

Assessment of a Planning Project Using a New Technique at Jordan

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ABSTRACT Zarqa City faces a major problem in its urban planning and design. Four main obstacles surround the city. From the north the location of heavy industry such as the Jordanian Refinery, the thermal plant for producing electricity and the purification unit to treat the wastes of the capital Amman and Zarqa are situated. From the west the natural barriers of steep mountains, where the slope reaches more than 30%, exists. From the south the City of Amman boundaries reaches Zarqa. And from the east the military camps is located. The current figure of population is around 838,250 inhabitants and there is no place for the city to expand. The only solution to expand the city was to demolish the military site existing to the eastern section of the city to facilitate its eastward expansion. This was begun in the year 2002 and a new project named "New Garden City" is proposed. This proposed project would start in the year 2006 after the completion of the infrastructure. This study will examine the "New Garden City" project design and its future impact on the quality of life of Zarqa's people. Middle Eastern countries in general and Jordan in particular started to examine the quality of life concept in detail at the beginning of the 21st century. Quality of life means measurement of people's satisfaction and the quality of the environment in which they live. The need to measure the quality of life of a city or a district is considered a vital part of the growth and urbanization process that is happening at an incredible rate at Jordan without the ability to control or analyze it. This has been achieved by applying Delphi and Concept Mapping techniques. Several conclusions are reached at end assuming that this new project will improve the quality of life of people of Zarqa but to a certain level.

1. INTRODUCTION: THE CITY OF ZARQA

Zarqa lies to the northeast of the capital Amman and is considered the second largest city in Jordan in terms of population, where the figure was 838,250 inhabitant in the year 2004 (Statistical Department of Jordan, 2005). Zarqa is a hilly city, and a branch of the Zarqa River runs through its center dividing the city into two parts, East, and West (Zarqa Municipality, 1992). In 1926, Zarqa became the base for the military force that controls the eastern section of Jordan. This resulted in the foundation of a large number of unplanned housing groups for soldiers and their families. The amorphous planning continued until 1976, when the first development plan was introduced by the Zarqa municipality (Zarqa Municipality, 1995). Zarqa City is considered the first industrial city in Jordan. It contains heavy, medium and light industry. The heaviest is located in the northern section of the city where the Jordanian Refinery, built in the year 1960, the thermal plant built in the year 1975, and the purification unit, built in 1985, are all situated. The medium size industry consists of factories located in the northern and southern sections of the city. Light industry such as craft shops, is

evident in the city center. Zarqa's existing neighborhoods are plagued with extreme levels of air pollution due to the proximity of heavy and medium industrial factories to both north and south of the city. No buffer zone around industries is planned. It is not clear whether climatic constraints have been taken into consideration at different stages in the designing of neighborhoods in Zarqa City.

Zarqa municipality was founded in 1928, but no regulations concerning building height, ratio of built forms, floor ratio or setbacks were proposed. Its main role was only to produce land use plans. The planning commission distributed residential and commercial users mainly and left all major land uses intact. Anyone can imagine the resulting situation. Chaotic, congested and dangerous intersections were all evident in Zarqa prior to 1976's irregular planning. A bad urban design resulted from a neglect to study building heights, setbacks and ratio of built terms. This is one of the major problems that face planners in our time as it limits any future expansion of the city. Most of the planning of neighborhoods in Zarqa City after 1976 has followed the topography when laying down main streets or dividing land. Zarqa City is a hilly area

Table 1: 25 expert's opinion on ranking the Zarqa domains, where the highest value means the most important domain

No.	Domain's value								
	Economy	Social	Environment	City profile	Housing	Transport	Recreation	Public participant	Legislation
1.	9	6	4	3	8	7	5	2	1
2.	8	5	6	2	9	7	4	1	3
3.	8	6	5	7	9	4	3	2	1
4.	9	3	8	6	7	5	4	2	1
5.	7	5	6	3	8	9	2	4	1
6.	7	6	4	5	9	8	2	1	3
7.	8	4	7	5	9	6	1	3	2
8.	9	4	7	6	8	5	3	1	2
9.	9	5	8	4	7	6	3	2	1
10.	8	5	7	6	9	3	2	1	4
11.	8	4	7	5	9	6	2	3	1
12.	7	8	9	6	5	4	3	2	1
13.	9	4	3	6	8	7	2	5	1
14.	9	6	8	5	7	3	2	4	1
15.	8	5	9	7	6	3	2	4	1
16.	7	4	8	6	9	5	1	3	2
17.	9	5	7	6	8	4	3	1	2
18.	8	7	9	6	5	4	3	2	1
19.	8	5	3	7	9	6	4	2	1
20.	9	5	3	6	8	7	4	2	1
21.	9	4	8	7	5	6	2	3	1
22.	8	3	7	6	9	2	5	4	1
23.	8	4	7	5	9	6	3	2	1
24.	7	8	4	5	9	6	3	2	1
25.	9	6	8	5	7	3	4	1	2
Total	205	127	162	135	196	132	72	59	37

Source: Author, 2005.

where you may find the separation between one neighborhood and another is achieved by constructing wide avenues that follow contour lines. Other times, there is no distinction between these boulevards and the streets widths inside the neighborhood. This results in unclear boundaries between neighborhoods inside Zarqa City.

Zarqa has many problems in its transportation system. The old part of the city center roads has a missing hierarchy. The city also has uncontrolled zones for vehicle movement that cause traffic congestion as well as an increased number of accidents. Too many types of vehicles share the same road. The present street network is poorly designed, poorly maintained and in bad condition. The city center is the most public section of the city, with a high density to accommodate different types of public activities (Hanida et al., 1994). Most of the neighborhoods inside Zarqa City lack a center for various kinds of services, such as commercial, governmental, health, open spaces or gardens, or parking areas. A mixed land use plan is found in Zarqa City where most of the neighborhoods are a mixture of public and private activities.

