



Alternative Use of Space as A Self-Organizing Solution by Local Society to Meet Shortage of Living Spaces in The Informal Settlements of Egypt

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DOI: <https://doi.org/10.30880/jstard.2023.05.01.001>

Received 28 Desember 2020; Accepted 14 January 2021; Available online 27 July 2023

Abstract: This research seeks to identify the land use dynamic phenomenon in the unplanned settlements in Greater Cairo Metropolitan Region (GMCR) which embodied in the alternative use of space (AUS). This phenomenon represents the way for the poor communities to meet their needs of space for living, working, and entertainment purposes for free or for low costs. It is considered the first research which included clarification for this phenomenon although the main role of AUS to meet the poor communities needs of lands in GCMR. By field survey and direct interviews with users and surrounding residents we have identified AUS types, times of use and Frequency for each type in addition to impacts of it on the prices of essential needs. Based on the goals of urban sustainability we have identified positive and negative aspects of AUS on our case study district. AUS provide lands for various needs of essential activities in free or low-cost rent which reduced the price of essential needs to 13 times for some item's comparison with the nearest planned district. AUS reduce living expenses and help low-income families and offer cheap choices of housing, goods, transportations, essential services, entertainments, in addition to work opportunities. We can consider the AUS as a tool for achieving sustainable development in the poor communities by efficient use of resources and providing job opportunities within the community.

Keywords: Land use dynamics, alternative uses of space, unplanned settlements, sustainable urban development, Greater Cairo Metropolitan Region (GMCR)

1. Introduction

The rapid urbanization in Egypt, over the past four decades, had caused the emergence of unplanned settlements. Unplanned settlements are thought to accommodate between 12 and 17 million inhabitants, or about 40% -50% of Egypt’s urban population and over 20% of total population (Kipper, R. & Fischer, M, 2009). Despite 30 years of attempts by the government to limit unplanned growth around in GCMR, as it has in most Egyptian cities and villages, unplanned settlements around GCMR sheltered more than 7 million inhabitants in 1998 (Sejourne, 2006). As of 2006, they are estimated to contain more than 65% of the population of GCMR (10.5 out of 16.2 million inhabitants), and the rate of population growth in these areas is higher than other city averages, increasing 2% between 1996 and 2006 (Sims & Sejourne, 2008).

