

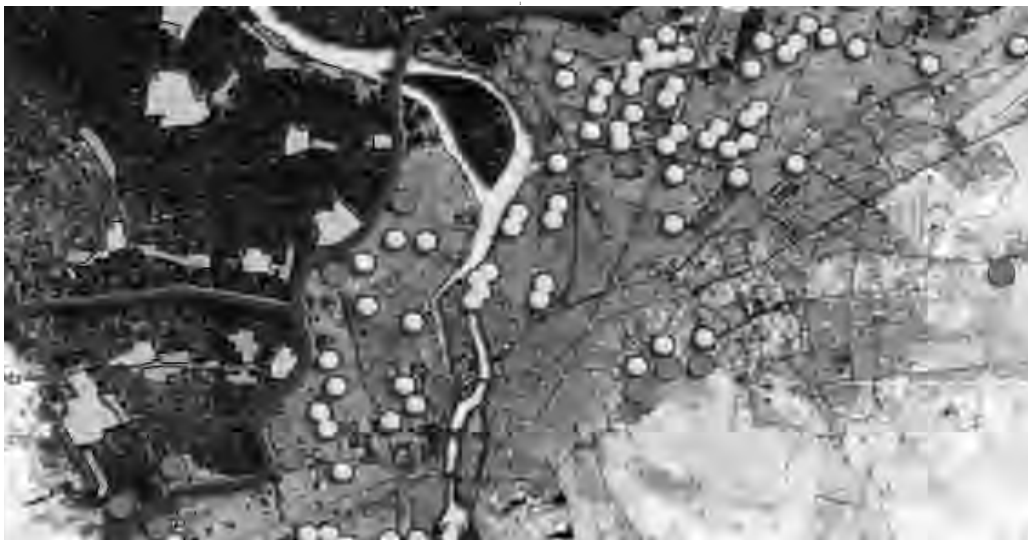


Faculty of Urban & Regional Planning  
Cairo University



# JOURNAL of URBAN RESEARCH

VOLUME 7 July 2009



ISSN 2090-0694

**Mailing Address:** Faculty of Urban and Regional Planning  
Cairo University. (Zip area code: 12613)  
**Telephone:** 35700830 – 35700831.  
**Fax:** 35680862

**USE OF AIRBORNE LASER SCANNING (ALS)  
FOR 3D MODELLING IN DENSE URBAN AREAS  
(OLD ISLAMIC PART OF FATIMID CAIRO - EGYPT)**

H. M. Gadou  
Ain Shams University, Faculty of Engineering,  
Dept. of Urban Design & Planning, Cairo, Egypt;

**ABSTRACT**

Cairo is one of the largest heritage cities in the world. It is a multi-cultural city where various cultural groups live. The Ministry of Culture in Egypt works towards protecting the multicultural life in the city by ensuring a healthy socio-cultural environment. However, the reality is very complex. As a matter of fact there is not enough spatial information in terms of maps on the social geography of the city. Whatever information is available is not up-to-date. Virtual studies or documentations are very poor.

This paper tries, *first*, to review these upgrading or rehabilitation events for old Cairo from many different planning perspective and its input; and *second*, to explain why Laser scanning technology should be chosen for collecting up-to-date laser data (*Digital Elevation Model - DEM*) for the purpose of upgrading the old Islamic part of Cairo. The paper tries also to explain the steps that were followed in carrying out a pilot project "Laser scanning for the old Cairo".

The data obtained through laser scanning were used to indicate ways and means towards enhancing the multicultural and traditional life style without any negative impact. The paper also identifies benefits as well as the problems encountered in the project.

**KEY WORDS:** Airborne Laser Scanning (ALS), DSM, DEM, 3D Modeling, Mapping, Old City Upgrading or Rehabilitation, 3D Visualization.

**المُلخَص**

القاهرة واحدة من أكبر مُدن التراث في العالم. كما أنها مدينة متعدّدة الثقافات تتعايش بها مجموعات ثقافية مُختلفة. تعمل وزارة الثقافة في مصر على حماية الحياة المتعدّدة الثقافات في المدينة وذلك من خلال دعمها لمناخ البيئة الاجتماعية الثقافية الصحيّة. على أية حال، واقع الحياة معقّد جداً. وفي واقع الأمر ليس هناك معلومات مكانية بما فيه الكفاية من ناحية الخرائط الجغرافية والموقع عليها المعلومات الاجتماعية للمدينة. والمعلومات المتوفّرة ليست حديثة. كما أن الدراسات أو التوثيق الافتراضية سيئة جداً.

نحاول في هذه الورقة، أولاً، مراجعة ودراسة أهم المحاولات لإعادة أحياء القاهرة القديمة من خلال وجهات نظر تخطيطية مختلفة والتعرف على المساهمات الواقعية، وثانياً، توضيح لماذا تم اختيار تقنية المسح الجوي بالليزر في المشروع التجريبي "مسح القاهرة القديمة بالليزر" لجمع البيانات المكانية ذات الدقة العالية واستخدام منتجها من النماذج الرقمية المختلفة لسطح الأرض وما عليها من منشآت ومن ثم استخدامها في عمليات الارتقاء التخطيطية بالقاهرة التاريخية.

وتستعرض الورقة البيانات التي تم الحصول عليها من مشروع المسح الجوي بالليزر لتفتح أمام المخططين طرق ووسائل حديثة تساهم بدقه في التعامل مع هذه المنطقة الحساسة ذات البعد التاريخي والثقافي المتميز. وتوضح الورقة أيضاً ما هو مستهدف مستقبلاً من تلك التقنيات وبياناتها الثلاثية الأبعاد.

## 1. INTRODUCTION

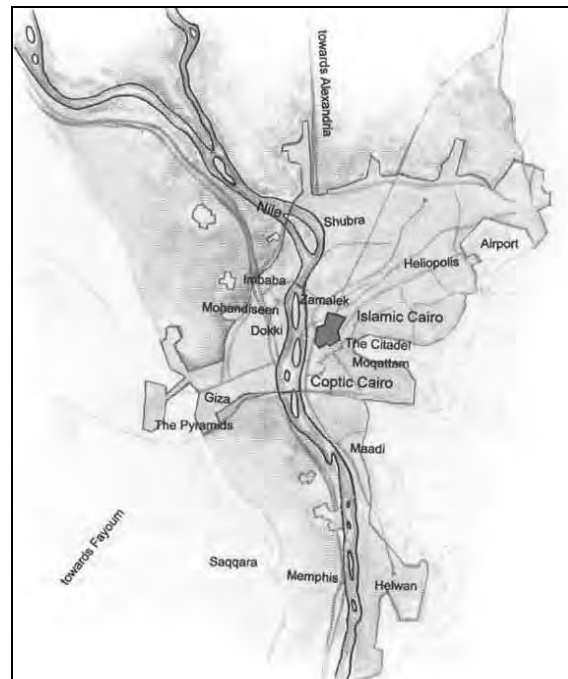
### 1.1 Historical Introduction :Fatimid Cairo: Al-Qahira

Cairo is the capital of Egypt and the largest city in Africa, its name means “the victorious city”. “The Fatimids” (descendants of the Prophet's daughter Fatima and her husband Ali) founded al-Qahira shortly after the taking of Fustat in 969. Al-Qahira was designed to house only the governing elite; the population of Fustat was not initially allowed to settle here. As Shia Muslims, the ruling dynasty held different religious views to the Sunni Egyptian population. Al-Qahira, the area of modern Cairo which is now called 'Islamic', formed the centre of the city up until the mid-nineteenth century.

Islamic Cairo, perhaps more properly thought of as medieval Cairo, is an area of narrow streets, covered markets and crumbling old buildings. Of all Cairo, this quarter most evokes its past, and in many ways has changed little. It has inspired many writings, from Arabian Nights to the works of the modern Nobel laureate Naguib Mahfouz. Getting lost amongst the winding alleys is almost inevitable and even enjoyable.

'Islamic Cairo' is a strange phrase. Egypt is of course a Muslim country. By using that phrase we are referring to the historic eastern sections of the city, spreading between the faded splendor of 19th-century downtown and the Muqqatam Hills.

**Figure (1)** Layout of Islamic Cairo.



Source: Egyptian Culture Ministry web page

This is the area nominated as a World Heritage Site by UNESCO, where streets are unpaved, mosques and '*madrassas*' cluster thickly, and life within the great city walls seemingly continues much as it did under the Mamlukes. Cairo is Islamic, though some areas are more than others. Actually, this area is no more Islamic than Central Cairo, but as though walking through a time machine, we are transported back to Cairo's past Islamic heritage, to a world of ancient mosques and 1,500 hundred year old markets; to medieval forts and the city that was Salah ad-Din's.

## 1.2 Technical Introduction

The technical importance of this project coming from that this is the first project done (July 1999) with laser scanning in this part of the word. This project came as a joint venture work\*, to transfer the hi-technology (ALS) from Germany to Egypt. We plan to use this technique in civil branch to support the urban planning projects in Egypt, especially in the areas in which are very hard to get up to date spatial information. The author of this paper was the technical manager for this transfer project. He started the work in Germany in 1997 and continued at NARSS in Cairo from Feb. 1998 until July 1999.

The ALS system used in this pilot project was the first version of the "TopoSys fiber scanner" accomplished by a camera. From airplane the LIDAR system basically captured three types of data: Laser, GPS, and INS (Inertial Navigation System) data.

## 2. CAIRO'S LAYOUT, MOVEMENT & CHARACTERISTICS

Old Cairo or Medieval Cairo has historical precursors at somewhat different geographical locations, in part explained by the changed channel of the Nile which formerly flowed much closer to Old Cairo. Pharaonic Memphis and On (Heliopolis) were located in some distance to the south and north-east of present-day Cairo.

A more immediate and geographically closer precursor was pre-Arab and pre-Muslim Cairo, called Misr-al-Fustat or Al-Khalifa, now known as Coptic Cairo. This settlement was also occupied and fortified by the Romans. To the north-east of what are now the ruins of Fustat, the Fatimids established the walled palace city of Al Qahira in about 1000 AD. By 1500 AD, Al Qahira or Fatimid Cairo had spread southwards and westwards to cover the area, now generally regarded as Old Cairo. Two related urban features should be noted.

To the east and south, extensive medieval cemeteries, now known collectively as the Cities of the Dead, were developed to provide burial sites for Fustat and Al Qahira. Secondly, the port outlier of Bulaq was developed on the eastern bank of the Nile, and this district is still distinctive today as morphologically reassembling Old Cairo, despite lying just north of the present-day Central Business District of modern Cairo.