2. DATA COLLECTION CRITERIA

Interviewing is the most known and suitable means of data collection to measure quality of life. Individual interviewing is based on asking each respondent alone a series of pre-established questions, where the main idea is gathering data from separate individuals without others' influences (Marans, 2002). This study will make use of Delphi and Concept Mapping techniques (ASA, 1997). In this study, 25 experts from various fields are joined together to give their views on the major domains that affect Zarqa City, where table 1 shows the results. The Concept Mapping technique, which focuses on a topic involving input from one or more participants, produces a diagram of their perceptions. It helps people think more effectively as a group without losing their individuality. Experts are selected through email and internet and the choice to participate depends on the number and degree of their responses and the applicability of reaching the respondents. The 25 experts suggest more than 18 different domains, and after discussion, only

Table 2: Statistical values of the main domains shown in table 1.

<i>Domain</i>	<i>Total value gained</i>	<i>Highest value</i>	<i>Lowest value</i>	<i>Rank</i>	<i>Rank mean</i>	<i>Variance</i>	<i>Median</i>
Economy	205	9	7	1	8.2	0.56	8
Social	127	8	3	6	5.08	2.49	5
Environment	162	9	3	3	6.72	3.89	7
City profile	135	7	2	4	5.40	1.66	5
Housing	196	9	5	2	7.84	1.88	8
Transport	132	9	2	5	5.28	3.11	6
Recreation	72	5	1	7	2.88	1.19	3
Public Participant	59	4	1	8	2.36	1.31	2
Legislation	37	4	1	9	1.48	0.60	1

Source: Author, 2005.

Table 3: Domain's frequency of values depending on table 1.

<i>Domain</i>	<i>Frequency of values</i>									<i>Total</i>
	<i>1</i>	<i>2</i>	<i>3</i>	<i>4</i>	<i>5</i>	<i>6</i>	<i>7</i>	<i>8</i>	<i>9</i>	
Economy	-	-	-	-	-	-	5	10	10	25
Social	-	-	2	7	8	5	1	2	-	25
Environment	-	-	3	3	1	2	7	6	3	25
City profile	-	1	2	1	7	10	4	-	-	25
Housing	-	-	-	-	3	1	4	6	11	25
Transport	-	1	4	4	3	7	4	1	1	25
Recreation	2	8	8	5	2	-	-	-	-	25
Public participant	6	10	4	4	1	-	-	-	-	25
Legislation	17	5	2	1	-	-	-	-	-	25

Source: Author, 2005.

9 domains that are selected by more than 50% of experts, or 13 experts, are chosen for this study. Examples of other domains, that are suggested but not included in this study, are Infrastructure, Health, Children care, Culture, Security, City management and Landuse plan. The author of this paper administered the Concept Mapping technique and in the end. This study tried to look for the domains that are of the highest influence on quality of life to residents of Zarqa in general. It classified them into ranks according to their importance as shown in table 2. Economy domain came in the first place followed by Housing domain, Environment domain, City Profile domain and Transport domain. The Social, Recreation, Public Participant and Legislation domains came in last. Also, in order to ensure accuracy table 3 is suggested, which analyzes table 1 according to frequency of values.

The second part of this research is to test the selected nine domains on the residents of Zarqa City. Nearly six hundreds residents living in Zarqa during, September 2006, are asked to participate in filling out the questionnaire. They are aged more than 18 years, selected randomly, with a

nearly even distribution of males and females and even different income ranges. Their response rate was 83%, where finally a total of 500 respondents resulted. The 250 sample of males and females is divided equally according to their income, where almost 83 of them are low-income group with average US\$ 500 yearly income (the poverty line of Jordan). Another 83 of them were middle-income group with average of US\$ 1,200 yearly income (the average individual income in Jordan), and 84 of them were high-income group with average above than US\$ 1,500 yearly income. Table 4 represents the T-Test for the whole sample where the Means of male and females are shown. Table 5 shows the analysis of variance and ANOVA for different income group, where the Mean, Standard Deviation, F-factor and Sig.-factor are displayed. A multiple comparisons or Post hoc Comparison between gender and income is tried and presented in table 6 to compare the different results. The Delphi technique and 5-points Likert Scale are used for answering the questionnaire, where number (5) represents the highest value of the concept it measures and number (1) represents the lowest value.

3. ZARQA “NEW GARDEN CITY” PROJECT

There are several city-planning models used in history. The Arabic-Islamic concept of town planning in the past adopted the use of a major spine for commercial use named “bazaar”, surrounded by dwellings. There was a strict separation between commercial and residential uses. Zarqa City and all other major Jordanian Cities are considered modern cities; therefore they did not follow this type of town planning. During the old and middle ages, such as Greek and Medieval, military engineering dominated town planning where geometrical forms took the shape of cities surrounded by large walls for protection. During the 19th century mostly engineers and not architects designed the industrial town, where factories were the centers of cities. The end of the 19th century and the beginning of the 20th century introduced the concepts of neighborhood, the Garden City and New Towns. Sir Ebenezer Howard developed the garden city concept in 1898. He proposed the ideal town as limited in size to a population of 50,000 at the beginning and 250,000 at later stages (Howard, 1898). The neighborhood is basically a group of residential houses with a population of between 6,000 and 10,000 serviced by an elementary school. The garden city movement and the neighborhood concept left their mark in nearly all cities over the world. It started in Britain in 1901 and moved to Jordan during the 1930s (Cherry, 1974).

