of several U.K. towns reveals that elements of social acceptability and quality of life (e.g. sense of pride and belonging to a neighborhood, satisfaction with neighborhood and home, appreciation of the local environment, sense of safety and stability, and sense of privacy) appear to be high in rate in lower density suburbs (Bramley et al., 2010). Another argument made by Farr (2008) indicates that density provokes "local hostility." In fact, many people in North America perceive high density as a "threat" to their quality of life and sense of privacy (Farr, 2008). These statements are further asserted by Jenks and Dempsey (2005) who argue that peoples' "hearts and minds" generally lean towards low density standards.

Even though the aforementioned arguments indicate that many people prefer low density developments, when challenging the notion of compactness it is important to note that there are counter-balancing studies in urban design literature where people valued and appreciated high density urban living due to better access to services, amenities, work, and mass transit. These aspects and benefits of high density urban livings respond to the "equity aspect of social sustainability" represented in fair access to facilities and transit options (Jones et al., 2010).

My research findings and social sustainability literature both stress that "density alone" does not lead to what is claimed to be a more sustainable urban form. Other factors such as mixed-use developments, efficient public transportation, diversity, and social acceptability must be considered (Jenks and Dempsey, 2005). In order to ensure a "socially viable urban form," neighborhood design and spatial organization of residential dwellings and services should be compatible with peoples' preferences and cultural norms (Lau, Wang, Giridharan, and Ganesan, 2005).

Because interview data show that the government has a plan to increase the level of density in the future, and survey results reveal a strong cultural opposition to this sustainable design strategy, the challenge is then how to educate the public and to define what they want (i.e. maintenance of privacy and sufficient living space). Involving the public in solving this issue is critical; therefore, I recommend the development of public participation framework in planning practice and decision-making. However, the specifics and details of this approach remain unknown and beyond the scope of my research. Accordingly, in the upcoming discussion I present several areas of future research that respond to the issue of density and public participation within Dubai's environment.

I argue that reshaping Dubai's neighborhoods from a low density dispersed form to a compact urban setting may require a bold decision and substantial change to Dubai's existing policy agenda and real estate market. Because intensifying the level of density in Dubai stirs up public opposition, as research data revealed, I recommend that there should be an open venue where the experts and decision-makers in Dubai can discuss, negotiate, and educate the public about future forms of neighborhoods. The majority of experts on the Delphi panel (68.29%, 28 out of 41 experts) argue that even though participatory approaches need a lot of effort, time, human resources, and organization, Dubai must enact a public policy that promotes public participation in planning practices.

The potential advantages of this discourse which provides the public an opportunity to be involved in the planning work are fivefold: (1) public engagement increases the transparency and accountability of planning decision-making in Dubai which is described as none-transparent, vague, lacking justification and assessment; (2) public participation leads to a better public understanding of the decision-making and implementation processes; (3) part of the problem in Dubai stems from the very rapid yet exclusive decision-making process , operating from top to down without obstruction from any public or political parties; therefore, public engagement will reduce the accelerated pace of decision-making and implementation processes which resulted in many developments that are neither culturally nor environmentally sensitive; (4) the interactive and educational nature of participatory planning approaches enables the public to learn different aspects of neighborhood design and planning ideas and, thus, make them aware of different sustainability tactics and indicators; and (5) this public dialog can discuss design proposals, particularly the ones related to density standards. This issue is described as very sensitive and as vulnerable to public resistance.

Another major rationale for my emphasis on public participation is that interview data reveal that Dubai plans to increase the density levels within the city by decreasing the size of the subsidized lots from 10,000 ft^2 to 7,500 ft^2 in the future. But survey responses confirm that the action of intensifying lands will engender public resistance, and garner serious debate and criticism. As the orientation towards high density developments run against the public preference in Dubai and this in turn could challenge the social dimension of sustainability, the public in Dubai should be involved in discussions and decisions associated with city reshaping and "urban transformation" strategies and polices. This would enable the public to be aware of the facts, reasons, and realities that explain the city's new direction towards compactness. Without public participation, it will be hard for the public to accept decisions and regulations concerned with high densities. In fact, the reduction in land size from 15,000 ft^2 to 10,000 ft^2 or less in the late '90s received serious objections from the natives. Citizens expressed their opposition to this amendment on internet forums and live radio broadcasts.

But my call for public involvement in planning decision-making may be challenged by survey results revealing that public participation is not greatly valued or prioritized by survey respondents compared to other physical design strategies such as walkability, interconnected street systems, and green spaces in the urban fabric. This might confirm the government officials' argument that currently people in Dubai do not have the interest in participation as their living standards are high, and the public in general trust the government's planning wise decisions. But similar to what many interviewees posit, I anticipate that a persistent and determined call for participation would stimulate and fuel undesired interest in participation if the town planning authority, for example, passed a law to increase the level of density through reducing the size of the subsidized land parcels.

Resistance to high density levels as indicated in my research as well as urban design literature challenges the notion of compact development, a core foundation principle suggested by experts surveyed for achieving socially, economically, and environmentally integrated neighborhoods. On the other hand, enforcing high density neighborhoods on the public who usually prefer low densities challenges the social dimension of sustainability; my research findings and many previous studies reveal that high density neighborhoods are generally not socially acceptable. The main question worthy of careful investigation is whether experts and policy makers should attempt to increase density levels and contain urban developments in Dubai, or should they listen to the public concerns and continue allowing for low density suburban development? I tend to agree with Bramley et al. that this question stimulates an old debate between two spatial arrangements: compact urban forms versus dispersed or sprawled urban forms that are more socially desired (2010).

In order to address issues of public resistance to high density areas and make the process of public involvement in neighborhood design culturally meaningful and appropriate, my findings point to the following areas of future research:

1. Making public participation in the planning of Dubai sensitive to the cultural traditions of male-female interactions in public spaces. What are some culturally appropriate forms of public participation that make men and women in Dubai feel comfortable in public as part of a planning process in neighborhood design?
2. Increasing density through vertical compensation. One strategy to increase density in neighborhoods is through reducing the size of land parcels, while concurrently honoring family's request for sufficient space by allowing vertical expansion (allowing locals to build three levels instead of two). The question becomes: what

kind of policy options and modified housing options would satisfy the public and their perceived need for space?

3. Increasing density and maintaining privacy through revitalization of inner courtyards. Another strategy to increase density and maintain residential privacy in neighborhoods is through reducing the size of land parcels, while concurrently honoring the family's request for an outdoor private space allocated for a garden or gathering area by revitalizing the concept of courtyard typologies and indoor gardens and terraces. The question becomes: how might the public perceive traditional housing forms with courtyards as satisfying their contemporary needs for privacy? How might traditional housing forms be adapted to address contemporary needs for privacy?

4. Valuing of morphological aspects over technological solutions. Arabic and Islamic cities have a rich history of responding to climate, culture, and growth through morphological solutions, and cities like Dubai were originally designed based on sets of rules and norms that governed how the city developed over time. One such rule was newly married males would expand the existing structure of their parents' home. This indicates that densities of housing and population were not static, but increased over time as families grew. In many ways, this kind of cultural practice can thus be framed as a regulatory mechanism that could potentially influence the pattern of new housing typologies. Therefore, an important future research question worth exploration would be: what kinds of new tactics (e.g. design solutions, and policy initiatives) can be developed to promote adaptability; that is, promote the intensity of densities over time. Or, how can a neighborhood and the city overall become flexible, adaptable, and supportive of change in terms of density through time?

5. Promoting behavior change. Culture emerges in this research as a powerful force. As a result, it is important to think about specific strategies, incentives, and government programs that can assist in a slow, iterative process of cultural transformation, and behavior change among different groups of people. In another word, we should not assume that culture is static and unmovable. Therefore, an important question worth exploration would be: What kinds of incentives and programs that the government might put forward to address and deal with different challenges indentified in this research such as promoting walkability, cycling, transit use, inclusive housing, public participation, and high densities?

I concur with a selection of Delphi experts that the third question is a very important future research topic worth investigating because: It is true that courtyard housing proved to perform very well climatically and socially in hot arid regions; however, this form has not evolved since many years and might not satisfy the modern needs and preferences of the local Emirati families. Besides, as the local Emirati families require big living space, courtyard housing in this case will add extra space to the floor and surface, and this may consequently result in more heat gain and hence more cooling load (Expert K1, 2010).

The statements above is asserted by Expert (G2) who argues that courtyard housing is an ideal housing model, particularly for the Muslim world, but "modern societies are opting away from it" as they are less socially oriented than the traditional societies which were based on privacy generating forms and human relations. According to Expert (G2), this argument is affirmed by a real case study in "India" where people were given a choice to select between a modern house and a traditional courtyard house. The result revealed that people favored contemporary forms over traditional courtyard

morphologies. Therefore, Expert (G2) points out that before designers and authorities decide on behalf of the public, it would be more culturally and politically feasible to "consult them in a participatory mode to decide this."

Political Resistance to Participatory Planning Approaches

I recognize that participatory planning approaches run against the history of planning practices and decision making in Dubai's centralized approach. In this system, power configurations and mechanisms often are known and controlled in planning situations by prominent individuals. Like other cities in the UAE, Dubai has a very conservative and centralized approach in city design and planning. Dubai never embraced the concept of public participation in design and planning decision-making. I argue that issues of sustainability are too complex and too difficult for exclusive resolution by authorities or by a group of experts. From my perspective, the emergence and development of sustainable cities depends on three population groups: the experts or professionals, the public, and the government officials. Movement toward a more sustainable future requires efforts and inputs by a variety of societal groups— including professionals, citizens, politicians, and government officials (Beatley, 2010). The opinions of these three segments are significant because the professionals possess knowledge, experience, and are generally the powerhouses of the design tactics and ideas. The public are the users and the consumers whose acceptability are essential because community design involves issues about which people deeply care like cultural norms, social values, and community appearance. Last, authorities are the policy makers who have the power as well as the background about the challenges and constraints that place major limitations on implementation.

The path to sustainability is not private or exclusive, but shared. The extensive local Agenda 21 initiatives exemplify the spirit of diverse and cumulative opinions in building sustainable cities (Beatley, 2000). Integrating as many different views as possible from different segments of society enhances the feasibility and livability of the sustainable city (Newman & Jennings, 2008). Aristotle calls this concept "second road of thinking," based on the insight that complex problems require multiple different voices (Newman & Jennings, 2008). I totally support the argument that diversity of opinions generates insights into many issues, such as cultural norms, local identity, and social needs that might not be considered by multi-national professionals whose advice comes from prior research, experience, or manual of best practices.

Public participation is always considered as a major dimension in promoting socially sensitive decisions. Dubai, however, is still a non-democratic state, where solid evidence of an opening for democracy or collective decision makings is hard to find. The socio-political circumstances of dominant native individuals parallel with a multicultural majority of foreign residents have created a state with a "centralized" power structure (Machado, 2006a). The UAE is characterized by large public sectors, centralized governments, huge public-private corporations, and limited public involvement in policy and decision making. A political change remains modest because changes and amendments generally come from within the government itself. In this kind of centralized system, the government works as a sponsor for people and decides on their behalf. The government is the decision-maker, the executer, the judge, and the assessor (Sepasdar & Sibley, 2008).

Ibtisam Suhail, a political science professor at the UAE University, argues that the public in the UAE have been sidelined in the decision-making process, and people have not been asked whether or not they want these multi-billion projects (Booming Dubai,

2006). Aisha Sultan, the director of a political program at a local Television, asserts that the extreme condition of growth that took place in the UAE was a result of a very centralized approach in decision-making that marginalizes the public opinions and assessments. Except for chamber of commerce elections in the capital Abu Dhabi and the Federal National Council (FNC) elections, no elections have ever been held in the country (Booming Dubai, 2006). However, the government in the past five years made massive efforts to enhance the role of the public in the (FNC) election system. As a reaction to this initial sign of democracy in the Emirates, Abdulkhaleq Abddulla the UAE University Political Science professor and democracy advocate, says that "it was getting awkward so they had to address it… from a historical perspective, it's a step forward. But this is also for outside consumption" (As cited in Krane, 2009, p. 272).

The one place where concerns and disputes are expressed by the Emirati natives and residents is the internet and radio channels like Noor Dubai, Ajman, and Sharjah. Live radio broadcasts and online discussion forums are popular ways for the public to freely express criticism, disagreement, and dissatisfaction (Hickman, 2008). The UAE has been pioneering in this type of media and "internet democracy" (Davidson, 2008). Most of the Emirates municipal departments, ministries, and prominent decision-makers have interactive websites that provide electronic forums for posting discussion topics, criticism, and recommendations (Davidson, 2008). Although these types of forums are active, widely appreciated by the public, and fairly bridged the gap between the political system and the public, it is still the state governor who controls the decision-making. The people can express their opinions and concerns; however, they can't make a direct change because they don't have real power or a seat in the decision-making.

Many real experiences suggest that with public participation, there will be better development agenda, better maintained physical environment, greater social

sustainability, greater public spirit, and more user satisfaction (Sanoff, 2000). In the literature, participation is defined as a direct public involvement in decision-making processes whereby people engage in decisions that determine the quality and direction of their lives (Sanoff, 2000). The type and degree of participation depend on several factors and vary from one place to another. In most cases, the degree of public participation ranges from hearing and attending the "ritual of participation," without having any actual influence, to having the real power needed to affect the outcome of the process (Arnstein, 1969).

A meaningful interaction between the public, city officials, and professionals may lead to a greater public satisfaction with and attachment to their neighborhood and home. The right of people to choose, to make a difference, and to influence decision-making all are necessary to create more successful and sustainable built environments. Based on my moderate analysis of the literature concerning public participation in the decision-making process, I recommend an opening framework that stresses the role of public participation in Dubai's planning decision-making and practices.

My proposal suggests that the public should have the opportunity to debate, reveal their views and concerns, realize the city's issues, express their reactions and opinions about different design solutions and alternatives, be involved in the decision-making, and be responsible for their opinions. For the case of Dubai, I propose that public participation can be implemented through a series of "incremental levels" starting from consultation, dialogue, and exchange in which the power holders educate the participants, and listen to them until it reaches higher levels of public involvement and empowerment in decision-making processes. In particular, the primary mechanism of my plan is divided into two main parts, ranging from a "mere consultation" to "delegated power" in which the power weight is reconfigured and redistributed among the participants.

The real objective of the first part is to enable the power holders to first educate the participants, listen to them, respect and support their voice, give them confidence, encourage teamwork and partnership, establish trust, build social capital, listen to their concerns and desires, and promote behavior change among different groups of people. The main objective of the second phase is to empower the public and build a partnership with city officials and developers. My model does not reach the level of "citizen control"[5] such that the public has the absolute power and the majority of decision-making seats. I tend to agree with both experts in the Delphi and officials interviewed that this level of power should not be granted to the public.

My model is basically a modified version of some earlier frameworks such as Burns' (1979) and Arnstein's (1969) models. I suggest that the members of the public who should be involved in the participatory process should include two groups: (1) prospective residents; and (2) residents of the adjacent neighborhoods (within a radius of 3 miles) of any proposed development. Participation should be organized as workshops and discussion sessions. The city should organize several workshops, but in every session the number of public involved should not exceed 25 participants. This will provide every participant a bigger opportunity to be engaged in the process. By request from the female populations, sessions that separate men and women could also be organized. I agree with the experts surveyed that it is more effective to involve at first the Emirati nationals who have a natural stake in the city, and then later the foreign residents based on years spent in Dubai or the UAE, and the amount they invested in the city. This public participation scenario does not emphasize the voice of the working class as they stay in the country on a temporary basis (2 years, more or less). This large and significant demographic group

[5] A level of control introduced by Arnstein (1969).

could be granted access and opportunity to participate if the government amended some of its immigration laws and policies such as allowing some low-income workers to bring their families.

Once a project is announced by the city or the developers (e.g. through media, radio, newspapers, and flyers) prospective residents or the residents of adjacent neighborhoods are encouraged to register online or in person in the local municipal authority, indicating their desire to participate. Once the registration is complete, the city should select participants randomly from the list, giving an equal opportunity for every individual to be selected. This participatory model, which is mainly structured to promote public involvement in city design and planning in the UAE, is divided into 4 major categories: revealment, consciousness, scenario planning, and decision-making (see Figure 18).

First, *revealment* involves exploring the realities and problems of a given environment so that everyone who takes part in the process is able to express his/her concerns and experiences in which change and development are required. For example, in this stage public should list the most pressing issues in their neighborhoods, express how these problems can be addressed, and present the elements and ideas that their ideal neighborhood should include. This stage also operates as an ice breaker where people can be acquainted with each other and with the planning team. Second, *consciousness* entails addressing a situation in further detail by realizing its physical, social, environmental, and economic implications. In this stage, experts and officials share with the public their thoughts, possible ideas, and how their understating of the situation or the needs become grounds for their proposed design agenda. In revealment the officials hear the public, while in consciousness the public hear what the planning team has to say. It is a process of hearing and being heard.

In the third stage, *scenario planning*, officials and experts should clearly present to the public different design options with detailed drawings and renderings from site scale to building and street scale specifies and details. This approach to planning indicates that the future can be envisioned in many ways. Scenario planning allows the audience to visualize and imagine how their potential living environment might look like in the future through different planning and design concepts. This process potentially generates a dialogue about what kinds of neighborhoods and housing typologies are mostly preferred among the public. Scenario planning also enables the public to grasp and understand the relationship between form and function, such as understanding the connection between high densities and transit systems. In particular, trade-offs like losing segregated low density developments in return for gaining vibrant neighborhoods characterized with moderate densities, transit lines, green spaces, mixed-use development, high quality services, and recreational amenities can be discussed.

The experts' role in this phase is to disseminate the information correctly and encourage the public to expose their thoughts, reactions, opinions, and concerns through discussions and feedback loops. This phase provides an opportunity for all sub-groups to discuss and negotiate agreements, disagreements, and priorities. For example, high density with its implication and impacts could be discussed in this level. In addition, the officials can address how their proposed housing typologies, block configuration, and gradation in neighborhood design and land use systems respect and respond to cultural needs and practices. An active and meaningful dialogue between all participants may satisfy family needs and aspirations, while at the same time maintain experts and officials desires towards moderate to high density levels, transit-oriented development, and diversity.

Fourth, the decision-making phase enables the participants working from the revealment, consciousness, and scenario planning stages to be involved in the decision-making process and vote for the design outcome. But yet the majority of seats in the decision making process will remain within the government structure. For example, in the first years the public can hold 30% of the decision-making seats, while the government 70%. Public share of votes can gradually increase through time to 40%.

It is important to note that this model does not include a stage known in the literature and practice as hands-on-design where the public design with the planning team. I did not include this stage as the majority of public surveyed think that the public do not possess the design ability and knowledge to put their hands on design. Particularly, many participants stated design and planning matters should be left to the professionals who possess experience and knowledge as the general public in Dubai (or even in any other setting) does not have design skills and abilities. Therefore, the proposed public participation model provides the public an opportunity to talk and express their opinions about and reactions to the city's planning and design scenarios, but does not allow them to put their hands on design.

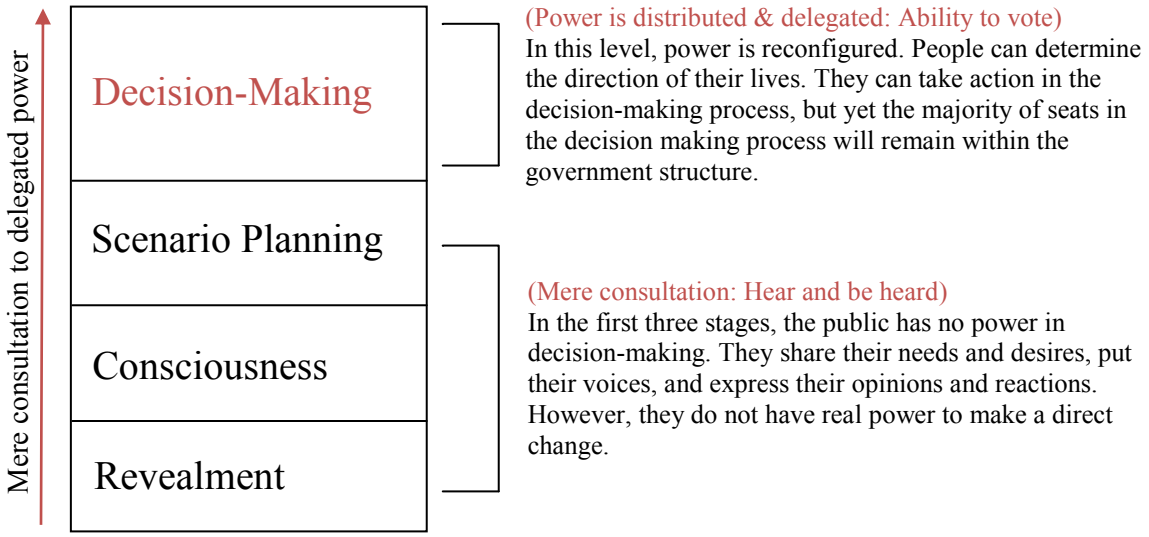


Figure 18: A conceptual framework for public participation.

This model provides a preliminary scheme or a one possible way to think, talk, and discuss about introducing participatory planning approaches within Dubai's social and political context in the future. Additional specifics and details for an open participatory planning strategy remain unknown and beyond the goal of my research. Therefore, I identify four areas for future research:

1. What are some forms of public participation considered politically feasible by the policy makers and power holders in Dubai?
2. What changes in the Municipality's planning structure and decision-making strategies can be made to support the implementation of plans related to different aspects of neighborhood sustainability?
3. There are many social groups in Dubai, each having different backgrounds, competing priorities, norms, values, interests, and beliefs that in most cases do not align with the traditional values of the indigenous population. A key challenge for determining a public planning process includes defining who the public is.

Therefore, critical questions include: What kinds of social groups should be involved in participatory planning processes? How can expats and other kinds of temporary workers be involved in a public planning process? What are the implications of prioritizing the involvement of local residents in a decision-making process on the cultural and political aspects of neighborhood design? Should participation be granted to the local population only (20% or less of the total population)?

4. Similar to places in the European Union and the United States, Dubai took a significant hit by the recession. Many reports indicated that Dubai was affected even more than other places due to its rapid pace of development and massive real estate and construction activity. During the booming period, decisions in Dubai were made directly from top to down. Therefore, an important question worth exploration would be: how can the government use this period of low economic and construction activity to re-strategize for a more deliberative and collective way to design a sustainable neighborhood? What are the opportunities for crafting a public participation process during this period of slow development process? What are the opportunities for crafting an educational project aimed to educate the public about their role in building future neighborhoods?

My research offers several design ideas and recommendations that could be tailored for different clients, including academics, practitioners and policy makers. For example, scholars can situate the findings to devise a research study that explores new patterns of sustainable development in Dubai or the broader region. Professionals can benefit from the outcome in their design and planning practice. Government officials and

authorities can explore different kinds of policies that might be developed to support the implementation of the research outcome such as enforcing the generated urban design strategies in practice and establishing a new public policy that supports a collective approach to place making and planning.

In many ways, expert-driven urban design strategies confirm what has been listed in sustainable urban form literature. However, the contribution and significance of my research lies in exploring the political and cultural aspects of the Delphi panel strategies. I argue that sustainability is context-dependent. In particular, sustainability needs to be approached on a case by case basis because cultural norms and governance mechanisms change from a place to another. For example, even though compact urban forms and participatory planning approaches are highly valued principles in sustainable urbanism practice and literature, Dubai's unique social and political environment places major limitations on the development of sustainable neighborhoods. In particular, cultural opposition to compact developments and top-down perspectives in decision-making processes are two defined obstacles to sustainability in Dubai. This leads us to think that the possibility of designing a sustainable neighborhood in Dubai depends on understanding and exploring the political system and cultural norms of the place.

Appendices

Appendix 1: A photo essay

Dubai

A Photo Essay

Content

The photo essay demonstrates:

- The geographic setting and political boundary of the United Arab Emirates
- The traditional urban morphology of Dubai
- The urban growth of Dubai from 1822 - 2006
- The intensity and rapidness of Dubai's urban expansion
- The current urban morphology of Dubai:
    - Dubai's current urban zone
    - The preserved segment of the old town
    - The emergence of a new downtown area (a stretch of mixed-use high-rise buildings along a major highway)
    - The emergence of mega developments along the Gulf shore, offshore, and in the desert
    - Pattern diagrams of mega developments
- Dubai behind its Glamour Image: Case: Al-Satwa District

Geographic Setting & Political Boundary

The United Arab Emirates: Geographic Setting & Emirates Political Boundaries

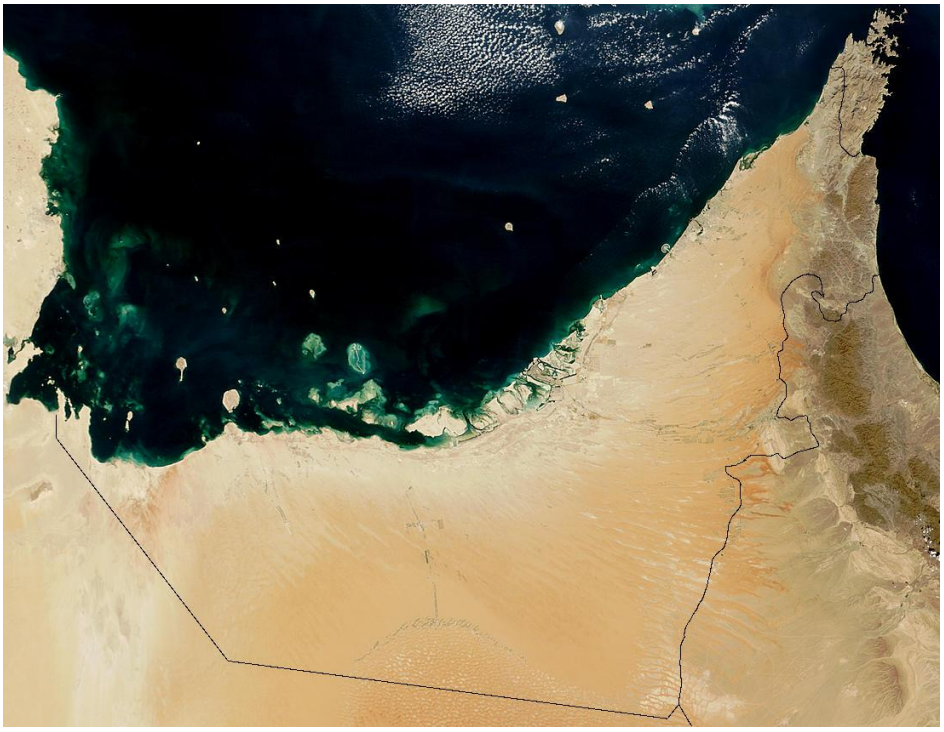


Figure A: The United Arab Emirates from air (earthobservatory.nasa.gov)

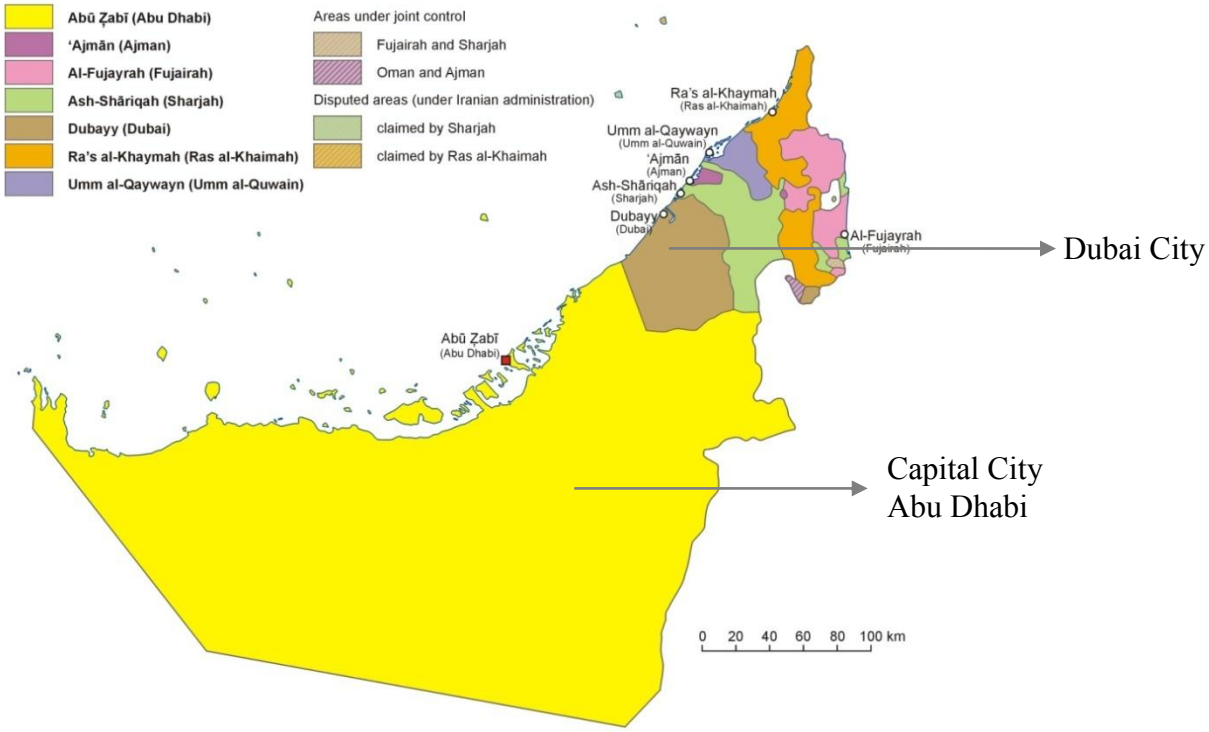


Figure B: The political boundary of the UAE and the seven Emirates

Figures A & B: Until 1955, Dubai's urban area did not surpass 3.2 km^2 and the land use was mainly for low-rise residential clusters with few commercial zones. Most of the people had settled around Dubai Creek and worked in fishing, pearl diving, and trade. The vast majority of people lived with extended families in houses built of palm fronds. Besides them, many people with reasonable incomes lived in houses with courtyards and wind-tower structures built of coral stone, mud, and wood (Facey & Grant, 1996).