---

\* by National Authority for Remote Sensing and Space Science (NARSS), Egypt, and Institute for Photogrammetry (ifp), University of Stuttgart, Germany

**Figure (2)** Street pattern of Old Cairo, 1798 and 1978



*Source: after UNDP (1997)*

During the 19th and early 20th centuries, Cairo extended northwards and westwards of Old Cairo, often on reclaimed land close to the Nile as in the case of Garden City and the Tahrir Square city centre area.

Late 20th-century urban growth has left Old Cairo as a relatively small portion of the sprawling metropolis of 10...12 million people (1996 census figures), small in area and population terms, but of major importance in terms of cultural and heritage. So, Old Cairo is larger in area than Fatimid or Medieval Cairo. Ahmed and Kamel (1996) divide Cairo up into three 'cities': Medieval Cairo, European Cairo and Contemporary Cairo.

Their 'Islamic or Medieval Cairo (969–1863 AD)' closely approximates the Old Cairo described above and, as the accompanying dates suggest, covers the area built up during the Fatimid, Ayyubid, Mamluk, Ottoman, French expedition and even Mohamed Ali periods. They argue that urban development during these successive eras "together led to the establishment of Islamic Cairo y all based conceptually on Islamic urban patterns" (Ahmed & Kamel, 1996, p. 105).

Perhaps an alternative nomenclature to 'Old Cairo' or 'Medieval Cairo' could be 'pre-Europeanised Cairo', which delimits its street pattern and layout from the strongly European influenced 19th-century layout and buildings of Mohamed Ali's period and later. To a large extent 'pre-Europeanised Cairo' equates to the built-up area surveyed by Napoleon's occupying forces, 1798–1801, and depicted in their resulting fascinating map dated 1800 (Description de l'Egypte, 1809).

Many elements of the original street pattern as surveyed in 1798–1800 are still evident in the present (1978) layout and morphology of Old Cairo (Fig. 2), except from the construction of two major new streets cutting across the old urban fabric, namely Al Azhar street in the north and the straight Mohamed Ali street further south linking Sultan Hussain mosque and 19th century Cairo. The north–south Al-Mu'izz street continues to be the main axis articulating the Old City.

Also, a lot of buildings are relatively recent, as during the late 19th century and first half of the 20th century a lot of old traditional buildings in Old Cairo were replaced by more modern single- and two-storey buildings. The urban fabric was thus 'modernised' but only within the long-established street pattern and the old landownership framework (Salin, 1996; Ilbert, 1982). This has been demonstrated for the 1990s by Aboukorah (1995) for the Al-Ghuriya quarter where, despite the permanency of the street pattern, numerous new buildings of sometimes up to 8 or 10 storeys have been constructed. Other older buildings have been modified by adding further storeys, all of which serves to further overstrain the poor water supply and sewerage systems. (K. Sutton, W. Fahmi / Habitat International 26 (2002) 73–93 79)

### **3. REHABILITATION EVENTS FOR OLD CAIRO**

Cairo's post-1800 'European-style' urban development to the west and north of the original 'Fatimid' Cairo contrasts sharply with the earlier traditional 'Islamic' street layout and vernacular buildings. Also, during the 19th century many administrative and Central Business District functions migrated out to this 19th and early 20th century extension of the city, built in part on the Haussman-like lines of 19th-century Paris. (URBAMA, 'Urbanisation du Monde Arabe') (Ilbert, 1982; Meyer, 1988) often include research on Old Cairo, clearly interpreting it as the academic equivalent.

Similarly, Abu-Lughod (1971) uses the medina model to good effect in her magisterial study of Cairo. Furthermore, the UNESCO has designated Old Cairo as a World Heritage Site.

#### **3.1 Old Cairo: heritage and conservation events, 1798–1998**

1798–1801 Napoleonic Expedition occupies Lower Egypt

1800 Detailed map published of Cairo by Napoleon's Surveyors

1880 Comite de Conservation des Monuments de l'Art Arabe established

1950	List of 622 'Islamic' monuments drawn up
1952	Comite de Conservation des Monuments de l'Art Arabe dissolved
1977	Association for the Urban Development of Islamic Cairo set up
1979	Old Cairo designated a World Heritage Site by UNESCO
1980	UNESCO Plan for Old Cairo produced
1988	Greater Cairo Region Master Plan included Old Cairo as part of Homogeneous Sector No. 1
1988–1991	GOPP/IAURIF Plans for rehabilitation of Sayeda Zeinab Quarter, Gamaliya Quarter and Darb al Asfar Quarter
1992	Earthquake damaged many monuments in Old Cairo
1997	UNDP Rehabilitation Plan for Old Cairo
1998–1999	Al-Azhar road tunnel constructed

*Source: (K. Sutton, W. Fahmi / Habitat International 26 - 2002).*

#### **4. OVERVIEW ON SOME NEW SPECIFIC PLANS FOR OLD CAIRO**

##### **4.1 The 1980 UNESCO Plan**

The late 1970s saw UNESCO involvement through its promotion of an inventory of historic monuments by Michael Meinecke on the basis of which Old Cairo was then publicized as a significant concentration of medieval Islamic buildings (Posmowski, 1978). This was followed by the designation of Old Cairo by UNESCO as a World Heritage Site in 1979.

As a consequence, a team of architects, planners and conservators was assembled to draw up a new specific plan for Old Cairo that aimed to reverse the flight of the Old City's residential population and to advocate emergency action for its many decaying monuments (Antoniou et al., 1980).

The established list of 450 monuments to be protected in Old Cairo was to be strengthened and updated. The problem of overlapping authorities was bemoaned with no overall control or policy for the future development of the Old City. Public authorities were weak in comparison with commercial interests. Better traffic management was advocated in particular to reduce cross traffic. Six priority zones were defined within which new development would be restricted, old buildings would be restored and new compatible functions introduced.

The 1980 UNESCO Plan also suggested that planning and conservation proposals should be launched for adjacent historic areas including the Northern and Southern Cemeteries, the Fustat archaeological zone, the Coptic area and Bulaq. Social studies were advocated to gain a fuller understanding of the situation, problems and aspirations of the existing residential population of Old Cairo and the other historic zones.

Although this 1980 plan remained a 'paper project' and was not put into action, subsequent projects tended to be based on it and there was even some continuity in



the consultants involved between the 1980 project and the 1997 UNDP Plan. The earlier efforts at restoring individual monuments continued in a piecemeal and uncoordinated way. A mosque here, a madrassa there, a sabil-kuttub (fountain) elsewhere were restored by both, Egyptian authorities and foreign agencies from a wide range of countries. The Italians restored the Mawlawi whirling dervishes theatre, the French restored some magnificent vernacular houses, the Royal Danish Academy of Fine Arts restored the Madrasa al-Jawhariyya next to the Al-Azhar mosque, and an Islamic order from India restored the major if dilapidated Al Hakim mosque in a somewhat controversial manner.

Rodenbeck (1983, p. 25) was critical of this restoration of the Al Hakim mosque, which, he suggested, has “given us instead a new building”. This was despite its restoration, or rather reconstruction, being carried out with the advice of Hassan Fathy whose “aesthetics are charming, but have no basis in history”.

Other countries and NGOs contributed to other such restoration efforts. While worthy in their own right, these scattered piecemeal contributions (only a handful of buildings out of the 500 buildings listed as important Islamic monuments) hardly added up to a planned conservation of the Old City. Rodenbeck (1983, p. 26) argued that to save monuments in isolation from their ‘environment’ (e.g. the urban fabric) was a sterile waste of time.

There was an urgent need to recapture Mameluk Cairo’s “size, splendour and dynamism” in a more holistic way. In similar vein, Lewcock (1989, p. 8), in commenting on the 1980 UNESCO Plan, argued that “it was felt that it was the uniqueness of ensemble that was the real quality of Old Cairo.

Individually, the buildings are not all masterpieces, but collectively their character is strong and fascinating”. Hence, he supported the focusing on six ensembles as ‘conservation and rehabilitation’ zones. In the event, however, the aim of conserving clusters of buildings “to preserve their essential ambience has not been adopted”. Instead, emergency action was taken on a number of individual monuments including the Citadel and the Aqueduct.

An alternative approach, also put forward during the 1980s for the Gamaliya area by Abdel Fattah and Abdelhalim (1989), advocated renovation through demolition. After suggesting that 35% of the built-up area should be upgraded plus any building over 100 years old, they argued that 60% to 65% of the buildings (excluding monuments) “must be regarded as ripe for redevelopment”. This meant ready for demolition!

They further advocated greater traffic access to Old Cairo with more parking availability and considered that a certain amount of gentrification was inevitable, as it would produce economic returns. Evidently, the future of the Old City was still under threat.

#### **4.2 The Greater Cairo Region (GCR) Master Plan 1988**

The development and upgrading of the Old City (categorised in the GCR Plan as Homogeneous Sector No. 1) aimed to preserve the traditional fabric through building control regulations combined with the development of open spaces and the improvement of its infrastructure including its street network through imposing restrictions on vehicle access.

In addition, the plan involved the development of public spaces in North Gamalia and Darb Al Asfar and the provision of mixed land uses aiming to improve the urban landscape. The conservation of monuments was prioritized with their reuse for various social and cultural activities, e.g. the Beit Al Sehimy in the Darb Al Asfar district (a restored 17th-century house).

Furthermore, these proposals identified the need also to upgrade the surrounding built environment and to raise local people's awareness. Commercial activities were to be developed to promote the socio-economic and cultural role already played by the Old City as a tourist attraction. Subsequently the official policy was to transfer wholesale commercial and industrial activities to the eastern New Settlements, whilst keeping retailing and handicraft workshops within the main historical spine.

#### **4.3 General Organisation for Physical Planning (GOPP) and Institut d'Aménagement Urbain et Regional de 'Ile de France (IAURIF) Plans, 1988–1991**

The early 1990s saw three projects which did endeavor to encompass whole districts. Schemes to rehabilitate the Sayeda Zeinab Quarter in the south, the Gamaliya Quarter in the north and the Darb al Asfar Quarter in the east were drawn up by a joint French–Egyptian planning and research body namely the IAURIF/GOPPP.

This collaborative research body produced general guidelines for the improvement of the built environment. In particular, it sought to develop the northern and southern gates and to put in place a ring road around the Old City.

The Sayeda Zeinab Project included the relocating of noisome tanning and abattoir activities to less problematic sites on the periphery of Greater Cairo. What would replace these premises is rather vague according to Madoeuf (1995). The planners would try and re-orientate the district towards the city centre through improved communications and then leave development to private initiative having implanted some green spaces and public services. In its Darb Al Asfar Scheme the GOPP/IAURIF identified priority areas, such as Beit El Sehimy, a house constructed in 1648, and the house of Mostafa Ga'afar, built in 1713, for action plans.