More recently sustainable development in town planning started to take place in European and American cities. By the end of the 20th century, the concept of compact city where an end to urban sprawl and a return to mixed land uses in the city to reduce travel distances is suggested (Commission of European Communities, 1990). The Urban Villages Forum is another town planning theme introduced that has also encouraged the mixing of use developments for the improvements of economic and health life (Aldous, 1992). Danish planners proposed promotion of higher density development along a public transport route or the creation of high-density sub centers (Elkin et al., 1991), where this might be seen as development to the concept of “bazaar” and might be appropriate to Arabic cities (Breheny et al., 1993). Modern British planners mix the uses within a city to reduce car

travel and obtain sustainability (Lock, 1995). American planners see higher density cities as answer to the “walkable city” (Calthorpe, 1993).

It is not clear why the planners of Jordan adopted the Garden City concept in the design of the Zarqa “New Garden City” project despite it has been more than one century since the first Garden City was erected in Britain. This might be due to its elegant road network and generous ratio of open space to building Zarqa lacks. Zarqa “New Garden City” project is already planned and the construction will start soon after the completion of the infrastructure in the year 2006. The project is a comprehensive residential city with a mixed-use land center for commercial use. The total developed area is 2500 hectares (Fig. 1). Among the objectives are the creations of a new urban environment adjacent to Zarqa’s existing city center, the improvement of social life of the city, and the provision of new development opportunities. The existing city center of Zarqa City will expand 3.5 kilometers to the east along a covered pedestrian market inspired by the traditional bazaar concept (Fig. 2). The development plan for the New Garden City has defined six construction phases for the entire site (National Resources Investment and Development Corporation, 2004).

The pilot project has a 250-hectare area representing the first phase of implementation of the master plan (Fig. 3). The pilot project will consist of private spaces, which will be the dwellings, and the public space at the center which will be the plaza, as well as commercial shops, entertainment facilities and other public uses as seen in figure 4. The pilot project has different shapes and layouts of buildings. The row-housing model, with alternative configurations that offer privacy, freehold ownership and a private garden for each dwelling is adopted. The pilot project depends on the concept of neighborhood, which is associated with the concept of the Garden City and New Towns. The pilot project has 27% of its total area for commercial use and public facilities, 36% for residential use, 29% for roads and 8% as a green area.

4. THE QUALITY OF LIFE CONCEPT

Quality of life means measurement of people’s satisfaction and the quality of the environment in which they live. The quality of life concept encompasses many domains of life indicators

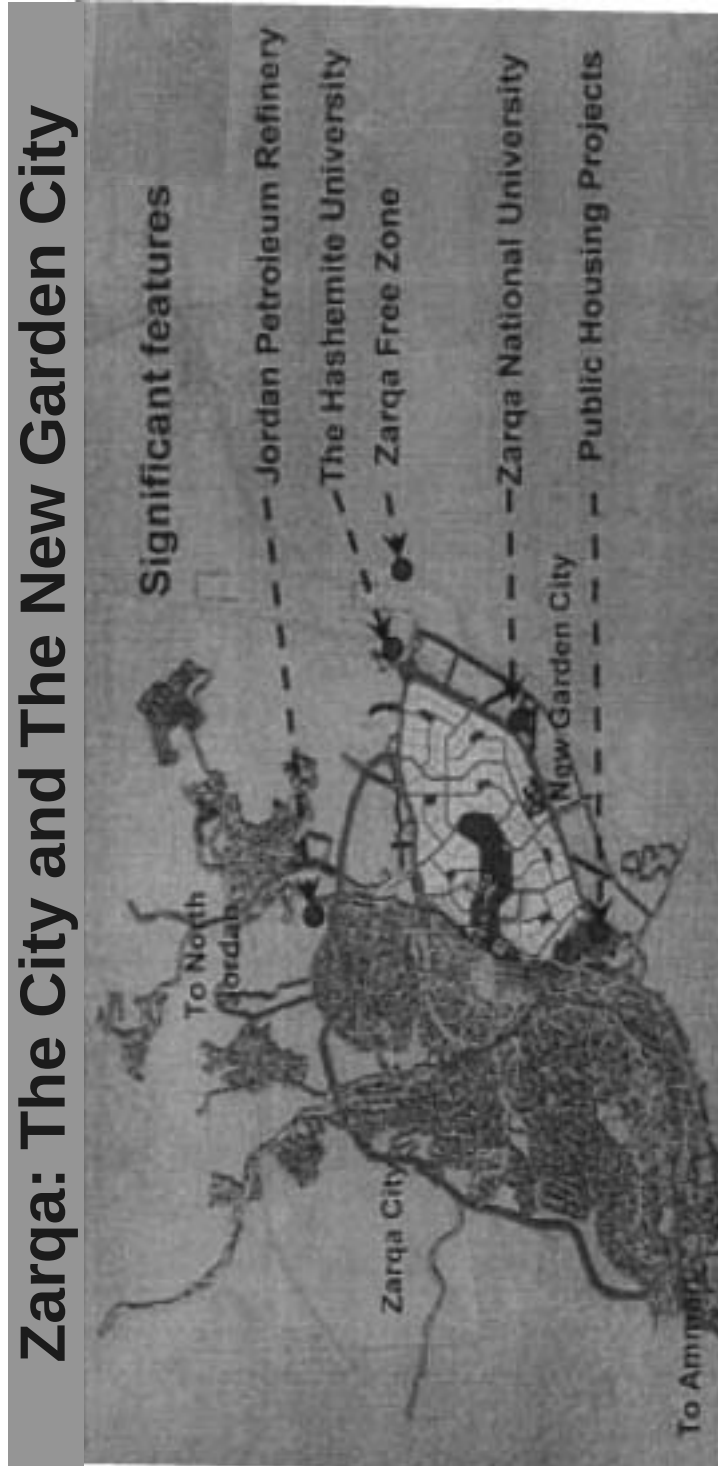


Fig. 1. Zarqa urban fabric and the proposed New Garden City project.
Scale: 1:100,000
 Source: National Resources Investment and Development Corporation, 2004.



Fig. 2. Commercial zone at New Garden City project.