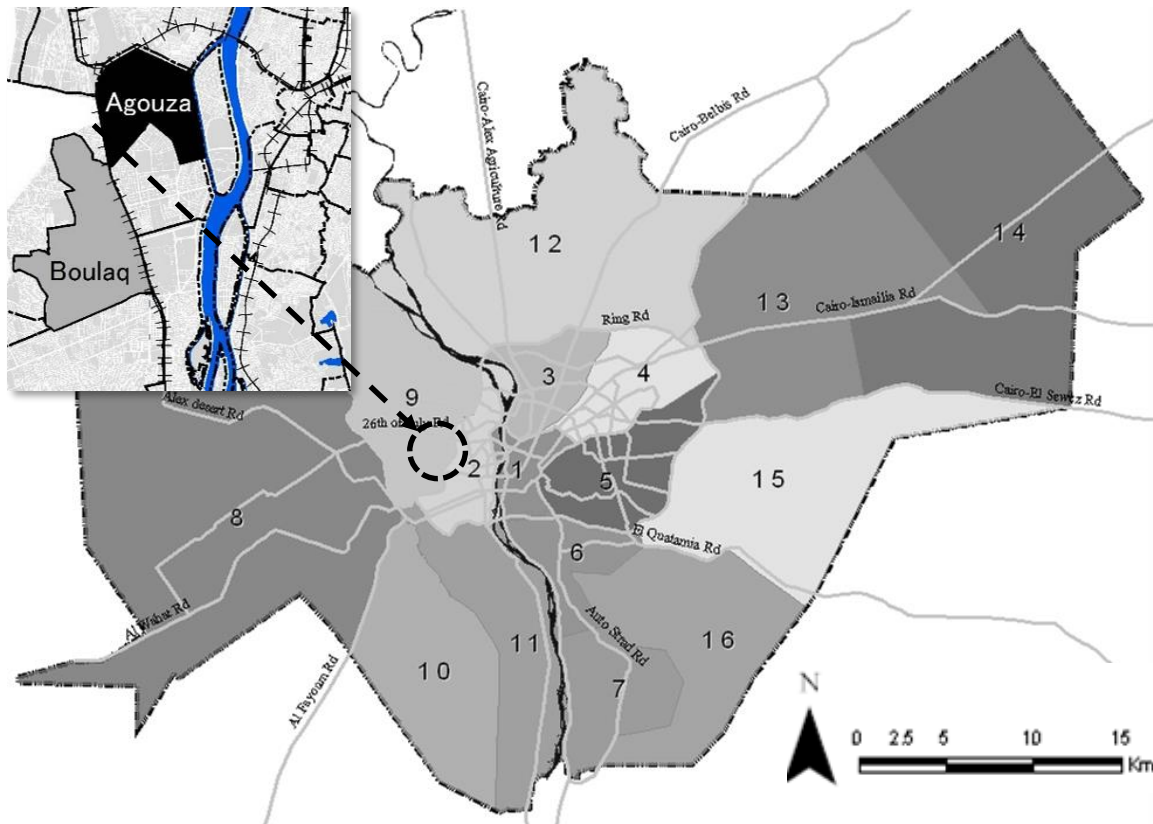


Fig. 1 - Location of research samples within GCMR planning Zones. Source: JICA, 2008

The GCMR occupies 928 km² of central Egypt, located adjacent to the Nile River. The GCMR is the most important settlement in the country, and serves as the center of government, finance, commerce, education, and culture, as well as transportation. These features make the GCMR the national citadel of the expertise, resources, and political power needed to combat chronic economic, social, and environmental problems. In Greater Cairo, 81 percent of informal settlements occupy private agricultural land, on agricultural land purchased from farmers in areas where there were no Subdivision plans and where building permissions were not given.

This settlement contains over half the population of Greater Cairo and almost half the total residential population. (UNDP, 2004)

The lack of urban planning for the unplanned settlements caused a deficit in lands for the required activities (Residential, Commercial, Productive, Municipality and services). All the previous activities suffer from the lack of lands especially with the current high rate of population growth. Unplanned settlements on former agriculture lands have no chances for horizontal expansion to meet their increased activities needs of lands because of the current strict governmental regulations to Prohibit buildings on agricultural lands and the high price of available buildable lands. The Alternative uses of space (AUS) which embodies the phenomenon of land use dynamics in the field work has been developed as an unprompted response by the local community to meet their temporary and permanent activities needs of lands without planning regulations to organize them. Although, local community considers unplanned AUS is the suitable solution to face paucity of the cheap buildable lands; they suffer from its negative effects because of the lack of planning regulations to manage these types of land uses.

According to Brundtland (1987), Pearce, Makandia & Barbier (1989), Daly (1991) sustainable development was defined as: Meet the essential needs of the poor, to which overriding priority should be given without compromising the

needs of future generations to meet their own needs, ensures real incomes rise, increase educational standards and the health of peoples, and improve the general quality of life.

In this research, we aim to clarify the phenomenon of AUS and classify their Alternative uses of space with time and frequency of occur, in addition to identify the relation with impacts on the poor community's needs.

2. Methodology



Fig. 2 - Shows main space types in our research sample

To track the AUS in our case study of Boulaq Al Dakroul, we have identified the Alternative uses of spaces according to time of the day or season. Based on the official land use map of GOPP which prepared in 2008, we have started the field survey including direct interviews to main spaces users to identify the alternative uses of spaces for each main function of spaces including roads. We have conducted interviews in July 2012, 3 times / a day (morning, noon, and night) to identify all AUS during all periods of day and month. We have identified one person for each main space type for each period of the day for the whole month of July.

To identify AUS out of the survey period, we have interviewed a sample of 3 persons for each period of day for each type of main function of space. Also, we have identified the frequency of occurrence for each AUS inside the main space during the year. Frequencies were classified into four classes based on the interview with a sample of 90 people for each main space during July 2012. Also, by the same method we have identified the time of use, and the sub-space inside the main space for each type of AUS.

We have measured the effect of land use dynamic on living costs by making a comparison for the essential needs' prices (housing, public transportation, daily market needs) in our case study and the nearest planned district Agouza that has not AUS. By literature review, we have identified the sustainable development goals and compared those goals with how AUS impacts them in our case study based on field survey.

