Decision Support System to Improve Public Participation Process in the Urban Planning of Egyptian Cities

Hatem Mahmoud* and Takafumi Arima**

*Doctor Candidate, Graduate School of Human-Environment Studies, Kyushu University, Japan
Assistant Lecturer, Dept. of Architecture, Aswan Faculty of Engineering, Egypt
E-mail: hatem3us@hotmail.com, Tel: +81-92-642-3348, Fax: +81-92-642-3349
**Associate Professor, Faculty of Human-Environment Studies, Kyushu University, Japan

Abstract. Faced with the challenges of urban growth, the Egyptian government has, since 2005, adopted a policy of participation in the decision-making of urban planning projects with the aim of enhancing urban growth management. As this is a new policy, shortcomings are inevitable, especially with regard to communication among the stakeholders and participation diversity. This study presents the Decision Support System (DSS), a computer prototype that introduces multiple tools aiming at facilitating more intensive and expanded participation. Developing this prototype involved three stages: 1) Collecting data about the participation process in Egypt and preparing an initial prototype; 2) Evaluating the prototype feasibility, collecting improving suggestions, as well as assessing the strengths and weaknesses of using such prototypes in the participation process through questionnaire responses from 50 Egyptian urban planners experienced in similar participatory activities; and 3) Finalizing the prototype based on the evaluation. The results show that shifting to such prototypes based on Information and Communication Technologies (ICTs) is likely to facilitate and promote more active participation among urban planners. For the proposed system to be truly effective, however, there should be greater emphasis on developing government policies regarding participation in decision-making in Egyptian urban planning projects.

1. Introduction

1.1. Background

In an approach to resolve urban problems in Egypt while reducing centralization in decision-making, the General Organization of Physical Planning (GOPP) introduced an initiative to prepare strategic plans for the Egyptian cities and villages[1]. This new scheme sought to stimulate greater participation of all stake-holding parties with the principal aim of formulating a national strategic plan for urban development in Egypt. This approach was initiated in collaboration with the United Nations Program for the urban settlements in Egypt (UN-Habitat).

From a previous research carried out in Egyptian cities (Mahmoud and Arima, 2010), it is apparent that the participation process in Egypt suffers from several shortcomings, both in policy and execution. This study focuses on two weaknesses in the implementation of the participation process: 1) Planners have difficulty communicating their ideas because the maps and sketches they prepare require a degree of expertise and experience to understand, and a fairly high illiteracy rate is prevalent in urban communities; and 2) There is a lack of diversity in the backgrounds of the participants during meetings arising from the small numbers that attend such meetings, and the absence of relevant groups such as academic planners, the youth and the disabled. The small attendance at such meetings is due to the lack of interest or time. Besides, women do not usually want to attend the meetings because of constraints of social customs. Hence, there is a need to develop practical tools to address the above-mentioned shortcomings.

Among several approaches that are available, we selected one based on Information and Communication Technologies (ICTs) because of its potential in capturing wide participation in the urban planning process. To address the problems of low skill

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[1] Strategic plans identify the need for future urban expansion, development priorities, and sources of funding.

levels and illiteracy among the targeted participants, we enlisted the help of team members and volunteers—who were already proficient in ICT to serve as helpers and facilitators. The system we developed improved the meeting tasks through the introduction of visualization tools that helped planners deliver urban planning concepts to the illiterate. With the use of 3D computer models, simulation methods, and multiple functions for collecting and sharing information, the participation process became more meaningful. Regarding the lack of diversity among the meeting participants, as evident from the experience of a planning team in Asyut city, the team distributed compact disks (CDs) that contained the same material shown during the official public meetings for the strategic urban planning of Asyut city. CD recipients also received the same questionnaire distributed at the meetings. Similar CDs and questionnaires were handed out to various groups that were not normally involved in town planning meetings, including youth groups in public Internet clubs, academics in the universities and women. Participants were asked to watch the CD and then complete the questionnaire. From our study, 90 people (82% of recipients) indicated that they were willing to participate in the future if these materials became available via the Internet. Accordingly, a system was developed to facilitate town planning information and questionnaires that were available on CDs which could be used at meetings. The system can be also used through the Internet.