These areas were determined according to the significance of monuments capable of upgrading and developing and according to the predominant commercial activities and their land use patterns. Policy guidelines stressed the rehabilitation of the urban fabric, the development of public spaces, and the transferring of industrial activities

out to surrounding settlements such as Manshiet Nasser. Then followed the redevelopment of housing and public services such as sewers and garbage disposal systems plus the introduction of tourist facilities, including a youth centre and hotels (Edward, 1998).

The North Gamalia district of Old Cairo had population densities reaching 600–800 persons/ha, all within an increasingly derelict and decaying urban area with environmentally damaging industries. The GOPP/IAURIF research team in 1990 recommended the creation of a new boulevard along the city walls in order to facilitate access to the Old City together with the development of open spaces and the landscaping of certain areas.

The Gamaliya Project (Madoeuf, 1995) aimed to rehabilitate 60 ha, half of which constituted the old cemetery of Bab al-Nasr just north of the Fatimid Walls, which themselves were to be restored and freed of their accompaniment of lean-to shanties (Edward, 1998). The cemetery partly occupied by squatters was to be transformed into a park but keeping some significant tombs such as that of Ibn Khaldoun. However, this never occurred as a result of disputes over compensation to cover the evacuation and demolition of the tombs.

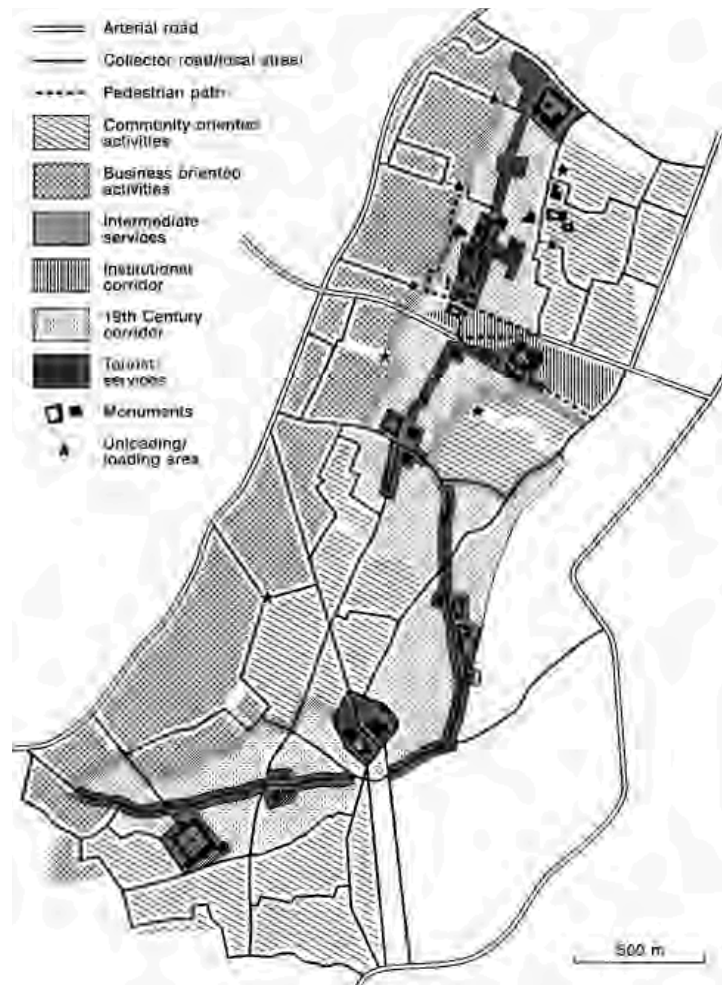
More controversially was a proposed development containing two luxury tourist hotels and a commercial centre in the form of a new souk, modeled on the Khan-el-Khalili bazaar area to the north of Bab el Futuh. In general terms, the Gamaliya Project sought to emphasise the creation of public spaces in front of monuments such as the Fatimid walls, but this approach was not a traditional Islamic concept with respect to urban organization and layout. Salin (1996, pp. 83–86) is quite critical of the over-orientation towards international tourism on the part of the North Gamalia Project. She argues that the social improvement aspirations of the IAURIF's French urbanists have been somewhat forgotten in the tourism-dominated GOPP Plan. A four-star tourist complex has little relevance in a zone of low class housing. An urban museum situation is threatened with a segregated space orientated more to tourists than to the original inhabitants.

Indeed, many of the residents would be re-settled in the new settlements on the fringe of Greater Cairo as, according to Madoeuf (1995), 500 dwellings and 280 businesses would disappear to be replaced by 1000 apartments and 10,500 m<sup>2</sup> of shopping space.

However, there certainly was a need to improve living conditions through upgrading services and creating public spaces whilst also reducing traffic congestion. In addition, 10 ha of industrial zone were to be redeveloped as part of the rehabilitation strategy, which proposed the relocation of small industrial units to new settlements east of Cairo. The newly created areas within the Old City were to be used to improve the street network and to introduce some open spaces, parking areas and community services. The reuse and renovation of historic buildings revitalizes the surrounding public open spaces. Hence the GOPP/IAURIF rehabilitation strategy proposed to enhance both the historic buildings and their

urban environment through the introduction (wherever possible) of new public spaces that would serve to set off the monuments to better effect. Somewhat in the style of European plazas, this objective would be achieved through removing various encroaching buildings and through pedestrianization and traffic control measures. Parking would be kept away from the historical monuments.

**Figure (3)** UNDP Rehabilitation Plan, 1997



Source: after UNDP (1997)

#### 4.4 The 1997 UNDP Rehabilitation Plan

The most recent plan for Old Cairo was drawn up by a UNDP team which interestingly included Jim Antoniou, a British architect who had earlier been part of the 1980 UNESCO team. The 1997 plan covers an area of about 4 km<sup>2</sup> in Old Cairo from Bab el Futuh in the north to the Ibn Tulun mosque in the south. The area so delineated contained about 310,000 inhabitants in 1986 which represented a sharp drop from its 1966 population of 433,000. In seeking to achieve a broad-based rehabilitation, the plan combines two contrasting approaches. Firstly, it advocates a

tourism-based rehabilitation to restore and reuse monuments. It aims to attract in investment to restore significant buildings and then reuse them for business and even housing so involving some limited gentrification. The squatters in such old monuments would be re-settled but not in the building in question. Vacant plots would be developed for recreation purposes, services and facilities for the gentrified communities.

This approach would ensure the protection of monuments up to a certain extent arguing that such preservation cannot be trusted to private investment and tourism without close supervision. With the re-settlement of some of the urban poor, the vibrant community atmosphere so redolent of Old Cairo would partly be lost.

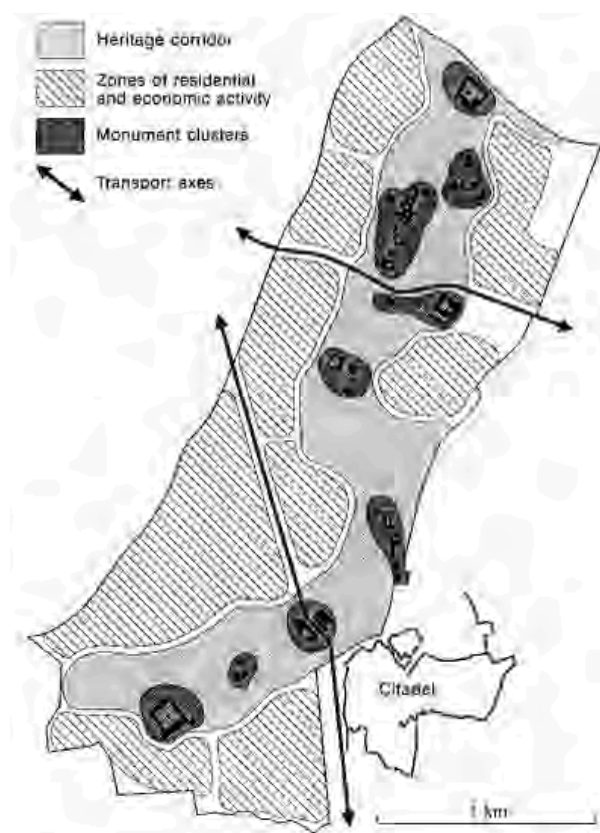
Secondly, the plan also advocates parallel community-based rehabilitation to benefit primarily the poorest amongst the present residents. This rehabilitation exercise would restore and improve local residents' housing and empower the local community as their education and skills are improved, their built environment is upgraded, and local social services are ameliorated. Monuments would be restored and reused for social services and other community functions. New projects, such as using vacant land to lodge the homeless and squatters, would be labor-intensive to provide local jobs. Cost recovery would not be ensured and few profit-generating opportunities would exist for private investors in this approach to rehabilitating the community as well as its built environment.

To overcome the resource gap it is expected that cross-subsidization would occur from the first private capital funded approach to this second community rehabilitation. In this way, a broader-based rehabilitation would attempt to achieve both the above rehabilitation objectives. So, there is a degree of compromise in the UNDP Plan as can be seen in Fig.3. The Heritage Corridor represents the first rehabilitation approach focused on business interests and tourists. The blocks of community orientated activities located on either side of the Heritage Corridor represent the second approach.

The plan uses a 'clusters approach' and identifies nine clusters of historic monuments, each being a primary target for rehabilitation, upgrading and conservation. Monument reuse would serve the community (through social services), the business sector (through licences for private sector use), and the tourist industry (through reuse as museums, information centers, etc.). The streets linking these clusters of monuments would be regarded as equally important as they provide continuity of traditional activities between the clusters. Together, the clusters and their linking streets make up the Heritage Corridor identified in Fig.4.

Interestingly, six of the clusters had been similarly identified in the 1980 UNESCO study, exemplifying continuity between plans. Other pertinent aspects of the 1997 plan include the pedestrianization of the central spine, along Al-Mu'izz Street, and some other streets, at least between 9.00 a.m. and 9.00 p.m. Also, one-way streets would be introduced to ease traffic congestion. Several loading/unloading areas are planned linked to the outside road system.

**Figure (4)** Monuments clusters and heritage corridor UNDP Plan



*Source: after Al-Futuh (1998)*

A vacant-land tax would seek to encourage development on hitherto unused and abandoned plots. A key contribution could be the advocated “adaptive reuse” (UNDP, 1997, p. 85) of restored buildings with the suggestion that a significant *sabil-kuttub* (former fountains and Koranic schools combined) be used as a tourist information centre. Interestingly, the plan also aims to resurrect the old ‘*al-fina*’ concept whereby shops and workshops can extend their activities out on to the street in front of their premises. So, as in days gone by, streets in Old Cairo would again consist of central public space for pedestrians and traffic and semi-private space that can be used by local residents for trading and other uses. While this UNDP Plan was originally produced in 1997, it has yet to be comprehensively put into action. Indeed, the UNDP consultancy team anticipated a lack of action, probably in the light of earlier experience with the Cairo and Egyptian Government authorities.