Scale: 1:50,000

Source: National Resources Investment and Development Corporation, 2004.



Fig. 3. The pilot project.
Scale: 1:25,000

Source: National Resources Investment and Development Corporation, 2004.

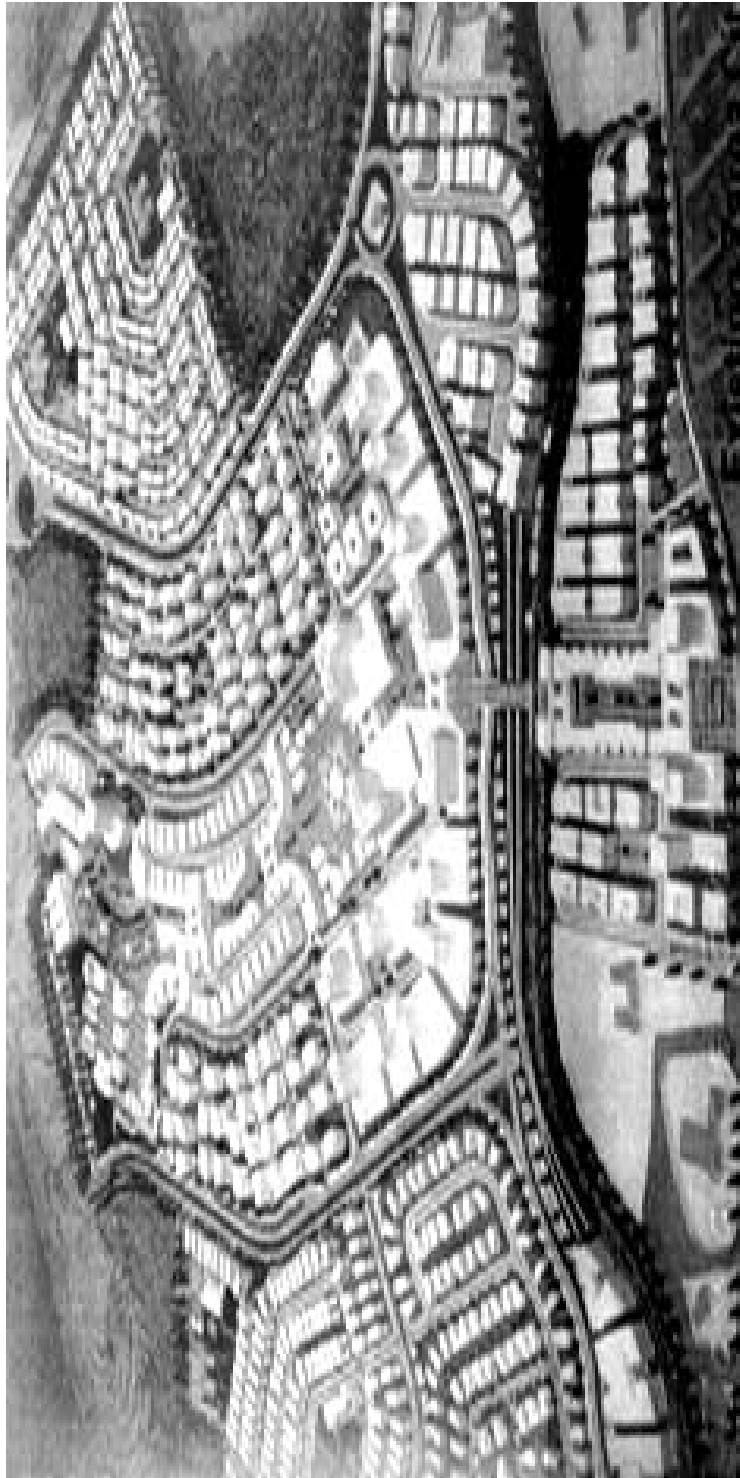


Fig. 4. Isometric of the pilot project.
Source: National Resources Investment and Development Corporation, 2004.

(Flynn et al., 2002). It is concerned with personal well being and satisfaction and with living conditions of places. It is indeed a well-developed phase to all social, economic and environmental research that is primarily descriptive, secondly evaluative. It is concerned with personal well being and satisfaction and with living conditions of places (Jones and Riseborough, 2002). Sociologists see quality of life as a subjective instrument, which is about feeling good or satisfied, such as psychological and behavioral dimensions of social order, safety, and communication. Economists see it as an objective instrument, which is about fulfilling the societal demands in the surrounding environment, such as infrastructure and public services provision (Luger, 1996). Both subjective and objective dimensions are included at the individual and society or community levels. At the individual level, subjective quality of life refers to life satisfaction and how people feel about themselves and their circumstances, while at the community level it is related to the ability to participate and influence decisions. Objective quality of life at the individual level implies a functional assessment and level of educational status, while at the community level it implies environmental, social, and economic conditions, health status, and government performance (Hancock, 2000).

Quality of life and social, economic and environmental studies are being proactive. In order to move from indicators to action, projects must examine and analyze the causes behind the symptoms (Cobb and Rixford, 1998). The quality of life is a compound concept of life satisfaction and standard of living, which must be studied parallel to each other. For example, the standards of living may be improving, but the quality of life may not be so at the same level. Another example, people might be satisfied with their circumstances of living in a poor quality of environment, and not aware of better possibilities (Yeih, 2001). In order to measure a quality of life in any district or city, developed indicators must be tested first (Land, 2002). The time frame of collected data is important. Some intervals are for ten years, some of five, some yearly and some sporadically. The domains and the elements underneath indicators are joined together by means of a framework that describes the relation between all domains and indicators (Greenwood, 2001). Domains vary in scale, time frame and terminology. The selected

domains for a study must represent the total construct or at least, as many components as possible, while each domain must encompass a substantial and discrete portion. Domains must be more generic to cover various kinds of population, such as elderly people, and must have the potential to be measured in both subjective and objective quality of life dimensions. Domains vary in scale, time frame and terminology. The domains must represent the total construct or at least as much components as possible. Each domain must encompass a substantial and discrete portion. Thus, strongly related aspects could be joined together under one major domain. Domains must be more generic to cover various kinds of population, such as elderly people and other kinds. Domains must have the potential to be measured in both subjective and objective quality of life dimensions (Hagerty et al., 2001).