3. Types of Alternative Uses of Space (AUS) in Our Case Study District

3.1 Alternative Uses of Spaces (AUS) in Residential Buildings

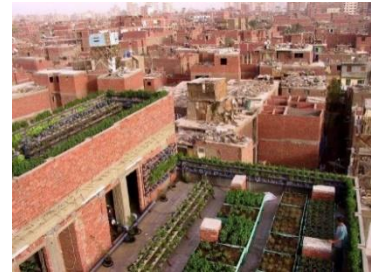
Residential area is 60.92% of total our case study and has 1705 buildings which include 8 alternative uses in addition the original function as residential space. The alternative uses are changing during the year according to inhabitant's needs and activities. Some needs related to seasonal occasions like feasts, traditional celebrations and other activities related to school seasons. Each of those activities needs a suitable space to fulfill its obligations which is only available as an alternative use of space in our case study.



kindergarten



Roof garden



Commercial storage

Fig. 3 - Shows Alternative Uses of Space (AUS) in residential buildings

An average of residential buildings has 7 floors in addition to the basement and roof., During the school season which extends from September to May residents use the first floor as a private study place and change to other uses out of school season according to the activities. Also, in the school season they use the ground floor as kindergarten and usually replace to commercial fairs in summer season especially in buildings with unique location. There are activities related to the summer season which need space for video games clubs, trade fairs, and seasonal temporary immigrant workers which are accommodated as an alternative use of residential buildings. Residents use roof space for celebrations or wedding parties during weekends which have no cost for rent and so appropriate for their needs.

Table 1 - Shows Alternative Uses of Space (AUS) in residential buildings

Main Space	Sub-Space	Alternative	Time of Use	Frequency
Multi-story residential buildings	First or living spaces	Trade fairs	Summer season	20% - 40%
		kindergarten	School season	0% - 20%
	Roof	Celebration parties garden	Weekends Seasonal	20% - 40% 0% - 20%
	Basement or first floor	Parking storage	Seasonal Seasonal	60% - 80% 20% - 40%
	Living spaces	Private education classes	School season	0% - 20%
		Entertainment ceremony	Holidays	40% - 60%

3.2 Alternative Uses of Space (AUS) in Vacant Lands



Private Education classes



Entertainment ceremony



Trade fairs

Fig. 4 - Shows Alternative Uses of Space (AUS) in residential buildings

Total Area of vacant lands was 250796 m² with average areas of 100 to 500 m². Vacant lands were agricultural lands converted to be buildable lands in future. Before building these lands were used for in temporary activities to achieve additional benefits by getting rent for their owners and offer cheap rent spaces for economic activities like coffee shops, parking, trade fairs, and food courts. Also, in some cases vacant lands are for social activities without rent such as sports and religious activities that need wide spaces.

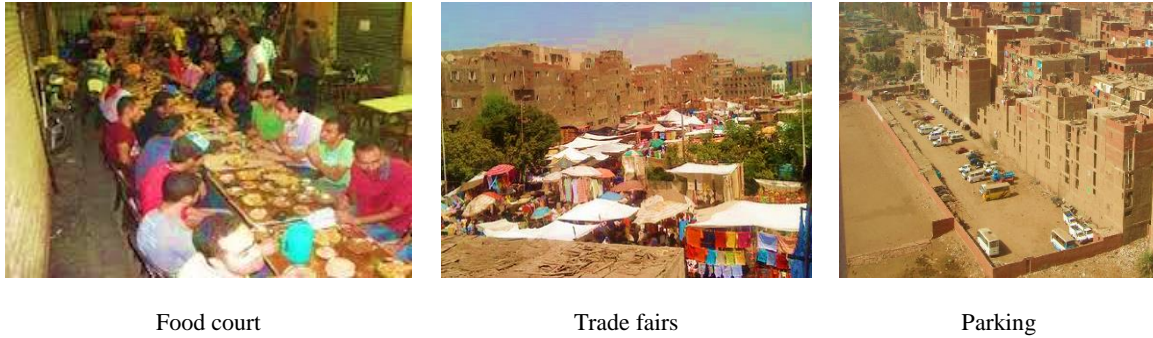


Fig. 5 - Shows Alternative uses of space (AUS) in vacant lands

Based on time of use we found two types of it, the first one is long time rent uses like parking and storage. The second type is the seasonal uses which related to the need for a unique location for their required activities whether to use all or part of it like trade fairs in summer and traditional. Also, they used as food courts whether by rent full land area or part of it during required season. Trade fairs, coffee shops, and food courts are usually located in vacant lands in nearby main streets and as temporary uses in summer and during traditional festival seasons and not extend thought the year.