The consultancy team quite frankly stated that without a proper organisation to implement their suggestions “the considerable resources devoted to the project will likely come to nought, at least in terms of action on the ground” (UNDP, 1997, p. vii). The team considered that the current (1997) situation was acute enough to necessitate immediate action on a large enough scale to save the fabric of historic Cairo and its many monuments. The alternative to taking such action would be to

relinquish the historic core to vested interests and only to concentrate on saving a few individual monuments.

The UNDP report considered that “such an outcome would be a major loss for Egypt and the whole world” (UNDP, 1997, p. viii). A related problem is the establishment of an appropriate authority like the Association for the Safeguard of the Medina in Tunis, focused on Old Cairo and managing its heritage conservation. The UNDP report (1997, p. 151) does suggest a very hierarchical organization dependent on the Egyptian Government ministries and hardly involving local people at all, whereas a bottom-up NGO would probably be preferable. Political considerations, however, would undoubtedly exclude the latter approach to management. So, Old Cairo now has a promising plan based largely on the principles of rehabilitation rather than just restoration. But action on Old Cairo’s safeguarding remains limited to the piecemeal restoration of a limited number of its monuments and to a few demonstration projects. The ideas are there but the will power, organization and funding are lacking and more of the historic monuments and the important built environment of this medina area are likely to disappear and crumble.

#### **4.5 Late 1990s planning activities in Old Cairo**

Despite the availability of an overall 1997 Rehabilitation Plan, the government has pursued its own separate conservation policies during 1998 and 1999. Given its tourist potential, Al Azhar square was considered a priority area by government officials. Furthermore, the Al Azhar road bridge presents visual problems and the associated traffic has environmental consequences for the locality’s historical monuments. So, resources are being invested in what amounts to one of the most significant projects so far to upgrade Old Cairo. After two years devoted to the restoration of the Al Azhar and Al Hussein mosques, the locality’s cultural role as the focus of the Al Mu’izz Street main spine and the Khan Al Khalili bazaar area came to be considered as threatened by the east–west road axis and road bridge; therefore, a road tunnel under the Al Azhar area and associated underground parking, form the next stage of the Al Azhar Project. As a result, the area between the two mosques will now be transformed into a new plaza which would directly have access to the central spine of Al Mu’izz Street which itself would be pedestrianised (walk street). Traffic would be diverted largely on to an inner ring road around the Old City.

### **5. WHY AIRBORNE LASER SCANNING**

All the different rehabilitation plans and their impacts are could better understand and discussed, if visualized in 3D. Even the setting up of any of the plans could be support by recent maps, preferably in 3D. As the need of up to date 3D information was obvious, in 1996 the idea came up to produce a elevation model of a part of Cairo by means if airborne laserscanning (ALS).

Basic benefits expected from ALS and the generated DEM were:

- actual, consistent 3D information on structure of a larger part of the city (also as realistic input for future rehabilitation plans)
- quick availability of the digital elevation model DEM (only weeks after the survey flight)
- get a means to measure building heights and calculate from this information the number of inhabitants in a certain area
- demonstrate the capabilities of ALS in order to use this technology more frequently in Egypt in future.

## 6. ISLAMIC CAIRO “ALS” DATA

### 6.1 About ALS technology

At that time it was decided to use the laserscanning system of TopoSys GmbH, Germany for the survey (Fig. 5). In 1996 laserscanning was just on the way to demonstrate its capabilities, while nowadays Laserscanning is accepted as an operation tool for fast generation of accurate 3D information. General information on laserscanning technology and its use can be found at e.g. Wehr (1999) and Lohr (2005).

**Figure (5)** Laser Equipment



*Source: TopoSys GmbH 1998*

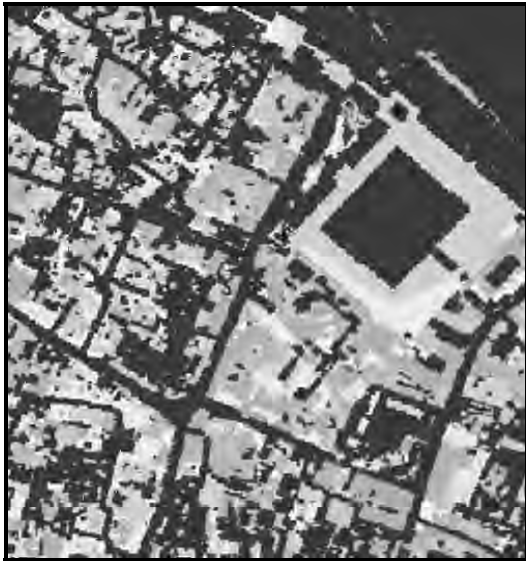
Installed in a Kingair aircraft of NARRS, the survey area was scanned with a high point density of about 4 laser measurement points per m<sup>2</sup>. Due to its small scan angle of in total about 14°, the laser scanner system was able to receive information from street level even in this dense building structure (frequently the width of streets do not exceed 3 meter). From laser measurements, dGPS and LINS data a 1 m raster elevation model of the district was generated providing an accuracy of 15 cm in height and 50 cm in position.



## 6.2 Examples of Islamic Cairo

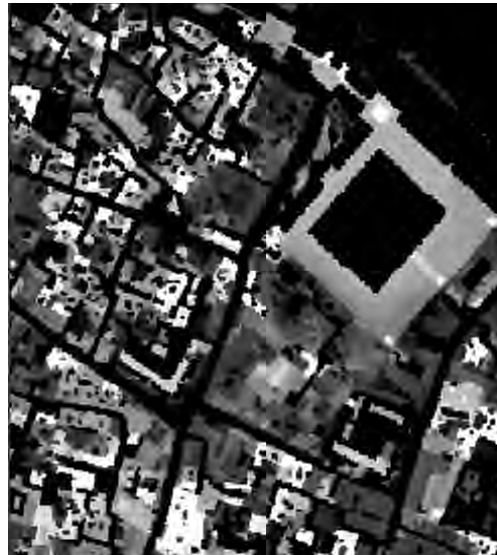
The following pictures show different views of the elevation model produced in the campaign (July 1999).

**Figure (6)**  
Part of pseudo-colored ALS data of  
El-Hakim district in Islamic Cairo



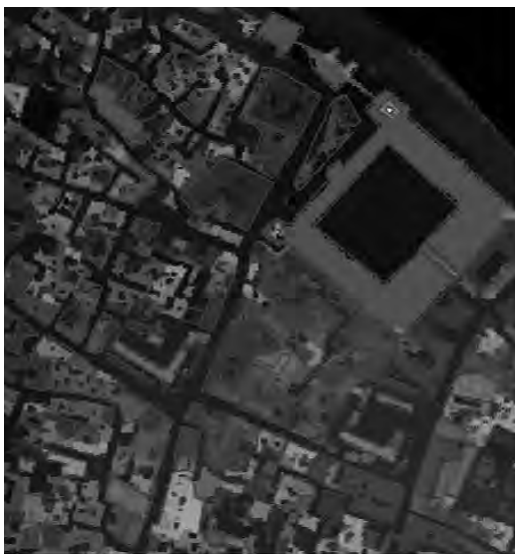
*Source NARSS ALS project 1999*

**Figure (7)**  
Part of grey-shaded ALS data of  
El-Hakim district in Islamic Cairo



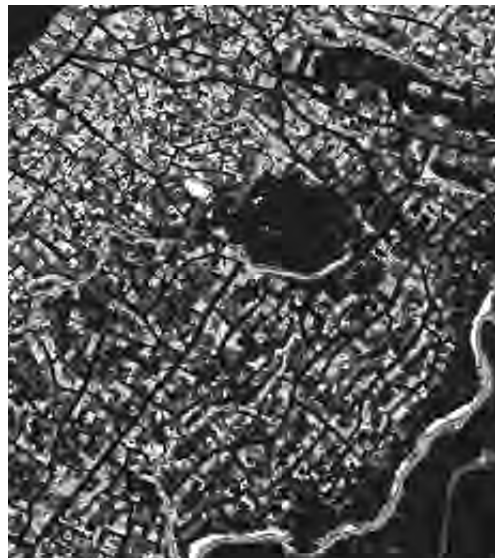
*Source NARSS ALS project 1999*

**Figure (8)**  
Vectorizing buildings of  
El-Hakim district in Islamic Cairo



*Source NARSS ALS project 1999*

**Figure (9)**  
Part of pseudo-colored ALS data of Manshit  
Naser unofficial district behind old Cairo



*Source NARSS ALS project 1999*

**Figure (10)** 3-D view of ALS data of the Manshit Naser unofficial district behind old Cairo



*Source NARSS ALS project 1999*

### **6.3 Further potential use of ALS data**

Beside of rehabilitation of city centers, the need for virtual 3D city models is rapidly growing for applications like city planning and development, location marketing and tourism, car navigation, disaster management (Lohr, 2004).

For the presentation of 3D models, a powerful and flexible 3D visualization and navigation system is essential - not only for showing the data. Sometimes, an attractive presentation is the central key to convince involved parties and decision makers of a specific intention (e.g. to illustrate the design of a new building in an existing environment).

For the purpose of presentation, laserscanning DEM (like that of Cairo) may be vectorized also to reduce the amount of data. Nowadays, vectorization can be done very efficiently and in a cost effective manner as there are tools commercially available (Brenner, 2000). After vectorization, the 3D building structure may be draped with photographs in order to give a realistic appearance (see Fig. 11).

Depending on the kind of visualization software, 3D-building may e.g. be replaced by new buildings generated in some architectural CAD software. In this manner single building or even a complex of planned buildings may be put into the model to replace existing building in order to show the appearance of e.g. a planned rehabilitation.

**Figure (11)** Part of the 3D city model of Parma, Italy © RealIT, Germany



## 7. CONCLUSION

We can say that in Islamic Cairo conservation and planning approaches have fallen into three main categories:

### ***a. Restoration:***

This approach concentrated on restoring the monuments or significant buildings, from palaces to mosques and including old traditional-style houses which exemplify vernacular architecture. The result can be to produce a 'museum town', for tourists rather than for residents.

### ***b. Renovation:***

This approach may be necessary if buildings in the medina collapse and have to be cleared. But renovation has become associated with demolition and may not always result in rebuilding in traditional vernacular architectural styles.

### ***c. Rehabilitation:***

This approach seeks to rehabilitate the old city society and economy as it is now, or as it recently was, and does not aim to recreate the past. Rehabilitation can and indeed ought to involve the participation of the medina's residents in decision making about their quarter and even in actively improving its buildings.