Figure A: The urban fabric and density in the 1950s. Houses were built intentionally in clusters to achieve privacy and collective tribal safety. The clusters were linked by narrow pathways designed for pedestrians, as well as for animals that were used to carry goods and water (Sunders, 2003)

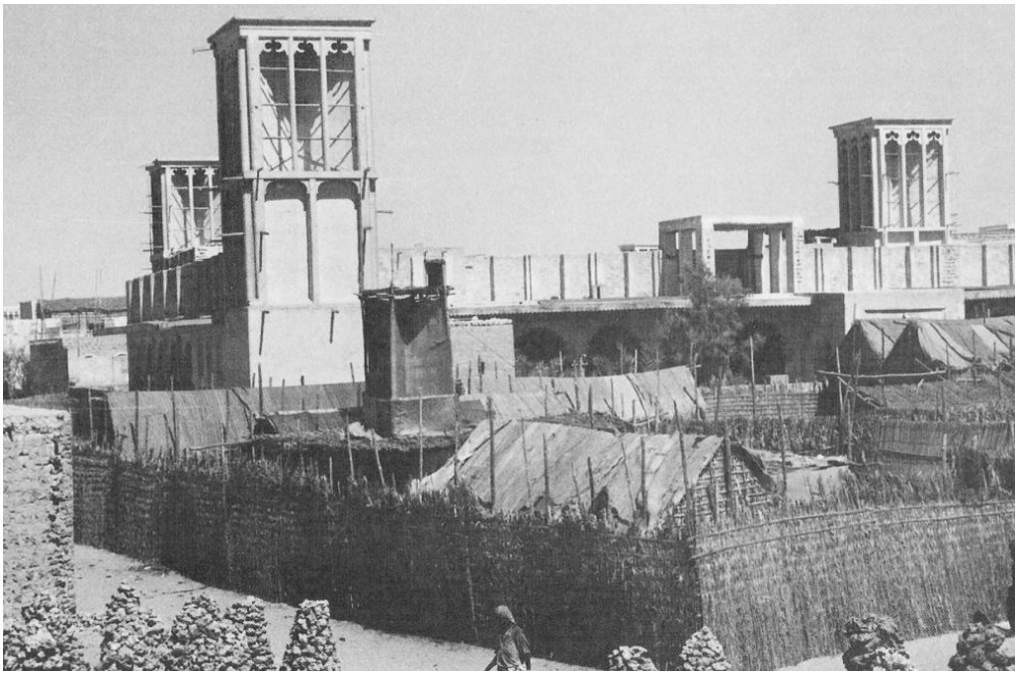


Figure B: Courtyard and wind-tower housing typologies in the background, and houses built of palm fronds in the foreground (Facey & Grant, 1996)

Figure A: Density, movement, and the skyline that is dominated by the mosque minaret (Miranda, 2010)

Figure B: Small rowing boats used to transport people across the creek are in the foreground; and dhows used for trade, fishing, and pearling are in the background (Miranda, 2010)

Figure C: The emergence of road networks divided the city into zones and led to further urban expansion (Miranda, 2010)

Figure A: This is the rowing boat landing station and an entrance to the market. In some cases, the lower ground of the buildings in the market was used for retail and storage and the upper level for housing (Facey & Grant, 1996)

Figure B: Mobility across the creek (Facey & Grant, 1996)

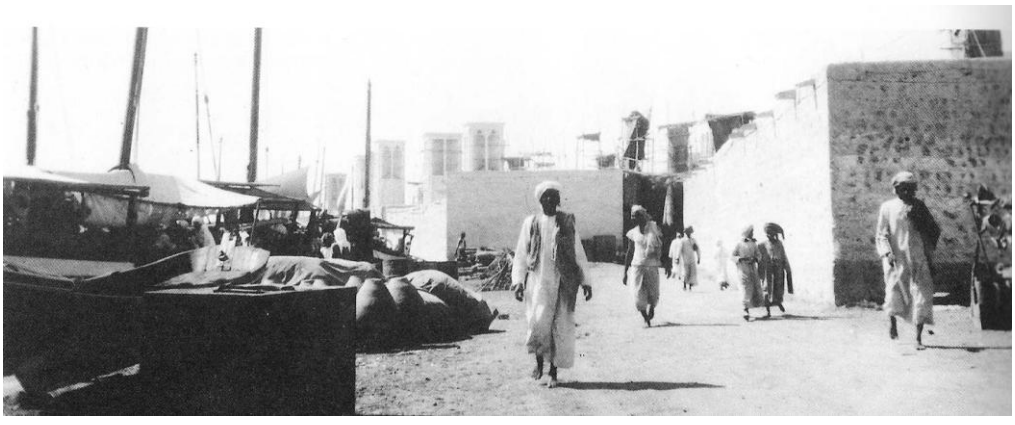


Figure C: The proximity of housing and the marketplace to the creek highlights its importance as a major center of movement, trade, and work (Facey & Grant, 1996)

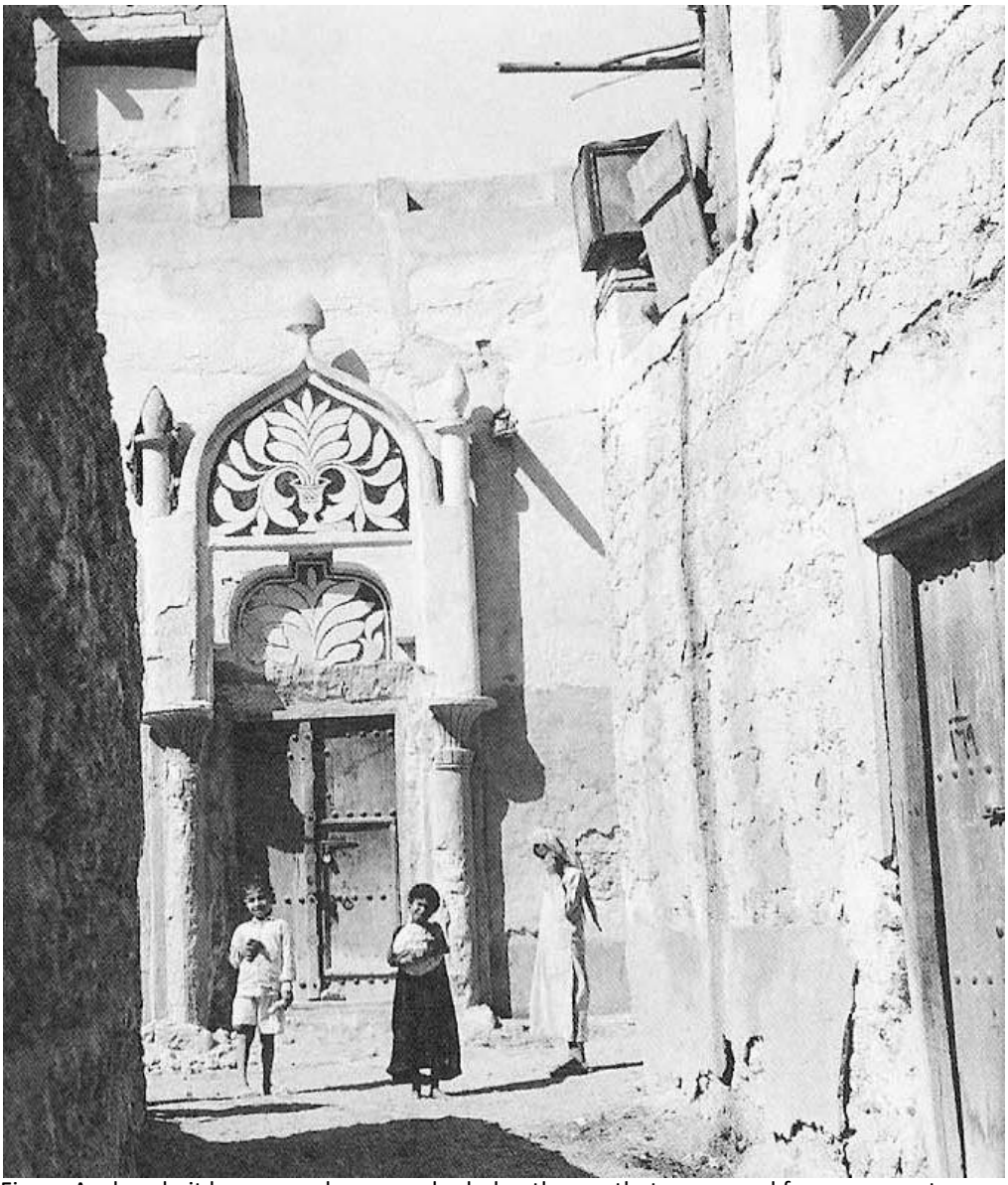


Figure A: close knit houses and narrow shaded pathways that were used for movement as well as social and meeting points (Facey & Grant, 1996)

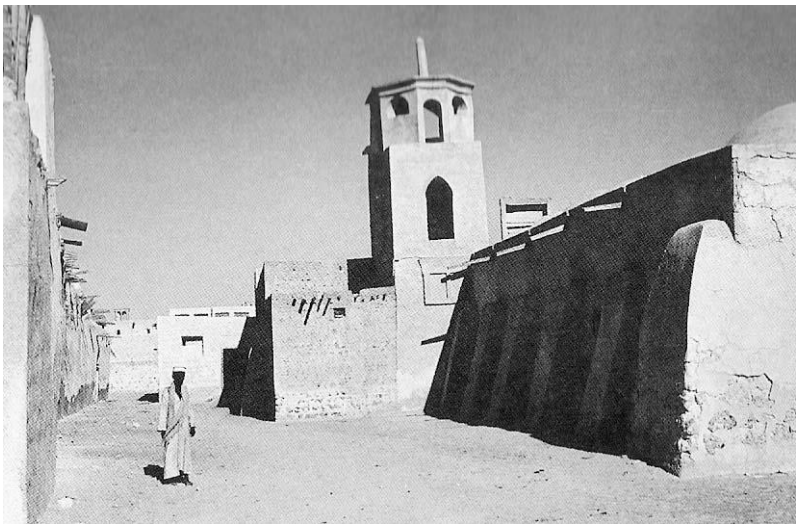


Figure A: The worship place (mosque), the path, and the housing areas (Facey & Grant, 1996)

Figure B: A typical pathway and housing typologies. The level of windows in most common cases were above pedestrians' eye level (Facey & Grant, 1996)

Figure C: Dubai Market in the 1960s. Palm fronds were used as shading structures (Facey & Grant, 1996)

Figure A: Dubai city in 1974. Road networks and mid-rise residential, commercial, and public buildings emerged in this period due to oil prosperity (Robinson, 1981)

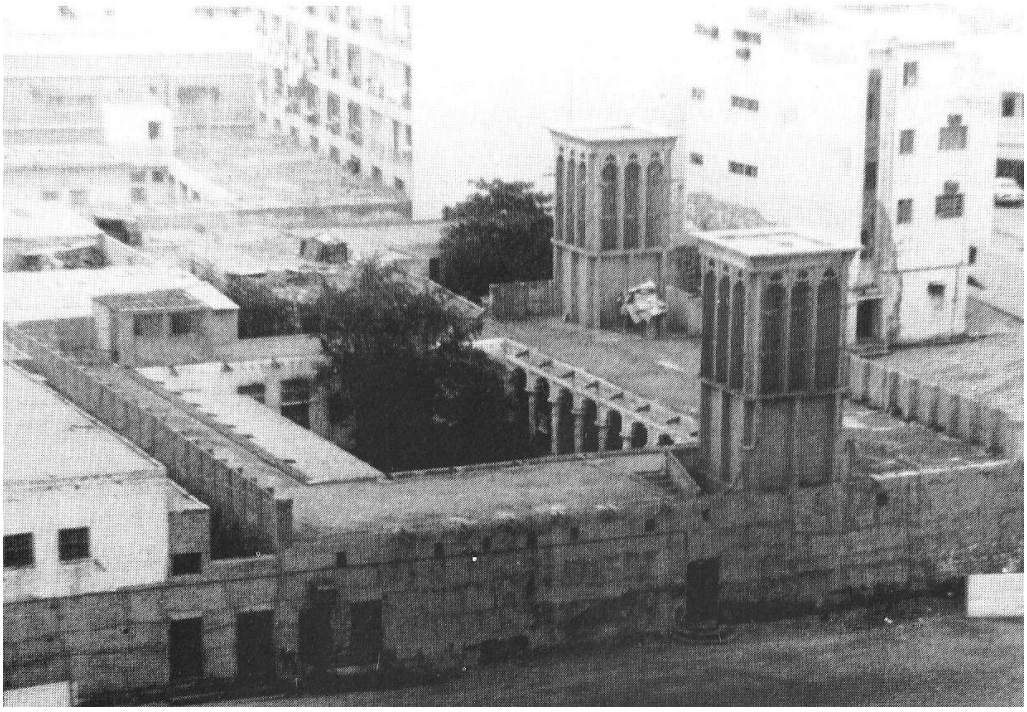


Figure B: Dubai city in the 70s. Heritage of the past, a wind-tower house surrounded by emergent mid-rise structures (Robinson, 1981)

Figure A: (Elevation) Dubai's skyline in the 60s. The mosque minaret dominated the skyline.

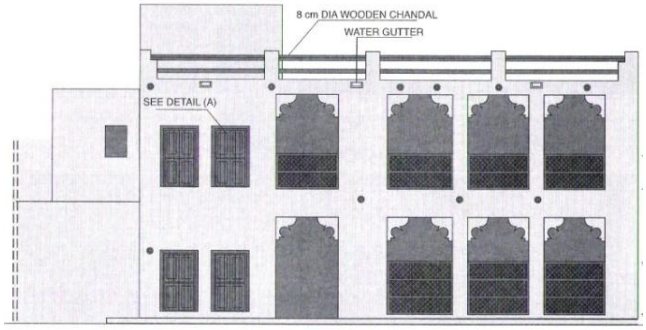


Figure B: (Elevation) Houses with large openings in the first floors were mostly complemented by a screen for privacy purposes

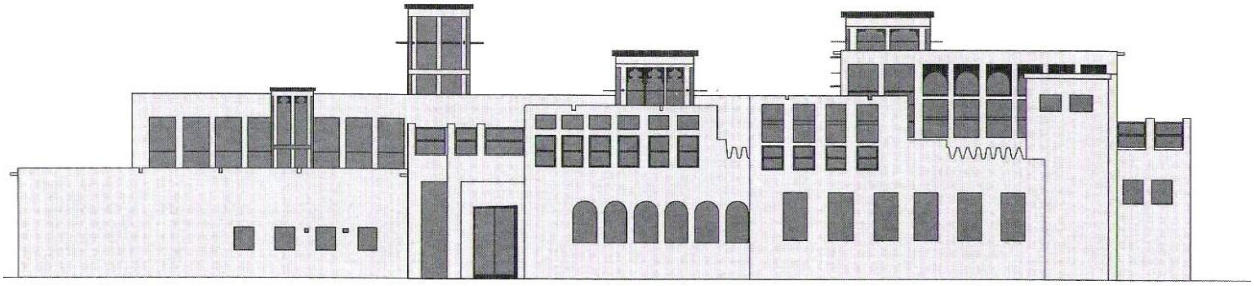


Figure C: Houses with narrow openings in the first floors were mostly located above the pedestrians' eye level for privacy purposes. Large openings were located indoors, along the courtyard area.

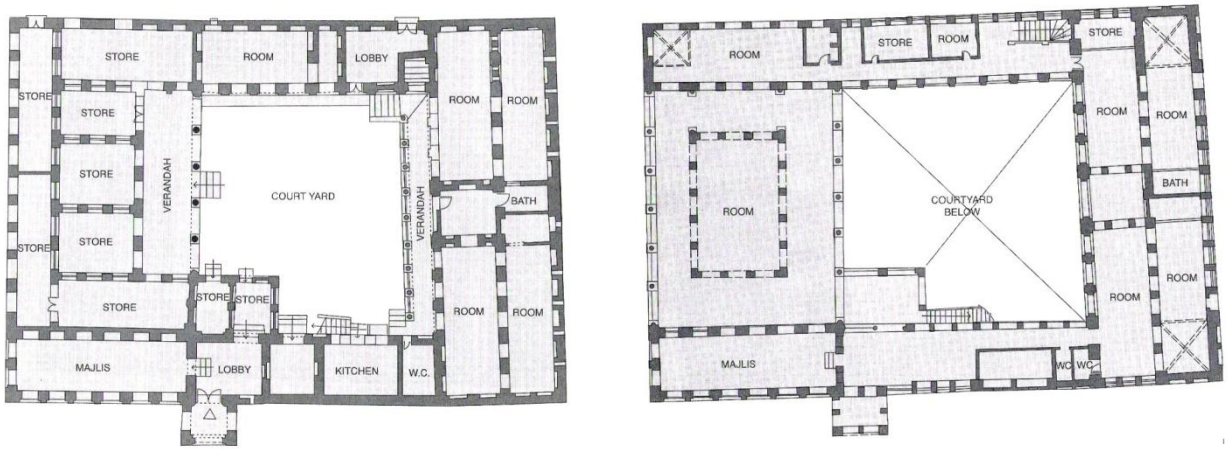


Figure D: First and second floor plans of courtyard housing typologies. (All drawings in this page are from Elements of Traditional Architecture in Dubai, 2000)

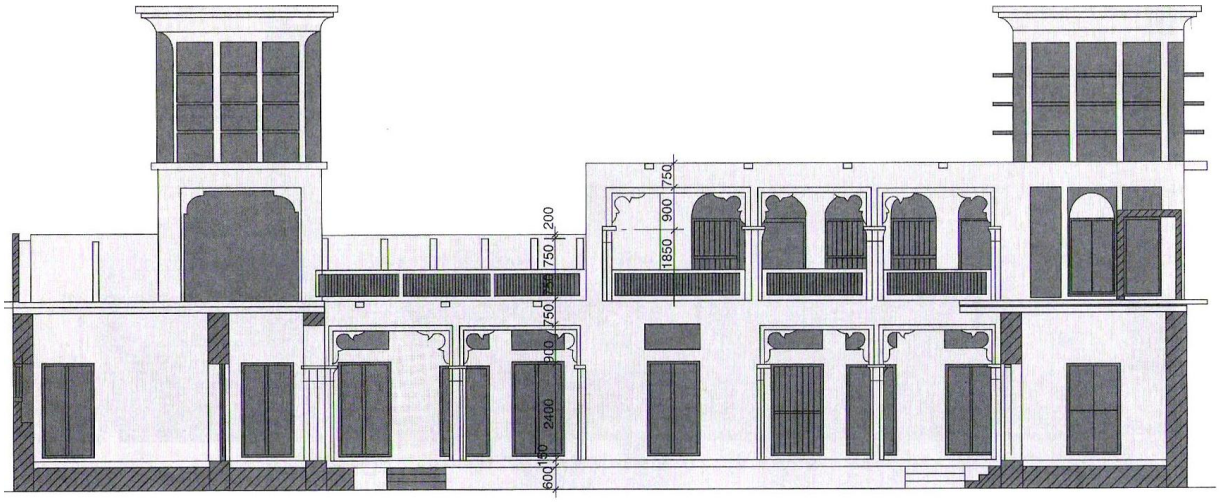


Figure A: A cross section through the courtyard showing the indoor openings.

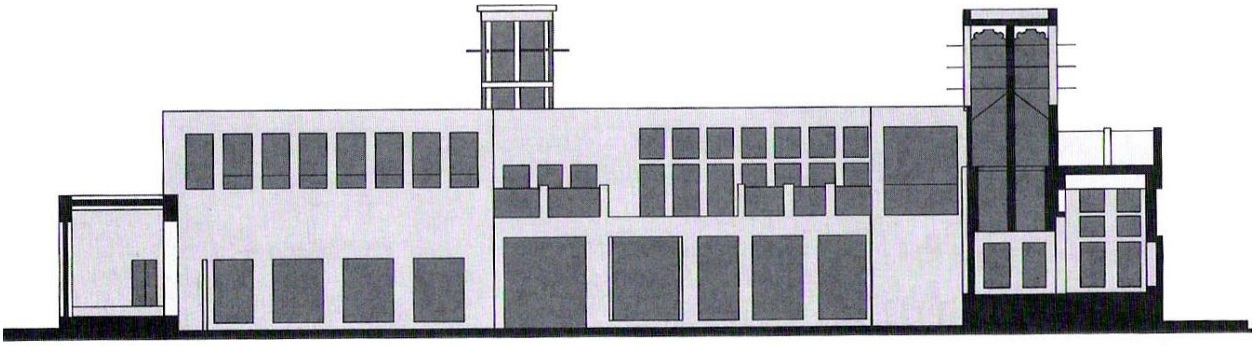


Figure B: A cross section through the wind-tower that was used as a passive cooling system for indoor spaces

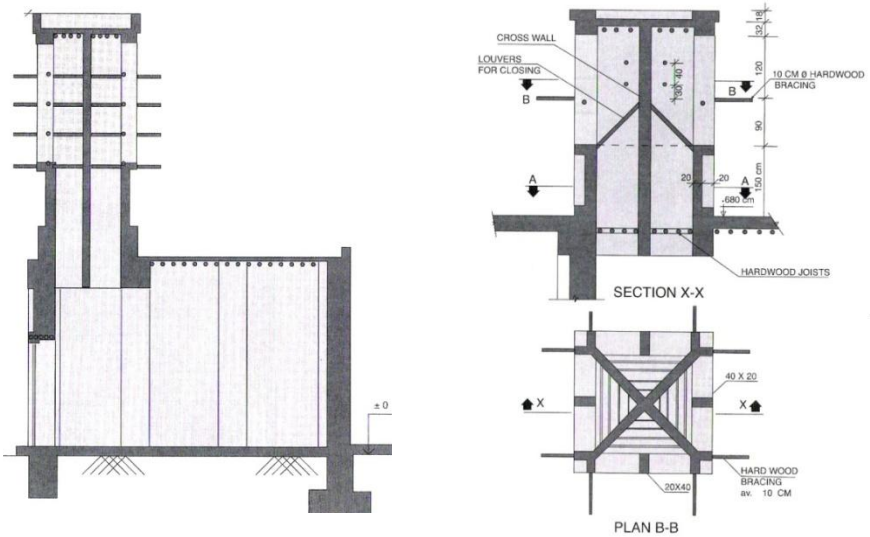


Figure C: Detailed sections of wind-tower structures. (All drawings in this page are from Elements of Traditional Architecture in Dubai, 2000)

Dubai’s Urban Growth (1822-2006)

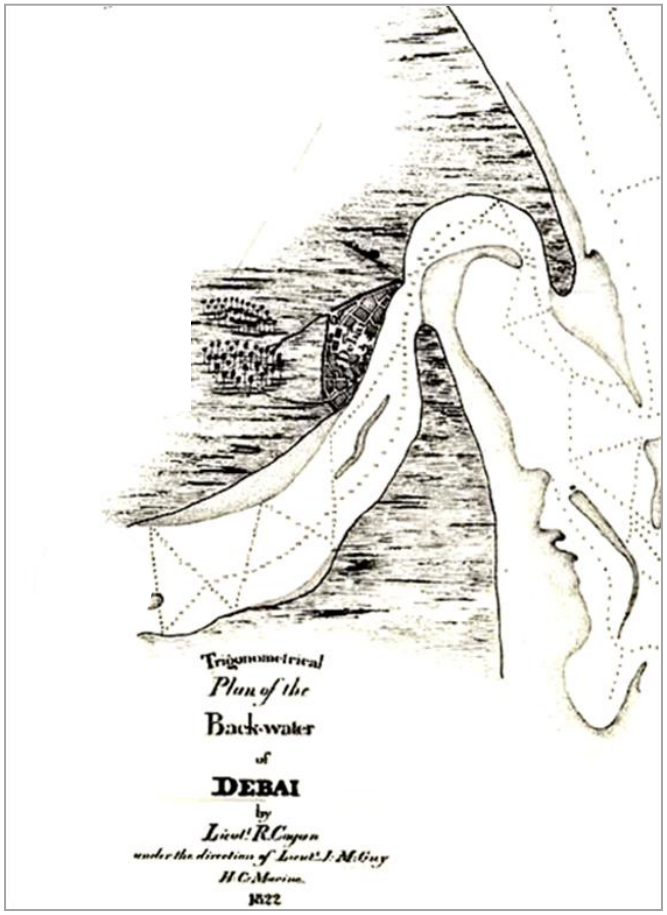


Figure A: "Trigonometrical plan of the Back-water of Dubai by Lieut R. Cogan, under the direction of Lieut J.M. Guy, HC Marine, 1822." This is the oldest available record of Dubai's built and natural environment (India Office Records, by courtesy of the British Library; cited in Elsheshtawy, 2009)

Figure B: Dubai in 1930, showing the establishment of three settlements around the creek. The red shade represents Al Fahidi Fort, built in 1799 and the oldest structure in Dubai (Sunders, 2003)

Figure A: Dubai in 1950s. The map shows the first three urban settlements of Dubai that are known as: Shindagha, Deira, and Bur Dubai. The urban fabric as shown is compact, clustered around the creek, and interconnected with narrow streets (Source: Dubai Municipality; cited in Elsheshtawy, 2009)

Figure A: Dubai in 1960. The city was dense and compact along the creek gate. Parts of the creek were shallow and street layouts were narrow and made of sand and gravel (Gabriel, 1987)

Figure B: Dubai in 1968. The emergence of manmade asphalt streets, the beginning of urban growth along the streets, and the creek after the dredging work and breakwaters construction (Gabriel, 1987)

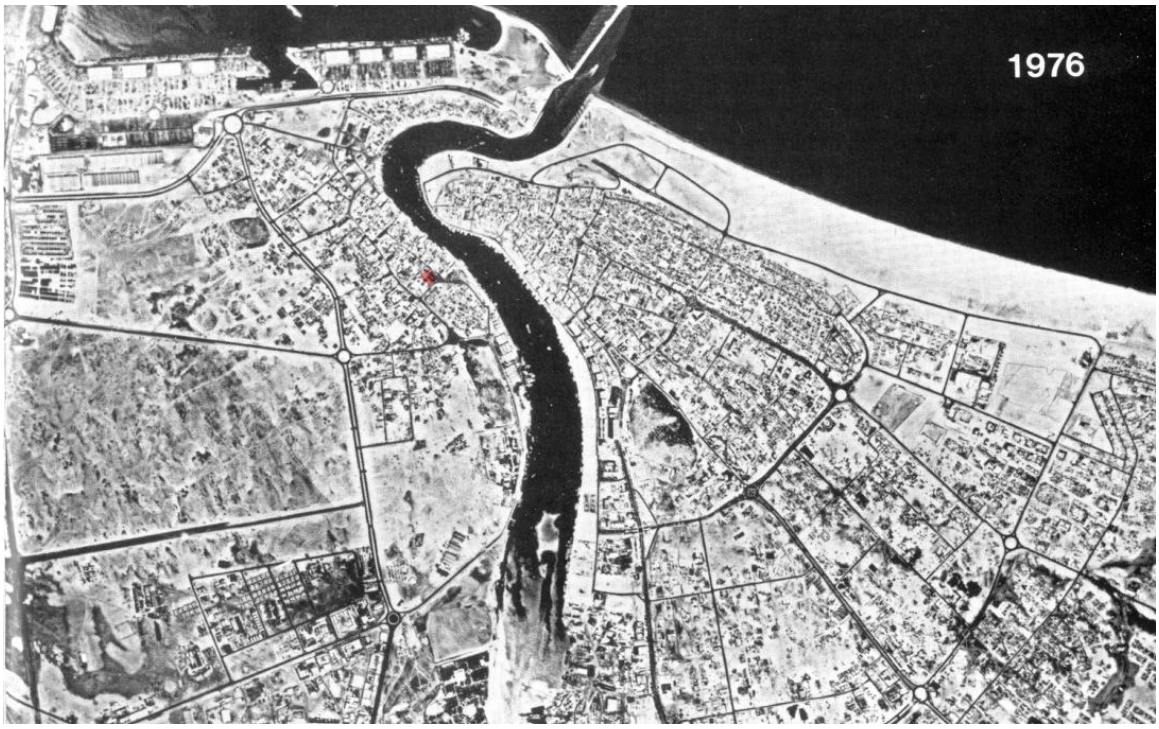


Figure A: Dubai in 1976. Due to oil prosperity, the city has rapidly urbanized along the creek, Gulf shore, and major streets. During this period, city officials focused on infrastructure projects and mobility systems. Port Rashid is shown in the top left of the image (Gabriel, 1987)

Figure B: Dubai in 1976. An aerial view of the city showing the Gulf, the mouth of the creek, the developments along streets, the low-rise housing density and courtyard typologies, and the emergence of mid-rise commercial, residential, and public buildings (Noor Ali Rashid, Photographer)

Figure A: The old city fabric and Dubai Port are shown in the foreground along the Creek, while the suburban growth is shown in the background along the Gulf shore and in the desert (Miranda, 2010)

Figure A: Dubai in 2003. Intense expansion took place along the shore and in the desert. The reclamation work of the first Palm Island is almost complete (earthobservatory.nasa.gov)

Figure A: Dubai in 2006 (earthobservatory.nasa.gov). The urban areas in the map are clustered in five locations:

1. The old Dubai with its two unique urban fabrics divided by Dubai Creek.
2. The existing city, long and narrow, stretches along the shore.
3. The new linear downtown area planned in the 1990s along Dubai's major highway.
4. The Gulf and the projects that are being built offshore
5. The desert that is expanding and embedding into the city structure (Machado, 2006b)

Figure A: In the 1990s, Dubai has planned a new downtown area that operates as a financial, commercial, governmental, and residential center. The corridor along Sheikh Zayed Highway towards Palm Islands dubbed Dubai as a modern city.