Community indicators were initiated around 1910, and too many surveys were conducted on education, health and general social conditions under the supervision of chambers of commerce, citizens' committees, church federation or civic improvement associations. These groups then relayed on the findings of the technical experts, but in the light of fact of absence of theories, these findings did not offer any explanation of causes, and the observations remained intact (Cobb and Rixford, 1998). Along their history, community indicators are achieving a great development that made them a powerful tool towards reforming societies as well as setting up successful policies. At the beginning three main community indicators were selected economic, social and environmental. The economic indicator was established in 1919. The National Income Unit of the Department of Commerce in the U.S.A. initiated this indicator. With corporation of the Product Accounts (NIPA), the well-known term of the Gross Domestic Product (GDP) or the board measure of final output of marketed goods and services, was introduced for the first time in history. The first set of economic data was published by the Bureau of Economic Analysis of the U.S. Department of Commerce in 1934. After the Second World War attention started to be paid towards measurement of unemployment and the use of surveys to gather data assessing living conditions (Flynn et al., 2002).

The successful of economic indicator encouraged other community indicators to be tested and examined such as the social indicator. The "Recent Social Trends" report issued by the U.S. Research Committee on social trends in 1933 was the first achievement in this field. By 1960s the social indicators developed well by several international organizations such as the United Nations, which introduced "System for Social and Demographic Statistics (SDSS)" which represented a social accounting system (Cobb and Rixford, 1998). Interest in environmental indicators did not take place until recently. For a long time, environment was not an issue of any national or international policy. The national Environmental Policy Act in 1970 was one of the first comprehensive environmental acts taking place in the U.S. (Flynn et al., 2002). The United Nations Conference on Environment and Development (UNCED) that held at Rio de Janeiro in 1992 addressed the topics of environment and sustainability, and their importance became international (Schmitt and Janckowitsch, 1999). Developing countries' quality of life domains differ from those of developed countries. The focus on the fundamentals in developing countries, such as the economic factor of availability of jobs and the housing factor of shelter and security are stressed. Less importance is paid to Recreation, Legislation and Public Participant domains (Andreus, 2001). Although the interest in "quality of life" studies appeared at the middle in the 20th century (around 1950) as part of the economic, social, and environmental studies, developing Middle Eastern countries did not start to examine it in detail until the beginning of the 21st century. The shortages of data, skills and capital need to be considered carefully in developing countries.

5. DOMAINS OF ZARQA NEW GARDEN CITY PROJECT

The concept Mapping technique was used to interview 25 experts. There were several domains either suggested by experts or prepared by the author, and after discussion with the selected experts, nine domains were chosen. These nine domains might be applicable to other Jordanian cities, but definitely not by the same ranking. The Delphi technique is also applied where a focused questionnaire is used in order to establish a consensus opinion from people

that do not necessary know each other. The domains will be discussed in detail according to their ranking as follows:

1. *Economy Domain:* The economic indicators in developing countries are considered an important issue that influences almost every individual. A high standard of living is the result of good economic performance (Bloom et al., 2001). The total Gross National Product, GNP, is US\$ 6.6 billion in Jordan. The yearly individual income averages approximately US\$ 1,200, far less than other surrounding countries. The unemployment figure is 10.1% for Zarqa City, less than the figure for Jordan, which is 12.5% (Statistical Department of Jordan 2005). The poverty line is calculated to be around US\$ 500 per year per person. In Zarqa City 22.3% of the population is below the poverty line, higher than the figure for Jordan, which is 14.2%. Between the year 2000 and 2004, 1519 new companies were established at Zarqa, which constitutes 5.9% of Jordan's new companies for the same period. The capitals for those new companies were US\$ 21 million, or 1.8% of Jordan's new companies capitals for the same period (Ministry of Commerce and Industry, 2005). Zarqa has a worse economic situation than other cities in Jordan. It has the second highest percentage of poverty in Jordan. The total investment for the year 2003 was US\$ 41 million, of which only US\$ 9 million was foreign investment. This represents only 6.9% of total investment in Jordan for the year 2003.
2. *Housing Domain:* Housing in Zarqa suffers from both bad planning of neighborhoods and bad quality of buildings due to absence of building regulations before the year 1976. The bad housing sector goes back in history to the year 1926, when Zarqa became the base for the military force that controls the eastern section of Jordan. This resulted in the foundation of a large number of unplanned housing groups for soldiers and their families where amorphous planning resulted. Housing is considered an important element in quality of life. It is not a shelter alone. It has physical and socioeconomic prospects. Poor quality of housing leads to diseases and otherwise affects health. The provision for housing should anticipate people's requirements in terms of type, size, style of

finish and utilities (Fried, 1990). Building regulations greatly affect the type and form of the housing schemes. The services related to housing are also important such as the provision of car parking, which is one of the most serious problems at Zarqa.