Despite the availability of the 1980 UNESCO Plan and the 1997 UNDP Plan for Old Cairo's rehabilitation, government policies remain insufficient and fragmentary with a tendency to favor tourist-orientated projects. The local population's attitudes and potential participation remain largely ignored.

From what we shown in this paper as a work in one of the biggest and oldest Heritage City (Cairo) it is really very useful to use the Laser data in the upgrading planning process. This data provides very accurate information and moreover, it is also 3D data (DEM).

ALS data is more easy, faster (days) and accurate compared to another ordinary aerial photography technique (month's). The decision maker nowadays needs this type of data, which is compatible with the GIS programs, to make his spatial analyses.

ALS is modernist recent remote sensing technique. We can use it in digital type with another data so easy to create 3D city model.

ALS German system (TopoSys) is now (2001-2002) in Egypt. The expert's decision in NARSS after this pilot or test project (1999) was to buy this system because the benefits in technique and price are not to compare. This is totally another state of art. In technique we have digital data in 3D (DEM) and in time we save many weeks. In civil work the western world use this technology only from few years (1994-1995). Maybe NARSS after they use it in some projects we can in Egypt have the price list.

## References

- Aboukorah, O. (1995). Espace d'habitat et espace de travail "a Darb al-Ahmar. *Lettre d'Information de l'Observatoire Urbaine du Caire Contemporaine*, 39, 11–20.
- Abu-Lughod, J. (1971). Cairo. 1001 years of the city victorious. *Princeton, NJ: Princeton University Press*.
- Ahmed, H. F., & Kamel, B. (1996). Cairo: Three cities, three periods, three maidans. *Built Environment*, 22(2), 104–123.
- Antoniou, J., Welbank, M., Lewcock, R., and El-Hakim, S. (1980). The conservation of the old city of Cairo. London: *UNESCO. 2 Vols*.
- Brenner, C., (2000). Towards Fully Automatic Generation of City Models. *IAPRS Vol. XXXIII, Part B3/1, Comm. III, ISPRS Congress, Amsterdam*, pp. 85-92,.
- Description de l'Égypte (1809). Imprimerie Imperiale. Paris. Dix, G. (1990). Conservation and change in the city. *Third World Planning Review*, 12, 385–406.
- Edward, H. (1998). Conference donnee par Hoda Edward dans le cadre du 25<sup>eme</sup> anniversaire du GOPP (General Organisation for Physical Planning) le 27/04/98 au Centre Francais de Culture et de Cooperation. *Lettre d'Information de l'Observatoire Urbaine du Caire Contemporaine*, 48, 40–47.
- Fathy, H. (1973). Architecture for the poor: An experimnt in rural Egypt. Chicago & London: *University of Chicago Press*.

- Ilbert, R. (1982). Le Caire a-t-il un medina? Publications de l'Equipe de Recherches Associee (No. 706). Fascicule de Recherches (No. 10–11, pp. 263–281). Tours: *Institut de Geographie*.
- Lewcock, R. (1989). Conservation in Islamic Cairo. In *The Aga Khan Award for Architecture*. The expanding metropolis: Coping with the urban growth of Cairo (Vol. 1). (Conference papers).
- Lohr, U. (2004), Precise LIDAR data – an efficient way to build up virtual 3D city models, at *International Workshop on Vision Techniques Applied to the Rehabilitation of City Centres organized by CIPA*, Lisbon, Portugal.
- Lohr, U. (2005), Capabilities and applications of airborne laser scanning, at *ISPRS Int. Conference on Advanced Remote Sensing for Earth Observation*, Riyadh, KSA.
- Madoeuf, A. (1997). Image et pratiques de la ville ancienne du Caire: Les sens de la ville. *Lettre d'Information du Observatoire Urbaine du Caire Contemporaine*, 47, 6–15.
- Meyer, G. (1988). Manufacturing in old quarter of Central Cairo. In *URBAMA, Elements sur les Centre-villes dans le Monde Arabe. Fascicule de Recherches (No. 19, pp. 75–90)*. Tours: URBAMA.
- Meyer, G. (1990). Wirtschaftlicher und sozialer Strukturwandel in der Altstadt von Kairo. *Erdkunde (44)*, 93–110.
- Posmowski, P. (1978). Le Caire Islamique: un tresor "a sauvegarder. *Information's UNESCO*, 738, 6–16.
- Rodenbeck, J. (1983). Urban conservation: its realities and the role it offers social research. In R. Lobban (Ed.), *Urban research strategies for Egypt*. Cairo Papers in Social Science (Vol. 6 (2), pp. 22–34). *Cairo: American University in Cairo Press*.
- Salin, E. (1996). Les Quartiers Historiques du Caire et de Mexico: representations de l'espace, mutations urbaines et protection de patrimoine. *Memoire de DEA. University of Paris X-Nanterre*.
- Schreur, E. (1999). National heritage Cairo style. *ISIM Newsletter (International Institute for the Study of Islam in the Modern World)*, 2, 18.
- Signoles, P. (1988). Place des Medinas dans le Fonctionnement et l'Amenagement des Villes au Maghreb. In *Elements sur les Centre-Villes dans le Monde Arabe (pp. 231–271)*. Fascicule 19. Tours: URBAMA.
- El-Shakhs (Eds.), *Urban development in the Muslim world* (pp. 94–108). New Brunswick, NJ: *Centre for Urban Policy Research*.
- Sutton, K., Fahmi, W. (2002), The rehabilitation of Old Cairo. *Habitat International 26 (2002) 73–93*
- UNDP (United Nations Development Program) (1997). Rehabilitation of historic Cairo. *Final report. Cairo: UNDP Technical Cooperation Office*
- Wehr, A., Lohr, U., 1999. Airborne Laserscanning – an introduction and overview, *ISPRS Journal of Photogrammetry and Remote Sensing*, 54, pp. 68 -82

## From comprehensive plans to strategic choices:

### *A Social Systems Framework for Assessing Strategic Planning of the Egyptian Village*

Ahmed M. Yousry

Faculty of Urban and Regional Planning,  
Cairo University

#### Abstract

This paper aims at evaluating the recent Egyptian experience in strategic planning for villages. More than 4000 villages have been planned with this new approach in the period from 2005 to 2008. The paper adopts a social systems approach as a basic framework for evaluating this experience. In using such an approach of systemic thinking, the paper's aims are not limited to the articulation of evaluation results of past experience, but also extend to envisage recommendations and suggestions that may be taken in consideration to achieve sustainable results. In the terms of systems theory, the paper argues that we can enhance the current planning methodology, that adopts strategic management methods, if we succeed in dealing with the village and encouraging its transformation from a *self-maintaining reactive* system to first, one that is *responsive or adaptive* to its environment, and later, to a *purposeful system* that actively develops its environment.

#### ملخص

تهدف الورقة إلى تقييم التجربة المصرية في التخطيط الاستراتيجي للقرى، والتي تم تطبيقها لأكثر من ٤٠٠٠ قرية في الفترة ما بين ٢٠٠٥ إلى ٢٠٠٨. وتتبنى الورقة مدخل "المنظومات الاجتماعية" كإطار لمنهجية التقييم. وباستخدام هذا المدخل للفكر النظرى للمنظومة، لا تهدف الورقة إلى تحليل نتائج التجربة فقط، بل تقدم أيضا بعض المقترحات والتوصيات التي يمكن اتخاذها في الاعتبار لتحقيق نتائج مستدامة لعملية التخطيط. وتتركز جدلية البحث في أن منهجية التخطيط الحالية تفتقر إلى الفعالية في تحقيق الأهداف المرجوة، بالرغم من أنها قد أصبحت أكثر كفاءة بتبني المناهج والأساليب المستخدمة في مجال الإدارة الاستراتيجية. ومن خلال الفكر النظرى للمنظومة، يتناول البحث أطروحة التعامل مع القرية كمنظومة اجتماعية يجب تطويرها على عدة مراحل. ففي البداية، يجب التركيز على الارتقاء بالقرية بتحويلها من مجرد منظومة تنسم أفعالها كمجرد "رد فعل" لجهود عملية التخطيط الاستراتيجي، إلى منظومة "فعالة"، تتفاعل وتتجاوب مع متغيراتها الداخلية من جهة، وكذلك تتلاءم مع الأحداث الخارجية المؤثرة عليها من جهة أخرى. أما المرحلة اللاحقة من عملية التطوير فتستهدف جعل القرية "منظومة تنموية" يمكن أن يكون لها "رسالة" تساهم بها في تنمية بيئتها المحيطة، بالإضافة إلى الأهداف الداخلية الخاصة بها.

## 1. Introduction: A Synopsis of the Egyptian Experience in Village Planning

Since the establishment of the *Organization for the Reconstruction and Development of the Egyptian Village* (ORDEV) – a subordinate agency of the *Ministry of Local Development*, in 1973, preparing master plans for the Egyptian village has been implemented as a tool for rural development. However, very few master plans, that were produced for about only 700 villages in 1970s and 1980s, have been implemented and executed due to several reasons, the most important of which was the absence of community participation in planning and implementation stages (Wafik, 2002). From the mid-1990s to the mid-2000s ORDEV's rural development efforts have shifted from the master planning framework to be instead concerted within the "National Program for Integrated Rural Development" (known as *Shorouk*). The program focused on the execution of specific development projects, rather than implementing comprehensive master plans, by adopting a participatory approach where projects were prioritized and implemented in various development sectors including the provision and upgrading of utilities and infrastructure, social and public service facilities, creating jobs and income generation, as well as support of local and community institutional development.

The *Shorouk* program has indeed alleviated, to some extent, degraded social and economic conditions of the village; it has not addressed, however, the predicament of rapid unplanned settlement growth on valuable agricultural land. In spite of the numerous subsequent laws and governmental decrees penalizing the construction of dwellings on arable land, and due to the absence of law enforcement as well as a realistic substitution to needed urban expansion, dwellers had no choice except to encroach on the villages' peripheral agricultural fields. By the beginning of the 2000s, the *General Organization for Physical Planning* (GOPP) – a subordinate agency of the *Ministry of Housing, Utilities and Urban Development*, launched a national program for preparing "Demonstrational Master Plans" for all Egyptian rural settlements. The program's main focus was to prevent future loss of agriculture land throughout concentrating all development effort and intensifying all construction activity within the "legal urban boundary" of the village, approved by the Ministry of Agriculture in 1985 and based upon the existing built-up area as depicted by 1984 satellite images (GOPP, 2002). Although adopting a comprehensive master plan approach, the planning product differed than what the GOPP was usually accustomed to deliver, in that it included, in addition to the "legal master plan," delineating needed mechanisms for implementation, outlining prioritized intervention, as well as the determination and detailing of prioritized action plans and projects.