A considerable amount of construction occurred alongside this stretch of highway, shifting the city skyline and center as a result. In addition, mega developments along the shore, offshore, and in the desert are embedding into the city structure. These developments are changing the linearity of the city and creating a city form that is fractured and disaggregated (McMorrow, 2009; Skyscrapercity.com)

The Intensity & Rapidness of Dubai's Urban Expansion

The Intensity & Rapidness of Growth: Diagram 1930 - 2015

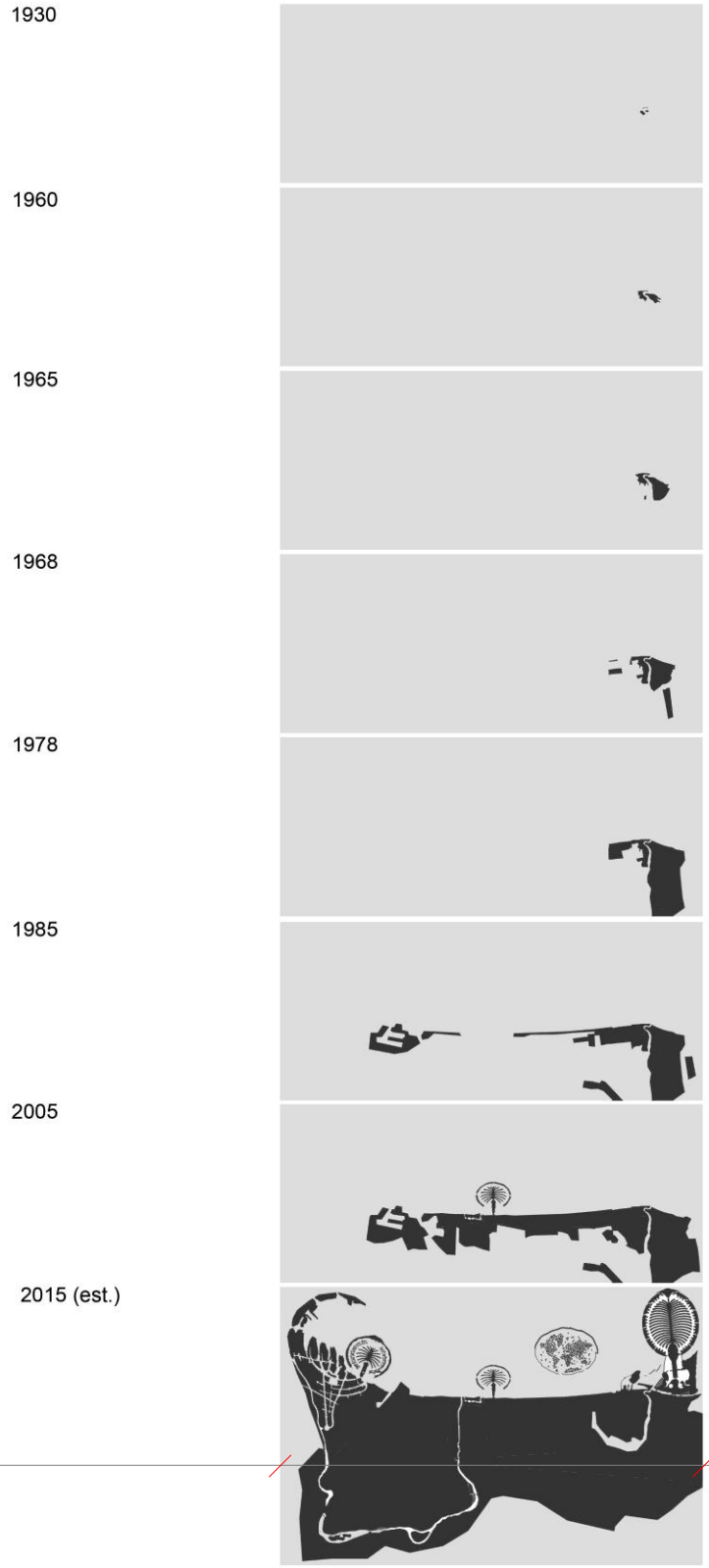


Figure A: Intense and rapid growth, 1930 to 2015 (Elsheshtawy, 2008)

Figure A: Dubai in 1973 (http://www.passportdiary.com/category/tropical/)

Figure B: Dubai in 1990 (http://www.passportdiary.com/category/tropical/)

Figure A: Dubai in 2000 (http://www.passportdiary.com/category/tropical/)

Figure B: Dubai in 2007 (http://www.passportdiary.com/category/tropical/)

Figure A: Dubai in 2015 (estimate) (http://www.passportdiary.com/category/tropical/)

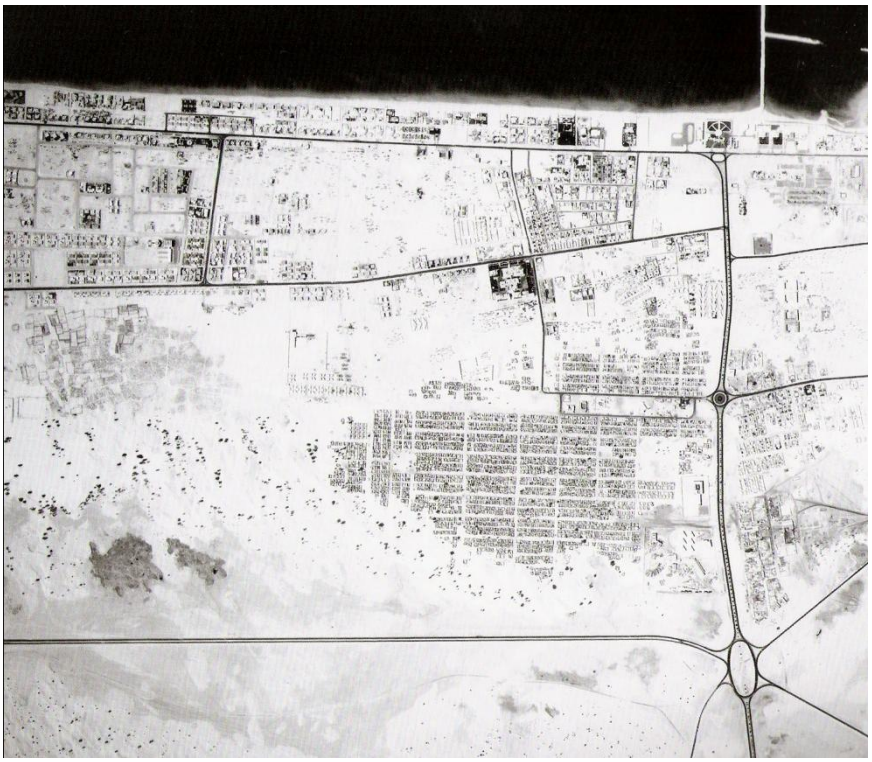


Figure A: No sign of high-rise developments. Most of the areas are residential, predominantly single family

Figure B: A new downtown area, a stretch of high-rises along a major highway, planned in the 1990s

Distance East to West = 4.2 Km

Distance From the highway to the Gulf shore = 2.5 Km

Figure A: Dubai in the late 80s (Miranda, 2010)

Figure B: Dubai in 2004, showing a major highway and a corridor of mixed-use high-rises (Miranda, 2010)

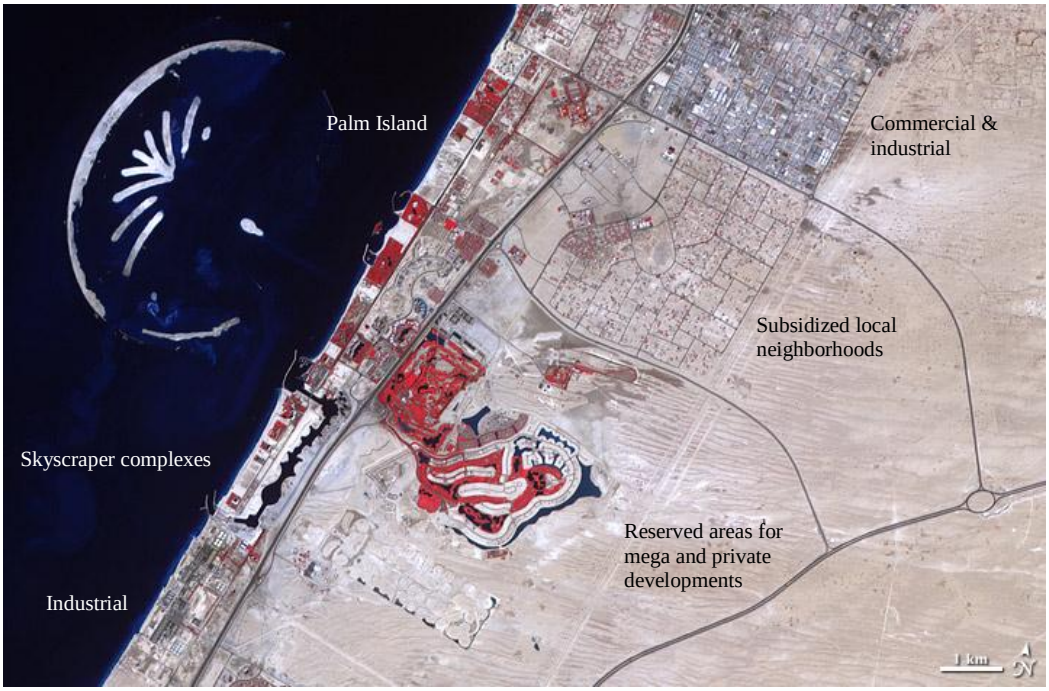


Figure B: Dubai in 2010. This more recent photo shows massive expansion in infrastructure and road networks. Palm Island took its final shape and mega projects on the mainland were undertaken, including high-rises, gated communities, and several tourist attractions (earthobservatory.nasa.gov)

Dubai’s Current Urban Morphology

Dubai's Current Urban Morphology

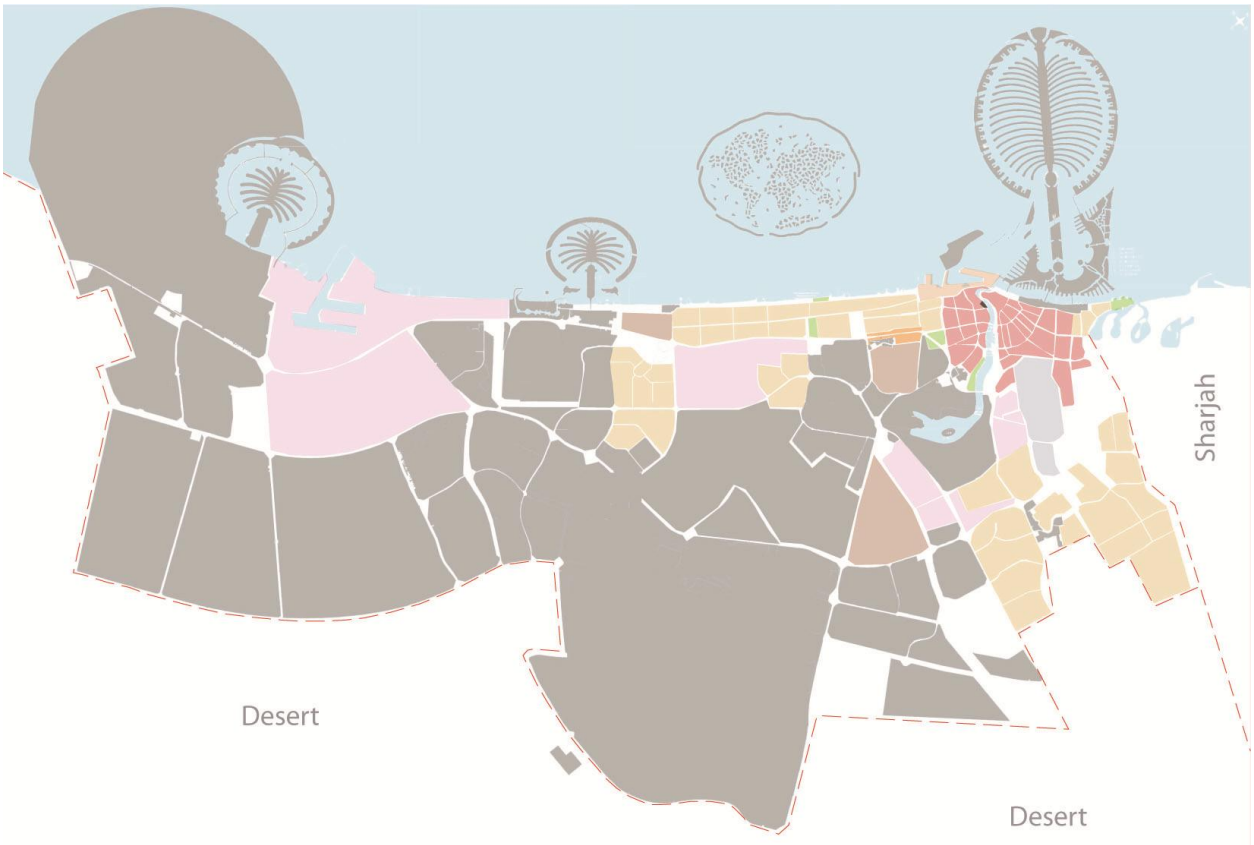


Figure A: An approximate map of Dubai's current urban zones (Author, 2009)

The preserved segment, the old town on Dubai Creek.

The old central Dubai with its two unique and dense urban fabrics divided by Dubai Creek. The area is dominated by low- and mid-rise residential, commercial, and public buildings mainly occupied by low and middle income residents.

The new downtown area, a stretch of skyscrapers along a major highway, planned in the 1990s.

Predominantly subsidized single family residential zones planned for natives.

Preserved areas for mega developments including tower complexes, gated communities, island projects, tourists' attractions, specialized business parks, etc. Due to the financial downturn, part of those preserved zones will be reassessed.

Industrial and business zones

Major urban parks

Private, presidential zones

Dubai International Airport

Dubai's Current Urban Morphology: The Remaining Old Town

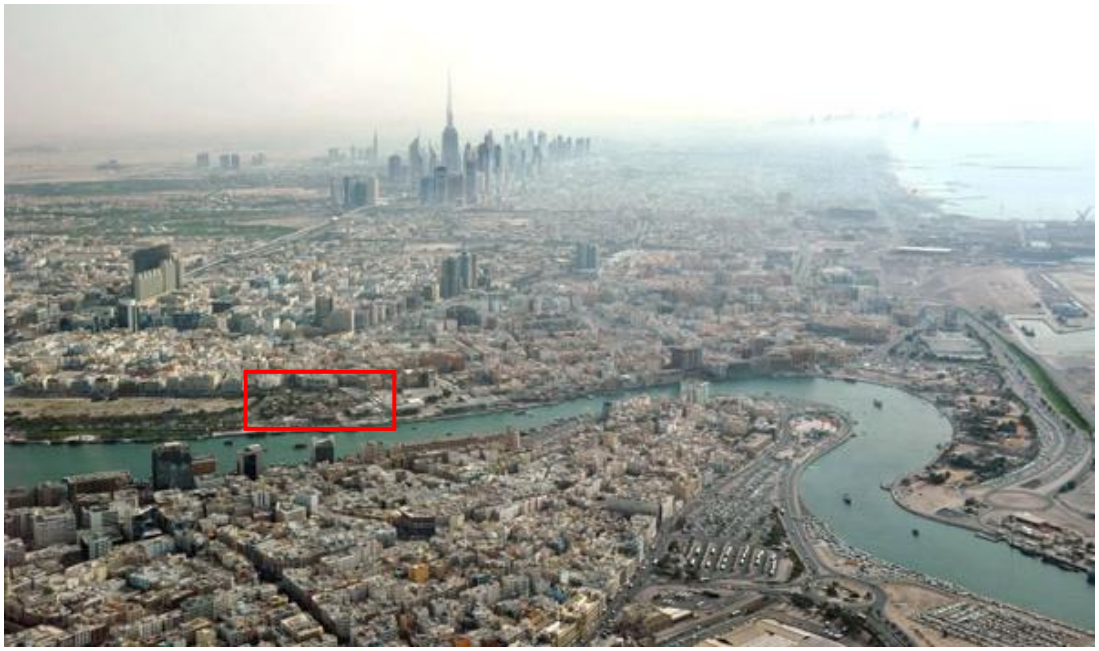


Figure A: The outlined area shows the remaining traditional urban morphology of Dubai that is represented in dense, clustered, low-rise courtyard typologies. The background, on the other hand, shows the modern urban Dubai that is represented by the new downtown area (McMorrow, 2009)

Figure B: A closer view of the remaining old town. The area is preserved and protected by Dubai's Municipal Authority for tourism and gallery spaces as well as social and business activities (McMorrow, 2004)

Dubai's Current Urban Morphology: The Remaining Old Town

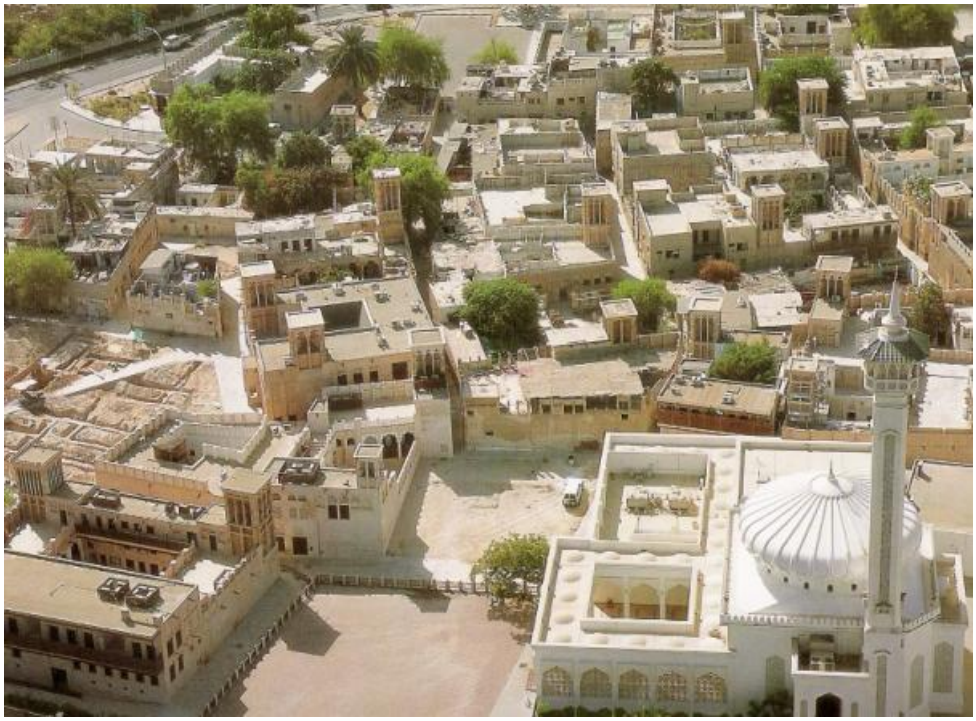


Figure A: The preserved traditional urban pattern represented with the place of worship (mosque), the courtyard typologies, the open spaces, and the narrow shaded streets (Skyscrapercity.com)

Figure B: Restored market (Skyscrapercity.com)

Figure C: Shaded alleyways (Skyscrapercity.com)

Figure A: Vista, focal points, architectural details, and openings that are above eye level (Skyscrapercity.com)

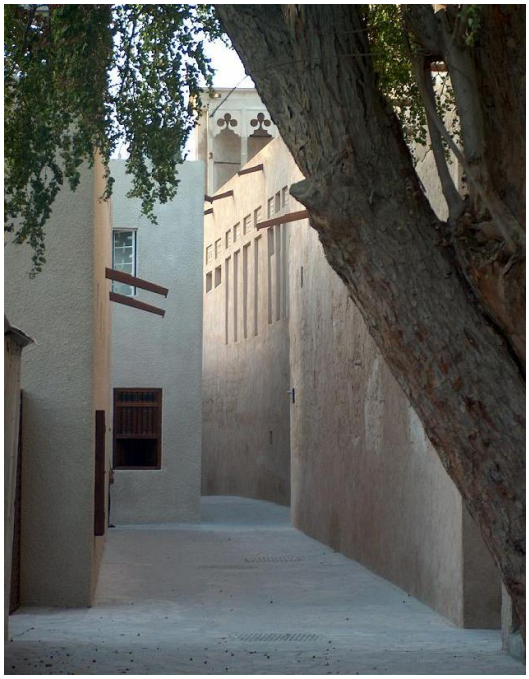


Figure B: The transition from alleyways to semi-private spaces (Skyscrapercity.com)

Figure C: Cluster of family houses complemented by a semi-private space (Skyscrapercity.com)

Figure D: An open space with native plants (Skyscrapercity.com)

Dubai's Current Urban Morphology: The Emergence of a New Downtown

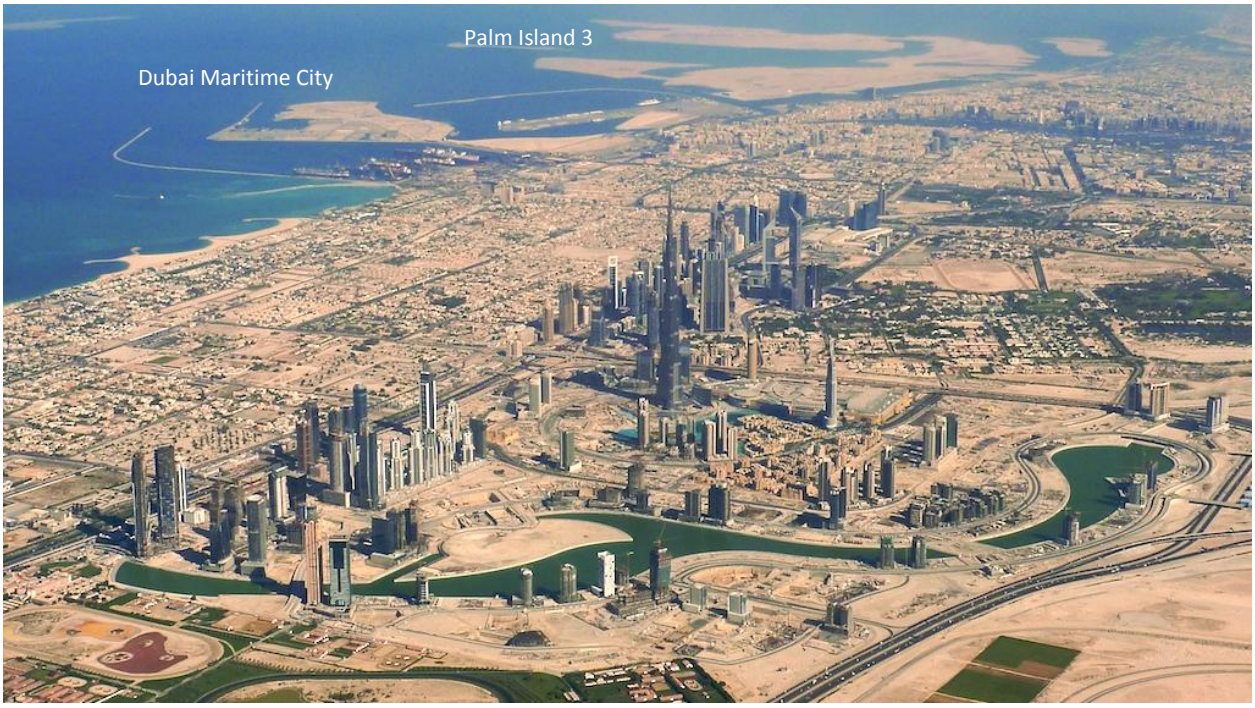


Figure A: Dubai in 2009. The background shows the old city center around the creek and the land reclamation of the third Palm Island and Dubai Maritime city. The foreground demonstrates the new downtown area along a major highway and some residential areas that run along the Gulf shore. The downtown is almost 4.4 Km long. The distance from the Gulf shore to the downtown is almost 2.5 Km (Skyscrapercity.com)

Figure B: The new downtown corridor in the background and some residential neighborhoods in the foreground (Skyscrapercity.com)

Dubai's Current Urban Morphology: The Emergence of a New Downtown

Figure A: From left to right: (1) Subsidized local neighborhoods designed in the early 70s, have deteriorated and are part vacant due to the influx of the working class. In the mid-90s many local families moved to bigger and newer subsidized neighborhoods, leaving the area for the working class; (2) Parking garages, serving the high-rises; (3) Mixed-use high-rise buildings; (4) two lanes of service roads, on-street parking, and a stretch of landscape; (5) A Multi-lane highway; (6) Dubai Metro (The red line that moves along the highway); and (7) Service lanes and high-rises (Skyscrapercity.com)

Dubai's Current Urban Morphology: The Emergence of Mega Developments

Figure A: Dubai in 2010. The lower left corner of the image shows the new downtown area. The urban areas along the shore are mostly private houses and subsidized residential areas. Developments around the Palm are privatized mega developments which include gated communities, high-rises, golf courses, and theme parks as well as some specialized districts such as Media City and Internet City (earthobservatory.nasa.gov)

Dubai's Current Urban Morphology: The Emergence of Mega Developments

Figure A: Mega developments (offshore, along the shore, and in the desert) + subsidized local neighborhoods (Miranda, 2010)

1. The lower right section and part of the upper section of the figure: Subsidized local neighborhoods, mainly occupied by Dubai citizens. The land parcels are mainly (100' x 100') or (100' x 150'), mainly zoned for single family houses.

2. The middle & lower left: Privatized gated communities with vast softscape and golf courses, mainly occupied by multi-national high income residents.

3. Offshore & along the shore: The Palm Island and several skyscraper complexes like Dubai Marina, Pearl Dubai, Jumierah Lake Towers, Jumierah Beach Residence, etc, all designed to attract foreigners, tourism, investments, and the high-income class.