Another advantage of using ICT in the collation of feedback from the public is that the impact ICTs have had on the Egyptian community in recent times. The country has adopted many strategies to increase access to the Internet. This is reflected in the significant increase in Internet users from 0.65 million in 2000 to 14.85 million in June 2009, and rising further to 19.66 million in June 2010 (a 32.31% annual growth rate). This represents a population penetration of 25.38% (Fig. 1). Government agencies are further providing incentives to boost Internet usage through the provision of diversified services available online. Nearly one-third (32.5%) of Egyptian government agencies with web sites in 2008 offered their services and around one-quarter (25.8%) provided forms online (MCIT, 2009). Nevertheless, some areas are still lagging, an example of which is the use of ICT in the public participation process. Hence, there is scope for ICT to play a greater role in introducing new tools to support the people's participation process in decision-making with regard to urban planning in Egypt.
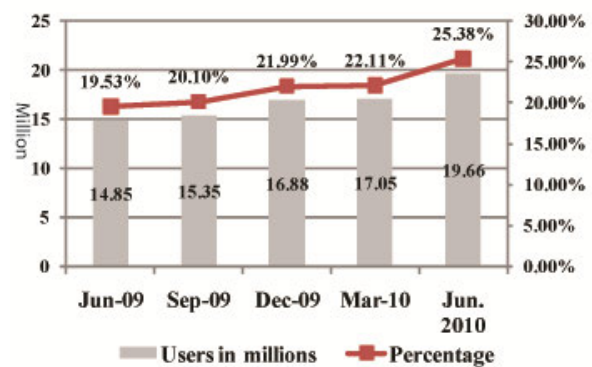

Fig. 1. The growth of Internet users in Egypt and their percentage of the population (MCIT, 2009).

1.2. Statement of the problems and objectives

In Egypt, urban planning has traditionally been implemented by planners and politicians working together, with the public being generally left out of the picture in decision-making. More recently, the government has made an attempt to involve local communities in preparing strategic plans for Egyptian cities. To encourage the decision-making process among the people, meetings are conducted to collect public opinion, identify the priorities of the community and discuss the perception of future plans for the city. As mentioned, progress in the level of public participation has often been held back by social customs and illiteracy.

The objective of this study is to introduce a localized computer prototype for a Decision Support System (DSS) that offers credible information to the public besides providing advanced tools for the community's participation in city planning. The proposed DSS aims to encourage planners to use advanced visualization tools such as 3D computer graphic, animation, and virtual reality (VR) to deliver their ideas more effectively to the public and to capture relevant local knowledge. Additionally, it aims to expand public participation via the Internet.

Eventually, the proposed DSS will be evaluated through a questionnaire to be completed by Egyptian urban planning experts. The results of this questionnaire would facilitate an understanding of the strengths and weaknesses of the DSS and its expected impact on public participation in planning the growth of cities.

1.3. Related studies

The importance and impact of information systems for urban planning have been widely discussed. Laurini (2001) introduced a study on urban renewal based on computers that incorporated various

techniques of visualization and e-participation. Hanzel (2007) proposed the use of information technology as a tool for public participation in urban planning. Hanzel's study contained a review of experiments and prototypes of different IT applications such as participatory planning Geographic Information Systems (GIS), 3D models and computer games. Other studies introduced various solutions based on IT tailored for specific communities. Arima, Tanoue and Sakai (2006) developed a participation system using the Virtual Reality (VR) technique in workshops associated with a real urban project in Japan, and then evaluated the practicality of this system. While these experiences served as useful precedents, the current study was carried out with the assumption that the DSS conditions were likely to vary from one community to another. The development of the scheme would be tuned to accommodate local characteristics specific for each community. Hence, the first step in this study was to work with professional planners in Egypt to understand how public participation in city planning was likely to respond to the ICT approach.

The Egyptian government has a short history of participation in urban planning since 2004. After that year, there have been limited studies that focused on analyzing the newly introduced participation policies, and—theoretically—how these policies might be improved. In supporting new methodologies for public participation in strategic planning, Madbouly (2005) made several recommendations to improve the success rate of community participation. Mahmoud, Kamal and Arima (2010) used the participation activities in Asyut city as an example to understand the difficulties encountered in such investigations, and they proposed various measures to address the problems that arose.

Our study is original in introducing the first prototype DSS designed as an empirical solution to improving the public participation process which would be compatible with the participation methodologies in Egyptian cities. To ensure that the prototype was suited for its purpose, a plan was structured after consulting with urban planning professionals who had been involved in the community participation process.