Fig. 6 - Shows Alternative uses of space (AUS) in vacant lands

Table - 2 Shows Alternative Uses of Space (AUS) in vacant lands with time and frequency

Main space	Alternative Use of Space	Time Of Use	Frequency
Vacant lands	Parking	Seasonal	60% - 80%
	Trade fairs	Summer season	0% - 20%
	Religious	Feast days	0% - 20%
	sports	Weekends	20% - 40%
	storage	Seasonal	20% - 40%
	Coffee shops	Night	40% - 60%
	Food court	Morning	20% - 40%

Residents consider AUS in vacant lands are suitable for the surrounding residential buildings except the storage alternative use that cause crowding and increase the vehicle traffic inside their narrow residential streets. On the other hand, they couldn't dispense it because of the lower rent which reflects on the prices of their needs in addition to absence of other alternatives of lands for this activity.

3.3 Alternative Uses in Educational Spaces

The area of educational utilities in our case study is 76117 m2 and have 39 buildings. In addition to the essential activity of this utilities in education, they have alternative functions in holidays such as sports, culture, training, and medical needs of local community which suffer from the lack of area per capita. The alternative uses of Educational utilities are mainly concerned in the period of summer holidays out of education season which extends from September to May. In addition to that those buildings are used in medical Emergency as an essential component of the health

campaigns during the year. Users of those activities are belonged to all Age categories with a free cost so local community thought that educational utilities are one of the main components to meet their essential needs. They use the school yards in sports, school workshops in youth training for jobs, school main hall for public symposiums and school libraries for public reading.

Table 3 - Shows Alternative Uses of Space (AUS) in educational spaces with time and frequency

Main space	Sub-space For alternative use	Alternative Use of space	Time of Use	Frequency
Educational Utilities	courtyard	sports	Holidays	60% - 80%
	library	culture	Holidays	20% - 40%
	workshop	Job Training	Holidays	20% - 40%
	class	Medical	seasonal campaign	0% - 20%



culture



sports



Medical

Fig. 7 - Shows Alternative Uses of Space (AUS) in educational spaces

3.4 Alternative Uses in Agriculture Lands

The total area of agricultural lands is 650089 m2 and represent 7.23% of total district area. In addition to their main function of agriculture activities, they represent an alternative way for gardens in traditional occasions Where the district suffers from the lack of area per capita in green areas which decreased to 0.013 m2/per in comparison with 0.27m2/per in the nearest planned district Agouza. Also, farmers allocate spaces in their agricultural lands to traders in harvest season as an open market for vegetables and fruits for residents of our case study district and surroundings. Those alternative spaces are considered an additional source of income for the farmer’s families by creating numbers of the seasonal jobs for their members. Furthermore, the poor residents consider it a unique chance to spend their vacations in open green area because of the lack of the municipal green areas.

Table 4 - Shows Alternative Uses of Space (AUS) in agriculture lands with time and frequency

Main space	Alternative Use of space	Time Of use	Frequency
Agriculture	Entertainment	Feasts	40% - 60%
	Market	Harvest season	60% - 80%

3.5 Alternative Uses of Space (AUS) in Religious Buildings

The total numbers of religious buildings in our case study are 34 buildings and represent 0.12% of total area. Original function of those buildings is worship, but they have also five alternative functions according to the current resident’s needs. Those buildings are consisting of main hall in the ground floor in addition to basement and first floor rooms. Based on the lack of area per capita of services in our case study, religious buildings use their internal spaces in alternative functions for their community. They use the first-floor spaces as clinics in part time periods during the year. In weekend there is a cultural symposium at the main hall of building. They use the basement as a training center for youth in holidays and to be a trade fair in feasts. In school season the first floor is used as an education space for the district students.