Dubai's Current Urban Morphology: The Emergence of Mega Developments

Figure A: Dubai in 2009. The first Palm Island development and skyscraper complexes along the Gulf shore and Dubai's major highway (Skyscrapercity.com)

Figure B: Gated communities in the background, high-rises and hotels in foreground (Skyscrapercity.com)

Dubai's Current Urban Morphology: The Emergence of Mega Developments

Figure A: The segregation and fragmentation between the developments. Every development seems to be in a private island with no integration with the others (Skyscrapercity.com)

Dubai's Current Urban Morphology: The Emergence of Mega Developments

Figures A & B: Gated communities complemented by artificial bodies of water and vast green areas increase the real estate value but also the service charge, which for many owners reaches $ 10,000 per year (Skyscrapercity.com)

Dubai's Current Urban Morphology: Pattern Diagrams of Mega Developments

Figure A: The urban pattern of mega developments (Author, 2009)

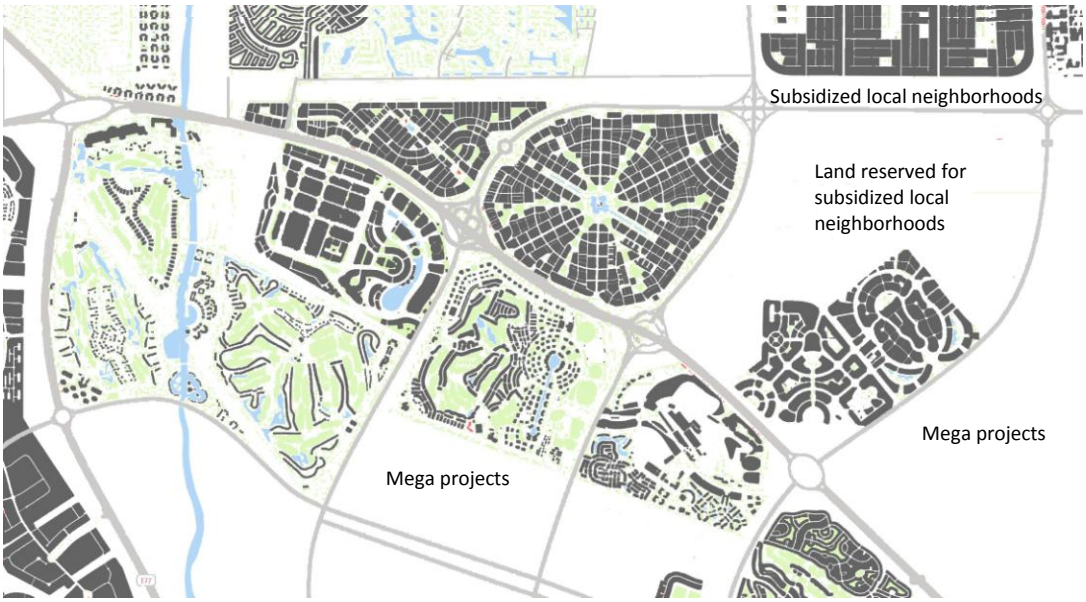


Figure B: The urban pattern of mega developments. Some represent existing building footprints; others represent land parcels for future developments (Author, 2009)

Dubai behind its Glamour Image

Contrasting Urbanism: Case Study: Al-Satwa

Figure A: Al-Satwa, a low-rise community shown in the foreground, was originally planned in the late 1960s by the government to provide housing for approximately 3000 local families. This area incorporates some design ideas that promote walkability such that narrow shaded alleyways, and a mixed-use retail corridor where people can walk, live, work, and shop. Today, this community with its close-knit residences (50 x 50 ft plots), which had accommodated a vibrant community in the 1970s and 1980s, is partly fractured and vacant. This area is physically and socially isolated from the new downtown corridor, shown in the background, along Sheikh Zayed Road where the rich and high-income people live. This new downtown area with its contemporary high rises and the highest real estate value in Dubai is only a few hundred feet away from the deteriorated community. A major arterial street and several parking garages and surface parking separate the two districts from each other. This section of Dubai shows a strong example of class segregation and ethnic prejudice.

In the late 1990s, Dubai Municipality planned new areas such as Al-Barsha and Al-Warqa with bigger lots (150 ft x 100 ft) for the natives. Accordingly, many citizens moved to those suburbs and leased their houses to laborers and low-income workers who were mainly from India, Pakistan, Bangladesh, and the Philippines. As a result, this area was transformed from a family-oriented neighborhood into a place where singles and ethnic groups live. Families who remained there and couldn't afford to move out suffered from the large accumulation of labors on streets and alleyways. I have observed that occupancy level in this old district reached around 20 to 30 workers per house of 2,500 ft^2. This restricted people's sense of safety, privacy, and attachment to the area. According to Elsheshtawy (2008), many Filipinos, Indians, Pakistanis, and Bengalis have settled in Al-Satwa since it was fairly affordable, even though they were employed in distanced zones.

Figure A: A view of contemporary Dubai from a roof top of an old house with laborers' laundry

Figure A: A closer view to the downtown. In 1995, a study conducted by the Strategic Planning Section in Dubai reported the social and urban issues in Al Satwa detailing its deterioration and lack of safety. The report also defined the positive aspects of the area represented by its strategic location, high real estate value, and huge potential for future development, which would bring the original/former citizens back to the area.

Figure A: An old house that accommodates tens of workers and stands few hundred feet away from the new downtown area. Houses in Al-Satwa are identical in terms of design and construction system. These houses are predominately built of concrete blocks and designed to accommodate all the spaces (including bedrooms, living rooms, and kitchen) around a central courtyard. These houses were not designed by specialists, but by handful of contractors who gained experience in the field. In most cases those builders were called “Oustaz,” an Arabic term of instructor or mentor.

Al-Satwa: Alleyways

Figure A: Al-Satwa is characterized with its multiple alleyways (10 feet wide) occupying 20 hectares, approximately 13 % of the area. Many reports indicated that these alleyways currently operate as “suitable hideouts” for criminals, illegal workers, burglars, and those who wish to cover up their actions (Ghadeer, October 11, 2006).

Al-Satwa: Alleyways

Figure A: A typical view of a shaded alleyway with dust, roof drains, and window units contrasted with the modern Dubai in the background.

Al-Satwa: Alleyways

Figure A: An alleyway with laborers' shoe storage. In the 70s, 80s, and early 90s these alleyways where used as a safe ground for children to play soccer, chess, hide and seek, etc.

Figure B: A view from a shaded alleyway towards a corner grocery store in a low rise development.

Al-Satwa: Alleyways

Figure A: An alleyway with a continuous deep shadow that protects pedestrians from summer heat.

Figure B: In many cases residents use alleyways as parking spaces due to the abundance of shade during the day.

Al-Satwa: Alleyways

Figure A: A partially paved alleyway with laborers laundry.

Figure B: An alleyway with laborers' bikes and windows with installed aluminum lattice used for safety reasons.

Al-Satwa: Alleyways

Figure A: For privacy purposes some houses are accessed from alleyways not the local streets that are usually busy with car and pedestrian traffic.

Figure B: Laborers' laundry hanging on walls.

Al-Satwa: Alleyways

Figure A: A laborer checking or hanging his laundry

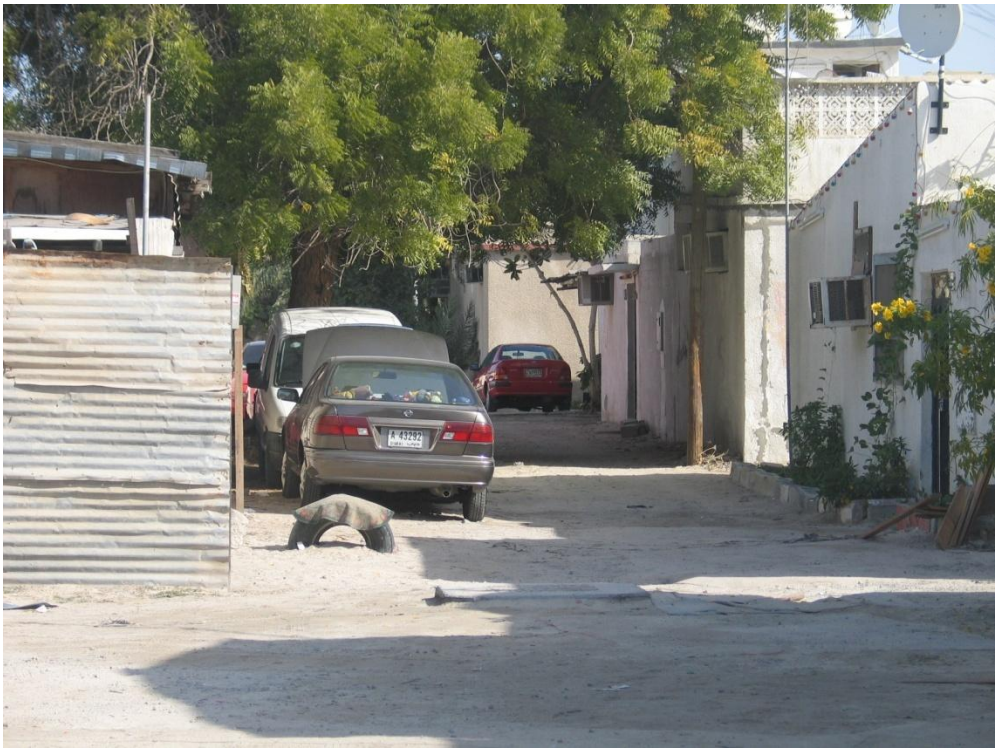
Figure B: An alleyway with dirt, graffiti, and a window unit that is about to fall

Figures A & B: Graffiti in Arabic and English

Al-Satwa: Houses of Metal Sheets

Figures A & B: Houses in Al-Satwa were usually made of concrete blocks, but exceptions include houses built of corrugated metal sheets and wood.

Al-Satwa: Unpaved Local Street



Figures A & B: Typical views of an unpaved local street

Al-Satwa: Paved Local Streets

Figures A & B: A one way local street with pavement and dedicated parking space on the right side. To the left, the sidewalk is used for parking due to the shortages of parking spaces

Al-Satwa: Paved Local Streets

Figure A: An enormous number of cars parked along a street due to the high occupancy level in every unit. In the background, a laborer cycling

Figure B: Residents of the area from the working class

Figure A: A sidewalk used for storage

Figure B: Services at the corner including a grocery store, barber shop, and laundry. The bike under palm tree is used in laundry and grocery delivery

Al-Satwa: Commercial and Retail Corridor

Figure A: Al-Satwa incorporates a vibrant mixed-use strip which accommodates retail stores, services, and ethnic restaurants in the ground level, and apartments and offices in the higher levels. Al-Satwa is surrounded by top notch skyscrapers from one side, yet from the other side it is surrounded by a vibrant commercial strip.

Al-Satwa: A View of Low and Mid-rises

Figure A: To the right, single family units with its courtyard typologies. To the left, mid-rises with retail stores usually located on the main street. Mid-rises emerged in the area in the mid 80s due to a change in building codes and regulations

Al-Satwa: A View of Low and Mid-rises

Figures A & B: Mid-rises looking down at low rises

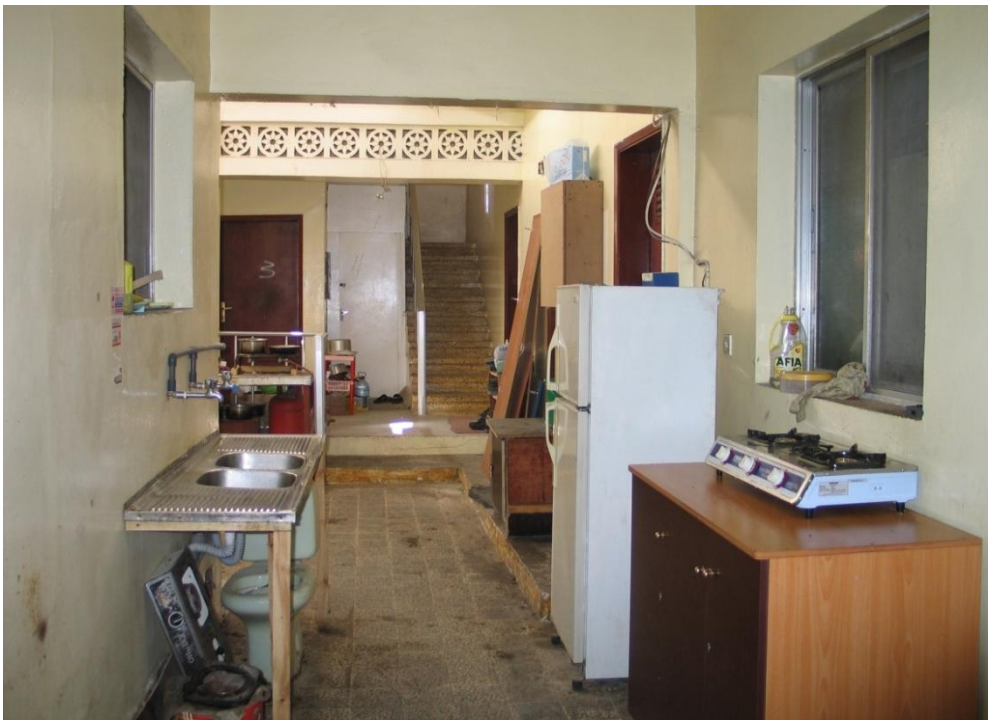


Figure A: Looking inside a house where many laborers live. The image shows a view from the entrance towards the courtyard. The staircase leads to roof.

Figure B: Two steps leading from the courtyard to the porch and rooms. Rooms are numbered to make every occupant or new laborer acquainted with his space.

Figure A: A view towards the porch with a laborer cooking in the courtyard. There are several stoves and cooking facilities, each for a group of workers.

Figure B: Families in the past utilized courtyards differently than the working class. For them, courtyards and porches were used as gathering spaces where family members came together to eat dinner, play, and socialize during night time.

Figure A: A view from the porch towards the courtyard and main entrance. There are extensions of pipelines for multiple sinks to serve large numbers of occupants.

Figure B: Several stoves, storage areas along walls, and dirt in the middle.

Al-Satwa: Indoor Life

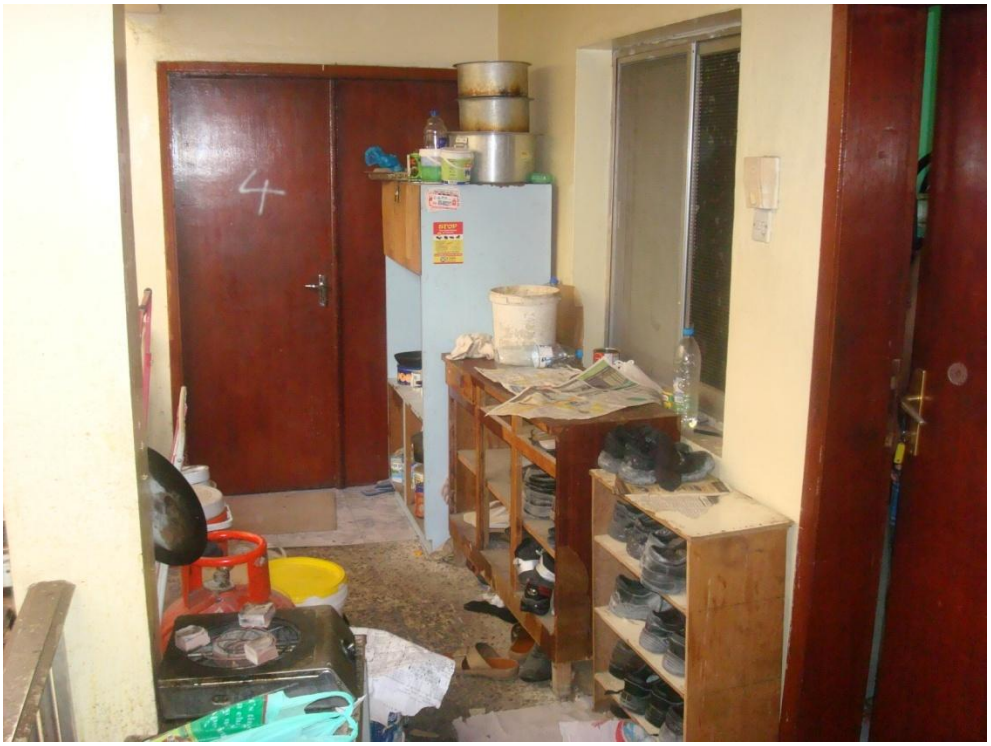


Figure A: Shoe stacks and a room with a window looking towards the courtyard and porch.


Figure B: Six laborers with bunk beds in a room of (10 x 10 feet). This image was taken in room number 3

Figure A: A courtyard covered by asbestos to protect the indoor from summer heat and dust. The shading structure is not directly attached to the walls. A little room is left for diffuse lighting and ventilation. In winter, people remove few panels or even the entire panels for the purpose of providing adequate ventilation and direct sunlight.

Figure B: To the left, a door that leads to the staircase; to the right, asbestos panels covering the courtyard.

Figures A & B: Views of new emergent housing typologies in the mid 1980s in lots of (10,000 to 15,000 sq.ft). Houses in figures A and B are approximately 4500 square feet in size. There is only a street separating this neighborhood, mainly occupied by locals, from the fractured area where the working class live

Al-Satwa: Demolition

Figure A: In 2007, Al-Satwa was allocated to Meraas, a Dubai based real estate investment company, to generate a development comprised of hotels and skyscrapers. The firm started knocking down the area in 2008. Many workers moved to the surrounding areas like Al Jafiliya, Al Bada'a, and Al-Karama. People who possessed a property in the area were compensated. The company decided to turn the area into a luxurious development with skyscrapers and artificial water canals. But, due to the global economic decline, some officials stated that the project is deferred until further announcement. (Note: Photo Taken in August, 2008. All the previous pictures were taken in January 2008, and summer 2007 before demolition)

Al-Satwa: Demolition

Figure A: Cranes and signs of demolition work in the middle of this shot. What remained in the area is the mix-use corridor known as Al-Satwa busy and dynamic commercial strip and couple of blocks south of the retail corridor. These two blocks that predominantly include low-rise developments with its courtyard typologies are shown in the foreground.

Al-Satwa: Demolition

Figures A & B: Views of Al-Satwa cleared up

Al-Satwa: Demolition

Figure A: A vacant structure waiting its turn to be demolished

Al-Satwa: Demolition

Figures A & B: Even the new emergent houses were torn down

Photo Essay References

Comparing Dubai Between 1973 and 2007, published in 2008. Retrieved March 29, 2010, from http://www.passportdiary.com/category/tropical/

Dubai Projects (Dubai Metro Development, Downtown Dubai Development, & Dubai Marina). Retrieved March 5, from http://www.skyscrapercity.com/forumdisplay.php?f=457

Elements of Traditional Architecture in Dubai (Reference Book) (2000). Dubai Municipality – General Projects Management - Historic Buildings Sections

Elsheshtawy, Y. (2008). Transitory sites: Mapping Dubai's 'forgotten' urban spaces. *International Journal of Urban and Regional Research.* (pp. 968-988)

Elsheshtawy, Y. (2009). *Dubai: Behind an urban spectacle*. Routledge

Facey, W., & Grant, G. (1996). *The Emirates by the First Photographers*. London: Stacey International.

Gabriel, E. (1987). *The Dubai Handbook*. Ahrensburg: Institute for Applied Economic Geography

McMorrow, B. (2004). Aerials-Dubai. Retrieved March 1, 2010, from http://www.pbase.com/bmcmorrow/dubaiaerials&page=5

McMorrow, B. (2009). Aerials-Dubai. Retrieved March 1, 2010, from http://www.pbase.com/bmcmorrow/dubaiaerials

Miranda, P. (2010). *The Evolution of Dubai.* Retrieved March 25, 2010, from http://blog.zeemp.com/the-evolution-of-dubai/

Record News. (August, 2008). *Architectural Record,* 32-34.

Robinson, J. (1981). *Dubai Arabia*. New Horizon

Saunders, D. (2003). *Dubai the Arabian Dream*. London: TransGlobe Publishing Ltd

Urbanization of Dubai. NASA-Earth Observatory. Retrieved March 26, from http://earthobservatory.nasa.gov/Search/index.php?q=Dubai&g=2

Appendix 2: Delphi First Round Instrument

Rethinking Dubai's Urbanism

Generating Sustainable Form-Based Urban Design Strategies for an Integrated Neighborhood

Introduction

This two-round Delphi study brings together some of the finest minds, including academics and practitioners, in the fields of urban design, planning, architecture, and sustainable development. You are one of a small group of experts who are being asked to give their opinion about rethinking the urbanism in Dubai. The Community and Regional Planning Program at the University of Texas at Austin would like to thank you for participating in this study. We realize that you are very busy in your current work and appreciate your consideration of participating in the research and development of sustainable urban form design strategies for a Dubai neighborhood.

The Delphi process, designed and managed by Mr. Alawadi of the University of Texas, will provide knowledge base about rethinking urbanism in Dubai. The goal of this research is to develop recommendations for sustainable urban design strategies based upon analyses that integrate the perspectives of experts, the public, and government officials.

Please return your answers within **25 days** of receiving the survey and background material **(August 5).** I am happy to answer any questions you might have. Please call me at (512)-698-9246, or email (khaled.alawadi@yahoo.com) with any questions and concerns. The success of our research depends on your insights and that of the other participants. By sharing your expertise, you can help establish and advance design strategies and ideas for an alternative urban design in Dubai, as well as in the region.

Thank you very much.

Sincerely,

Dr. Sarah Dooling, Assistant Professor
School of Architecture and the Environmental Science Institute

Khaled Alawadi, Ph.D. Candidate
School of Architecture, Community and Regional Planning Program

Structure and Instructions

This is the first of two rounds in this Delphi study. Your responses to the survey will be summarized along with those of the other participants. The collated responses will be sent back to you as a report with an opportunity to make further comments during the second round. The study will conclude with a final report. This Delphi survey package includes two different files: A PDF file and a Word document file.

- Please use the PDF file to read the photo essay and background section about Dubai.
- High resolution images are used in the photo essay file; please zoom in to see further details.
- Please use the Word document file for your answers and discussion.
- There are three questions in this Delphi round; a complete answer to all three questions is very appreciated.
- For each question, 2 to 3 pages of answer (Font 12) would be sufficient and highly respected, but please feel free to add additional pages.
- Any visuals including drawings, images, and sketches can be scanned and attached to your answers.
- For the purposes of this Delphi survey, the definition of form-based or formal urban design strategies is drawn from the literature as follows:

    - One definition emphasizes that sustainable urban form includes high density of the built environment, with diversity of residents and land uses that integrates multiple transportation options and alternative energy sources arranged compactly[6].

    - Other studies indicate that the following six form-based urban design principles lead to sustainable communities: Proximity of employment to housing; diversity of housing types; accessible mixed-use corridors; interconnected street systems; five minute walking distance to amenities and transit options; and an integrated system of parks and green corridors into the urban fabric[7].

The survey takes approximately (2) hours to complete. Please return your survey within **25 days** of receiving it, by email to (Khaled.Alawadi@yahoo.com). I am happy to discuss any questions and concerns by email as well as by phone at (512)-698-9246. Your participation in this Delphi study will be of great assistance in the completion of my doctoral research, and I thank you very much for your time.

---

6 Jabareen, Y. (2006). Sustainable urban forms: Their typologies, models, and concepts. *Journal of Planning Education and Research, 26*(1), 38-52.

7 *Sustainability by design: A vision for a region of 4 million*. (2006). Vancouver: The Design Center for Sustainability at the University of British Columbia

7 Condon, P. (2010). *Seven rules for sustainable communities: Design strategies for the post-carbon world*. Island Press: Washington

Questions

1) Form-based Urban Design Strategies for Sustainable Urban Neighborhoods in Dubai

Consider that the urban growth in Dubai is going to continue after the recovery of the global economy, and assume you are appointed to lead a task force to formulate an urban design agenda for a sustainable urban neighborhood to effectively guide Dubai through its coming years.

Question 1: In your opinion, what are the five to ten (5 to 10) most essential form-based urban design strategies that would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai? (Please explain why you consider each of the proposed / selected design strategies to be important).

Notes:

- Visuals including diagrams, sketches, and images are highly appreciated and encouraged within your discussion when possible.

- Providing 2 to 3 pages of text (Font 12) would be sufficient and highly respected, but please feel free to add additional pages.

Answer:

2) Lessons from Urban Design Interventions

Question 2: Please identify two to four (2 to 4) places, projects or examples that represent promising sustainable urban design interventions and strategies that exist in hot arid areas, the Middle-East, North Africa, or any other parts around the globe.

- From **each example** that you provide, please explain at least two (2) benefits and lessons that can be derived.
- From the **collection of examples** you provide, please identify the most important principle that could potentially be applied to Dubai's future neighborhoods?

Notes:

- Any listed links and sources are greatly appreciated and will be shared with others.

- Providing 2 to 3 pages of text (Font 12) would be sufficient and highly respected, but please feel free to add additional pages.

Answer:

3) The Integration of Traditional & Contemporary Urban Form Strategies

Traditionally, prior to the discovery of oil, people in Dubai employed an extensive repertoire of culturally and climatically adaptive urban forms that included:

1. High density of low-rise housing arranged in a compact form;

2. Courtyard typologies, shading elements, cross ventilation techniques, and wind towers that operated as passive cooling structures;

3. Narrow, shaded, interconnected, and pedestrian-focused communities;

4. An urban orientation that minimized direct solar access and maximized the flow of prevailing winds; and

5. A culturally meaningful transition from the private, to semi-private, to public spaces that provided experiences of security, safety, privacy, and more frequent exchanges among residents.

Today, the juxtaposition of Dubai's urban areas contribute to a patchwork morphology that ignores local vernacular architectural forms, is primarily driven by large-scaled development, creates a disconnected urban fabric, is automobile oriented, and is unresponsive to its environment. Yet despite the disaggregated and unplanned urbanism, Dubai recently is showing goodwill by trying to establish a vision of urban sustainability through some promising contemporary formal strategies and policy initiatives that include:

1. An emphasis on the culture of an alternative and clean transit system represented in Dubai Metro and a future plan for tram lines and bike infrastructure;

2. The implementation of greenroofs in public, private, multi-family residential and commercial buildings;

3. The implementation of Emirates green building standards (Emirates LEED) in 2015;

4. The construction of mixed-use corridors, multi-use structures, and a concentration on vertical zoning; and

5. The incorporation of an appropriate level of services, amenities, and daily uses within urban communities.

Question 3: Please rate on a scale of 1 to 5 where 1 is (very low), 2 is (low), 3 is (moderate), 4 is (high), and 5 is (very high) the following design strategies from the traditional and contemporary parts of Dubai. Please base your rating of the strategies on their potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods. Finally, please briefly explain your ratings.

Answer:

Traditional Urban Form Patterns

1. High density of low-rise housing arranged in a compact form.

   Rating ( )

   Explanation:

2. Courtyard typologies, shading elements, cross ventilation techniques, and wind towers as passive cooling structures.

   Rating ( )

   Explanation:

3. Narrow, shaded, and interconnected pedestrian-focused community.

   Rating ( )

   Explanation:

4. An urban orientation that minimized direct solar access and maximized the flow of prevailing winds.

   Rating ( )

   Explanation:

5. A culturally meaningful transition from the private, to semi-private, to public spaces that provided experiences of security, safety, privacy, and more frequent exchanges among residents.

   Rating ( )

   Explanation:

Contemporary Urban Form Patterns and Policies

1. The emphasis on the culture of alternative and clean transit system represented in Dubai Metro and a future plan for tram lines and bike infrastructure.

   Rating ( )

   Explanation:

2. The implementation of greenroofs in public, private, multi-family residential and commercial buildings.

   Rating ( )

   Explanation:

3. The implementation of Emirates green building standards (Emirates LEED) in 2015.

   Rating ( )

   Explanation:

4. The construction of mixed-use corridors, multi-use structures, and a concentration on vertical zoning.

   Rating ( )

   Explanation:

5. The incorporation of an appropriate level of services, amenities, and daily uses within urban communities.

   Rating ( )

   Explanation:

Appendix 3: Delphi second round instrument

Rethinking Dubai's Urbanism

Generating Sustainable Form-Based Urban Design Strategies for an Integrated Neighborhood

A Delphi Study: Final Round

Introduction

The Community and Regional Planning Program at the University of Texas at Austin would like to thank you for participating in this study. This is the last of two rounds in this Delphi study. Your responses to the survey will be summarized along with those of the other participants. The collated responses will be sent back to you as a report. This Delphi survey package includes only one file: A Word document file. There are seven (7) questions in this Delphi round; a complete answer to all seven questions is appreciated.

The survey may take a minimum of 15 minutes or longer (as much as 40 minutes) if you provide detailed explanations. Please return your survey **before November 18**, by email to (Khaled.Alawadi@yahoo.com). Mr. Alawadi is happy to discuss any questions and concerns by email, as well as by phone at (512)-698-9246. The success of our research depends on your insights and that of the other participants. Your participation in this Delphi study will be of great assistance in the completion of this research, and we thank you very much for your time and effort.