1.4. Methodology

The study was based on empirical and survey work from November 2009 to January 2010 in Egypt. During this period, the researchers sought to understand the participation process, obstacles to the process, and the approaches that could be useful to improve the participation process. Documents relevant to these objectives were collected using the strategic plan for Asyut city as an example. From January 2010 to March 2010, an initial computer prototype system was proposed based on the data collected. Twenty five planners who had been involved in the community participation process were interviewed, and an evaluation was conducted on a questionnaire to which 50 Egyptian urban planners responded. Opinions were collected on the ways to improve the prototype and its expected strengths and weaknesses in implementing the participation process. Based on the feedback, the computer prototype was progressively modified from March to August 2010. The methods used in this study can be divided into three steps.

The first step was to select a city for a case study. Asyut city was selected for three reasons: 1) Asyut was recommended by urban planning professionals as a typical example of a city that had newly adopted the participation process in Egypt's medium-sized cities[2]. The same procedures for implementing participatory urban planning were used in all cities involved in preparing the strategic plan schedule. 2) At the time we were collecting data for our study, a strategic plan for Asyut was being prepared. Hence, we were able to obtain detailed data about the participation procedures. 3) The planning group responsible for preparing the strategic plan for Asyut was familiar with our proposed prototype of data collection to support their own trial.

The second step was setting up the prototype computer system. This step was divided into two stages over a nine-month period. In the first stage, the prototype was based on the collected data and suggestions from academic planners of Asyut University who were involved in the participatory planning work. C# programming language was used to write the prototype scripts, Microsoft Visual Studio 2005 was used to design the Windows forms to work as a Windows application. In the second stage, the SQL[3] server management studio was used to design database tables and its connections. Finally, the database was connected to the prototype Windows forms.

The third step was the evaluation of the system's role in improving the participation process in Egypt. Feedback regarding the positive and negative aspects of the first part of the prototype was obtained from questionnaires. Ninety questionnaires were distributed to academic planners and GOPP

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(2) Egypt's medium-sized cities are cities where the population is between 250,000 and 500,000 people.

(3) SQL (Structured Query Language) is a database computer language designed for managing data in relational database management system.

officials. Of the 52 returned questionnaires, two were excluded from the analysis because they were incomplete.

2. Participation Activities through Preparing the Strategic Plans in Asyut City

Asyut city is the capital of Asyut Province and the Upper Egypt region. Despite the importance of this city, it suffers from a 22.5% illiteracy rate and 12.3% unemployment (CAPMAS, 2006). Asyut is one of Egypt's medium-sized cities with a population of 442,712. The General Organization for Physical Planning (GOPP) has introduced a reference book for all planners participating in the preparation of strategic plans for Egyptian cities to familiarize them with the framework of the decision-making process to prepare strategic plans for the target year 2027.

In the course of the decision-making process, there were five main meetings with the public. Besides the main meetings, the planning team had the right to conduct additional meetings with them or with specific groups as the project demanded. The stakeholders who were involved in the decision-making were: 1) GOPP as the central government representative; they also included the GOPP planners who helped the planning team in acquiring the city data, arranging the meetings and inviting the development partners to the meetings. 2) The planners' team comprising academic planners and consultants who prepared the documents and reports, analyzed the proposals, and suggested solutions. 3) The Development Partners comprising three groups: Governmental sector representatives, including representatives for trade and employment, and non-governmental local partners, including members of the public (GOPP, 2007).

The work in preparing the strategic plan in Asyut city started in February 2007 (Fig. 2). After collecting data about the present situation in the city, the planners' team conducted its first meeting. Through open discussions, this meeting aimed to: 1) Discuss the framework and the project schedule; 2) Introduce the strategic plan goals; and 3) Discuss important development issues in Asyut city, such as the high price of land due to the inflexible boundaries of the urban area that had to accommodate an increasing population. Other issues included the lack of a good network of roads (Mahmoud and Arima, 2010).
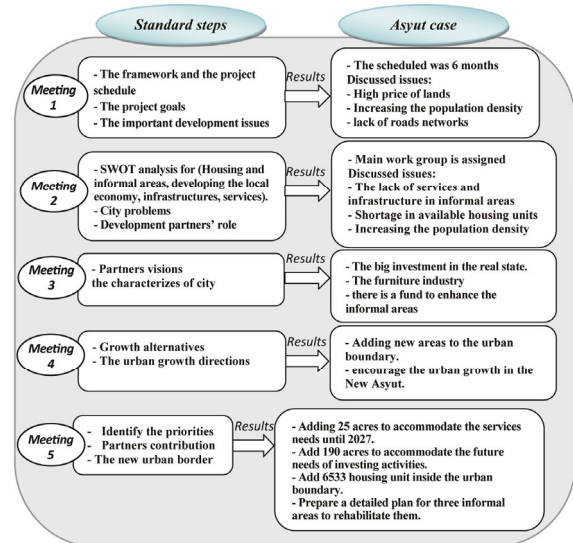

Fig. 2. Participation activities in preparing the strategic plans of Asyut city.