3. *Environment Domain:* Environment is related to all our surroundings, including built and natural environments (Rahman et al., 2002). Natural environmental quality includes air, water, soil and natural resources, while built environment is related to other fields such as infrastructure, energy, employment, transportation, recreation, housing and public safety. In Zarqa natural resources became limited due to population increase and the limited area of cultivated land. Green area declined and water and air were polluted due to the exist heavy industry north of the city. Solid waste increased, acid rain was prevalent, carbon dioxide spread and concerns of global warming were raised. Currently Zarqa has a lot of traffic congestion and unchecked growth of business and activities, which leads to an unpleasant environmental situation. Solid waste treatment is also inefficient at Zarqa. Recycling is not yet employed, but it would improve the environment and provide a better quality of life satisfaction. The lack of open spaces and green area at Zarqa City increases the air and noise pollution. The New Garden City project at Zarqa might minimize this problem particularly as the provision for open spaces and plantation is anticipated in the design scheme.
4. *City Profile Domain:* The urban fabric of the city reflects the social interaction of its people and is also reflected in the city skyline, which is considered an important element in the quality of life (Friedmann, 2002). The growth of Zarqa is occurring at incredible rates. Zarqa has a non-homogeneous population, due to various reasons, that makes integration between community members difficult. This results in an increased number of crimes in the society and raises the question of solidarity among the community's families. The Zarqa New Garden City project will provide a completely new image to the city of Zarqa, where new well-planned neighborhoods will be the dominant feature. The design suggests building several neighborhoods and a covered commercial street that will improve the environment.
5. *Transport Domain:* The convenience of travel within Zarqa City by public means of transport is poor. There is no underground or "metro" means of transportation, and the existing public buses are not sufficient and are mostly inconvenient. Transportation plays a significant role in quality of life. It is a service that everyone needs (Bartuska et al., 1994). The New Garden City project planning is trying to solve this problem by means of providing a wide road network. For existing streets at Zarqa, new construction of bridges, tunnels and by-pass roads to ease vehicle movement might be the answer. The existing situation treatments to pedestrian and pavement walks at Zarqa are bad. At New Garden City project a complete pedestrian arcade of more than 3.5 kilometers long will be designed through the pilot project.
6. *Social Domain:* The social satisfaction of inhabitants is relative to figures of rate of savings of private households and their satisfaction with their income. Social situation of the community is highly related to the economy. The average working hours per week is associated with people's productivity that classifies them into low, medium, and high-income groups. The total number of population in Zarqa is 838,250, or about 15.7% of the Jordan's population, of which 436,900 or 52.1% are males. The birth rate is 2.7% and the death rate is 0.28%. Almost 95.3% of Zarqa's inhabitants are urbanized and only 4.7% live in rural areas (Statistical Department of Jordan, 2005). Health is considered part of the social satisfaction of the society. As the level of health increases the potential of happiness does too; thus good health results in a better quality of life. Good health leads to higher income due to better productivity and larger labor force participation (Banerjee et al., 1991). Air pollution, noise and stress, which all exist at Zarqa, are factors that strongly contribute to the spread of diseases.
7. *Recreation Domain:* The daily human needs require a certain level of open space and green area, such as public parks (Broadbent, 1990). Recreation is a vital issue in people's lives. It is the main theme that distinguishes human beings from other creatures. Zarqa's

urban tissue suffers from a lack of recreational facilities, and where they do exist, they are rarely used and suffer from poor maintenance. Public parks in Zarqa do not exist. In the New Garden City project special attention has been given to designing high quality gardens that are furnished with fountains, chairs on which to rest, kiosks, cafes and other leisure facilities. Sports activities are severely limited at Zarqa and the children suffer from a lack of recreational opportunities.

8. *Public Participant Domain:* Public participation requires a certain degree of education and awareness of the society's needs and requirements. As a result of their participation people feel that they are part of the community in which they live. In order to be effective citizens they should participate in community and city decisions (Douglass, 1995). It is an important new domain in the Middle East that has started to appear in developing countries only recently. Although there are many charity associations and international organizations in Zarqa, people's participation is limited for various reasons. One reason might be the non-homogeneous population of the city of Zarqa and the various concerns about personal interests. The Municipality of Zarqa has not made any effort to bring public participation into reality. The New Garden City project does not account for public participation.
9. *Legislation Domain:* Although the Zarqa municipality was founded in 1928, no regulations concerning building height, ratio of built forms, floor ratio or setbacks were proposed. Its main role was only to produce land use plans. In the year 1976 a building regulation was introduced in Zarqa, but the current situation is poor in terms of planning and building regulations due to the pre-1976 situation. The New Garden City project will provide for new building regulations and, hopefully, the situation of Zarqa will improve.

6. RESULTS

Modern British planners mix the uses within a city to reduce car travel and obtain sustainability. Moreover, British planners began to increase density in existing by calling for new housing schemes to be built in urban areas to

achieve sustainability. From the previous literature we find that planning concepts develop with time even for the same city or country. In Zarqa City although it has been more than 100 years since the first Garden City was erected in Britain, yet the National Resources Investment and Development Corporation planning committee view it as the best solution for Zarqa. This might be due to its distinguished elegant road network and generous ratio of open space to buildings. As a conclusion to this study I think that the National Resources Investment and Development Corporation should look at other new concepts in planning to achieve sustainability, which is one of their main goals. For example a look at the concept of compact city suggested by the Commission of the European Communities in 1990 where sustainable development and an end to urban sprawl to reduce travel distances are suggested. The Urban Villages Forum has also encouraged the mixing of use developments for the improvements of economic and health life. The mix of uses within a city includes the juxtaposition of residential and commercial uses within new developments and the location of new development, leisure and commercial facilities close to housing zone.

For the present situation of Zarqa City, a land use plan of balanced distribution between residential, commercial and industrial areas will ensure a better situation. Definite zones should be clearly planned. A complete study of the existing land use in all Zarqa neighborhoods should be executed in order to solve the existing problems of Zarqa before implementing the New Garden City project. The Danish model of planning based on promotion of higher density development along a public transport route can be adopted at later phases. It is similar to the concept of "bazaar" and might be appropriate to specific region. This is also in line with the American suggestion of higher density cities as answer to the "walkable city". This leads us to achieve social sustainability and better quality of life in cities, similar to the old traditional streets and urban villages, which provided for social interaction.