Sincerely,

Dr. Sarah Dooling, Assistant Professor
School of Architecture and the Environmental Science Institute

Khaled Alawadi, Ph.D. Candidate
School of Architecture, Community and Regional Planning Program

Instructions

- Please use this Word document file for your answers and discussion.
- There are seven (7) questions in this Delphi round; a complete answer to all seven questions will be appreciated.
- Please answer the privacy and confidentiality section below.
- For the purposes of consistency, experts are asked to highlight their responses or selection in a different color. Highlighting the responses in the following format, as shown below, will be appreciated.
    - Illustration: Would you recommend a policy that caps building heights to (12 stories max) in Dubai's residential neighborhoods? Please highlight your selection below in a different color.

      (1) Yes (2 No
- Explanation of responses in this round is vital in the analysis. Experts can explain their responses briefly, ranging from few sentences to a paragraph. The space provided for explanation in every question does not reflect the desired length of your written response.

Privacy & Confidentiality

Experts can decide whether they prefer to remain anonymous (referred to as an expert research participant) or to receive public acknowledgement of participation (referred to by name and affiliation and complied into a list of publically acknowledged participants) in the dissertation and in resulting publications.

Question: Would you like to remain anonymous (referred to as an expert research participant)? Please highlight your selection below in a different color.

(1) Yes (2) No

If your answer in No, please provide and confirm your affiliation below

Question 1: (Most Effective Five Strategies)

The preliminary results of the first round Delphi indicated that the following nine form-based urban design foundation principles would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai:

(1) Compact development
(2) Connectivity and multiple transportation options
(3) Integration
(4) Diversity
(5) Green, open, and social nodes in the urban fabric
(6) Tradition-based urbanism and architecture
(7) Climate-sensitive urbanism and architecture
(8) Eco-balanced design and planning
(9) Adaptability

Question 1.1: Do you consider these 9 principles as having equal weight and effectiveness?

Please highlight your response below in a different color.

(1) Yes (2) No

Question 1.2: If no, please identify the FIVE (5) most effective strategies for achieving socially, environmentally, and economically integrated neighborhoods in Dubai. And please rank your selection in terms of effectiveness, ONE (1) being the most effective principle.

(1)
(2)
(3)
(4)
(5)

Question 1.3: Do you think that the concept of Compact Development as it was described in the first round Delphi and as applied to Dubai, should include all of the other 8 principles listed above? (Please see the introduction in Question 1 for the listed principles.)

Please highlight your response below in a different color.

(1) Yes (2) No

Please briefly explain your response.

Question 2: (Visualizing Height & Density in Dubai's Neighborhoods)

Determining the net density (defined as the number of residential units per acre) for a neighborhood is often driven by cultural values and norms, as well as by politics and market forces. In many cases, redevelopment proposals define densities that are lower than densities associated with compact development designs. The purpose of this section is for you to identify appropriate density levels for Dubai's neighborhoods.

In the first round of the Delphi, the vast majority of experts on the panel suggested that compact neighborhoods should include a variety of buildings and density levels, ranging from moderate to high.

In your opinion, what is an appropriate minimum level of residential density for the following development types in Dubai's neighborhoods? Please highlight your response below in a different color.

Question 2.1: Detached single family units (1 to 2 Stories)[8]: (1 Hectare = 2.47 acre) (1 Acre = 0.40 Hectare) (1 Acre = 43560 Square Feet) (1 Acre = 4046.82 m^2)

- 3 units per acre
- 4 units per acre
- 7 units per acre
- 15 units per acre
- 17 units per acre
- Other, please specify……..

[8] A detached single family unit is the most preferred development type among local Emiratis and most Dubai residents. In subsidized local neighborhoods, the lot configurations are mainly (100'x 100') or (100'x150'). The approximate average size of residential unit is 4000 to 5000 ft^2. In some cases, this figure increases and reaches over 6000, 7000, or 8000 ft^2, etc. According to Dubai's building codes and regulations, all detached residential units should have a setback of 10' from the property line (physically defined by a boundary wall/fence). In smaller lots (such as 80'x80') a 10% setback from the lots width/length is required. In addition, any built detached service unit or guest house should have a 10' setback from the main structure (the house). At present, many of local Emiratis, especially young professionals, get married and live in the same house with their parents. In other cases, they built a detached guest house (approximately more or less than 1000 ft^2 in the same land. Sharing a house with parents might extend to several years, perhaps less or more than 5 years. This practice has been very common and has increased mainly in the last decade due to the increase in real estate and construction costs. In a sense, this development typology increases density levels through time, while also increasing demands on energy consumption and pressures on infrastructure.

Question 2.2: Multi-family units (Low-rise buildings, 2 to 3 stories): (1 Hectare = 2.47 acre) (1 Acre = 0.40 Hectare) (1 Acre = 43560 Square Feet) (1 Acre = 4046.82 m^2)

- 7 to 15 units per acre
- 10 to 20 units per acre
- 20 to 30 units per acre
- 30 to 40 units per acre
- Other, please specify……..

Question 2.3: The first round of the Delphi generated a variety of responses:

1) Some experts are in favor of low-rise development over medium- or high-rise since low-rise development minimizes heat gain and cooling loads. It is also argued that low-rise buildings reflect the most energy-efficient height, so they can be cooled/heated passively. Such architecture brings people back to the street level and encourages greater social interaction. However, low-rise developments are inefficient in terms of land, since they require more space as the population and city grow.

2) Other experts are in favor of low-rise architecture combined with medium- and high-rise buildings (max. 12 stories) with set-back above the 3rd or 4th floor. "The maximum height of 12 stories has proven to be the limit beyond which providing heating and cooling in a building through mechanical means becomes highly energy-inefficient . . . In addition, this model will help to achieve a more human-scale, pedestrian-oriented, energy efficient, transit-oriented city" (Expert R2, 2010).

3) Another group of experts are in favor of high-rises.[9] They argue that, in terms of sustainability, it is more beneficial to build high-rises (more than 12 stories), meaning that it can house a large number of occupants on a small plot of land. Besides, high-rises are more environmentally friendly in terms of saving land, and they use energy and water resources in a more efficient manner. In addition, the shortage and price of land are major concerns in Dubai. Consequently, low-rise housing may not be affordable in the near future.

[9] According to Emporis Standards, a structure is automatically listed as a high-rise when it has a minimum of 12 floors, (height more than 35 meters/115 feet).

Would you recommend a policy that caps building heights to (12 stories max) in Dubai's neighborhoods?

Please highlight your response below in a different color.

(1) Yes (2) No

Please briefly explain your response.

Question 3: (Urban Block)

Urban block is considered the foundation or the DNA of any urban development. The first round of the Delphi indicated that a sustainable Dubai should be based on an interconnected street system and short blocks. Large blocks or super blocks reduce choices and place burden on traffic and pedestrian movement. Smaller blocks, on the other hand, make both street life and walking more possible, feasible, convenient, and exciting.

Please highlight your response below in a different color.

For a new neighborhood development in Dubai, the length of urban blocks (measured as the distance between intersections) should (ideally) be no longer than the ranges listed below:

o 200 – 270 feet	**Intervals in Metrics**	(60 – 82 meters)
o 280 – 350 feet		(85 – 106 meters)
o 330 – 400 feet		(100 – 121 meters)
o 380 – 450 feet		(115 – 137 meters)
o 430 – 500 feet		(131 – 152 meters)

o Other, please specify…….....

Please briefly explain your response.

Question 4: (Cycling)

There are significant barriers to promoting bicycle use in Dubai. The cultural norms among natives discourage biking, while residents are more likely to use bicycles. Extreme summer heat also inhibits widespread bicycle use.

Given these constraints, do you consider the incorporation of bike infrastructure (dedicated bike lanes and other easements like parking and zones where bikes are the priority) in Dubai's neighborhoods appropriate and potentially effective?

Please highlight your response below in a different color.

(1) Yes (2) No

Please briefly explain your response.

Question 5: (Orientation)

Orientation and exposure to solar radiation have been completely disregarded in Dubai's urban development. Correct orientation of buildings and glazing could reduce the overall heat gain into all building facades, lessen cooling loads, reduce power supply, and result in a large reduction of CO_2.

Please highlight your response below in a different color.

Would you support a building code that legislates environmental performance based on the following? :

(1) Orientation

(1) Yes (2) No

(2) Location and size of shading structures on buildings

(1) Yes (2) No

(3) Location and size of windows

(1) Yes (2) No

Please briefly explain your responses.

Question 6: (Inclusive Housing)

The vast majority of Dubai's residents are construction workers, as well as retail and service sectors workers employed in commercial stores, restaurants, and cafes. The lack of affordable and appropriate housing types for this segment of population caught the attention of international organizations, media, and press. This resulted in construction workers being housed in labor dorms provided by construction companies on the outskirts of Dubai. Retail and other service workers, on the other hand, moved into Dubai's older districts closer to the central city. In these older districts, occupancy levels reached 30 to 50 people (mostly single) in a detached single family house of 2500 ft^2. This created ethnically segregated enclaves, amplified energy and drainage loads, invaded the privacy of many families, housed many illegal workers, and in some cases created zones with concentrated crime.

The first round of the Delphi suggested that Dubai's neighborhoods should be diverse, including a wide variety of incomes, ethnic and cultural backgrounds, and family types. However, most high and medium income people in Dubai prefer privacy and a family-oriented environment, and do not want to live in a neighborhood with a high concentration of construction and retail workers who live in groups away from their families.

Given the cultural norms of Dubai, could inclusive housing (incorporating housing units for the working class within neighborhoods) be successfully implemented in Dubai?

Please highlight your response below in a different color.

(1) Yes (2) No

Please briefly explain your response.

Question 7: (The Role of Public Participation)

The challenges to public participation in neighborhood planning in Dubai include the following:

- The planning and decision-making system in Dubai is best described as a top-down approach where criteria for making decisions are not transparent to the general public; and

- The cultural differences between the natives (who are mostly private and are more trusting of planning decisions) and the residents (who are more accepting of and comfortable with open dialogue in a public setting).

Given the challenges acknowledged above, could a participatory approach to urban design and planning be successfully implemented in Dubai?

Please highlight your response below in a different color.

(1) Yes (2) No

Please briefly explain your response.

Appendix 4: Invitation letter to experts.

The letter was printed on the University of Texas at Austin, School of Architecture letterhead.

June 16, 2010

Dear (name by title),

I am Dr. Sarah Dooling, Assistant Professor of Urban Ecology at the University of Texas at Austin. As a research faculty member in the School of Architecture, I am involved in advising doctoral students in the development of their research projects, and monitoring their progress until completion. Our doctoral program is known internationally for conducting applied research that addresses critical issues facing the world's populations and places. Rapid and massive urbanization is one of these pressing issues. Dubai, as an example, is a case that requires new design tactics for changing unchecked growth and unregulated development. This letter invites you, as an expert in the design fields, sustainability, and/or planning to participate in a research project designed by one of our current doctoral students. This project will address the development of guidelines for sustainable urban design for neighborhoods in Dubai.

Mr. Khaled Alawadi is a native of Dubai and is trained as an urban designer. He obtained his Masters in Urban Design at the University of Texas, and is currently pursuing a doctoral degree in Community and Regional Planning. I am his academic supervisor, and attest to the rigor of his proposed work, and to the anticipated contributions his work will make to the formulation of sustainable urban design strategies for Dubai. As a doctoral student, Mr. Alawadi intends for this research to address and generate dialogue about future sustainable forms for Dubai's urban neighborhoods. Following the completion of his analyses, Mr. Alawadi hopes to pursue concepts and principles of sustainability in a future academic and professional position; his role in such a position might consequently have an impact on the direction of urbanism in Dubai.

Background

The current trend of urbanization in Dubai has been characterized as "vertical", "mega", "exaggerated", and unresponsive to its physical environment and culture. The juxtaposition of Dubai's urban projects has contributed to an urban form that is dispersed, segregated, and fragmented yet connected by multi-lane highways. As a result, integrating ecological and social aspects into creating high quality neighborhoods for Dubai is an ultimate challenge. Considerable efforts have been dedicated to the concept of sustainable urban design and sustainable urban form in the last years; however, the majority of research has focused on Western societies. Only a handful of studies have focused on hot arid regions, or Dubai specifically. Therefore, our research addresses this gap and proposes a research design that aims to explore, articulate and advance design strategies and tactics that promote better sustainable urban design for Dubai. The identification, articulation and development of such design strategies and tactics is predicated upon your participation as an expert in the fields of design, planning, and/or sustainability.

Research Method

Mr. Alawadi would like to obtain your expert opinion regarding sustainable urban design strategies for Dubai neighborhood development through the Delphi method. The Delphi is a structured process for collecting and analyzing information through a series of two questionnaires, followed up with a report that synthesizes experts' opinions and recommendations. This Delphi study brings together the finest minds— including academics and practitioners— in the field of urban design, planning, architecture, and sustainable development.

In order for the results to represent the ultimate scope of knowledge and opinions in this field, we hope that you participate in the two rounds of this Delphi study. A report summarizing the outcome and results of each round will be sent to the participants following each respective round. The results of this research will enable Mr. Alawadi to advance and complete his dissertation research.

The overall goal of the research is to bring together a panel of international experts in order to formulate best urban design strategies for Dubai's urban neighborhood. The questions that you will be asked in the first round include, for example,

- Identification of (5 to 10) most essential urban design strategies that you anticipate would most likely lead to more socially, environmentally, and economically integrated neighborhoods in Dubai.
- Identification of (2 to 4) places, projects, or examples that represent promising sustainable urban design interventions.
- Rating (on a scale of 1 to 5) 10 urban design strategies and policy initiatives.

The questions that you will be asked in the second round of the Delphi will be based upon responses to the first Delphi questionnaire. The second round questions will be more close-ended in order to refine analyses and develop recommendations.

Included in the first Delphi questionnaire will be a package of information that reviews Dubai's development history. This file will include photographs related to the traditional and contemporary urban forms and identify the most pressing issues facing the city.

Timeframe

Participants will be given 25 days to complete each round of the Delphi; each questionnaire will take approximately 2 hours to complete. After each iteration a qualitative feedback report including analysis, comments, and findings will be sent by Mr. Alawadi to the panel.

Privacy & Confidentiality

Your name, firm, school, or organization will not be attached to any comments you provide. In addition, you will not be referred to by name or organization in the feedback reports and research write-up. However, please note that in order to make research analysis as meaningful as possible, we intend to refer to perspectives expressed by the individuals in a generic manner (e.g., "a scholar …," "an expert explained…" etc). If you prefer that your comments be referenced differently in the research write-up and feedback reports, please discuss this issue with Mr. Alawadi to find an agreeable alternative. The records of this study will be stored securely and kept confidential. Authorized persons from The University of Texas at Austin, members of the Institutional Review Board, have the legal right to review your research records and will protect the confidentiality of those records to the extent permitted by law.

Your participation in this research is extremely important in helping Mr. Alawadi complete his doctoral dissertation research; however, it is strictly voluntary. You may decline to answer any question and you have the right to discontinue your participation at any time. Refusal to participate will have no effect on you in any way and will not impact current or future relationships you may have with the University of Texas at Austin. As a matter of full disclosure, we also clarify that Mr. Alawadi is conducting this research solely for academic purposes.

Contact

Please contact Mr. Alawadi (khaled.alawadi@yahoo.com) at your earliest possible convenience to notify him of your potential participation in the study. We realize that you are very busy in your current work and hope that you will be able to participate. The success of our research depends on your insights and that of the other participants. By sharing your expertise, you can help establish and advance the body of knowledge related to the development of sustainable urban design principles and strategies in Dubai, as well as in the region. In return for the generous donation of your time, Mr. Alawadi will provide you with a digital copy of his dissertation. Mr. Alawadi is the final author of his dissertation and retains primary authorship from all publications resulting from this research.

If you have any questions, please contact myself or Mr. Alawadi (our contact information is listed below).

Thank you very much

Sincerely, (signatures were included below)

Dr. Sarah Dooling, Assistant Professor
The University of Texas at Austin
School of Architecture and the Environmental Science Institute
512-471-7878 / sarah.dooling@mail.utexas.edu

Khaled Alawadi, Ph.D. Candidate
The University of Texas at Austin
School of Architecture: Community & Regional Planning
512-698-9246 / Khaled.Alawadi@yahoo.com

This study has been reviewed and approved by The University of Texas at Austin Institutional Review Board. If you have questions about your rights as a study participant, or are dissatisfied at any time with any aspect ofthis study, you may contact - anonymously, if you wish - the Institutional Review Board by phone at (512) 471-8871 or email at orsc@uts.cc.utexas.edu. IRB Approval Number: 2009-12-0047.

Appendix 5: Interview protocols

Interview Questions

1. What are some constraints for implementing the following urban design strategies defined by experts that were surveyed?

1. Walkability (Pedestrian-friendly environment). Having a neighborhood that is easy and inviting for residents to walk around in.

2. Bike Infrastructure (having dedicated bike lanes and other easements like parking and zones where bikes are given priority over vehicles)

3. A macro-network of transit (Having neighborhoods connected to the existing metro system by a macro-network of trams)

4. Short blocks and interconnected street systems within a neighborhood

5. Green, open, and social spaces in the urban fabric (Having an interconnected system of social spaces and parks, and shaded pathway systems using soft shadows from plants & trees)

6. Diversity of residential offerings, inclusive housing (having housing for all segments of population without exceptions including high, middle, low, and working classes)

7. Diversity of land use and building types (Having neighborhoods becomes places where there is mixed-use development)

8. Density Levels (Detached single family units). A specific number that is identified by experts in round 2 Delphi will be inserted.

9. Orientation (Having a building code that identifies correct orientation (Urban + Building); location and size of shading structures on buildings; and location and size of windows.

10. Public participation in city design and development (through community workshops and surveys). Having the public, including natives and residents, participate in planning and design processes for neighborhood development.

2. Given the strategies we just discussed, where do you see opportunities for implementing some of these proposed strategies within the existing government framework? What kinds of policies might be developed to support the implementation of these proposed strategies?

3. Of the proposed strategies we have been talking about, which ones might have the most influence on the future development of Dubai? Please explain why.

Appendix 6: Invitation letter to government officials.

The letter was printed on the University of Texas at Austin, School of Architecture letterhead.

Date: was included

Dear Sir/Madam:

I am Dr. Sarah Dooling, Assistant Professor of Urban Ecology at the University of Texas at Austin. As a research faculty member in the School of Architecture, I am involved in advising doctoral students in the development of their research projects, and monitoring their progress until completion. Our doctoral program is known internationally for conducting applied research that addresses critical issues facing the world's populations and places. Rapid and massive urbanization is one of these pressing issues. Dubai, as an example, is a case that requires new design tactics for changing unchecked growth and unregulated development. This letter invites you, as an official in Dubai's local authority to participate in a research project designed by one of our current doctoral students. This project will address the development of guidelines for sustainable urban design for neighborhoods in Dubai.

Mr. Khaled Alawadi is a native of Dubai and is trained as an urban designer. He obtained his Masters in Urban Design at the University of Texas, and is currently pursuing a doctoral degree in Community and Regional Planning. I am his academic supervisor, and attest to the rigor of his proposed work, and to the anticipated contributions his work will make to the formulation of sustainable urban design strategies for Dubai. As a doctoral student, Mr. Alawadi intends for this research to address and generate dialogue about future sustainable forms for Dubai's urban neighborhoods. Following the completion of his analyses, Mr. Alawadi hopes to pursue concepts and principles of sustainability in a future academic and professional position; his role in such a position might consequently have an impact on the direction of urbanism in Dubai.

A Vision for Sustainable Dubai

His Highness Sheikh Mohammed bin Rashid Al Maktoum, the UAE Vice President and Prime Minister and Ruler of Dubai argue that "those who neglect the new will remain at the back of the line; those who wait for luck to make things happen will be disappointed . . . Determination, strategy, [research] and vision for the future are our real resources in the quest for excellence and success . . . The pen and knowledge are mightier than all other powers . . . Investment in education means investment in the lasting peace and security, which our people undoubtedly deserve . . . We have never been, nor ever will be among those who rest on their laurels; nor those who obsess on their success; nor those who believe that the march forward will continue automatically."

The vision continues, "we realize that what we have achieved is ground-breaking by all standards; we also appreciate that we are still at the beginning of the journey and that the road is long . . . I have faith and I look to the future; I want all people to share the same optimism about the future, so that we may work together to build it . . . The new world order that we are living in makes it an imperative for us to be aware of what is going on around us, so that we may ready ourselves to face any emergency ahead, regardless its source." As a result, our responsibility is to collaborate and work

together to attain ***His Highness*** revelation and image. Practitioners, professionals, academics, researchers, government officials, all in all should participate to build a sustainable Dubai that stands out in an era of diminished resources. In this regard, this research is ultimately designed to explore, articulate and advance design strategies and tactics that promote better sustainable urban design for Dubai. The articulation, assessments, and implementation of such design strategies and tactics is predicated upon your insights and participation in the research as a local authority in Dubai's government.

Research Method & Questions

Particularly, we have been undertaking a study focused on generating sustainable urban form design guidebook for neighborhood development in Dubai. An international and local panel of experts participated in the first phase of the research to identify and generate form-based urban design strategies for Dubai's neighborhood development. To conclude our study, Mr. Alawadi would like to obtain your thoughts regarding this topic via a 45 minutes to 1 hour interview (either face to face or telephone). Mr. Alawadi is interested in your thoughts because you have the knowledge about the city's infrastructure, planning process, and regulations as well as understanding about the constraints that might limit the implementation of these design strategies. Specifically, the questions that you will be asked in the interview include, for example,

- What are some constraints for implementing the following urban design strategies defined by experts that were surveyed? (Walkability, bike infrastructure, a macro-network of transit, interconnected streets systems and short blocks, green and social spaces in the urban fabric, diversity of residential offerings, diversity of land use and building types, density levels, orientation, and public participation in city design and development).

- Given the strategies we just discussed, where do you see opportunities for implementing some of these proposed strategies within the existing government framework? What kinds of policies might be developed to support the implementation of these proposed strategies?

- Of the proposed strategies we have been talking about, which ones might have the most influence on the future development of Dubai? Please explain why.

Privacy & Confidentiality

Your name or organization will not be attached to any comments you provide. In addition, you will not be referred to by name or organization in the research write-up. However, please note that in order to make research analysis as meaningful as possible, we intend to refer to perspectives expressed by the individuals Mr. Alawadi interviews in a generic manner (e.g., "a local official noted ….", "a city planner or urban designer explained…" etc). If you prefer that your comments be referenced differently in the final research write-up, please discuss this issue with Mr. Alawadi to find an agreeable alternative.

Your participation in this research is extremely important, however, it is strictly voluntary. You may decline to answer any question and you have the right to discontinue your participation at any time. Refusal to participate will have no effect on you in any way and will not impact current or future

relationships you may have with the University of Texas at Austin. As a matter of full disclosure, we also clarify that Mr. Alawadi is conducting this research solely for academic purposes.

Interviews or sessions will be audio recorded:

- The records of this study (audio records and transcripts) will be stored securely and kept confidential.
- The records will be stored in my personal computer; no-one will have an access to it. In addition, the computer is secured by a password.
- The records will be coded so that no personally identifying information is visible on them.
- Records will be heard or viewed only for research purposes by the investigator and his or her associates
- To make possible future analysis the investigator will retain the recordings in his personal computer during the research duration.
- The audio records will be erased after the study is completed and defended

The records of this study will be stored securely and kept confidential. Authorized persons from The University of Texas at Austin, members of the Institutional Review Board (IRB) have the legal right to review your research records and will protect the confidentiality of those records to the extent permitted by law.

Contact

Please contact Mr. Alawadi (Khaled.Alawadi@yahoo.com / +971504533044) to schedule an interview at your earliest possible convenience or with any questions. We realize that you are very busy in your current work and hope that you will be able to participate. The success of our research depends on your insights and that of the other officials in Dubai's local authority. By sharing your expertise, you can help establish and advance the body of knowledge related to the development of sustainable urban design principles and strategies in Dubai, as well as in the region.

Thank you very much.

Sincerely,

Dr. Sarah Dooling, Assistant Professor
School of Architecture and the Environmental Science Institute
(Signature was included)

Khaled Alawadi, Ph.D. Candidate
School of Architecture, Community and Regional Planning Program
(Signature was included)

This study has been reviewed and approved by The University of Texas at Austin Institutional Review Board. If you have questions about your rights as a study participant, or are dissatisfied at any time with any aspect of this study, you may contact - anonymously, if you wish - the Institutional Review Board by phone at (512) 471-8871 or email at orsc@uts.cc.utexas.edu. IRB Approval Number: 2009-12-0047.

Appendix 7: Survey Instrument: Arabic and English Versions

مستقبل التنمية العمرانية في دبي

استراتيجيات لتصميم أحياء سكنية

الإستبيان متوفر باللغة العربية والإنجليزية، من فضلك إختر اللغة المناسبة لك

Both Arabic and English versions of the survey are provided. Please choose the language that is appropriate to you.

النسخة العربية من الإستبيان تبدأ من الصفحة الثانية.....
The English version of the survey starts on page .....

The Future of Urban Development in Dubai

Strategies for Neighborhood Design

مستقبل التنمية العمرانية في دبي :

استراتيجيات لتصميم أحياء سكنية

الباحث الرئيسي:

خالد عبدالرحمن العوضي ، طالب دكتوراه ، قسم تخطيط المناطق المحلية والإقليمية ، كلية العمارة ، جامعة تكساس في أوستن.

البريد الالكتروني : Khaled.Alawadi@gmail.com

المشرف على البحث:

الدكتورة سارة دولينج، أستاذ مساعد.
كلية العمارة ومعهد العلوم البيئية، جامعة تكساس في أوستن.

ملاحظة : لمعرفة خلفية بسيطة عن موضوع البحث وأهدافه والالتزام في خصوصية البيانات، وتعليمات عن كيفية إتمام الإستبيان يرجى قراءة المعلومات الواردة أدناه. خلاف ذلك أسئلة الإستبيان تبدأ في الصفحة الخامسة.

معلومات عن البحث و الإستبيان :

يتمركز هذا البحث حول إيجاد أفكار و معايير تصميمية جديدة ومناسبة لتطوير المناطق السكنية في دبي من أجل رفع مستوى المعيشة و الوصول إلى منطقة سكنية مثالية ومستديمة. اشترك مجموعة من الخبراء المحليين والعالميين في الجزء الأول من البحث لإيجاد هذه المعايير. يرغب الباحث الرئيسي في أخذ أراء الجمهور من خلال هذا الاستبيان لإكمال هذا البحث. البحث قد يستغرق ثلاثون دقيقة لإكماله، الإستبيان متوفر باللغة العربية والإنجليزية، من فضلك إختر اللغة المناسبة لك.
الباحث الرئيسي يرغب في معرفة أراء الجمهور حول موضوع البحث وذلك لأن الجمهور ملم بالنواحي الثقافية و الإجتماعية وهو كذلك المستهلك و المقيم وصاحب الخبرة بالمنطقة. كما أن الباحث الرئيسي يرغب في معرفة رأي الجمهور حول الحلول و المعايير التصميمية المقترحة من قبل الخبراء.

أهداف البحث

- معرفة رأي و مقترحات الجمهور حول بعض المعايير والأفكار التصميمية المقترحة من بعض الخبراء المحليين والعالميين للوصول إلى منطقة سكنية مثالية ومستدامة في دبي
- معرفة رأي الجمهور حول إمكانية تطبيق هذه الأفكار التصميمية في مدينة دبي
- معرفة رأي الجمهور حول الأفكار التصميمية الإيجابية و المناسبة و التي يجب أن تطبّق في المناطق السكنية في دبي
- معرفة رأي الجمهور حول الأفكار التصميمية الغير مناسبة و التي تحتاج إلى التطوير قبل أن يتم الأخذ بها

الالتزام بخصوصية البيانات

التطوع في المشاركة في هذا البحث في غاية الأهمية . يمكنكم عدم الرد على أية أسئلة لا ترغبون في الرد عليها ،و يمكنكم التوقف عن المشاركة في أي وقت إذا كنتم لا ترغبون في الرد على أية أسئلة.

إجاباتكم سرية. الباحث لن يطلب تزويده بمعلوماتكم الخاصة كالاسم والعنوان، إجابتكم لن ترتبط بكم أوبمشاركتكم في هذه الدراسة. كما أن سجلات هذه الدراسة سيتم تخزينها بشكل آمن وسيتم الحفاظ على سريتها. لا توجد أية فوائد أو تكاليف لكم للرد على أسئلة الباحث. رفض المشاركة في الإجابة على أسئلة الإستبيان لن يكون لها تأثير بأي شكل من الأشكال على العلاقات الحالية أو المستقبلية التي قد تكون لديكم مع جهة عملكم أو المدرسة أو الجامعة.