A second meeting was held with the development partners, with the aim to: 1) Identify the most important Strengths, Weaknesses, Opportunities, and Threats (SWOT) in the development sectors that included the local developing economy, infrastructures, services, housing and informal areas (transgressing settlements outside the framework of the state); 2) Agree on common problems that the city suffers from, and to decide on appropriate solutions; and 3) Discuss the different roles of relevant parties in initiating development. Through this meeting, a questionnaire and recent aerial photos were distributed to the participants and the planning team subsequently analyzed the data to prepare the final SWOT analysis. When present and future public needs were assessed, deficiencies in the services and in informal infrastructure were evident. Housing also fell short of projected requirements. The planners' team assessed the experience of the development partners, and the extent to which they were prepared to participate in planning the development of the city. This was an essential prerequisite to identifying the main work group that would be charged with the responsibility of monitoring the implementation of the plan after its adoption (GOPP, 2008).

A third meeting was conducted to promote developmental and investment prospects in Asyut city. Besides real estate development, Asyut city has a thriving furniture industry with funds allocated to enhance the informal areas. Open discussion among the participants followed the presentation of the data collected. The opinions of stakeholders on the various proposals that were raised were collated through a set of questionnaires.

Following this meeting, the planners' team prepared a presentation on future plans for the city based on an analysis of the feedback. The presentation highlighted the following: 1) Opportunities for development in the city; 2) An evaluation of the proposals drawn up by the development partners; and 3) The final proposal agreed to by the planning team.

The presentation that was subsequently delivered in the fourth meeting aimed to: 1) Arrive at an agreement on the growth alternatives, and the planned projects and services (schools, hospitals, social units, telecommunication centers, fire departments, etc.); and 2) Identify the urban growth directions and set the new city limit boundaries. The principal decisions at this meeting were based on the results of a questionnaire distributed at the meeting (GOPP, 2008).

The planners' team prepared a final revised presentation of the developmental projections for Asyut city that was delivered at the fifth meeting. This meeting was conducted to: 1) Prioritize the local planned projects and issues; 2) Prepare an initial estimate for the partners' contributions in the implementation of the city's development; 3) Agree on the distribution of projects and their locations; and 4) Agree on the limits of a new urban border.

Based on this meeting, it was decided to allocate an additional 25 acres to accommodate its service needs until 2027, allocate an additional 190 acres to accommodate the future needs of investing activities; allocate an additional 6,533 housing units within the urban boundary; prepare a detailed plan for the rehabilitation of three informal areas (GOPP, 2008).

The number of participants at the meetings ranged from 20 to 30. The planners' team submitted documents indicating approval of the development partners on all the proposed issues, as well as pictures and video records of the proceedings of the meetings. At this juncture, the planners' team finalized the documents and maps for submission to the government.

3. Proposed Decision Support System Concept

Subsequent to the series of meetings mentioned above, the next processes that were initiated were: 1) Exploring possible problems in the development of the city through public discussions. This would be followed by an identification of the main problems, possibilities, and opportunities based on a questionnaire (poll). 2) Visualizing alternatives of the future development using visualization tools (maps, sketches) to convey the planners' ideas to participants. 3) Evaluating the alternatives and taking a decision on the direction for future development and its related priorities based on discussions and a questionnaire. 4) Enlisting public participation in the selection of location of proposed projects in specific areas (districts).

Based on the above analysis, the proposed DSS concept was developed with the aim of improving the participation process by identifying the difficulties likely to be encountered and possible solutions to counter the problems. Accordingly, the proposed DSS has the following functions: 1) Exploration: It allows the participants to explore, provide and share information on the current situation. 2) Visualization: The system facilitates advanced visualization tools to help stakeholders better understand the proposed alternatives. 3) Evaluation: It incorporates a poll function that enables users to vote for a preferred option or course of action, and directly presents the outcome in graphical and statistical form. 4) The selection of location of proposed projects: Besides enabling the users to evaluate alternatives, the system allows a design game for the users to build their own alternative and to explore different alternatives for locating the proposed projects in a specific area or district. 5) Forum: It enables the users to express their preferences, discuss current issues, as well as contribute their opinions and comments on the decision-making process. 6) Accessibility: one of the most important features of this system is the ability to classify the data, and then store them in database, and later allow data and the results to be accessible by public through the Internet. In the future use, The system can be available through the Internet to create a virtual community where local concerns, knowledge and wishes are expressed and discussed.