This study started with the Concept Mapping technique to select different domains that affect the quality of life in the New Garden City project at Zarqa. Next, the Delphi technique was applied for the purpose of studying the expected future influence of the New Garden City project on

people's quality of life. The 500-participant sample is considered a good number in terms of quality of life questionnaires. The evident result obtained from tables 1 and 4 are the wide variation that appeared in participants' opinions and the level of priorities of the first six domains (Economy, Social, Environment, City Profile, Housing and Transport), compared to the other three domains. The other three domains of Recreation, Public Participation and Legislation are considered as partial domains by all 25 of the selected experts who participated in the study. Table 2 summarizes these results, ranking them and showing the average for each domain. Economy is the most important domain followed by Housing, Environment, City Profile, Transport and Social domains respectively. On the other hand, Legislation, Recreation and Public Participation are at the opposite end, expressing an ordinary situation in a developing country. It also should be stressed that the ranking of these domains is applicable and valid only for Zarqa's New Garden City project, but will definitely change if applied to other cities in Jordan or in the Middle East.

Table 4, which demonstrates the t-Test of group statistics and independent samples, for the questionnaire on Zarqa redevelopment project according to their ranks shown in table 2, compares gender results. Only questions number 1 and 4 that have values less than 0.05 on t-test, show significant difference between males and females. The answers to other questions have almost the same result obtained from both genders. The 5-points Likert Scale is used to measure the degree of inhabitants' response in this table, where number (5) represents the highest value. After analyzing the collected data actually males think that this New Garden City project will improve their economic situation more than the females, where the difference of Means is 0.4600. Males believe that the economic situation will improve due to the large amounts of developed area and commercial area proposed. The construction of this massive site will require skilled laborers during building. After construction, the project will stimulate growth in retail sales, business and commerce. Males also think that this the New Garden City project will improve the city skyline and produce a new desirable city profile more than females, where the difference of Means is 0.4000. The New Garden City project will provide for a new and

Table 4: t-Test where group statistics and independent samples are shown for the questionnaire on Zarqa redevelopment project according to their ranks as in table 2. The actual total number of participants is 250 males and 250 females aged more than 20 years, selected randomly, with a nearly even numbers of different income ranges. 5-points Likert Scale is used, where number (5) represents the highest value. Three types of income groups are selected with equal numbers: low, middle and high. Less than 0.05 is choused to be significant.

	Gender		t-test for Equality of Means (Equal variances assumed)		
	Male	Female	t	df	Sig. (2-tailed)
Q.1	3.5600	3.1000	4.4114	498	0.000
Q.2	2.7600	2.8160	-0.514	498	0.608
Q.3	2.8840	2.9600	-0.678	498	0.498
Q.4	3.1760	2.7760	3.806	498	0.000
Q.5	3.5160	3.4720	0.402	498	0.688
Q.6	3.1000	3.1000	0.000	498	1.000
Q.7	2.9840	2.9160	0.563	498	0.574
Q.8	3.5680	3.4600	0.930	498	0.353
Q.9	3.1960	3.0720	1.022	498	0.307
Total	3.1938	3.0747	1.080	498	0.281

The questions are:

- Q.1: Do you think that Zarqa redevelopment project will improve economic situation at Zarqa?
 Q.2: Do you think that Zarqa redevelopment project will facilitate for social interaction?
 Q.3: Do you think that Zarqa redevelopment project will improve the environment at Zarqa?
 Q.4: Do you think that Zarqa redevelopment project will introduce a new desirable city profile and skyline?
 Q.5: Do you think that Zarqa redevelopment project will provide for better housing projects?
 Q.6: Do you think that Zarqa redevelopment project will improve transportation system in the area?
 Q.7: Do you think that Zarqa redevelopment project will provide for recreation areas?
 Q.8: Do you think that Zarqa redevelopment project should take the public opinion in its design?
 Q.9: Do you think that Zarqa redevelopment project will improve building legislation in the city?

Source: Author, 2006.

desirable concept in urban design. The new neighborhood design will introduce completely new housing layouts for Zarqa. The concepts of neighborhood and New Towns developed at Zarqa New Garden City project will introduce an ideal town limited in size to a population of 23,000 at the first phase and 250,000 at later stages. The pilot project has different shapes and layouts of buildings for housing and other facilities. The row-housing model, with alternative configurations that do not require large areas of land offer also privacy, freehold ownership and a private garden. After looking at international standards in

Table 5: Results of ANOVA for the questionnaire on Zarqa redevelopment project. The actual total number of participants is 250 males and 250 females aged more than 20 years, selected randomly, with a nearly even numbers of different income ranges. 5-points Likert Scale is used, where number (5) represents the highest value. Three types of income groups are selected with equal numbers: low, middle and high.

One-way ANOVA	Low Income		Middle Income		High Income		Total		F-value	Sig.-value
	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation	Mean	Std. Deviation		
Q.1	3.3253	1.2897	3.2831	1.2879	3.3810	1.2372	3.3300	1.2698	0.249	0.780
Q.2	2.8976	1.2438	2.5181	1.1996	2.9464	1.1698	2.7880	1.2174	6.307	0.002
Q.3	2.9518	1.2544	2.6145	1.1582	3.1964	1.2774	2.9220	1.2518	9.400	0.000
Q.4	3.1747	1.2648	2.8494	1.1527	2.9048	1.333	2.9760	1.1909	3.586	0.028
Q.5	3.6867	1.1901	3.4699	1.2537	3.3274	1.2063	3.4940	1.2235	3.689	0.026
Q.6	3.2349	1.4009	3.0422	1.3182	3.0238	1.3710	3.1000	1.3644	1.224	0.295
Q.7	3.1145	1.4117	2.8795	1.3017	2.8571	1.3281	2.9500	1.3502	1.861	0.157
Q.8	3.5904	1.3077	3.5361	1.2390	3.4167	1.3466	3.5140	1.2981	0.783	0.458
Q.9	3.1265	1.3670	3.1687	1.3647	3.1071	1.3449	3.1340	1.3564	0.089	0.915
Total	3.2336	1.2672	3.0402	1.2052	3.1290	1.2281	3.1342	1.2338	1.022	0.360