Progress in this program has abruptly terminated by the mid-2000s, however, as the GOPP realized that produced master plans postulate irrational logic in dealing only with the built-up area within the 1985 legal boundary and ignoring all actual urban development as well as social and economic activity outside it. According to a recent study, "thousands of underdeveloped, unplanned, overpopulated villages have in many cases quadrupled in

size since the 1985 decree by the turn of the century” (Abdo and Elmokadem, 2007: 587). Moreover, the GOPP have also acknowledged flaws and defects imbedded in the comprehensive master planning methodology, such as lack of community participation and involvement, cumbersome analytical procedures, and ambiguity in implementation mechanisms and responsibilities.

By the beginning of 2005, the GOPP instigated another national program to prepare “Strategic Plans” for all Egyptian villages totalling “4,623 villages within 4 years” (UNDP, 2005: 5). As stated by the *2005 UNDP Spatial Development and Housing Policy Brief*, the program “uses strategic planning to propose integrated development projects for each village through direct community participation and private sector involvement in the finance and implementation process together with the participation of local government” (UNDP, 2005: 6).

## **2. The Egyptian Village Strategic Plan**

The “Egyptian Village Strategic Plan” program has been considered by officials and planners alike as “a substantial step towards decentralization and empowering local communities in decision-making and management” (UNDP, 2005: 6).

The underlying philosophy upon which the new planning approach was premised was that effectiveness in reaching intended results is much more realistic than aiming to efficient comprehensive plans. Dealing with such problems as inexperienced implementation bodies, ineffective legislation, and inefficient resource utilization, called for adopting a new planning approach, namely, “strategic planning.” – an approach that implicates the endorsement of *contingency planning* that *envisions the future* as an alternative to master planning that strives to cope with *blueprint* future expectations; an approach that focuses on *prioritized strategic choices* contributing to effective improvement, rather than one that renders comprehensive, yet illusive and unfeasible plans.

The main aims of new strategic planning approach, therefore, are twofold. First, there is a need for *effective urban management* within a clear and agreed-upon settlement boundary for the village’s built-up area. Failure to manage unplanned settlement growth has resulted to the loss of more than one million feddans of agricultural land in the last two decades (GOPP, 2006: 3). Second, there is a need for a clear and agreed-upon *strategic vision* that reflect priorities and details implementation mechanisms, to deal effectively with deteriorated environmental, social, and economic conditions such as pollution and solid waste management, lack and insufficiency of service facilities and infrastructure, and degradation in socioeconomic characteristics such as the increase in illiteracy and unemployment rates.

Preparing the strategic plan adopts a methodology that differs from master planning in both its analytical and synthetic aspects. Problems, constraints and potentials are determined throughout a number of strategic planning analytical tools such as stakeholder



analysis, environmental scanning, PEST factors analysis, and SWOT analysis. In contrast with synthetic alternatives and holistic master plans produced by the orthodox approach, results of strategic planning focuses on only a selection of priority choices and details the strategy to implement them.

As participation of all constituents is a main ingredient of the strategic plan methodology, the formulation of the stakeholder group is an essential first step in the planning process. Stakeholders include local government (e.g., local executive administration, ministerial department officials, utility agencies officials, village mayor), institutional bodies (e.g., development bank, agricultural associations, credit institutions, etc.), community associations (e.g., community development associations, voluntary associations, NGOs, vulnerable groups' associations, etc.), and community leaders (e.g., community public council representatives, private-sector businessmen and land owners, influential key persons, natural leaders, etc.). This stakeholder group will participate in all stages of planning, beginning from the assessment of needs, to the agreement on and selection of prioritized action and projects, as well as being responsible for implementation and execution of projects in the post-planning phase.

A variety of participation mechanisms have been specified in the Strategic Plan Project Document (Terms of Reference) and been implemented throughout planning implementation. These included stakeholder structured interviews and questionnaires; stakeholder village meetings to determine problems, agree on priorities, propose alternatives, and discuss different viewpoints; and several ad-hoc workshops to finalize results of strategic plan (e.g., settlement legal boundary, prioritized and detailed project lists, development control regulations for different zones, etc.).

The planning methodology proceeds in sequential steps beginning from needs assessment and ending with strategic intervention. Further, planning stages are articulated within basic development sectors, namely, environment and pollution, local economy, social characteristics and population, service facilities, urban shelter, infrastructure systems, and settlement management. First the current situation for each sector is assessed throughout both field surveys as well as stakeholders interviews and questionnaires. GIS technology is used to provide a geo-database that could be utilized to regulate land use and land management in the implementation stage. Strategic issues and priority alternatives are then identified in each sector using strategic analytic tools such as the SWOT analysis. Finally, throughout a series of successive workshops, the strategic plan's outputs are agreed upon and finalized. These outputs include the new urban boundary and its coordinates showing future extension visions and possibilities; planning and building regulations and development controls; the list of detailed action plans, proposed services and utilities, and projects, including their location, cost, finance, and responsibilities; and the formulation of a institutionalized group for undertaking the implementation of the plan and executing projects.

The implementation of the strategic planning methodology was carried out by consulting firms and university schools with professional expertise. During the period 2005 to 2008 the author has participated within the *Faculty of Urban and Regional Planning* team in preparing strategic plans for about 80 villages in the Governorates of Giza, Kafr El Sheikh, Gharbeya, Sharkeya, and the New Valley. In the following section, the paper will attempt to evaluate this relatively new experience of adopting the strategic planning approach in rural development. Indeed implementation results have not yet been fully materialized, and it would seem intuitive, unscientific, or rather unfair, to evaluate a new-embraced approach against deeply-rooted traditional ones that both professionals and executives have been used to for decades. . In this short period, however, various healthy symptoms indicate that strategic plans have begun to generate some fruitful results. Most importantly is that local communities in the settlements that have experienced the process of strategic planning have been motivated and enthusiastically embraced and participated in implementing strategic choices – an important ingredient that was undeniably missing in previous planning approaches.

### **3. Evaluation and Future Implications**

In evaluating the past experience and suggesting future implications for the strategic planning of the Egyptian village, a theoretical abstract framework can be used to understand and analyze past and current procedures, as well as to hypothesize future propositions. As such, the paper will adopt a *social systems approach* and its theoretical concepts of a system and its environment. Systems theory provides a trans-disciplinary framework of the abstract organization of phenomena, independent of their substance, type, or spatial or temporal scale of existence (Heylighen, 2000). It is commonly used as a conceptual basis to avoid being overwhelmed by complexity (Univ. of Washington, 2005).

The systems approach considers two basic components: elements and processes. Elements are measurable things that can be linked together. They are also called objects, events, patterns, or structures. Processes change elements from one form to another. They may also be called activities, relations, or functions. In systems thinking, the elements or processes are grouped in order to reduce the complexity of the system for conceptual or applied purposes (Churchman, 1968; Checkland, 1981).

#### **3.1 The Village as a Social System**

Considering the village as a social system implies that it is a set of elements and components (e.g., community social attributes, economic structure of good production or the classification of jobs, physical setting in regard to housing, service facilities, road and infrastructure patterns, etc.). These elements, components, and subsequently sub-systems, are interrelated and interdependent in such a way that give the system, as a whole, a certain overall meaning and behavior that are dependent and affected by the behavior of its parts. Essential properties and the performance of the system, hence,

derive from the interaction of its parts, rather than how they act independently from each other (Ackoff, 1971: 661).

Any social system is not only bound to its internal structural elements and their interrelationships. It will definitely have some certain exchange and interaction with other elements and components outside its boundary. Such elements, and their relative properties, are not parts of the system; they rather compose the system's environment. A system's boundary which separates it from its environment is always determined depending on the purpose of the researcher. In that sense, while systems and their environments are objective things, they are also subjective insofar as the particular configuration that forms both is dictated by the interests and purposes of the researcher. Hence, different observers of the same phenomena or events may conceptualize them into different systems and environments (Ackoff, 1971: 662).

As the social system cannot be studied isolated from its environment, the notion of the *nested system* is pivotal in social system theory. In a nested system, there are three levels of environment, namely, the *internal*, the *external transactional*, and the *external contextual environments* (Emery and Trist, 1969; Davis, 2003). The *internal* environment of a nested system is merely the system in study (i.e., the village in this paper). The external environment to this system can be subdivided into two levels. The first is the *transactional* environment, which contains the direct input/output transactional interactions or interdependencies with the system (e.g., *input transactional action*: project budget allocation to the village from higher-level administrative local government body; *output transactional interaction*: use of village residents to higher-level services in the village's region). The second level of external environment is the *contextual* environment, which encompasses relevant general political, economic, social and techno-scientific (PEST) factors or forces (e.g., *political*: local administrative system, laws and regulations, etc.; *economic*: micro- and macro- economic states of unemployment rates, poverty and job creation, etc.; *social*: tradition, value system, social behavior and norms, etc.; *techno-scientific*: state of technological production or use, state of scientific research, etc.).