4. Proposed Participation Process Skeleton

The proposed computer prototype is developed to be used as a Windows application. It supports a distributed database management system to allow users access to data from different sources, both remotely and locally. The system has been developed as an improvement over the former participation through meetings and, in addition, adds a new capability to participate via the Internet.

In Fig. 3, the outlines of the participation process are presented in three areas. Activities in each area are listed inside each oval. These are as follows: 1) Administration Area: where the decision makers upload the project materials on the database server. This process is conducted gradually based on the decision-making progress. At the stage of collecting opinions about the present situation, the decision

makers upload images, maps and open topics (opinions categories) to discuss and survey (poll) the present situation. After an assessment of the current situation, they upload to the system the visuals of the proposed projects, open topics for discussion, and a questionnaire on the future status of the proposed constructions. Finally, when all the views have been collected, a final decision is made. 2) Participation Area: where the participants explore, visualize the present situation and future positions, and participate in polls. In addition, the participants can contribute alternative suggestions via a design game. The user inputs can become a basis for further discussions that can be shared with others. 3) Reports Area: where the results are analyzed. There are three kinds of results: poll results (presented graphically and statistically), categories of collected opinions, and the alternatives suggested by participants regarding the distribution of proposed projects. Hence, this area is not only an indicator of the decisions made but it also facilitates sharing information among participants.
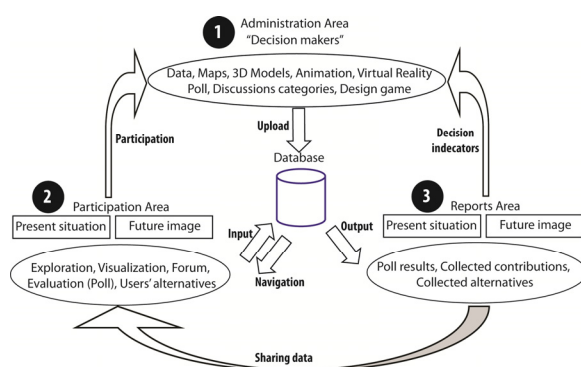

Fig. 3. Proposed Decision Support System skeleton.

4.1. Administration area tasks

The prototype that is developed for the Windows operating system supports the uploading of a range of various raster data formats for visualization materials (maps, sketches, images) onto a database (Fig. 5). It also has the capacity for the inclusion of further video files (AVI and WMV extensions) and Virtual Reality (VR) files (VMO extension). A facility for 3D modeling addresses the difficulties otherwise encountered in visualizing concepts in the third dimension on a two-dimensional display. Various categories to collect feedback are uploaded to this forum (Fig. 6). Questionnaires that were previously distributed at stakeholders meetings are now available online (Fig. 7). All uploaded materials can be categorized to enable the viewer to compare the present scenario with future possibilities. Finally, the design game materials are uploaded, starting with

the main map that includes alternatives sites for the proposed projects. Icons for the proposed projects can then be uploaded (Fig. 8).

To simulate the participation process in Asyut city, we uploaded maps of the present city urban boundary, images representative of the present situation, video clips for some areas, and VR for proposals of a developing project (the researchers prepared a VR model for the proposed development of a public library and its surrounded area). Various developmental issues such as housing, informal areas, infrastructures, and price of lands were uploaded for discussion. Some of the questions that appeared in a questionnaire distributed in the second meeting were also uploaded to this site. Strictly speaking, materials depicting future scenarios should appear only after analyzing opinions pertaining to the present situation. Nevertheless, projected future scenarios based on feedback from the meetings were depicted so that the proposals could be evaluated by the stakeholders, including academic planners. In the design game, a map for an informal area in the north of Asyut city (Elweladya district) was displayed with proposed projects (hospital, high school, … etc.) inserted, and with notes to explain the alternatives to the proposed projects.

4.2. Participation area tasks

The Participation Area is designed to encompass all the points raised at official meetings, and to add more advantages that improve the meetings' tasks (Fig. 4).