Source: Author, 2005.

planning such as Houghton-Evans (1978), Fawaz, M. (1980), Gibbered (1967), Cherry (1974), Unwin (1971), Osborn and Whittick (1977), and others one can figure out that percentage of the pilot project at Zarqa which is 36% for residential use is considered low if compared to other projects. The 29% for roads is considered high, the 27% for commercial use and public facilities is relatively high, and the 8% as a green area is good percentage. Higher percentages for housing should be reconsidered and lower percentages for roads and commercial facilities should be applied. Clear boundaries between proposed neighborhoods would make people distinguish between different kinds of neighborhoods that are missing in the present urban design of Zarqa. The problem of car parking at the commercial zone will be another important issue to discuss in this project.

Applying ANOVA (Table 5) to all questions according to the different type of income groups, questions number 2, 3, 4, and 5, that have values less than 0.05, show significant differences between the three types of income groups. Post hoc comparison (Table 6) shows that for Social domain question number 2, the middle income group gives different results from low and high-income groups. The Social domain is related to that of Economy, as indicated previously and the middle income group thinks that the New Garden City project will improve the social life of the community less than the other two types of income groups. Social life, which is related in a way to health, suffers from bad health service at Zarqa and from the pollution of heavy and

medium industry found throughout the city. For the Environment domain, shown in question number 3 the middle income group gives different results from the other two income groups as seen from table 6. The middle income group agrees less than the other two income groups in thinking that the New Garden City project will improve the local environment. The infrastructure laid down in the New Garden City project is new and advanced in terms of technology and technique; thus, it may improve the spatial quality of local environment, and hopefully, it will reduce vehicular pollution. The major problems of the Jordanian oil refinery and of heavy industry located at the northern section of the city in terms of air pollution is not yet solved, thus, the

Table 6: Post Hoc Tests where multiple comparisons are shown for the questionnaire on Zarqa redevelopment project. Less than 0.05 is considered significant.

Dependent variable	Sig.		
	(I) Income		
	Low		Middle
	(J) Income		(J)
	Middle	High	High
Q.1	0.951	0.916	0.762
Q.2	0.011	0.927	0.003
Q.3	0.034	0.164	0.000
Q.4	0.033	0.094	0.904
Q.5	0.236	0.019	0.533
Q.6	0.402	0.333	0.992
Q.7	0.251	0.189	0.987
Q.8	0.923	0.440	0.678
Q.9	0.957	0.991	0.910
Total	0.326	0.718	0.788

Source: Author, 2005.

participants' Mean value to question number three were among the lowest. The provision of new open space with fountains, a bazaar, and an arcade in the New Garden City project is considered a positive element in people's opinions about Environment domain. Question number 4 in table 6 shows a different opinion according to income groups. The low-income group sees that the New Garden City project will improve the city's profile of Zarqa. For Housing domain the middle income group sees that the New Garden City project will not improve the situation at Zarqa as the other two kinds of income groups as shown in table 6. Although the exact design of houses has not yet been determined, the consideration of all previous mentioned climatic conditions at Zarqa should provide for good design qualities. The orientation of neighborhoods and dwellings should pay attention to the study of wind, rain, sun movement and topography.

For the other tested domains by ANOVA the difference between the different kinds of income group opinion is minimal. The total Mean ranges between the lowest number of 3.1000 for the sixth question, which is about Transportation domain, to 3.5140 for the eighth question, which is about Public opinion domain. Most of the answers for the Transportation domain lie under numbers (1), (2) and (3) at Likert scale. Contrary to Public opinion domain where most of the answers lie under numbers (3), (4) and (5). Inhabitants do not strongly agree that the construction of a new road network at Zarqa will facilitate vehicle movement because mainly of the not yet solved problem of the public transportation. The public transportation problem should be addressed on a national level and the start of an underground transit project should accompany this redevelopment project. The municipality did not tackle this issue in the New Garden City project nor in any other project. As discussed before in this study this situation should not continue. People's participation will provide for better environmental qualities, thus it will influence the whole life of the citizens. For the Recreational domain inhabitants think that the provision of recreational space in the New Garden City project is limited, but people see the shopping arcade and bazaar as a core for such a facility. The few amenities that do exist are in poor condition due to neglect in maintenance. Legislation domain is related in a way to Public Participant domain.

Participants see that this new project will lead to improvements in legislation.

In the end, as concluded by this study, the New Garden City project of Zarqa might improve the quality of life but only to a certain level and only if existing problems of Zarqa City are solved first. The total Mean of the whole questions is 3.1342 on Likert scale (Table 5), which is above the central Mean point of 3. Furthermore an adoption to new planning concepts as discussed before in the future phases (from phase two to seven) will ensure better implementation to sustainable urban form. The higher urban densities, the concentration of work requirements or economy components at public transport nodes and the adoption of compact urban development will ensure more efficient urban sustainability. Global warming, air pollution, over population, Ozone layer depletion and the loss of green areas are all the major problems caused by our new civilization to nearly all cities might be softened by using the concept of sustainability as suggested in this study.

This research has some limitations that can be looked at in another field works. Focus Groups technique, which is not used in this research, may be of good importance to give wider and much deeper conclusions to participant's opinion in this new project. The number of participating sample for Delphi technique might also be larger and age group might be divided into several categories. The number of experts participating in the Concept Mapping technique might be raised to reach fifty to obtain much accurate result. The number of domains might also be increased to sixteen in future researches.

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