Table 5 - Shows Alternative Uses of Space (AUS) in religious buildings with time and frequency

Main space	Sub-space For alternative use	Alternative Use of space	Time Of use	Frequency
Multi-story Religious buildings	First Floor	Education	School season	20% - 40%
		Medical	seasonal	0% - 20%
	Main hall	Culture	weekends	60% - 80%
	Basement	Trade fairs	seasonal	20% - 40%
		Job Training	Holidays	0% - 20%



Trade fairs



Educational classes



medical clinics

Fig. 8 - Shows Alternative Uses of Space (AUS) in religious buildings

3.6 Alternative Uses in Roads Spaces

The total area of roads and open spaces is 1319836 m² and represent 14.68% of total district area. In addition to their essential function in traffic and pedestrian movement, local community uses those spaces in alternative functions to meet their needs of essential activities. Residents use the roads spaces as a daily needs market which is considered a Mutual interest between local community and traders where the side streets are used as a cheap alternative for supermarkets without rental cost for traders and provide suitable price goods for lower income families. During the night, Main streets are used as an extension to coffee shops without rental cost and provide a cheap entertainment way to low-income families. The cheap food courts for workers and poor local citizens are the main landmarks of the Main road spaces during the day light. They are flexible based on the season where they move to be near to the attraction points such as schools, workshops, and transport stations during the day light in addition to coffee shops and the crowded commercial ways all day.



Daily Food court



Seasonal Food court



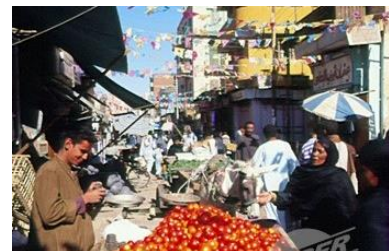
Celebration



Seasonal markets



Craft activities



Daily markets



Fig. 9 - Shows Alternative Uses of Space (AUS) in roads spaces

The workshops use their nearby open spaces as extensions for their activities to meet their needs of spaces especially in seasons of increasing demand on their products that require more additional spaces for work. They can meet their needs of lands without rental cost which is necessary for their cheap products. On Fridays at noon, mosques use their nearby streets as extensions for prayers due to the lack of area per capita to .02 m²/per in comparison with 0.24 m²/per in the nearest planned district. Furthermore, the side streets are used by children in holidays to practice sport games and local community use those spaces for the celebration parties at nights due to the lack of specialized spaces for these activities and the lower cost of it. Although the negative aspects of the previously mentioned alternative functions such as noise and security threats, the low income residents depend on those ways due to the meet of their needs for free or for lower.

Table 6 - Shows Alternative Uses of Space (AUS) in roads spaces with time and frequency

Main space	Type of road	Alternative Use of space	Time Of use	Frequency
Roads	Main	Daily markets	Day light	40% - 60%
		Coffee shops	Night	40% - 60%
		Food court	Daylight	40% - 60%
	Sub-road	sports	weekends	20% - 40%
		Celebration	weekends	20% - 40%
	Main / Sub-road	Religious	Friday at noon	60% - 80%
Main / Sub-road	Craft activities	Day light	60% - 80%	

4. Effects of AUS on Inhabitant’s Essential Needs

The alternative uses of spaces reduce the effect of lack of area per capita in main spaces uses in our unplanned district by increasing times of space use in alternative functions based on resident’s needs during year. The functions of alternative use of spaces are flexible with the resident’s activities that changing from time to time. In addition to meet lack of area per capita of the basic needs of medical, educational, sports, Entertainment, and transportation, AUS meet the required spaces for the seasonal activities of feasts and traditional celebrations. AUS is an unprompted solution for resident’s issues of low income and poor status which reflected in the lack of area for their daily activities. AUS decrease the minimum required income for living by offering spaces for free or low rent cost for all basic needs.

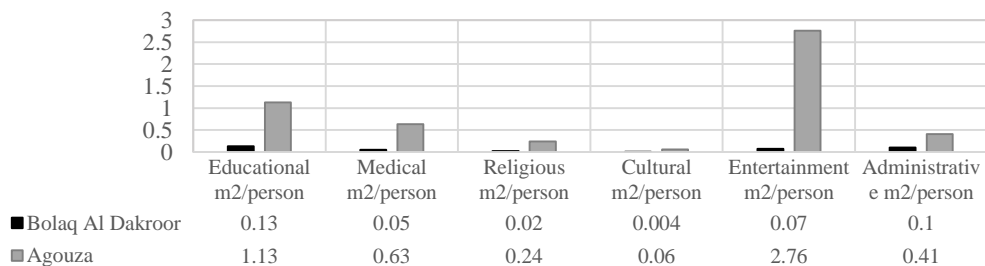


Fig. 10 - Shows the area per capita of services in Boulaq comparing with nearest planned district Agouza