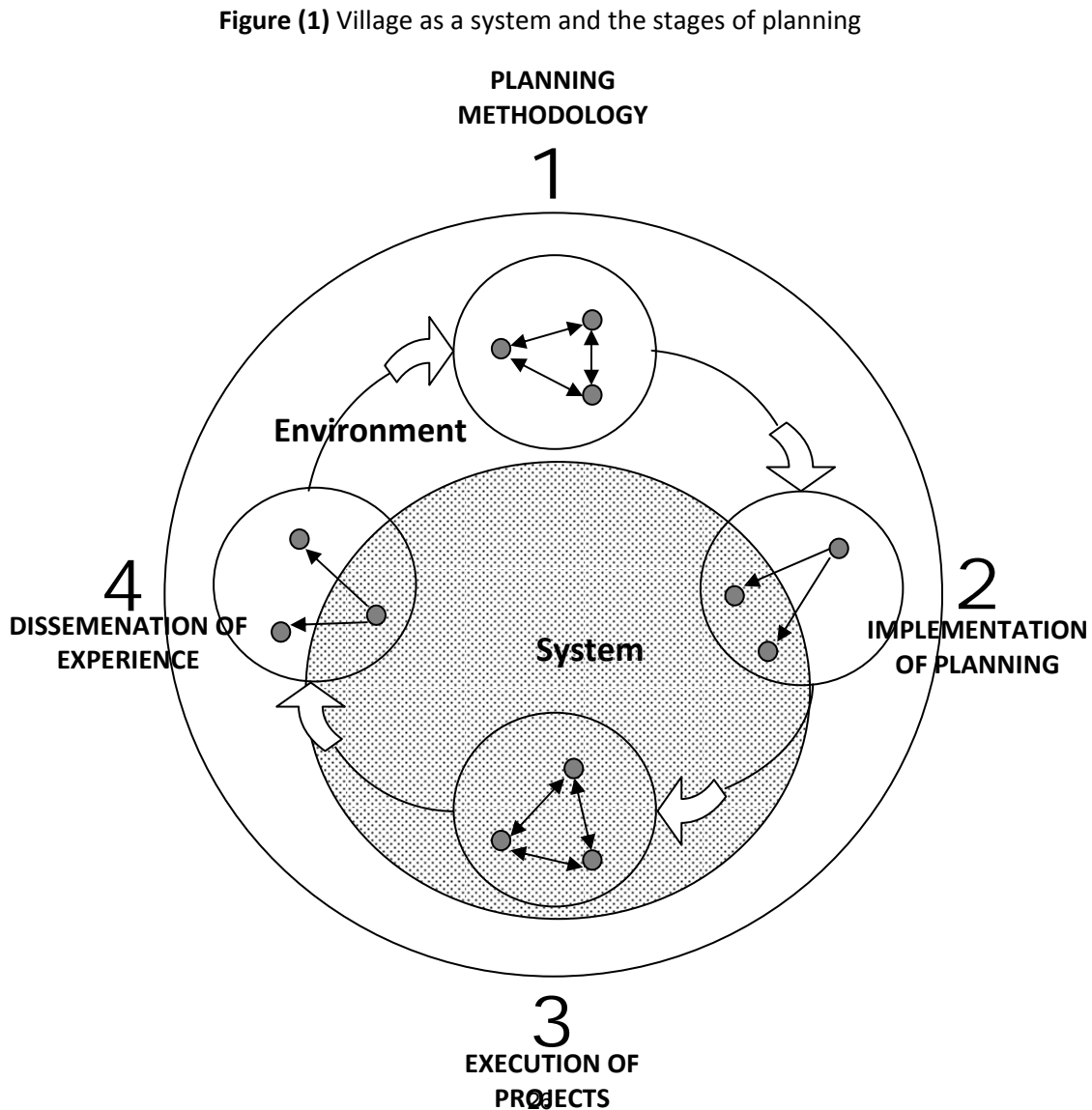
In the context of this paper, therefore, we are looking at the village as a system encompassing both its physical and non-physical attributes as mentioned earlier. The environment of this system in turn are also *physical*, such as the village's region (*zimam*) and surrounding rural communities, as well as *non-physical* such as the PEST factors that affects the village as human settlement in a certain context (e.g., rural characteristics or attributes) and setting (e.g., rural region, governorate, Delta, Upper Egypt, etc.).

Processes occur in a system and its environment according to the occurrence of system events. A system or an environment event is a change in one or more structural properties of the system or the environment over a time of specified duration (Ackoff, 1971: 663). If an event or more occur, the system may react, respond or act according to this event. As such, reactions, responses and actions constitute system behavior (Ackoff, 1971: 664).

### 3.2 Planning Stages, System Behavior and Actor roles

Figure (1) below shows the village as a system in relation to four stages of planning, namely, (1) planning methodology, (2) implementation of planning, (3) execution of projects, and (4) dissemination of experience. Table (1) below shows the classification of the system in each planning stage according to system behavior. Table (2) shows Actor roles in each planning stage.

The first stage of planning, which is setting out the methodology, occurs outside the system (village), i.e., in its external contextual environment. Processes at this stage, therefore, are characterized by *external - external* interrelationships, interdependencies and linkages. Modification and changes occur in the system's environment without any interference with or from the system. As shown in Table (2), actors in this stage are those only external to the village, namely: the national government (GOPP) and the planner.



**Figure (1)** Village as a system and the stages of planning

**Table (1)** System classification and behavior in different stages of planning

STAGE	1 PLANNING METHODOLOGY	2 IMPLEMENTATION OF PLANNING	3 EXECUTION OF PROJECTS	4 DISSEMINATION OF EXPERIENCE
<b>System Classification</b>		REACTIVE SYSTEM	RESPONSIVE SYSTEM	PURPOSEFUL SYSTEM
<b>System Behavior</b>		<ul style="list-style-type: none"> <li>• Reacts</li> <li>• State maintaining</li> <li>• Learning</li> </ul>	<ul style="list-style-type: none"> <li>• Responds</li> <li>• Goal seeking</li> <li>• Adapting</li> </ul>	<ul style="list-style-type: none"> <li>• Acts</li> <li>• Pro-acts</li> <li>• Developing</li> </ul>
<b>Inter-relationships / processes</b>	External - External	External - Internal	Internal - Internal	Internal - External
<b>Modification / change setting</b>	Environment	System	System	Environment

**Table (2)** Actor roles in different stages of planning

STAGE	1 PLANNING METHODOLOGY	2 IMPLEMENTATION OF PLANNING	3 EXECUTION OF PROJECTS	4 DISSEMINATION OF EXPERIENCE
<b>ACTORS</b>	National Level	Local Level	Local Level	Regional / National level
<b>National Government</b>	■	□	□	□
<b>Local Government</b>		■	□	□
<b>Stakeholder Group</b>		■	■	
<b>Community CBOs, NGOs</b>		■	■	■
<b>Planner</b>	■	■	□	□
CBOs: Community-based organizations NGOs: Non-governmental organizations			■	Primary role
			□	Secondary role

The planner's role in this first stage is theoretical rather than practical. He is responsible for developing planning methodologies and tools to cope with continuous rapid change in extremely complex and uncertain settings. These are in turn adopted by national government to be translated into national policies and programs.

Examples of *external - external* processes are GOPP's actions of developing of planning methodology based on continuous assessment to achieve effectiveness and efficiency. These processes have resulted in changing planning methodology from comprehensive master planning towards strategic planning, focusing on action plans and projects rather than producing cumbersome master plans. Environment modifications regarding operational planning methods include changes such as outlining relaxed criteria for boundary determination instead of determining the 1985 boundary as limits to settlement growth, and abandoning the top-down approach in favor of participatory one where stakeholders are involved in all phases of planning process.

In implementing the new strategic planning approach to a specific village setting (Stage 2), *external - internal* processes from the environment to the system begin to occur. In this stage the planner is the primary key player in transferring knowledge from the environment to the system, and therefore modifying the system. The role of the planner in this stage is that of an executor expert, carrying out activities of preset policies and programs (i.e., the strategic plan). The role of the GOPP in this stage is secondary. Its role is that of a facilitator and a regulator, supporting implementation contractual and technical procedures, monitoring results and implementation phases, and evaluating the effectiveness and efficiency of the process. Primary actors in this stage are obviously those inside the system: local government, the local community and its organizations, and the stakeholder group that was particularly formed for the strategic plan implementation.

The village at this planning stage can be conceptually classified, in regard to system theory terms, as a *reactive system* (Ackoff, 1971: 665). The system behaves in such a way that it reacts to external events to maintain a prescribed desired state. As such, the system is behaving in accordance with the set procedures of the strategic plan methodology. In other words, it is behaving according to *specific means* to achieve *specific goals*, both fixed and given by actors outside the system (in its contextual environment) such as the GOPP. In participating in different steps of the strategic plan, local actors are involved in a *learning-by-doing* process. From the very start, they work together with experts (planner and his team) in needs assessment, analysis of problems and potentials, determination of strategic issues, proposing action plans and projects, agreeing on the urban boundary, and prioritizing strategic intervention.

After the strategic plan of the village have been set, detailing what needs to be done in a specific agreed-upon setting, the system moves to the third stage of the process. In Stage 3, execution of action plans and projects within the village reflect *internal - internal*

interrelationships inside the system, as local actors begin to implement the strategic plan outputs. Modification, therefore, occurs within the system as a result of internal events.

The village in this stage is a *responsive system*, as its elements respond to the changes that will occur when executing action plans and projects. It is a *goal-seeking system*, as it is attempting to achieve certain specified outcomes. A goal-seeking system's behavior is responsive as the system has the choice to respond differently to different internal events (Ackoff, 1971: 665). The system in this stage is practicing. It is engaged in active adaptation, choosing different means (e.g., project contractor selection, alternative resources for financing projects, changing project phasing or implementation precedence, etc.) to attain desired prescribed goals (e.g., needed service facilities, upgrading of infrastructure networks, economic project, etc.).

The stakeholder group as well as the community and its organizations are the key actors in this stage. They are institutionalized in order to execute action plans and projects under the support and supervision of the local government. The role of the national government as well as the planner become secondary at this stage, as the regulative role of the first is transferred to the local government, and the expertise of the planner is transferred to the stakeholder.

To achieve sustainability, the planning process should not end at the realization of intended outcomes. As shown in Figure (1), any problem-solving activity should be an ongoing continuous cyclic process rather than a linear one. In Stage (3), *internal - external* processes are produced from the system (village) to its transactional and contextual environment. Good practice in implementation and execution of action plans and projects could result in replication in other villages. Gained experience within the village can be disseminated to other settings. The system in this stage is involved in active adaptation, but not within its internal environment as in the previous stage, but rather within its external transactional environment. The modification is happening this time in the environment, and the system acts to develop and improve its environment. Using systems theory's vocabulary, the system in this stage can be classified as a *purposeful system*. It is a system that pursues *chosen goals* in variable behavior patterns and by different *chosen means*. The system, therefore, is not *purposive* as it behaves to accomplish a certain purpose (i.e., set outcomes of the strategic plan) as it does in Stage (3); it is rather *purposeful* as it actually establishes its own purposes that it will attain (Ackoff, 1971: 666).

The community and the community-based organizations (community development associations or non-governmental organizations) are the primary key players in this stage. Convinced that the development of the system is certainly dependent on the development of its environment, they will act to disseminate their gained experience to other villages in their system's transactional environment. They will be motivated to indulge in such action out their sense of social responsibility, or in pursuit of materialistic

benefits. As the community is encouraged to take the lead in this stage, the planner, the GOPP and local government play the roles of supporters at both the national and regional levels.

In light of the above theoretical framework, the experience of strategic planning of the Egyptian village can be assessed. Evaluation of the two first planning stages (planning methodology and implementation of the strategic plan) is discussed below. These two stages have already taken place and constitute the current range of the strategic planning experience. The last sub-section of the paper presents some suggestions and implications for the future subsequent stage of execution of projects.