للمراسلة

إذا كان لديكم أية أسئلة يرجى الاتصال بالسيد خالد العوضي (Khaled.Alawadi @ gmail.com). نجاح هذا البحث يعتمد على مساهمتكم ومساهمة المجتمع في مدينة دبي لذلك يأمل الباحث ان تكونوا قادرين على المشاركة من خلال تبادل ارائكم وأفكاركم والتي يمكنها المساعدة في تطوير سلسلة الأفكار التصميمية التي تسهم في رفع مستوى المعيشة في الاحياء السكنية في دبي.

شاكرين تعاونكم معنا

مع خالص التقدير ،

الباحث الرئيسي:

خالد عبدالرحمن العوضي ، طالب دكتوراه ، قسم تخطيط المناطق المحلية والإقليمية ، كلية العمارة، جامعة تكساس في أوستن.

المشرف على البحث:

الدكتورة سارة دولينج، أستاذ مساعد.
كلية العمارة ومعهد العلوم البيئية، ، جامعة تكساس في أوستن.

التعليمات:

- الرجاء استخدام هذا الإستبيان – سواء النسخة العربية أو الإنجليزية – لأجاباتك وأرائك.

- الاسئلة مقسمة إلى قسمين :
  - القسم الأول مكون من ثمانية أسئلة عن الخلفية الخاصة بك.
  - القسم الثاني مكون من إحدى عشر سؤال عن الاستراتيجيات و المعايير التصميمية المقترحة لتطوير الأحياء السكنية في دبي مستقبلاً.

- أرجو من حضرتكم ملاحظة ما يأتي قبل الإجابة :-
  1. قراءة فقرات استمارة الاستبيان بدقة و تمعن.
  2. وضع دائرة حول الإجابة المناسبة و كتابة أسباب الإختيار في المساحة المتوفرة.

- أرجو مراسلة الباحث عبر البريد الإلكتروني للمزيد من التوضيحات عند مواجهتكم لأية صعوبة في الإجابة عن الأسئلة.

شاكرين تعاونكم معنا

الباحث:

خـــالـــد العـــوضـــي
Khaled.Alawadi@gmail.com

القسم الأول من الأسئلة : المعلومات الديموغرافية

الرجاء وضع دائرة حول الإجابة المناسبة أو كتابة الإجابة في الفراغ المخصص

1. **الجنس ؟**

ذكر أنثى

2. **العمر ؟**

19-16	25-20	30-25	35-30
40-35	45-40	50-45	أكثر من 50

3. **المستوى التعليمي؟**

أقل من الشهادة الثانوية	شهادة ثانوية	مؤهل جامعي
درجة الماجستير	درجة الدكتوراة	
أخرى ؟ اذكر		

4. **نوع العمل: يرجى وصف عملك**

5. **الجنسية ؟**

6. **المدينة التي تعيش فيها حالياً؟**

7. **المطنقة السكنية – أجب عن هذا السؤال إذا كانت دبي هي المدينة التي تعيش فيها.**

القسم الثاني من الأسئلة : أسئلة البحث

الرجاء قراءة الأسئلة التالية التي تدور حول المعايير التصميمية الخاصة بتصميم المناطق السكنية في دبي.
ضع دائرة حول الرقم المناسب للإجابة على أسئلة هذا القسم حيث أن :

الرقم (1) يعني : تعتقد أن الفكرة التصميمية ليست مهمة على الإطلاق.
الرقم (2) يعني : تعتقد أن الفكرة التصميمية مهمة إلى حد ما.
الرقم (3) يعني : تعتقد أن الفكرة التصميمية مهمة جداً.

بعد اختيارالرقم المناسب في كل سؤال، الرجاء توضيح سبب أجابتكم في المساحة المخصصة.

الأسئلة:

الرجاء وضع دائرة حول الرقم المناسب و كتابة إجابتك في المساحة المخصصة.

الفكرة التصميمية الأولى : (بيئة جذابة و مناسبة للمشاة) : ما رأيك في وجود أحياء سكنية مفعمة بالحيوية والنشاط ، وذلك من خلال توفير ممرات خاصة وآمنة للمشاة تسهل عليهم قضاء الإحتياجات اليومية ؟
مثال: ممرات مشاة خاصة تمكن الفرد على قضاء حاجاته اليومية سيراُ على الأقدام كالوصول إلى المسجد و المنتزهات و المحلات التجارية و المطاعم وغيرها من الخدمات.

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

الفكرة التصميمية الثانية : (شبكة ممرات متكاملة للدراجات الهوائية) : ما رأيك في وجود مسارات خاصة للدراجات الهوائية – منفصلة عن المسارات المخصصة للسيارات- في الأحياء السكنية، بالإضافة إلى توفير مواقف خاصة للدراجات الهوائية وجميع التسهيلات كوسائل الأمن المرتبطة لجعل الدراجات الهوائية وسيلة تنقل سهلة وآمنة ومحافظة على البيئة ؟

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

الفكرة التصميمية الثالثة : (سلسلة من الحدائق والأماكن العامة) : ما رأيك في زيادة نسبة الحدائق و المنتزهات و البساتين و المنشآت الترفيهية و الرياضية بالإضافة إلى تخصيص ممرات مشاة مضللة بالأشجار في الأحياء السكنية ؟ حيث تكون هذه الأماكن العامة والحدائق على بعد مسافات قصيرة وسهلة للوصول إليها سيرا على الأقدام.

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

الفكرة التصميمية الرابعة : (مجموعة من الخيارات السكنية) : ما رأيك في وجود مناطق سكنية مهيئة لإستيعاب إحتياجات شرائح السكان المختلفة في دبي؟، و ذلك من خلال توفير مجموعة من الخيارات السكنية – أنواع و أحجام مختلفة من المنازل والشقق – لجميع الناس من مختلف فئات الدخل. العمل بهذه الفكرة يهدف إلى توفير مرونة كافية لإستيعاب إحتياجات القاطنين بمدينة دبي من مواطنين وعائلات المقيمين على تنوع جنسياتهم و العزاب و العمالة الوافدة مثل عمال البناء و العاملين في المتاجر و المطاعم. هذه الفكرة تهدف إلى توفير نفس مستوى الخدمات والتسهيلات لجميع فئات المجتمع.

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

الفكرة التصميمية الخامسة : (إستعمالات متعددة و متنوعة للأراضي) : ما رأيك في وجود سلسلة متنوعة من المنازل و المدارس و أماكن العمل و المنتزهات والأماكن الترفيهية و العيادات و المتاجر والمطاعم وغيرها من الخدمات في المناطق السكنية ؟

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

الفكرة التصميمية السادسة : (التصميم البيئي للمباني) : ما رأيك في زيادة مستوى الراحة في المباني السكنية من خلال تطبيق معايير وحلول تصميمية تقلل من تسرب أشعة الشمس المباشرة و ترفع من نسبة التهوية الطبيعة في المباني من أجل تقليل نسبة استهلاك الطاقة ؟

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

الفكرة التصميمية السابعة : (شبكة من القطارات الخفيفة - الترام*- في الأحياء السكنية) : ما رأيك في توفير شبكة من الترام تربط السكان بالخدمات المتوفرة في الأحياء السكنية و بوسائل النقل مثل مترو دبي ؟
(الصفحة التالية توضح الفكرة المقترحة).

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

* **الترام** : أخف و اقصر من القطارات التقليدية و العالية السرعة، يتم تشغيلها على المسارات المخصصة للسيارات او في مسارات منفصلة بجانب الأرصفة أو على منصات الجزيرة.

الشكل 1 : منطقة مظللة للإنتظار في يسار الصورة

مصدر الصورة : مجلس أبوظبي للتخطيط العمراني

الشكل 2 : مثال لنظام الترام في حي سكني

مصدر الصورة : مجلس أبوظبي للتخطيط العمراني

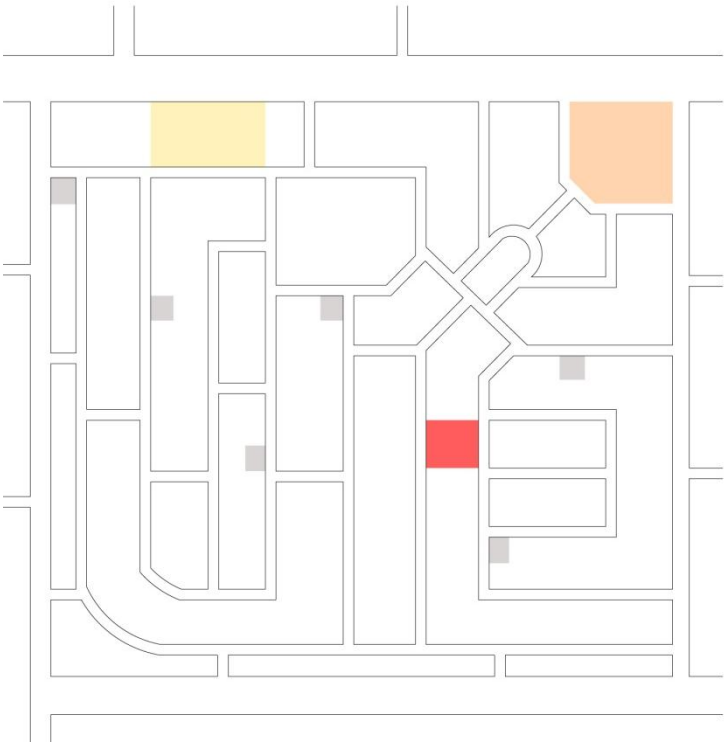
* **الترام** : أخف و اقصر من القطارات التقليدية و العالية السرعة، يتم تشغيلها على المسارات المخصصة للسيارات او في مسارات منفصلة بجانب الأرصفة أو على منصات الجزيرة.

الفكرة التصميمية الثامنة : (نظام الشوارع في الأحياء السكنية) : يرجى إلقاء نظرة على المخططات التالية والخصائص التي توضح نظامين للشوارع في حي سكني ومن ثم أجب على السؤال في الصفحة التالية :

الشكل 1
شبكة طرق مترابطة

خصائص و مواصفات :
1. الشبكة مخصصة للمشاة (سهلة وآمنة على المشي)
2. يمّكن المشاة والسائقين الوصول بسهولة وبسرعة إلى بعض الوجهات مثل منزل الجيران، المسجد، السوق، أوالمدرسة
3. المشاة والسائقون يملكون العديد من الخيارات والاحتمالات لتحويل الوجهة
4. يمّكن المشاة والسائقون العثور على العنوان أو الوجهة بسهولة
5. الحد الأقصى للسرعة في هذه الشبكة منخفض إلى معتدل(شعورعالي بالأمان)

الشكل 2
نموذج تقريبي لشبكة الطرق المتوفرة في معظم الأحياء السكنية في دبي



خصائص و مواصفات :
1. الشبكة مخصصة للسيارات (صعبة و ليست آمنة للمشي)
2. تستغرق وقتا وجهدا للمشاة والسائقين للعثورعلى عنوان أو التوصل إلى بعض الوجهات مثل منزل الجيران، المسجد، السوق، أو المدرسة وذلك لوجود خيارات محدودة وقليلة لتحويل الوجهة
3. الحد الأقصى للسرعة في هذه الشبكة متوسط إلى عالي (شعور قليل بالأمان)

أي النظامين تفضل ؟

- نظام الشوارع في الشكل 1
- نظام الشوارع في الشكل 2

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

الفكرة التصميمية التاسعة : (مشاركة المجتمع في تنمية وتصميم الأحياء السكنية) : ما رأيك في إعطاء المواطنين و بعض المقيمين في دبي الفرصة في المشاركة في تخطيط و تصميم الأحياء السكنية من خلال حلقات عمل و إجتماعات عامة و الاستبيانات و الاستطلاعات ؟

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

الفكرة التصميمية العاشرة : (مساحة الأرض لمنزل عائلة واحدة ـ فيلا) : حكومة دبي توفرللمواطنين أراضي سكنية لبناء منزل عائلة واحدة (فيلا). المقيمين ، من ناحية أخرى ، يشترون الأراضي أو الفلل الجاهزة من السوق. هناك مجموعة واسعة من مساحات الأراضي في دبي ، ولكن متوسط مساحة الأرض لمنزل عائلة واحدة يصل تقريبا الى 10000 قدم مربع (929 متر مربع).

اقترحت مجموعة من الخبراء أن هذه المساحة كبيرة جدا. وأكدوا أن دبي بحاجة لتوفير الطاقة وخفض النفقات المرتبطة بتوفير البنية التحتية والخدمات للمنازل. لذلك اقترح الخبراء بخفض متوسط مساحة الأراضي السكنية للفيلات الى ما يقرب 6200 قدم مربع (576 متر مربع) ، ومنح مالك الأرض فرصة البناء على الأرض بأكملها. بالإضافة ستتوفر أراضي أكبر للعائلات الكبيرة و القادرين على تحمل تكاليف بناء منازل كبيرة.

ما رأيك في هذا الاقتراح ؟

1. ليس مهماً على الإطلاق
2. مهم إلى حد ما
3. مهم جداً

الرجاء شرح إجابتكم في المساحة الموجودة أدناه

السؤال الحادي عشر : من مجموعة الأفكار التصميمية المطروحة في هذا الاستبيان من فضلك اختر أفضل خمسة (5) أفكار قد تسهم في رفع مستوى المعيشة في مدينة دبي.

الرجاء تحديد الخيارات الخمسة الخاصة بك أدناه، بوضع دائرة حول الرقم المناسب
عند الحاجة، يرجى الرجوع إلى وصف الأفكار التصميمية المتوفرة أعلاه.

1. بيئة جذابة و مناسبة للمشاة
2. شبكة ممرات متكاملة للدراجات الهوائية
3. سلسلة من الحدائق والأماكن العامة
4. مجموعة من الخيارات السكنية
5. إستعمالات متعددة و متنوعة للأراضي
6. التصميم البيئي للمباني
7. شبكة من القطارات الخفيفة - الترام- في الأحياء السكنية
8. نظام الشوارع في الأحياء السكنية (إذا قمت بإختيار هذه الفكرة التصميمية ، يرجى اختيار إما ألف أو باء)
   أ. شبكة الطرق المترابطة
   ب. نموذج تقريبي لشبكة الطرق المتوفرة في معظم الأحياء السكنية في دبي
9. مشاركة المجتمع في تنمية وتصميم الأحياء السكنية
10. مساحة الأرض لمنزل عائلة واحدة – فيلا

الرجاء شرح أسباب اختيارك في المساحة الموجودة أدناه

The Future of Urban Development in Dubai:

Strategies for Neighborhood Design

Investigators

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Email: Khaled.alawadi@gmail.com

Supervisor

Dr. Sarah Dooling, Assistant Professor
School of Architecture and the Environmental Science Institute

Hint: For your interest and background about the research topic and goals, commitment to privacy and confidentiality, and instructions of how to complete the survey please read the following information. Otherwise, the survey questions start on page 18

Research Topic and Procedure

Particularly, we have been undertaking a study focused on generating sustainable urban form design strategies for neighborhood development in Dubai. An international and local panel of experts participated in the first phase of the research to identify and generate potential urban design strategies. To conclude our study, Mr. Alawadi would like to obtain your thoughts regarding this topic through a self-administrated survey. The survey might take approximately 30 minutes of your time. Both Arabic and English versions of the survey are provided. Please choose the language that is appropriate to you. Mr. Alawadi is interested in your thoughts because you are the users and the residents of Dubai who have the knowledge about the city's cultural and social aspects. In addition, the survey will enable the researcher to obtain your feedback and opinion on the experts proposed design ideas and strategies for Dubai's neighborhood development.

Research Objectives

- Identify the public opinion about design ideas for Dubai neighborhood that have suggested by an international and local panel of experts.
- Understand how the public perceives the suitability of the proposed design strategies and ideas for Dubai.
- Identify the strategies that public feel are positive and should be encouraged in future development of neighborhoods.
- Identify the strategies that public feel are inappropriate and should be discouraged in future neighborhoods, or improved before implementation.

Privacy & Confidentiality

Your participation in this research is extremely important. However, you don't have to answer any questions you do not want to answer—this is voluntary—and if you don't want to answer any questions you can discontinue your participation at any time.

I will not be asking for your name and address so that your answers cannot be associated with you or your participation in this study. In other words, your answers are confidential. The records of this study will also be stored securely and kept confidential. There are no benefits or costs to you for answering my questions. Refusal to participate will have no effect on you in any way and will not impact current or future relationships you may have with (your employment, school, or university).

Contact

Please contact Mr. Alawadi (Khaled.Alawadi@gmail.com) if you have any question about the research or the survey. We hope that you will be able to participate. The success of our research, in fact, depends on your contribution and insights and that of the other public in Dubai. By sharing your opinion, you can help establish and advance the body of knowledge related to the development of high quality urban living in Dubai, as well as in the Emirates.

Thank you very much.

Sincerely,

Dr. Sarah Dooling, Assistant Professor
School of Architecture and the Environmental Science Institute

Khaled Alawadi, Ph.D. Candidate
School of Architecture, Community and Regional Planning Program

Instructions

- Please use this document (either the Arabic or the English version) for your answers and opinions.
- There are two sections in this survey. Section 1 includes 8 questions about your background; a complete answer to all questions is appreciated.
- Section 2 in the survey includes 11 questions that ask you about specific strategies to improve Dubai neighborhoods; a complete answer to all questions is appreciated.
- Please answer each question by circling the appropriate answer and by writing your response in the space provided.
- If any sentence, direction, or question is not clear to you, please email the main investigator with your questions.

Thank you

Investigator:

Khaled Alawadi
Khaled.Alawadi@gmail.com

Section (I): Demographic Information

Please answer each question by circling the appropriate answer or writing your answer in the space provided.

1. What is your gender?

(A) Male (B) Female

2. What is your age?

(A) 16-19 (A) 20-25 (B) 25-30 (C) 30-35 (D) 35-40 (E) 40-45

(F) 45-50 (G) More than 50

4. What is the highest level of education you have completed?

(A) Less than high school (B) High school (C) Some college (D) College degree

(E) Master's degree (F) Doctorate degree

5. Employer type: Please describe your work

6. What is your nationality?

7. In which city do you currently live?

8. If you live in Dubai, in which neighborhood do you currently live?

Section (2): Research Questions

Please read the questions below and rate on a scale of 1 to 3 your opinion about the important design ideas for and qualities of your ideal neighborhood should have

- 1 means: You believe that the design idea is not important at all.
- 2 means: You believe that the design idea is somewhat important.
- 3 means: You believe that the design idea is very important.

In every question, please explain your response within the space provided.

Questions:

Please provide your opinion by circling the appropriate number and by writing your answer in the space provided.

Design Idea 1 : Walkability (Pedestrian-friendly environment) : What do you think about a neighborhood that is easy and inviting for people to walk around? For example, being able to walk to a mosque, parks, shops, grocery stores, cafes, restaurants, and other services.

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

Design Idea 2 : (Bike Infrastructure) : What do you think about neighborhoods with special bicycle lanes and other qualities like parking for bicycles and areas where bicycles use is safe and easy?

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

Design Idea 3 : (Green areas in the neighborhood) : What do you think about increasing the amount of parks, sport fields, gardens, playgrounds, and shaded sidewalks in neighborhoods? These would all be short walk and easy to get to.

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

Design Idea 4 : (Housing choices) : What do you think about neighborhoods with a wide-range of housing choices – having different types and sizes of houses and apartments – for all segments of Dubai's population? This strategy would allow singles, construction workers, as well as retail and service sector workers employed in commercial stores, restaurants, and cafes to live together with families and those who have higher income levels in the same neighborhood and have access to the same facilities and services.

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

Design Idea 5 : (Mixture of land use and buildings) : What do you think about neighborhoods that combine houses, schools, places of work, parks, clinics, stores, services, cafes, and restaurants?

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

Design Idea 6 : (Environmental design of buildings) : What do you think about neighborhoods that have buildings built to increase comfort levels by capturing more breezes and less sun in order to reduce energy use.

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

Design Idea 7 : (Network of trams* in neighborhoods) : What do you think about neighborhoods that have a tram system that connects residents with different uses and services in the neighborhood and also to the Dubai Metro system? For example, walking from houses, schools, place of work, services, parks, and stores to neighborhood tram stops would take no more than 5 minutes. (Figures below show how the tram system in a neighborhood might look like).

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

*** Trams** are usually lighter and shorter than conventional and high speed trains. They run on streets. They can share the lane with vehicles or have a dedicated, separated lane, either along the sidewalks or on island platforms.

Figure 1: A shaded waiting area on the left.
Image Source: Abu Dhabi Urban Planning Council

Figure 2: An example of a tram system through a neighborhood
Image Source: Abu Dhabi Urban Planning Council

*** Trams** are usually lighter and shorter than conventional trains and high speed trains. They run on streets. They can share the lane with vehicles or have a dedicated, separated lane, either along the sidewalks or on island platforms.

Design Idea 8 : (Neighborhood street systems) : Please look at the following drawings and qualities of two different street systems and then answer the question in the next page.

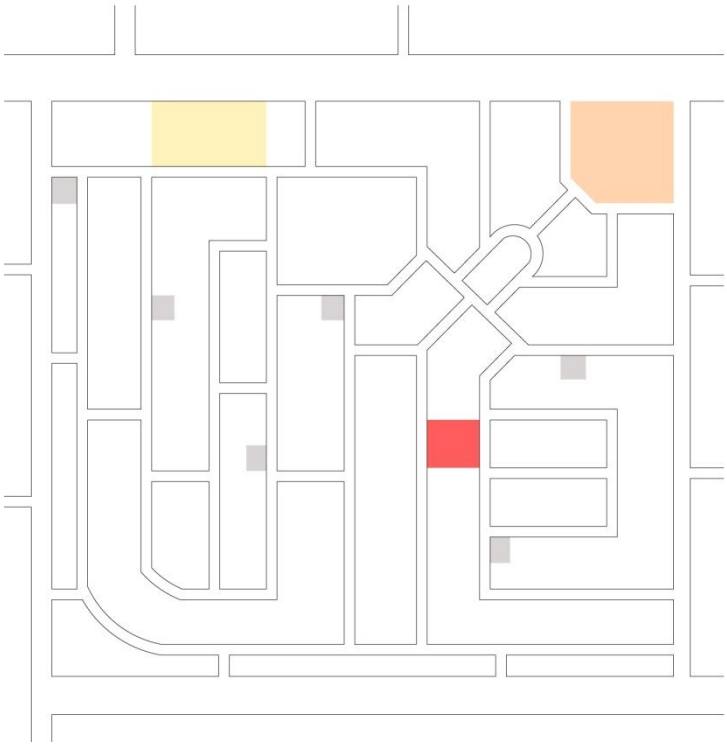

Figure 1
Interconnected street system

Qualities & Characteristics:
1. Pedestrian oriented (Safe and easy to walk around)
2. Pedestrians and drivers can easily and quickly reach destinations like a neighbor house, mosque, market, school.
3. Pedestrians and drivers have many choices and possibilities to turn.
4. Pedestrians and drivers can simply find an address or a destination.
5. Road speed limit is low to moderate (Sense of safety is high)

Figure 2
A common street system in Dubai's neighborhoods

Qualities & Characteristics:
1. Car oriented (Unsafe and difficult to walk around)
2. With limited choices to turn, it takes time and effort for pedestrians and drivers to find an address or reach destinations like a neighbor house, mosque, market, school.
3. Road speed limit is moderate to high (Sense of safety is poor)

Which street system do you prefer the most?

- The street system in Figure 1
- The street system in Figure 2

Please explain your response within the space provided below.

Design Idea 9 : (Public participation in neighborhood design and development) : What do you think about allowing natives and some residents in Dubai to participate in the planning and design of their neighborhoods through workshops, public meetings, and surveys?

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

Design Idea 10 : (Land size for a single family house - Villa) : Natives in Dubai have subsidized land parcels from the government to build a single family house (Villa). Residents, on the other hand, purchase lots or single family villas out on the open market. There are a wide range of lot sizes in Dubai, but the average land size for a single family house is around 10,000 ft^2 (929 m^2).
A group of experts have suggested that the current amount of land for a single family house is too big. They say that Dubai needs to save energy and reduce expenses associated with providing infrastructure and services to homes. For these reasons, they suggest a smaller land area for single family homes, approximately 6,200 ft^2 (576 m^2), and giving the home owner the opportunity to build on the entire land that they own. Besides, there will be larger lands for big families and people with the budget to afford building big houses.

What do you think about this suggestion?

- 1 (not important at all)
- 2 (somewhat important)
- 3 (very important)

Please explain your response within the space provided below.

Question 11 : Out of the design ideas and neighborhood qualities presented in this survey, which five (5) do you think will most likely improve the quality of Dubai's neighborhoods?

Please select your 5 choices, below, by circling the numbers
Please refer to the description of the design ideas that are provided above when needed

1. Walkability (Pedestrian-friendly environment):
2. Bike Infrastructure
3. Green areas in the neighborhood
4. Housing choices
5. Mixture of land use and buildings
6. Environmental design of buildings
7. Network of trams in neighborhoods
8. Neighborhood street systems (If you select this design idea, please select either A or B)
    A. Interconnected street system
    B. A common street system in Dubai's neighborhood
9. Public participation in neighborhood design and development
10. Land size for a single family house (Villa)

Please briefly explain why your selections are important

Appendix 8: Delphi round one results; examples of urban design interventions

Table: Geography of Cases

Geographic Setting	Case Studies / Examples	
Middle-East		
UAE	Masdar City	Dubai: Up-Town Mirdif
	Xeritown: Dubai	Dubai Marina
	RAK Gate way project in Ras Al Khaimah Emirate, by Snohetta	Badrah development for Nakheel which was designed as a LEED Silver neighborhood, Dubai
	The Walk at Jumierah Beach Residences in Dubai Marina	Dubai World Trade Centre and other buildings of the 1970s and 1980s in Dubai
	Dubai International Financial Center (DIFC)	Bastakiya, Dubai
	Old Town: Fountain/Dubai Mall/Burj Khalifa	The Old CBD redevelopment, Abu Dhabi
	Cairo Dubai, Dubai	Abu Dhabi Rapid Transit 2030
	Al Hilal City, Fujeirah, UAE	Eco-City Development, RAK, UAE
	Al-Maha Resort, Dubai	
KSA, Saudi Arabia	Using spatial sustainability in redeveloping of Jeddah by Space Syntax Limited, UK	The Ministry of Foreign Affairs Staff Housing, Riyadh, KSA, Saudi Arabia
	Wasia village, Saudi Arabia	Villa proposal for the Government of Saudi Arabia
	Tuwaiq Palace, Saudi Arabia	King Abdulla City, Saudi Arabia
Qatar	College of North Atlantic, Doha, Qatar	
	MUSHREIB (Heart of Doha Project), Doha, Qatar, Dohaland	
Kuwait	Avenues Mall	
Oman	Blue City	
Syria	The recent revitalization work that continues in Aleppo with the Aga Khan Trust for Culture.	
Lebanon	Beirut Souks Project Proposal by Stan Allen	
	Master Plan for the American University of Beirut by Sasaki Associates & Machado Silvetti	
	Saifi Village, Beirut	

Iran	Low carbon housing experiment at Hashtgerd New Town, Iran	
Europe		
Germany	Direct use of solar energy: The city of Freiburg, Germany	
	Using more Bicycles: Münster (Muenster), the bicycle capital of Germany	
Belgium	Changing Food Habits: The city of Ghent, Belgium	
UK	BedZED (the Beddington Zero Energy Development)	
Sweden	Hammarby Sjöstad	
Austria	European sustainable city: Vienna	
North America		
U.S.	Portland, U.S.	Conserving water: The city of Las Vegas
	Arcosanti (in Arizona) "Canalscape," Phoenix metropolitan area	Unpublished, essay on sustainable desert urbanism by Elias Amidon and Elizabeth Roberts "Oasis: Dwelling in the Desert", 1988
	Hybrid form-based/zoning code for Phoenix	Chicago Urban Design Strategy: Chicago Metropolitan Agency for Planning
	California Public Employees' Retirement System (CalPERS) Headquarters Complex	Thoreau Center for Sustainability, San Francisco, CA
	Lawrence Berkeley National Laboratory Molecular Foundry, Berkeley, CA	Baca/Dlo'ay azhi Community School, Prewitt, NM
	Applications of New Urbanism: City center revitalization project, Louisville, KY / Riverfront development in Providence RI, U.S. / Martin Luther King, JR. Plaza revitalization project in Philadelphia, PA, U.S	
Canada	Vancouver model of urban development	
South Asia		
India	Asian Games village, New Delhi	
	Jaisalmer, Thar desert: India	
	Aranya Community Housing, Indore, India (South Asia) by Vastu-Shilpa Foundation, Balkrishna V. Doshi	
	Maharashtra Housing project by Charles Correa, Mumbai	
Africa		

Egypt	Madinaty, Cairo, Egypt
	Using earth in parts of Africa, Latin America and even Europe
	The work of Hassan Fathy in Egypt, such as New Baris Cultural Park for Children in Cairo, Egypt (North Africa) by Abdelhalim Ibrahim Abdelhalim
Tunis	Sidi El Aloui Primary SchoolSidi El Aloui Primary School in Tunis, Tunisia (North Africa) by Association de Sauvegarde de la Médina de Tunis / Samir Hamaici, Denis Lesage.