By comparison between our case study and the nearest planned district Agouza where no AUS solutions, we found the minimum monthly rent for the residential units is 800\$ in comparison with 70 \$ in our case study district. The minimum cost to rent a hall for a celebration party is 5000\$ without AUS which can decrease the cost to zero \$. Furthermore, the minimum for transportation inside Agouza is 2 \$ but in our case study is 0.15 \$ and costs of daily needs of vegetable and fruits in our case study is less with 40% of the cost in the comparative district. By AUS residents can get educational, medical, sport, Entertainment, and cultural needs for free or for lower costs .03\$ are enough to get a food meal in any food court in the unplanned district in comparison with 1.5\$ in the nearest planned district.

The best advantage of AUS for residents in the unplanned districts is to get them chances to increase their low incomes by using their residential buildings spaces in a profitable function such as seasonal trade fairs, gardens, kindergarten, private educational classes, storage, and parking. On the other hand, the main negative aspects of AUS are represented in noise, congestion, security threats and lack of privacy. The main victims of this effects are the educational, medical, and residential spaces.

5. Conclusion

Local community uses alternative uses of spaces as unprompted solution to face the paucity of buildable lands and reduce the impacts of incidence of poverty between residents. The need for cheap products and services in addition to face the lack of area per capita of services, working and living spaces found a solution in the AUS which has the flexibility to adapt with people's needs. The change of spaces functions according to the current needs of communities have positive aspects on people's needs meet and reducing the impact of poverty on their local community. Residents can get their essential needs of medical, Educational, sport and cultural services for free and easily after increasing the real area per capita for each activity by AUS. Although the official Arithmetic data show lack of area per capita for those activities.

AUS maximize the current spaces which reflect in meet more needs and reduce the impact of lack of area per capita of main space uses without additional costs. Decrease the cost of economic activities as commercial, workshops, food courts and coffee shops that reflecting on the price of those services for the poor residents and can meet their needs at low cost which is considered an effective way for reducing the impact of poverty in the unplanned settlements. AUS supports poor peoples to start their own works at low costs by saving lands for free or for lower cost. They have the required flexibility to change their economic activities according to the needs of the market in quantity and quality, which maximize profits.

By comparison between AUS effects and the sustainability goals, we found AUS can meet all those goals. We can consider that AUS can improve the life of the poor communities, minimize the impacts of their poor conditions, and increase their incomes by providing the cheap jobs in addition to keep the rights of future generation to have better life by improve their parent's life and increase their income which meet their community sustainability goals.

Acknowledgement

We would like to thank the journal's editor and the anonymous reviewers for their positive feedback and suggestions for the improvement of this article.

References

- Brundtland, (1987) *World Commission on Environment and Development. Our Common Future*. Oxford: Oxford University Press.
- Daly, H. E., (1991) *Elements of environmental macroeconomics. Ecological Economics: The Science and Management of Sustainability*. R. Costanza. New York, Columbia University Press.
- Development Project, executed by the Institute of National Planning under technical cooperation with the United Nations Development Program (UNDP), Egypt.
- JICA, 2008. *The strategic urban development master plan study for sustainable development of the Greater Cairo region in the Arabic Republic of Egypt. the final report summary, volume 1*. Cairo, Egypt.
- Kipper, R. & Fischer, M., 2009. *Cairo's informal areas: Between urban challenges and hidden potentials*. German Technical Cooperation (GTZ). Cairo, Egypt.
- Pearce, D.W., Markandya, A., and Barbier, E.B., 1989. *Blueprint for a Green Economy*, Earthscan, London.
- Sejourne, M., 2006. *Les politiques recentes de 'traitement' des quartiers illegaux au Caire: nouveaux enjeux et configuration du systeme d'acteurs?* Ph.D. Thesis, University F. Rabelais. Tours, France.
- Sims, D., & Sejourne, M., 2008. *The dynamics of peri-urban areas around greater Cairo: A preliminary Reconnaissance*. World Bank. Washington, D.C.USA.
- UNDP, 2004. *Egypt Human Development Report 2004; major output of the Human*