### **3.3 Evaluation of Planning Methodology and Implementation**

Practice experience with the new planning methodology has revealed that the strategic plan is distinguished than the orthodox master plan in a number of aspects. Most importantly it is an inclusive approach. All important stakeholder groups have a voice in the planning effort (Mittenthal, 2002: 3). The success of the planning approach is indeed premised on the incorporation of views of all the constituencies that will be affected by the plan or have a role in its implementation. The planning process is therefore characterized by “collaborative, inclusionary consensus-building practices through which the stakeholders discuss their common concerns, get to know each other across their divisions and conflicts and develop strategies that most can ‘own’ and abide by” (Weik and Walter 2009: 361). Furthermore, participatory and collaborative practices have proven to be not merely ‘nice-to-have’, but rather a necessary setting that “allows for mutual and joint learning among the involved stakeholders,” and “leads to robust and sustainable decisions” (Weik and Walter, 2009: 361).

However, a number of concerns can be raised regarding participatory processes in the implementation phase. First, to achieve inclusiveness without sacrificing productivity, there was always a need to formulate smaller ‘taskforce’ stakeholder groups within different sectors of the strategic plan’s structure (e.g., urban shelter, environment, social issues, services, infrastructure, etc.). Second, in many cases lack of transparency, insufficient information, and skepticism and distrust towards government gestures has often hampered genuine stakeholder participation. Further, participation of private-sector businessmen and landowners has been often rather symbolic and insubstantial, because of “an embedded assumption that the planning could work against their social and economic interests” (Abdo and Elmokadem, 2007: 587). Third, participatory processes are often undermined because of power relations, value conflicts and corruption. Landowners of peripheral agricultural pockets that had a potential to be included within the new urban boundaries, have mostly opposed the planning process as the rules for peripheral land selection and compensation often contradicted with their interests.



Using strategic analytical tools such as environmental scanning and SWOT analysis is yet another procedural differentiation from conventional planning practice. Such analytical techniques produce a clear and comprehensive grasp of external opportunities and challenges that reshape solutions, plans and suggested projects. Dealing with the village a social system, not merely a physical entity, makes it feasible to render a realistic assessment of the system's strengths and limitations. Yet, although considered as a substantial methodological shift in planning thought and practice in the Egyptian context, the strategic planning methodology that was adopted and implemented is missing some important ingredients such as deriving at clear statements for the vision and the mission, formulating scenarios, and delineating operational plans.

The formulation of the *vision* and *mission* statements is pivotal in the strategic planning process. GOPP has indeed recently added this important ingredient to the strategic planning methodology for cities. The *vision* statement outlines what the system desires to be in the future. It is a source of inspiration and "stems from the values of all stakeholders involved in the process" (Shilder, 1997: 5). The vision is then translated into a *mission* statement: a broad, comprehensive statement of the purpose of the system, which specifies the desired level of its performance. Absence of the vision and mission statements from the planning methodology and implementation of the strategic plans will most probably have negative implications on the next planning stages. Execution of action plans and projects as well as dissemination of successful experience will need an overall sense of direction and a clear statement of purpose that can serve as driving forces towards desired goals.

Scenario planning is also another strategic planning technique that have not been specified nor used. It is used to formulate strategies the system can undertake in response to anticipated changes that may occur to the existing situation of the village or its context. Several scenarios can be constructed depending on the interplay and selection of external forces and their potential impact on the system (McNamara, 2006: 121). A worse-case scenario often provokes strong motivation to change within the system. A best-case scenario, on the other hand, may render unrealistic over-ambitious conceptualizations. Most reasonable strategies that the village may use to respond to changing circumstances will probably fall in between the worst - and best - case scenarios. Because this technique was not used in implementing the strategic plans, strategies for dealing with different sectoral issues lack flexibility and adaptation to any possible change that may occur within the village and its transactional and contextual environments.

Another missing component of the strategic plan that may be urgently needed for starting the execution of its outputs is the *operational plan*. The strategic plan may provide the general outline describing the action steps and the resources needed to accomplish them within an overall framework to insure maximum efficiency and impact. This has been done through preparing a portfolio including a brief description for priority projects. However, this is unfortunately not enough as a basis for moving into execution. Operational plans for different proposals and projects are needed. The operational plan is

a coordinated set of tasks for carrying out the goals delineated in different sectors of the Strategic plan. It goes into further detail than the strategic plan from which it is derived, spelling out timeframes and roles of different stakeholders, and has a shorter time horizon (Mittenthal, 2002: 2). It also may include a results-based accountability system, which comprises methods and tools for goal measurement such as indicators representing quantifiable measures of progress, and benchmarks representing target levels of performance against which actual achievement can be measured (Shilder, 1997: 7).

### **3.4 Implications for Project Execution**

To date strategic plans for all Egyptian villages have been prepared and most of them approved. The documents of the strategic plan include the plan of the village with its new urban boundary, proposed areas for settlement extension, and location of proposed service facilities and utilities, portfolio of projects, and the list of stakeholders who participated in various stages of planning implementation. Despite the intention that the stakeholder group would be responsible for detailed action planning and project execution, no practical procedures were undertaken to institutionalize and empower this group to enable it to act as a project implementation unit (PIU).

If the strategic plan should contribute to effective improvement of the Egyptian village's conditions, establishing a PIU is of extreme importance to render the desired impact regarding strategic chosen issues. To implement the strategic plan outputs, there will be a need for an institutional setting enabled to undertake decision making and taking. The core of the PIU will include the original stakeholder group, and may be further broadened to include other potential community leaders and community-based organization officials.

In addition to the necessity of empowering this unit as an executive entity, there will be a need also for institutional capacity building for the PIU's officials so that they can effectively execute the strategic plan outputs. Training programs will be needed for PIU's officials in various fields such as managerial skills, feasibility studies, project management and execution mechanisms, allocating finance resources, conflict resolution, and consensus building. Training guidelines and procedural manuals will be also a needed resource for the PIU operations.

High-level political support and insured financial and managerial autonomy are prerequisites for the establishment of the PIU to ensure decentralized institutionalization and sustainability. As mentioned above in the theoretical framework, the role of local government and the planner in this stage will be secondary in contrast to that of the community and the stakeholder group (or the PIU). Devolution of authority in terms of legislation and financial budgeting is needed at this stage so that the local government can play its regulatory role as effectively as possible. The extent of the regulative role of the national government will depend on the degree of decentralization and powers delegated to local government. Similarly, the scope of supportive role that the planner will play

depends on the degree of technical capability of the PIU and the community associations. Hence, the planner's role could range from an ad-hoc expert, rendering his services when needed, to merely a facilitator, responsible for organization, mediation and networking among different activities.

### **Concluding Synopsis**

In evaluating the Egyptian experience of strategic planning for villages, the paper attempts to present an abstracted view where planning phases (planning methodology, planning implementation, execution of projects, and dissemination of experience) are articulated in accordance with system – environment behavior and interrelationships. In the first phase, planning methodology is formulated to suit the turbulent environment of settlement systems. The GOPP has adopted the “strategic planning” methodology instead of the conventional “comprehensive” approach. Evaluating results presented by this paper calls for further development of the strategic planning approach to enhance participation, analytical tools, and plan operation. Such deficiencies in planning methodologies were derived at when planners engaged in the implementation of the new planning methodology, applying internal – external processes to the system (village).

In the third planning phase, the system applies internal – internal processes in executing projects agreed upon by the stakeholder groups and delineated in the approved strategic plan of the village. In this stage, the paper argues that the formulation of a “Project Implementation Unit” is crucial for successful execution and effective impact. To complete the planning cycle, a fourth planning stage of “dissemination of experience” is envisaged. Experience, accumulated throughout the individual practices of planning implementation and project execution in villages, will act as stimulus for planning methodology development and efficiency. Internal – external systemic processes occurring at this planning stage develop the village from merely a reactive and responsive system to a purposeful one – a system with a diverse set of purposes which include not only these related to its own improvement, but also those that aim at upgrading other villages in its transactional environment as well as the enhancing the characteristics of the contextual environment itself.

### **References**

- Abdou, Amal, and Ashraf Elmokadem (2007): Shielding agriculture bequest against villages with desert planning strategy: the case of Menia Governorate, Egypt, in *Vision, Implementations, Results: Planning the Urban Environment: 2<sup>nd</sup> International Congress on Environmental Planning and Management*, eds. Hartmut Kenneweg and Uwe Troger, Berlin: Technische Universtat, 587-590
- Ackoff, R. I. (1971). Towards a system of system concepts, *Management Science*, Volume 17, No. 11, July: 661-671
- Checkland, P. (1981): *Systems Thinking, Systems Practice*, New York: Wiley

- Churchman, C. W. (1968): *The systems approach*, New York: Dell.
- Davis, Gordon B. (2003): Systems Approach, *Encyclopedia of Information Systems*, Volume 4: 351-360
- Emery, Fred, and Eric Trist (1969): The Causal Texture of Organizational Environments, in F. Emery (ed.): *Systems Thinking*, Baltimore: Penguin
- General Organization for Physical Planning (GOPP) (2002): Project's Terms of Reference for "Preparing the Demonstrational Master Plan for the Egyptian Village," Cairo: GOPP, Ministry of Housing, Utilities, and Urban Development (MHUUD) (in Arabic)
- GOPP (2006): Project's Terms of Reference for "Preparing the Strategic Plan for the Egyptian Village," 2<sup>nd</sup> Revised Document, Cairo: GOPP, MHUUD (in Arabic)
- Heylighen, F. (2000): "Basic concepts of systems approach" and "What is system theory?", in: F. Heylighen, C. Joslyn and V. Turchin (editors): *Principia Cybernetica Web* (Principia Cybernetica, Brussels), URL: <http://cleamc11.vub.ac.be/REFERPCP.html>
- McNamara, Carter (2006): *Field Guide to Nonprofit Strategic Planning and Facilitation*, New York: Authenticity Consulting, LLC
- Mittenthal, Richard A. (2002): *Ten Keys to Successful Strategic Planning for Nonprofit and Foundation Leaders*, New York: TCC Group Briefing Paper
- Schilder, Diane (1997): *Strategic Planning Process: Steps in Developing Strategic Plans*, Harvard Family Research Project Report, Boston: Harvard Graduate School of Education
- UNDP and National Planning Institution (2005): *Spatial Development and Housing, Policy Brief #8*, based on the 2005 Egypt Human Development Report, Cairo: UNDP and Ministry of Planning
- University of Washington, College of Forest Resources Website (2005): Ecosystem Management: Concepts and Approaches: System Theory, URL: <http://silvae.cfr.washington.edu/ecosystem-management/IntroFrame.html>
- Wafik, Tarek (2002): On Social Dialogue and Participation in Egypt: An Analytic Vision, LIFE Program Publication, Cairo: UNDP and Ford Foundation (in Arabic)
- Wiek, Arnim and Walter Alexander (2009): A trans-disciplinary approach for formalized integrated planning and decision-making in complex systems, *European Journal of Operational Research*, 197: 360-370