Table: The Contributed cases by the panel

Experts	Case Studies / Examples
Expert A	Yemen Wasia village, Saudi Arabia Villa proposal for the Government of Saudi Arabia Tuwaiq Palace, KSA Asian Games village, New Delhi
Expert A1	Masdar City RAK, UAE, Eco-City Development Traditional cities that are well adapted to the desert and to the culture *of the place* such as Old Cairo, Old Damascus, Old Baghdad London
Expert A2	Barcelona, Spain Vancouver, Canada Portland, Oregon, USA
Expert A4	The Old CBD redevelopment (Abu Dhabi) Vancouver Model of urban development (Canada)
Expert A5	The Ministry of Foreign Affairs Staff Housing, Riyadh, KSA College of North Atlantic, Doha, Qatar
Expert A6	Cairo Dubai (Dubai, UAE) Madinaty (Cairo, Egypt)
Expert A7	Masdar City Al-Maha Resort (Dubai)
Expert A & N	King Abdulla City, Saudi Arabia Using spatial sustainability in redeveloping of Jeddah by Space Syntax Limited, UK
Expert C	Abu Dhabi Rapid Transit 2030, RTA Beirut Souks Project (Proposal), Stan Allen
Expert D	Dubai International Financial Center (DIFC) Old Town: Fountain/Dubai Mall/Burj Khalifa The Walk at Jumierah Beach Residences in Dubai Marina
Expert E	Masdar City Fujeirah, UAE: Al Hilal City Dubai: Up-Town Mirdif

	Dubai Marina
Expert F	An example of compact neighborhood Campus development plan of Texas A&M University
Expert F1	Direct use of solar energy: The city of Freiburg, Germany Conserving water: The city of Las Vegas Using more Bicycles: Münster (Muenster), the bicycle capital of Germany Changing Food Habits: The city of Ghent, Belgium Moving Information Better than Moving People Creating Stakeholders
Expert F2	Masdar City Xeritown: Dubai Blue City: Oman
Expert G	Dohaland Avenues Mall in Kuwait. And indeed many of the other large malls in the Gulf
Expert G2	The best model for Dubai is its own indigenous architecture and urban design. It just needs to be densified and built with modern materials and with modern amenities. Of course high density does not have to mean just high-rise structures, and high-density low-rise solutions should be considered, especially for housing.
Expert G3	Xeritown, Dubai, by SMAQ RAK Gate way project in Ras Al Khaimah Emirate, by Snohetta.
Expert J	Jaisalmer, Thar desert: India Masdar City Dammam proposal, Duany Platter Ayberk & Co. Rashad Hoipdsital proposal, MUDD program UNSW
Expert K	Applications of New Urbanism: City center revitalization project, Louisville, KY Riverfront development in Providence RI, U.S. Martin Luther King, JR. Plaza revitalization project in Philadelphia, PA, U.S. Saifi Village, Beirut, Lebanon
Expert K1	California Public Employees' Retirement System (CalPERS) Headquarters Complex Thoreau Center for Sustainability, San Francisco, CA Lawrence Berkeley National Laboratory Molecular Foundry, Berkeley, CA Baca/Dlo'ay azhi Community School, Prewitt, NM
Expert K2	Masdar City Existing examples that have proven successful are the Medinas found in North Africa and Yemen. There are other examples built using earth in parts of Africa, Latin America and even Europe. See Basim Selim Hakim's book on *Arabic-Islamic Cities: building and planning principles.*
Expert K3	BedZED (the Beddington Zero Energy Development), UK Maharashtra Housing project by Charles Correa Ken Yeang's Approach: "City-in-the-Sky"
Expert K4	Hammarby Sjöstad, Sweden Traditional City Fabrics: "traditional" examples of cities in the MENA region

	(e.g those covered in S Bianca's *Urban Form in the Arab World*).
Expert M	World's Most Successful Cities according to the European Institute for Urban Affairs (EIUA) Portland's model: Sustainability indicators of Portland Live Green Toronto; a unique environmental program Mercer Consulting Survey on quality of life (sustainable cities worldwide). European sustainable city: Vienna, Austria. Best eco-cities in Europe SustainLane's classification and ranking of U.S cities (2008) Indicators and sub-indicators of a sustainable city.
Expert N	MUSHREIB (Heart of Doha Project), Doha, Qatar by Dohaland Masdar City Barcelona, Spain
Expert N1	"Canalscape," Phoenix metropolitan area Hybrid form-based/zoning code for Phoenix Unpublished, essay on sustainable desert urbanism by Elias Amidon and Elizabe Roberts "Oasis: Dwelling in the Desert", 1988.
Expert R	Urban design theory that has arisen from the "New Urbanist" movement. The work by Hassan Fathy in Egypt, such as New Baris, and the recent revitalization work that continues in Aleppo with the Aga Khan Trust for Culture.
Expert R1	Masdar City Badrah development for Nakheel which was designed as a LEED Silver neighborhood.
Expert R2	Masdar City Arcosanti (in Arizona)
Expert S	Dubai World Trade Centre and other buildings of the 1970s and 1980s in Dubai Masdar City / Bastakiya, Dubai
Expert S2	Al Azhar Park and Revitalization project, Darb Al Ahmar district in Cairo, Egypt. Central Market, Koudougou, Burkina Faso (West Africa) by Swiss Agency for Development and Cooperation. Aranya Community Housing, Indore, India (South Asia) by Vastu-Shilpa Foundation, Balkrishna V. Doshi. Master Plan for the American University of Beirut by Sasaki Associates & Machado Silvetti. Low carbon housing experiment at Hashtgerd New Town, Iran Cultural Park for Children in Cairo, Egypt (North Africa) by Abdelhalim Ibrahim Abdelhalim. Sidi El Aloui Primary SchoolSidi El Aloui Primary School in Tunis, Tunisia (North Africa) by Association de Sauvegarde de la Médina de Tunis / Samir Hamaici, Denis Lesage.
Expert S3	Chicago Urban Design Strategy: Chicago Metropolitan Agency for Planning

Appendix 9: Evaluation of traditional and contemporary urban form strategies: Experts' rating and comments of single, specific design strategy and policy initiative

An urban orientation that minimized direct solar access and maximized the flow of prevailing winds.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	20	8	6	1	0
Percentage	57.14 %	22.86 %	17.14 %	2.86 %	0
Average	4.28				
Median	5				
Potential Benefits	1. Urban orientation should always be a priority "number 1" (K1, 2010). 2. This strategy is a simple means of maximizing "on-site opportunities," and should be considered as much as possible (N1, 2010). 3. The urban layout should always take an advantage of natural factors (sun, wind). 4. This simple solar "defense strategy" is used far too little in Dubai (D, 2010). 5. They have been largely "discarded" in favor of financial returns and technological solutions. Many proposals do not take into consideration how urban and building orientation could reduce negative impacts of hot weather (G1, 2010). 6. Urban orientation should be more addressed in Dubai that has an extreme weather condition. New developments have to respond to climate (B1, 2010). 7. If this strategy is achieved and used appropriately, it will have a good impact on environmental, thus economic factors (A&N, 2010). 8. This passive strategy is extremely important to "mitigate" the urban heat island effect (A7, 2010). 9. This is a very important strategy in reducing energy consumption especially for "cooling" purposes (K3, 2010). 10. This is very important as the orientation would reduce the "overall heat gain into all building facades, lessens cooling loads, hence reduces power supply, and yet results in large reduction of CO_2" (M, 2010) 11. Communities should be laid out so that "fenestration "is minimized/avoided on West facades and maximized on North facades. Besides, long sides of buildings should always be oriented towards North (S, 2010). 12. Orientation is not only important in improving "thermal comfort," but also in enhancing mental and "psychological means" by providing adequate light in buildings (A1, 2010). 13. To be in "perfect alignment with nature" is an important sustainability indicator that can reduce energy demand (N, 2010). This statement is affirmed by another expert who says that the "primary focus" of urban layout should take as much advantage as possible from the environment (e.g. sun, wind, tide, and geothermal) (F2, 2010).				
Constraints / Recommendations	1. One expert says, after working in several public and private agencies, I observed that this strategy is completely disregarded in city design and planning (A2, 2010). 2. Sometimes maximizing the flow of prevailing wind might lead to very cold and windy streets/spaces between buildings in winter which can be "uncomfortable" (A2, 2010). 3. The strategy is useful for a great part of the year, but not "July and August" (R1, 2010). 4. It is an important strategy but not always achievable in design (A4, 2010). There might be factors that "prohibit implementation" (existing buildings and street networks,				

	etc.) (K4, 2010). 5. It will lower the temperature "3 or 5" degrees but not to a human comfort level (A5, 2010). 6. Orientation + type of façade should be adopted as planning and building codes (C, 2010). 7. Orientation should be a consideration, but not the "principal generative" strategy of urban form (C, 2010). 8. If we are looking for energy efficiency we should also consider the "cross section of wall and material resistance, especially the U value" (F, 2010).

Narrow, shaded, and interconnected pedestrian-focused community.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	12	13	9	1	0
Percentage	34.29 %	37.14 %	25.71 %	2.86 %	0
Average	4				
Median	4				
Potential Benefits	1. This strategy is very close to the original "native settlement." The one that was climatically and culturally sensitive and was most "conducive" to a dynamic, friendly, and collaborative urban community (R2, 2010). 2. This strategy is one of "the best and successful practices and it is a correct model for human scaled communities" (N, 2010). 3. Walkability is a "success" (E, 2010). It creates a "safer" (A, 2010) environment and a "healthy" lifestyle (S2, 2010). 4. A pedestrian-focused community reflects "a human-scale environment" (A2, 2010). 5. Dubai has too few walkable outdoor realms; therefore, this strategy will encourage walking, especially during the cooler months (P, 2010). 6. Dubai's very "wide roads" promote the use of automobile; therefore, network of pedestrian paths is essential to provide a healthier way of life and movement (G1, 2010). 7. This strategy can emerge as a "prototype" of great streets in new developments (B1, 2010). 8. To make this pedestrian focused community functional, proper shading should be provided; services and transit stops should also be within a walking distance (B1, 2010). 9. A pedestrian-oriented community based on interconnected street patterns is a "precondition" for a healthy and "socially" oriented neighborhood (K4, 2010). 9. Pedestrian focused communities reduce automobile use, carbon emissions, air pollution, accidents, and stress (F1; S, 2010). 10. Could provide a new "holistic" experience of the city "away from the automobile" (F1, 2010).				
Constraints / Recommendations	1. The problem with this strategy is associated with "travel behavior" as the majority of Dubai inhabitants excessively rely on private cars and this is very difficult to change (F, 2010). One expert says, the middle and high income groups in Dubai would "hardly accept this" (G3, 2010). Besides, it should be considered that walkability is less favored among the "Emiratis" than the expats (D, 2010). 2. It can work if residents are willing to "change" their life style. New policies, such as a higher taxation on car driving, congestion fees, high gas prices might make walkability more favorable than cars (F2, 2010).				

	3. Has potential, but the reality of "modern living" and indeed "fire trucks access" requires a level of urban mobility that denies the "historic" patterns (R1, 2010). 4. This could be beneficial, but the "hot and humid climate" may put some limits (M, 2010). 5. The effectiveness of this strategy will depend on the "time of the year" (S3, 2010). 6. Narrow is a "relative" term. It should be replaced by a "ratio" between building height and street width (A1, 2010). 7. Narrowness of streets to increase shading is not very effective in "latitudes between 15-22 degrees" (like the UAE) due to the "high altitude" of the sun (K1, 2010). 8. Providing shading by "horizontal fabrics" or light structures or by trees is a better solution (K1, 2010). 9. Shaded and interconnected are important, but "narrow is not." Could be wide, but with "shading" elements (N1, 2010).

A culturally meaningful transition from the private, to semi-private, to public spaces that provided experiences of security, safety, privacy, and more frequent exchanges among residents.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	18	7	4	2	3
Percentage (%)	31.43 %	20.00 %	11.42 %	5.71 %	8.57 %
Average	4.05				
Median	5				
Potential Benefits	1. "Contemporary urbanism" should be based on "cultural, spirituals, and religious needs and values (A; F2, 2010). 2. It is important to "distinguish" between public domain, semi public and, private spaces in urban design (F, 2010). 3. It is a very important strategy and "easy" to achieve in design (J, 2010), but it is unfortunately not considered in Dubai's urban development (K3, 2010). 4. "Hierarchy of spaces" in many cases reflects cultural and religious values and concerns in design (A4, 2010). 5. Such transition is the "most respectful" of traditional values in Islamic societies (R2, 2010). 6. Transition between different spaces would most certainly be ideal since "privacy" is very important to the local culture in Dubai (A2, 2010). 7. Privacy is more "cherished" and protected in the Middle-East than in the West (D, 2010); so designing in this direction, which takes cultural norms critically, would serve the community and make architecture and planning more "meaningful" (A, 2010). 8. This is one of the most "effective" urban strategies that enhance security, safety, connectivity, and "exchange" among residents (A1; A&N, 2010). 9. Such strategy increases the identification of residents with each other and with their immediate environment. Positive results might be: greater sense of security, enhanced social meetings and exchanges, enhanced accessibility, and more connectivity.				
Constraints / Recommendations	1. It is an important strategy for ensuring a sense of security and privacy; however, it would "not necessarily" lead to more "frequent exchanges" between residents (K4,				

	2010). 2. The statement above is asserted by another expert who argues that the transition between spaces is a good strategy, but it might not lead to a frequent exchange between people, especially between the natives and residents as the Arab culture is mostly "private-oriented" (G3, 2010). 3. Another expert says that this strategy is important; however, it might not promote "interaction" between multiple cultures (C, 2010). 4. It might not be culturally meaningful as it was in the past since people have "evolved" and today most of the people prefer to communicate with their own ethnic groups (N1, 2010). 5. This transition is vital, but it should be "integrated" with civic and cultural programs (M, 2010). 6. The issue is that the vast majority if Dubai's residents are "temporary" (people come and go); therefore, this provides "less" opportunities of creating strong "social bonds" (R1, 2010).

Courtyard typologies, shading elements, cross ventilation techniques, and wind towers as passive cooling structures.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	14	6	15	0	0
Percentage	40.00 %	17.14 %	42.86 %	0	0
Average	4				
Median	4				
Potential Benefits	1. Building an urban environment by using the possibilities given by "nature" is "more sustainable" more affordable than an excessive use of "technology" that requires cost and maintenance (A; F2, 2010). 2. Passive and vernacular elements have "evolved" over centuries throughout the world and have "proven" to be environmentally sustainable approaches to creating high quality urban neighborhoods (G1, 2010). 3. They can "limit" energy consumption and pollution levels (G3, 2010). 4. This is the "essential correct sustainable paradigm for this region" (N, 2010) that should be "regulated" by new and solid municipal standards (C; N, 2010) 5. Important elements for "successful desert urbanism" (N1, 2010). 6. To not consider these elements and other passive strategies in design is a "crime" against nature and context. Vernacular elements and forms should be "integrated" with efficient active systems, modern materials, and new construction techniques (R, 2010) 7. Considerably reduces the need for "electric cooling-heating" (R2, 2010). 8. Courtyard typologies have environmental and social aspects and can create a unique "urban identity" and image (A2, F, 2010). 9. Coutyard housing is one of many effective forms that should be embraced in neighborhood design (C, 2010). 10. Shading elements could greatly enhance the "walking time and experience" (A2, 2010). 11. Shading is essential, and natural ventilation is good for approximately "half the year" (D, 2010). 12. Shading elements would be an effective way to "reduce heat gain and improve				

	building performance" (K4, 2010).
Constraints / Recommendations	1. "Great techniques, but the world has "moved away" from nostalgic approaches in design. We need to find "new" sustainable models and tactics (G, 2010). One expert argues that modern cities "opting away" from these passive design solutions that worked effectively in the past in many locations (G2, 2010). 2. These natural strategies should not be adopted or "copied" as is. Research should be conducted to "test" their performance and potential in saving energy in our "modern" cities (A7, 2010). 3. These elements have great "historic and cultural values," but their "performance" and effectiveness in our modern societies have to be examined (B1, 2010). 4. Even if these elements were adopted in design, the reduction in temperature would not be substantial (A5, 2010). 5. Dubai has an overheated period with "high RH%," most of the year. Therefore, the role of ventilation is "minor (F; M, 2010). 6. The average annual wind speed in the UAE is very low 3.65m/s." You can't design a system depending on such "low variable" (M, 2010). 7. Cross-ventilation is vital, but attention must be given to the issue of "dust and sand" (K4, 2010). 8. Wind towers are "more effective in dry/ arid conditions," and are "less" in humid environs like Dubai (C, 2010). 9. Wind towers are no longer practical for homes with "air-conditioning" system. But it could be used to "increase air circulation" on porches, in galleries and courtyards, as well as outdoor commercial spaces (D, 2010). 10. Wind towers are useful but other elements can achieve the "same" function (J, 2010). But still Wind towers are considered as "identify makers" in Dubai (A2, 2010). 11. Courtyard housing can perform very well climatically in hot arid regions. But this form has not evolved since many years and "might not" satisfy the modern needs. Besides, courtyards "add" extra space to the floor and surface and this means "more" heat gain and hence "more" cooling load (K1, 2010). 12. The courtyard house was built around a family unit and traditions that were appropriate for "its time and culture." Today, the majority of Dubai residents come from different backgrounds. Besides, many natives changed and do not share with their ancestors their old wisdom and culture (R1, 2010). 13. One expert added: "Orientation and arrangement of openings on facades" as of the most important aspects of alleviating the effects of climate on the built structure (K4, 2010).

High density of low-rise housing arranged in a compact form.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	11	9	8	7	0
Percentage	31.43 %	25.71 %	22.86 %	20.00 %	0
Average	3.71				
Median	4				
Potential Benefits	1. This pattern is always good and is "inevitable a right step" (F2, 2010). 2. Compact development "reinforces" social interaction (A; F; G1, 2010). 3. Compactness increases "culture coherence;" and encourages "walkability" (A&N,				

	2010). 4. Urban compactness reduces infrastructure and service expenses (A; A&N, 2010). 5. This development model is better economically as well as socially when compared with Dubai's current fragmented and disconnected urban fabric. 6. Compactness has the quality of "self shading." Compact forms reduce surface exposure to solar radiation, provide shade, and reduce walking distances (A, 2010). 7. Compact forms reduce "heat gain" during the daytime hours and helps to "employ" passive cooling strategies "easily" when compared to tall buildings (K1, 2010). 8. The compact form is the "old wisdom" of urbanism in hot climates (F, 2010). 9. A "tighter" urban fabric provides density needed to sustain alternate modes of transport such as cycling, walking, and mass transit; increase social interaction; and support businesses in neighborhoods (F1; G1, 2010). 10. Compact development creates a sense of "defensible space, gives residents a stake in the shared public space, and limits acts of vandalism" (R, 2010). 11. Low-rise housing arranged compactly is an appropriate form for Dubai's climate and the most "conducive to a pedestrian environment" (R2, 2010). 12. Low-rise buildings reflect the "most energy-efficient height" so they can be cooled/heated passively (R2, 2010). 13. In Dubai it is neither practical nor socially viable to develop "tall" buildings (S2, 2010).
Constraints / Recommendations	1. Dubai has a "superlative" and mega approach in urbanism and architecture focused on having the tallest building, the largest mall, the grandest artificial island, the most luxury life style, etc, so fitting now into a "modest paradigm" might not suit its urban policy agenda and aspirations (F1, 2010). 2. This strategy could be very beneficial, especially in the old eroded parts of the city that require "infill" and densification. However, it should be realized that Dubai has also "a culture of high rise buildings" (G, 2010). Therefore, a combination of various building heights, typologies, density levels should be encouraged. "Variety" of residential settlements is a key to satisfy the needs of different population segments and family types (A2, 2010). 3. One expert argues that sustainable cities should not have a "singular typology of housing," but rather a diverse one (C, 2010). 4. "Good strategy, but taken alone is not enough." It must be mixed-use; it must become middle- and high-rise near transit stops (D, 2010). 5. The statements above are asserted by another experts who argues that compact forms are good, but it should not "cancel" the other form of developments (mid and high-rise patterns), but it should "integrate" with it. 6. In compact neighborhoods where built structures are close to each other, "privacy" would need to be carefully addressed through architectural design strategies (K4, 2010). 7. The compact form was very "desirable" in the traditional societies, but not today. The narrow streets of the traditional Arab and Islamic cities were predominantly designed for "pedestrians." But, in our modern cities, "parking requirements and automobile traffic" put major limitations on having narrow streets (G, 2010). 8. One expert argues that these design patterns may revitalize some cultural and aesthetics complements of the traditional urban morphology, but there is no guarantee that these forms "can successfully replace current development trends" (B1, 2010). 9. High density with low-rise "automatically" means "lack of open areas." A better model would be "high to moderate density" with "medium" rise buildings (A7, 2010). 10. Not really appropriate in the "modern context" (E, 2010). 11. It will require "huge" infrastructure and service provision since the city will expand horizontally (e.g.; water piping lines and electricity grid) (K1, 2010). 12. In terms of sustainability, it is "more beneficial" to build high rises, meaning that it occupy a "large" number of occupants on a "small" plot of land (M, 2010). 13. High rises are a "more" environmentally friendly in terms of "saving land resources"

	(S, 2010). 14. High rises use energy and water resources in a "more efficient" manner (S, 2010). 15. The "shortage and price of land" are major concerns in Dubai. Low-rise housing will not be affordable in the near future (A2; K2, 2010). 16. Despite the "good theoretical expected" outcome of embracing compact forms, many UAE citizens as well as residents prefer large single family units, so this strategy sounds "unacceptable." This expert experienced and observed through some relevant research that many UAE citizens prioritize detached, spacious single family houses on large lots over dense developments (k3, 2010).

The incorporation of an appropriate level of services, amenities, and daily uses within urban communities.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	21	8	5	1	0
Percentage	60.00 %	22.86 %	14.29 %	2.86 %	0
Average	4.48				
Median	5				
Potential Benefits	1. This measure has the "greatest potential" to integrate economic, cultural, and environmental components within Dubai's neighborhoods (K4, 2010). 2. Vibrant and livable neighborhoods are those that offer an appropriate level of services, amenities, and daily uses; the lack of these would create isolated and segregated urban areas (A2, 2010). 3. These policies are important "ingredients" for a sustainable neighborhood design and "good planning" (A1, 2010). "These are all essential for successful planning" (A7, 2010). 4. Appropriate distribution of services, especially within a walking distance, is a "key" sustainability indicator (A4, 2010). 5. The "integration" of services into residential areas is very important (F2, 2010). 6. These measures can promote "self-sufficient" and "self-determining" urban areas (S2, 2010). 7. If these measures are not present, there will be "urban fragmentation, segregation, and poor life quality" (N1, 2010). 8. An appropriate level of services, amenities, and daily uses within neighborhoods is vital to reduce number of daily trips, mobility, expenditure, pollution, traffic costs, accidents, stress levels, and greenhouse gas emissions (A&N; K1; K4, 2010). 9. "Most important," these measures will minimize transportation needs, encourage walkability, and thus support sustainable urbanism (K2, 2010). 10. These are required elements to ensure an "eco-friendly" city requirement is met (M, 2010). 11. These are critical. Living in any area in Dubai with having a good access to all the daily needs of one's life without using a motor vehicle is rare (R, 2010).				
Constraints / Recommendations	1. This strategy reduces travel needs but the problem is that facilities have service and loading zones that might cause traffic and noise (J, 2010). 2. This policy imitative should be "first priority" to reduce travel time (N, 2010).				

	3. To encourage infill and densification within Dubai's existing urban areas, services and amenities should not be extended into undeveloped areas of the city (C, 2010). 4. The concentrations of services and amenities would be more efficient if high density is achieved. Higher densities provide a "bigger market" for the services and amenities which in terms make the area more "attractive," appealing, and dynamic (G1, 2010). 5. Providing basic services and amenities within the existing urban areas in Dubai, including the new mega developments such as "gated communities" are vital (F1, 2010). 6. The usefulness of the strategy depends on how these uses will be "presented and distributed" (K, 2010). 7. Success also depends on the "users' satisfaction" with the "quality" of services and amenities (K, 2010).

The emphasis on the culture of alternative and clean transit system represented in Dubai Metro and a future plan for tram lines and bike infrastructure.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	18	8	8	1	0
Percentage	51.43 %	22.86 %	22.86 %	2.86	0
Average	4.17				
Median	4				
Potential Benefits	1. Important step toward decreasing the dominance of "car culture" in Dubai (A&N; C, 2010). 2. A significant "investment on behalf" of Dubai (F1, 2010). 3. Important step to a consolidated and integrated urban development. But, neighborhoods have to be connected to the existing metro system by "a macro-network (Trams, buses)" (F2, 2010). 4. Without efficient "non-motorized" transit means, sustainable urbanism "cannot" exist (N, 2010). 5. Public transit system should be promoted in Dubai. Dubai has a "linear" city-wide spatial structure, which can be served by public transit "better than" other spatial forms (B1, 2010). 6. Mass transportations could reduce pollution, traffic problems, emissions, and noise (F1; K1, 2010). 7. Mass transportations could decrease reliance on private cars (F1, 2010).				
Constraints / Recommendations	1. Given the current state of planning in Dubai, it is highly recommended that "greater efforts" should be taken in this direction. 2. But, this direction might be more used by "low-income class and tourists," but not the rich In other words, do not "expect" too much from it (J, 2010). It will be more accepted among the working class and foreigners and less among the native population (D, 2010). This is asserted by another expert who argues that "I do not think the high income groups and Gulf citizens with use the metro (G3, 2010). 3. The metro should be seen as an essential, "functional" system not only as an "image enhancer" (A7, 2010). 4. "Regional" transit to Abu Dhabi, Sharjah and beyond should also be considered.				

	5. Dubai has been developed in a fragmented, auto-oriented fashion. Therefore, a transition is difficult to achieve, but it is attainable. To make clean transportation modes more effective, land development and urban form have to be oriented toward "transport infrastructure" (E, 2010). 6. The transit plan requires "integration" between different institutional structures and different forms of clean transportation (S, 2010). 7. It is very difficult to change "travel behavioral patterns" in Dubai. Additional road fees, increased parking costs and gas price, and taxation on cars might change this behavior (F1; K4, 2010). 8. One has to consider the "weather" and "pedestrian infrastructure" when designing access to transit stops (K2, 2010). 9. Bicycle and pedestrian infrastructure will have to be "shaded" (R2, 2010). But still this will be "limited" to certain times of the year (C, 2010). 10. Hope and expectations for widespread bike use should be "lower" than transit due to cultural and climatic reasons (D, 2010). 11. Dubai Metro connects passengers to a series of shopping malls, tourist locations, business districts, etc. Its service lines do not extend to residential neighborhoods (A2, 2010). 12. Currently, Dubai Metro has nothing to do with a "green agenda" because the system does not mainly go to "where people live and doesn't take them to where they work." Additional metro lines combined with "a macro transit network" of trams should complement the existing system to connect larger zones (R1, 2010). 13. Metro stations and transit stops should be integrated with sufficient parking areas. The current metro stops have very limited space for transit parking (A2, 2010).

The construction of mixed-use corridors, multi-use structures, and a concentration on vertical zoning.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	13	9	6	2	5
Percentage	37.14 %	25.71 %	17.14 %	5.71 %	14.29 %
Average	3.6				
Median	4				
Potential Benefits	1. Important patterns to achieve "integration and connectivity" (A4, 2010). 2. Could increase cultural exchange, reduce mobility, increase land values, and increase accessibility. It is an essential strategy to get away from single-use zoning (A&N, 2010). 3. Socially, mixed-use developments would "congregate" a diversity of people and cultures and would provide the "opportunity" for social interaction (A2, 2010). 4. It does create a "vibrant urban areas with eyes on the street, but many people find them stressful" (J, 2010). 5. Mixed-use corridors with adequate density make mass transit, civic activities, and outdoor life dynamic and more effective (C, 2010). 6. Jane Jacobs dense and mixed-use urban patterns are vital to a "healthy" urban area (A2; F2, 2010). 7. The "proximity and good alignment" of different uses a long an urban corridor will reduce mobility, pollution, wastage of time, etc (A; S, 2010). 8. These patterns should be encouraged especially in those areas that are "served by major transit lines" (B1, 2010).				

	9. Could "connect" multiple uses and "reduce" distances between home, work, leisure, and services (F2, 2010). 10. The construction of mixed-use developments allows residents to have easier and more proximate access to commercial spaces and other daily services and amenities. 11. Activities and variety of uses and densities along a major "circulation" path that accommodates different mobility systems are important to create livable and high quality space (F, 2010). 12. The mix of "functions" is an important strategy to avoid "segregation" and single use scattered developments (G3, 2010). 13. Mix of uses or what Expert (N) calls "programmatic density" is essential for good urbanism.
Constraints / Recommendations	1. Vertical development has to be within "reasonable limits" (A4, 2010). If the strategy calls for the concentration of various uses in "low to mid-rise structures," then it is a good idea. However, if the meaning is to continue building towers with some mixed-use in them, this is a "wrong" path for Dubai (N, 2010). This statement is asserted by another expert who argues that what Dubai needs is diversity of uses in low to mid-rise buildings (R2, 2010). 2. New development should focus on dense, "compact low rise form that can achieve smaller carbon footprints" (R, 2010). 3. Since low rise developments are "more appropriate" for hot climates, an intensive focus on vertical zoning within high-rises is not a good option for Dubai (S2, 2010). 4. This form may cause "air pollution, waste, noise, and traffic congestion including trucks areas for loading and unloading" (M, 2010). 5. Mixed use areas and multi-use structures are "critical" to create sustainable cities. However, corridors are "linear" forms and it might be considered as a "poor" urban form from the transportation efficiency standpoint (G1, 2010) 6. This strategy is perhaps best appropriate for built forms with "a greater degree of density than Dubai has at present" (K4, 2010).

The implementation of Emirates green building standards (Emirates LEED) in 2015.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	12	6	10	5	2
Percentage	34.29 %	17.14 %	28.57 %	14.29 %	5.71 %
Average	3.51				
Median	3				
Potential Benefits	1. Green standards are required to produce "healthy" buildings. These standards should be "codified" and "enforced" by the Municipality (A1, 2010). 2. This will help raise consciousness among developers and institutions involved in Dubai's development (A7, 2010). 3. The green standards would need to be "site-specific" (S3, 2010). The standards should be "tailored" according to the local conditions of the region (E; K3, 2010). 4. Local green policies that are based on cultural and climatic conditions of the region should emerge as a "regulatory" agenda in Dubai (K3, 2010).				

	5. The green standards are critical to create sustainable sites; minimize water consumption; reduce energy consumption of buildings, utilize more renewable resources; use efficient and healthy materials; and enhance the quality of indoor living (K, 2010). 6. It is a good step in the "right direction." It could improve "the physical and environmental performance of the built form" (A4, 2010). It could also have a positive impact on "lifecycle cost of projects" (A&N, 2010).
Constraints / Recommendations	1. The green building policies are important as long as they are "well-articulated" (N1, 2010), "monitored," (S, 2010), and "enforced" by the government. This statement is asserted by another expert who argues that this strategy is a good idea but "I worry about the lax enforcement of any rules in Dubai" (G2, 2010). 2. Green standards are expected to reduce overall building energy consumption. But, it is not clear how these building scale efforts can result in much reduction at "metro-wide scale" (B1, 2010). 3. "Metro scale" green standards should be developed and then "integrated" with these building scale codes and regulations (B1, 2010). 4. Green building standards do not address the underlying issue of "inappropriate urban form" and urban residential densities (G1, 2010). Expert (G1) believes that it is more important to achieve compact forms with high density levels and diversity of uses than achieving LEED standards on "individual buildings." The standards targets buildings only, not urban form or spaces (A2, 2010). Therefore, what Dubai needs is "LEED ND" (Neighborhood Design) (R2, 2010). 5. Green building standards contribute to a process of "selling and marketing environmental design." In fact, developers often like to use these standards to escalate the selling and real-estate profit (F2, 2010). 6. While LEED appears as a bold step, it should be noted that LEED is just one of several competing standards . . . The "winning" of LEED over other standards (e.g. BREEAM, DGNB) is subjective (F1, 2010). For more details, please prefer to figure below provided in next page. 7. Dubai should create a research team to "investigate" all the international green standards in order to generate a practical localized regulatory system (F1, 2010). 8. If there is no commitment to "energy and water conservation" within the green agenda, this is "a waste of time" (R1, 2010). 10. "Too late" for implementation since a lot have already been developed and constructed. The "weight" and effectiveness of this strategy is "less" than other listed strategies in the survey (M, 2010).

Following is a graph as provided by the DGNB (translation by this author, F1).

http://www.towntown.at/hp_german/downloads/03-Green%20Building%20und%20DGNB-Zertifizierung.pdf

No. DGNB	Criterion	DGNB, New Office Building	LEED NC 2.2	BREEAM International
1	Greenhouse Potential			
2	Potential for destructing the Ozone Layer			
3	Potential for supplying Ozone			
4	Potential for Over-acidification			
5	Potential for Hyperfertilization			
6	Risks for the local Environment (Risk for groundwater, surface water, and soil, risk for the air)			
7	Other effects for the local environment (e.g. air contamination)			
8	Other effects on the global environment (material use from resources)			
9	Microclimate (heat island effect)			
10	Primary Energy Need (Non-Renewables)			
11	Primary Energy Need (Renewables)			
12	Usage of other non-renewable resources			
13	Waste according to Waste Categories			
14	Fresh Water Consumption during usage			
15	Space Consumption			
Legend	High Weighting			
	Medium Weighting			
	Low Weighting			
	Not Contained			
	Currently not included, will be incorporated in the next revision			

The implementation of greenroofs in public, private, multi-family residential and commercial buildings.					
Scale	5	4	3	2	1
	Very High	High	Moderate	Low	Very Low
The scale is based on the strategies potential to integrate economic, cultural, and environmental components within Dubai's neighborhoods.					
# of Votes	3	5	10	9	8
Percentage	8.57 %	14.29 %	28.57 %	25.71 %	22.86 %
Average	2.57				
Median	2				
Potential Benefits	1. Incorporating green roofs as a climate control element, recreational facility, and food production space seems like a "win-win-win solution" (E, 2010). 2. Good Strategy especially if the plants are watered by greywater or "condensed" water resulting from A/C units in the buildings (F2; K3; 2010). 3. Since the roof typology in Dubai is predominantly "flat" rather than "sloped;" therefore, the surface area is appropriate for green roof implementation (R, 2010). 4. Green roofs could reduce heat gain and cooling load. It could also reduce urban heat island effects, provide public/private spaces, might be good for noise insulation and thermal insulation, and could enhance indoor living environment. However, the main problems are associated with water, maintenance, construction cost, and experience (A2; D; F; F1; G1; N1; R2; S, 2010). 5. But all of the aforementioned benefits are "not enough to justify the capital and operating expenses" of construction green roofs in a hot, humid, and arid city (D, 2010).				
Constraints / Recommendations	1. Compared with other provided strategies, this intervention will have "minor" impacts (K, 2010). 2. Dubai green roof initiative has not been enforced by the Municipality. The result is a small number of green roofs in the city (R, 2010). 3. The implementation of this policy was not fully enforced or considered to be applied to private villas and multi-family residential buildings due to "high implementation cost (estimated at AED 150,000 per villa an equivalent of US$ 40,760)" (M, 2010). 4. First, Dubai has to build an "experimental" model, and then based on "real projections" and outcomes, the planning and decisions have to be made (A; F, 2010). 5. It is a "narrow" approach to sustainability. Given the sun angles in Dubai, the protection of roof surface is important, but "alternative" strategies that suits Dubai's climatic conditions should be considered (K4, 2010). 6. While greenroofs may slightly reduce indoor heat gain, a well-insulated building appears of "paramount" importance (F1, 2010). 7. Greenroofs cannot be applied to high rise buildings that are in non-district cooling provision since the "cooling towers" will occupy most of the roof (M, 2010). 8. It is also ineffective in tall buildings since the "footprint is too small" to substantially reduce cooling requirements (G2, 2010). 9. The reduction in cooling requirements as well as heat gain is not significant in tall- and medium- rise buildings since it is mainly limited to the "floor below the roof" (M, 2010). 10. Water remains a very expensive service to provide. The city doesn't have enough water resources for greenroofing to be sustainable or even make sense (K3; R2; S3, 2010). 11. One expert says, "I am skeptical of green roofs in a brown sandy climate" (G, 2010), while another experts says green roofs can provide habitat for native "desert" types plants that does not require excessive water such as "native flora and fauna" (A7, 2010) 12. It is not practical due to high cost of maintenance and irrigation (G3; P; S, 2010).				

	13. Good for minimizing heat gain through roofs. But, it will raise building costs due to additional structures and materials that will be used for protection from water leakage (K1, 2010). 14. Greenroofs add to the structural load of the building (requiring more concrete – higher embodied energy), and thus higher cost (K1; S, 2010). 15. Beneficial, but not as in moderate climate zones with substantial rainfall (D; J; G1; G3; S2, 2010). 16. A better solution would be focusing on "compact development; and the creation of green areas with indigenous vegetation in a way that maximizes its potential as an urban heat sink (G1, 2010).

Appendix 10: Panel list

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Bibliography

Adler, M., & Ziglio. E. (1996). Gazing into the oracle: The Delphi Method and its application to social policy and public health. London: Jessica Kingsley Publishers.

Al-Masri, W. (2008). Contextualizing globalization: Towards and architectural synthesis in the Gulf region. In A. Moustafa, J. Al-Qawasmi, & K. Mitchell (Eds), Instant cities: Emergent trends in Architecture and Urbanism in Arab world? (pp. 163-182). CSAAR: Center for the Study Architecture in the Arab Region.

AlShafieei, S. (1997). The Spatial Implications of Urban

Land Policies in Dubai City. Unpublished Report, Dubai Municipality.

Alseragy, A., & Elnokaly, A. (2008). Proposal for sustainable and eco-exurban communities at the western desert development corridor in Egypt. In A. Moustafa, J. Al-Qawasmi, & K. Mitchell (Eds), Instant cities: Emergent trends in Architecture and Urbanism in Arab world? (pp. 435--448).CSAAR: Center for the Study Architecture in the Arab Region.

Arnstein, S. (1969). A ladder of citizen participation. Journal of the American Planning Association, 35(4), 216-224

Atkinson, P., Silverman, D. (1997). Kundera's immortality: The interview society and the intervention of the self. Qualitative Inquiry, 3, 304-325

Beatley, T. (2000). Green urbanism: Learning from European cities. Island Press: Washington

Bramley, G., Brown, C., Dempsey, N., Power, S., & Watkins, D. (2010). Social Acceptability. In M. Jenks, E. Burton, & C. Jones (Eds), Dimensions of the sustainable city, (pp. 105-128). London New York: Springer.

Breheny, M. (1996). Centrists, decentrists and compromisers: Views on the future of urban forms. In K. Williams, E. Burton, & M. Jenks (Eds), The compact city: A sustainable Urban Form? (pp. 13-35). London: E & FN Spon.

Briggs, C. (1986). Learning how to ask: Asociolinguistic appraisal of the role of the interview in social science research. Cambridge, UK: Cambridge University Press.

Brown, L., Dixon, D., Gillham, O. (2009). Urban design for an urban century: Place making for people. New Jersey: WILEY

Buchanan, P. (1988). What city? A plea for place in the public realm, Architectural Review, 1101 (November), pp. 31-41.

Building boom turns up the heat (2009, June 2). 7 days. Retrieved June 1, 2009, from

http://www.7days.ae/storydetails.php?id=78891&page=local news&title=Building boom turns up the heat

Burton, E. (2002). Measuring urban compactness in UK towns and cities. Environment and Planning B: Planning and Design, 29, 219-250. Retrieved from http://www.envplan.com/abstract.cgi?id=b2713

Burton, E., Williams, K., & Jenks, M. (1996). The compact city and urban sustainability: Conflicts and complexities. In K. Williams, E. Burton, & M. Jenks (Eds), The compact city: A sustainable Urban Form? (pp. 231-247). London: E & FN Spon.

Calthorpe, P. (1993). The next American metropolis: Ecology, community, and the American Dream. New York: Princeton Architectural Press

Chapman, N., & Lund, H. (2004). Housing density and livability in Portland. In C. P. Ozawa Ed.), *The Portland edge: Challenges and successes in growing communities* (pp. 206-229). Washington: Island Press.

Chan, E., Lee, G. (2008). Critical factors for improving social sustainability of urban renewal projects. Social indicators research, 85(2), 243 – 256.

Church, C. (1995). Sustainable cities. International Report, February 1995, 13-14.

City of Amsterdam. (1994). A City in progress: Physical planning in Amsterdam. Amsterdam, The Netherlands: dienst Ruimtelijke Ordening.

Condon, P. (2010). Seven rules for sustainable communities: Design strategies for the post- carbon world. Washington: ISLAND PRESS

Congress for the New Urbanism (CNU) (2000). Charter of the New Urbanism.

New York: McGraw-Hill.

Corbett, J., & Corbett, M. (2000). Designing sustainable communities: Learning from village homes.Canada: Island Press.

Creswell, J. (2003). Research Design: Qualitative, Quantitative, and Mixed Methods Approaches by. London: Sage, 2003.

Czinkota, M., & Ronkainen (1997). International business and trade in the next decade: Report from a Delphi study. Journal of International Business Studies, 28(4), 827 - 844.

Dalkey, N., & Helmer, O. (1963). An experimental application of the Delphi method to the use of experts. Manage. Sci, **9** (3), 458–467.

Davidson, C. (2008). Dubai: The vulnerability of success. New York: Colombia University Press

Davidson, C. (2005). The United Arab Emirates. Lynne Rienner Publishers: Boulder, CO.

Davis, M. (2007). Fear and money in Dubai. Retrieved August 1, 2009, from

http://www.newleftreview.org/?view=2635

Delbeq, A., Van de Ven, A., & Gustafson, D. H. (1975). Group techniques for program planning: A guide to nominal group and Delphi processes. Glenview, USA: Scott, Foresman and Company.

Doherty, G. (2008). The landscape of Dubai's urbanism. In A. Moustafa, J. Al-Qawasmi, & K. Mitchell (Eds), Instant cities: Emergent trends in Architecture and Urbanism in Arab world? (pp. 103-112). CSAAR: Center for the Study Architecture in the Arab Region.

Drawn on the sand: John Harris, Dubai's pioneering modernist (2007). Al-Manakh Gulf survey, 12, 152-167

Dubai Land: Investment Opportunities (2004). Retrieved Nov 18, 2008, from

http://www.dubailand.ae/

Dubai Municipality (1995). Planning study for the development of the Satwa area.

Unpublished Report.

Dumreicher, H., Levine, R., & Yanarella, E. (2000). The appropriate scale for "low energy": Theory and practice at the Westbahnhof. In S. Koen & S. Yannas (Eds), Architecture, city, environment. Proceedings of PLEA 2000, (pp. 359-63). London: James & James.

ECOTEC (1993). Reducing transport emissions through planning. London: HMSO

Ellis, Cliff. (2002). The New Urbanism: Critiques and Rebuttals. Journal of Urban Design **7**(3): 261-291.

Elsheshtawy, Y. (2004). Redrawing boundaries: Dubai, the emergence of a global city. In

Y. Elsheshtawy (Ed.), Planning the Middle East City: An Urban Kaleidoscope in a Globalizing World (pp. 169-199). Routledge: London.

Elsheshtawy, Y. (2008). Transitory sites: Mapping Dubai's 'forgotten' urban spaces. International Journal of Urban and Regional Research. (pp. 968-988)

Emily Talen and Cliff Ellis, "Beyond Relativism; Reclaiming the Search for Good City Form," Journal of Planning Education and Research, Vol. 22, 2002, pp. 36-49.

Facey, W., & Grant, G. (1996). The Emirates by the First Photographers. London:

Stacey International.

Faludi, A., Waterhout, B., & Instute Royal Town Planning. (2002). The making of the European spatial development perspective: No master plan. London: Routledge.

Farr, D. (2008). *Sustainable urbanism: Urban design with nature*. Wiley & Sons: New Jersey

Fenton, M. M. (2007, December 24). Global warming: The causes, the perils, the solutions, and the actions: what can you do? Time: Special Edition.

Fink, A., & Kosecoff, J. (1985). How to conduct surveys: A step-by-step guide. London, UK, Sage Publications.

Fontana, A., & Frey, J. (2002). The interview: From natural stance to political involvement. In N. Denzin, & Y. Lincoln (Eds), The sage handbook of qualitative research, 3rd edition (pp. 695-727). Sage: London

Ford, Larry. (1999). Lynch revisited: New urbanism and theories of good city form. Cities, 16(4), 247-257. Retrieved from UT Library database.

Gabriel, E. (1987). The Dubai Handbook. Ahrensburg: Institute for Applied Economic Geography

Ghadeer, M. (2006, October 11). Alemarat Alyoum. Retrieved May 17, 2011 from -----

Glaser, B. G., & Strauss, A. L. (1967). The discovery of grounded theory. Aldine de Gruyter: New York.

Gehl, J. (2001). Life between buildings: Using public space. The Danish Architectural Press: Copenhagen

Gordon, P., & Richardson, H. (1989). Gasoline consumption and cities – a reply. Journal of the American Planning Association, 12(3), 342-5.

Graham, S., & Marvin, S. (2001) Splintering urbanism: networked infrastructures, technological motilities, and the urban condition. Routledge: London.

Guba, E. G., & Lincoln, Y. S. (1989). Fourth generation evaluation. Sage: Newbury Park, CA

Gunder, M. (2006). Sustainability: Planning's saving grace or road to perdition? Journal of planning research and education 26(2), 208-22. Retrieved from UT Library database

Hall, P. G., & Pain, K. (2006). The polycentric metropolis: Learning from mega-city regions in Europe. London: Earthscan.

Heards-Bey, F. (1982) From Trucial States to United Arab Emirates. Harlow: Longman.

Jabareen, Y. (2006). Sustainable urban forms: Their typologies, models, and concepts. Journal of Planning Education and Research, 26(1), 38-52. Retrieved from UT Library database.

Jacob, J. (1961). The death and life of great American cities. Cape

Jenks, M., & Dempsey, N. (2005). The language and meaning of density. In M. Jenks, N. Dempsey (Eds), Future forms and design for sustainable cities (pp. 287-310). Routledge: New York.

Jenks, D., & Kozak, D. (2008). Polycentrism and 'defragmentation': Towards a more sustainable urban form? In M. Jenks, D. Kozak, & P. Takkanon (Eds), World cities and urban form: Fragmented, polycentric, sustainable? (pp. 71-94). Routledge: New York.

Jenks, M., Kozak, D., & Takkanon, P. (2008). Conclusion: The form of cities to come. In M. Jenks, D. Kozak, & P. Takkanon (Eds), World cities and urban form: Fragmented, polycentric, sustainable? (pp. 71-94). Routledge: New York.

Jenks, M. (2000). The acceptability of urban intensification. In K. Williams, E. Burton, & M. Jenks (Eds), Achieving sustainable urban form, London: E & FN Spon.

Williams, K., Burton, E., & Jenks, M. (2000). Achieving sustainable urban form: Conclusions. In K. Williams, E. Burton, & M. Jenks (Eds), Achieving sustainable urban form, (pp. 347-55). London: E & FN Spon.

Jones, C., Jenks, M., & Bramley, G. (2010). Complementarities and Contradictions. In M. Jenks, E. Burton, & C. Jones (Eds), Dimensions of the sustainable city, (pp. 239-256). London New York: Springer.

Katodrytis, G. (2007). The Dubai experiment. Al-Manakh Gulf survey, 12, 38-47

Kazim, A. (2000). The United Arab Emirates A.D. 600 to the Present: A socio-discursive transformation in the Arabian Gulf. Dubai: Gulf Book Centre.

Katz, P .(1994). The New Urbanism: Toward an Architecture of Community. New York: McGraw-Hill,

Kim Quaile Hill & Jib Fowles (1975). The Methodological Worth of the Delphi Forecasting Technique. Technol. Forecast. Soc. Change **7**, 179–192.

Krane, J. (2007, January 15). UAE beats Americans' environmental harm: WWF: Country has world's largest per-capita 'ecological footprint'. msnbc: World Environment. Retrieved Feb 09, from http://www.msnbc.msn.com/id/16640176/

Krane, J. (2009). The story of the world's fastest city. London: Atlantic Books

Kriken, J., Enquist, P., and Rapaport, R. (2010). City building: Nine planning principles for the Twenty-First Century. New York: Princeton Architectural Press

Krueger, R. A. (1998). *Focus group kit*. Sage: Thousand Oaks, California.

Lacan, J. (2004). The seminar of Jacques Lacan, Book XVII. Manuscript translation by Russell Grigg (photocopy from translator).

Landeta, J. (2005) Current validity of the Delphi method in social sciences. *Technol. Forecast. Soc. Change*, **73**(5), 467–482.

Lau, S., Wang, J., Giridbaran, R., and Ganesan, S. (2005). High-density, high-rise and multiple and intensive land use in Hong Kong: A future city form for the new millennium. In M. Jenks, N. Dempsey (Eds), Future forms and design for sustainable cities (pp. 153-166). Routledge: New York.

Levinson, D., & Kumar, A. (1994). The rational locator: why travel time have remained stable. Journal of the American Planning Association, 70 (3), 319-332

Linstone, H., & Turloff, M. (1975). The Delphi method: Techniques and applications. London, UK: Addison-Wesley.

Lynch, K. (1981). A Theory of Good City Form. Cambridge, MA, MIT Press.

Lynch, K. (1960). The Image of the City. Cambridge, MA, MIT Press.

Machado, R. (2006a). Dubai studio. Retrieved Sept 09, from

http://www.gsd.harvard.edu/people/faculty/machado/studios.html#dubai.

Machado, R. (2006b). Dubai is not yet. Harvard Design Magazine. Issue 25.

pp. 97-103. Harvard University

Macionis, J. J., & Parrillo, N. V. (2007). Cities and urban life. New Jersey: PEARSON

Malik, T. (2008, May 12). Dubai's construction waste up 163%. Arabian Business.

Retrieved Oct26, from

http://www.arabianbusiness.com/519084-dubais-construction-waste-up-163

Markusen, A. (2003). Fuzzy concepts, scanty evidence, policy distance: The case for rigor and policy relevance in critical regional studies. Regional Studies 37 (6/7), 701–717.

Mitchell, K. (2007). Constructing fact, fantasy, and fiction. Al-Manakh Gulf survey, 12, 30-37

Montgomery, J. (1998). Making a city: Urbanity, vitality and urban design.

Journal of Urban Design ***3*****(1)**, 93-116.

Moudon, A.V. (2000). Proof of goodness: a substantive basis for New Urbanism?

Places, 13(2), 38–43.

Moustafa, A., & Rifki, A. (2007). Madinat Jumeirah and the urban experience in the private city. Al-Manakh Gulf survey, 12, 23-29

Munif, A. (1989). Cities of Salt. New York: Vintage Books.

Naess, P. (1993). Can urban development be made environmentally sound? Journal of Environmental Planning and Management, 36 (3), 309-333

202 Nationalities in labor market (2006, August 25). Khaleej Times.

Retrieved Nov 8, 2008 from http://www.khaleejtimes.ae/DisplayArticleNew.asp?xfile=data/theuae/2006/August/theuae_August735.xml&section=theuae&col=

Nelson, A., Burby, R., Feser, E., Dawkins, C., Malizia, E., & Quercia, R. (2004). Urban containment and central-city revitalization. Journal of the American Planning Association,70 (4), 411-25.

Newman, P., & Jennings, I. (2008). Cities as sustainable ecosystems: Principles and practices. Island Press: Washington

Neuman, M. (2005). The compact city fallacy. Journal of Planning Education and Research 25 (1): 11–26.

Newman, P., & Kenworthy, J. (1992). Is there a role for physical planners?. Journal of the American Planning Association, 58 (3), 353-52.

Newman, P., & Kenworthy, J. (1989a). Cities and automobile dependence: A sourcebook. Gower, Aldershot and Brookfield, Victoria.

Newman, P., & Kenworthy, J. (1989b). Gasoline consumption and cities – a comparison of U.S. cities with a global survey. Journal of the American Planning Association, 58 (1), 24-37.

Norquist, J .(1998). The Wealth of Cities. MA: Addison-Wesley, Reading.

Okabe, A. (2005). Towards the spatial sustainability of city-regions: A comparative study of Tokyo and Randstad. In M. Jenks, N. Dempsey (Eds), Future forms and design for sustainable cities (pp. 55-72). Routledge: New York.

Pederson, W. (2004). Strategies for tall urban buildings. CTBUH Technical papers

Pucher, J., & Buehler, R. (2008). Making cycling irresistible: Lessons from the Netherland, Denmark and Germany. Transport Reviews, 28(4), 495–528.

Record News. (August, 2008). Architectural Record, 32-34.

Rogers, R. G., (1997). Cities for a small planet. London: Faber & Faber.

Row, G., Wright, G., & McColl, A. (2005) Judgment change during Delphi-like procedures: the role of majority influence, expertise, and confidence. *Technol. Forecast. Soc. Change*, **72**(4), 377–399.

Sanoff, H. (2000). Community participation methods in design and planning.

Wiley & Sons: New Jersey

Saunders, D. (2003). Dubai the Arabian Dream. London: TransGlobe Publishing

Limited

Sepasdar, G., & Sibley, M. (2008). Public participation and urban development in Islamic countries. In A. Moustafa, J. Al-Qawasmi, & K. Mitchell (Eds), Instant cities: Emergent trends in Architecture and Urbanism in Arab world? (pp. 561-575). CSAAR: Center for the Study Architecture in the Arab Region.

Sherlock, H. (1990). Cities are good for us: The case for high densities, friendly streets, local shops and public transport. London: Transport 2000.

Silverman, D. (1993). Interpreting qualitative data: Methods for analyzing talk, text, and interaction. Sage: London

Skulmoski, G., & Hartman, F. (2002). The Delphi method: Researching what does not exist (yet). Proceedings of the International Research Network on Organization by Projects, IRNOP V Conference, Renesse, The Netherlands.

Smalley, B. (2002). A tale of two cities: By 2005 Dubai will be able to boast another city within a city. STARS Online, (www.stars.com/art).

Staley, S., Edgens, J., & Mildner, G. (1999). A line in the land: Urban-growth boundaries, smart growth, and housing affordability. Reason Public Policy Institute(RPPI).RetrievedNovember15,2008 from http://www.reason.org/pb11.pdf

Sternberg, E. (2000). An integrative theory of urban design. Journal of the American Planning Association 66, 265-78.

Structure Plan Team: Parsons-HBA, Inc. (1995). Structural Plan for the Dubai Urban Area 1993 – 2012. Dubai: Dubai Municipality, Planning and Surveying Department.

Sustainability by design: A vision for a region of 4 million. (2006). Vancouver: The Design Center for Sustainability at the University of British Columbia

Thomas, L., & Cousins, W. (1996). The compact city: A successful, desirable, and achievable urban form? In K. Williams, E. Burton, & M. Jenks (Eds), The compact city: A sustainable Urban Form? (pp. 53-65). London: E & FN Spon.

2007 Water statistics. DEWA: Dubai Electricity & Water Authority (2008). Retrieved Oct 26, from http://www.dewa.gov.ae/aboutus/waterStats2007.asp

WCED (1987). Our common future. London: Oxford University Press

Welch Guerra, M., ed. (2005). Buenos Aires a la deriva. Buenos Aires: Biblos.

Wheeler, S. (2003). The evolution of urban form in Portland and Toronto: Implications for sustainability planning. Local Environment the International Journal of Justice and Sustainability, 8(3), 317 – 336.

Wiedmann, F. (2008). Sustainability: The challenge of urban development strategies in the Gulf. In A. Moustafa, J. Al-Qawasmi, & K. Mitchell (Eds), Instant cities: Emergent trends in Architecture and Urbanism in Arab world? (pp. 449-460). CSAAR: Center for the Study Architecture in the Arab Region.

Winter, P. (1994). Planning and sustainability: an examination of the role of the planning system as an instrument for the delivery of sustainable development. Journal of Planning and Environmental Law, October, 883-900.

Witkin, B. R., & Altschuld, J. W. (1995). Planning and conducting needs assessment:

A practical guide. Thousand Oaks, CA: Sage.