At the first official meeting, an exploration for the present situation of the city was conducted using aerial maps and pictures. The system provides a special form for exploring materials that have been uploaded in the administration area (maps, videos, etc.). The system also hosts a special forum for an open discussion to identify developmental issues (Fig. 6). The planners' team or skilled volunteers update the system database with significant contributions introduced by the participants at the meeting. These contributions are categorized (filtered) by categories according to images and opinions. These contributions can be policies, actions or comments (viewpoints, arguments and opinions) on various issues that are center to the whole deliberation process. In addition, the participants in the official meetings can share the contributions of others linked through the Internet, thereby facilitating remote participation and virtual connection of disparate groups, including women and the handicapped. The website also provides the opportunity to exchange ideas on specific areas and even convene meetings among local groups that cannot join the official meetings.
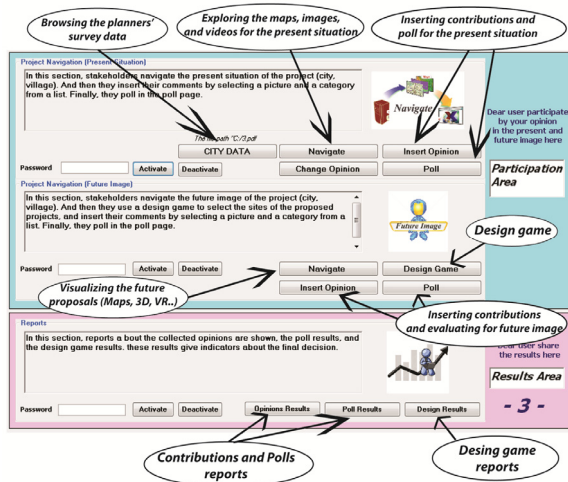
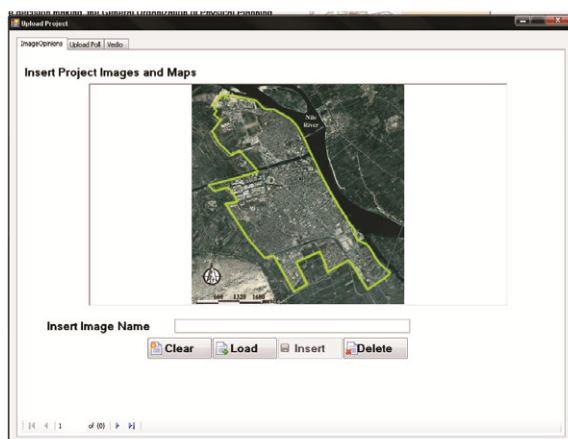**Fig. 4. Administration and Reports area interface.**

Fig. 5. Upload maps, images, and videos.

At the second official meeting, a questionnaire on a SWOT analysis incorporated a poll on the most important issues. By using the system, graphical and statistical poll outcomes (Fig. 7) were obtained and discussed at the same meeting. The speed with which the results are collated and analyzed by the computerized participation system would be difficult to achieve

using the procedures normally adopted in traditional meetings. These results are used to prepare the alternatives directly at the next meeting.
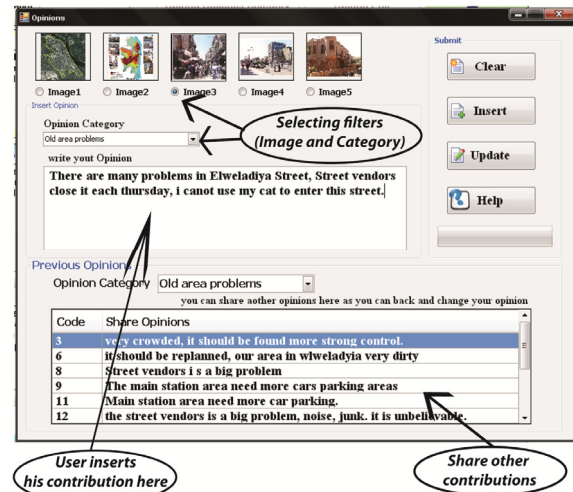
Fig. 6. Forum interface.

The forum and poll systems were also used to conduct the tasks of the third meeting to discuss and evaluate its themes. By the fourth meeting, the planners were in a position to introduce specific alternatives for the future plans and proposed projects. Effective visualization of the concepts under discussion is very important at this stage. The computerized participation system promotes multiple visualization tools, including 3D models and VR that are available to different levels of participants in developmental projects (Fig. 9). The use of 3D modeling and VR enhances the understanding of space. Orientation is also much easier because the user is able to identify landmarks in 3D as in real life. By the end of the meeting, a decision on suitable alternatives can normally be taken based on the poll outcome.
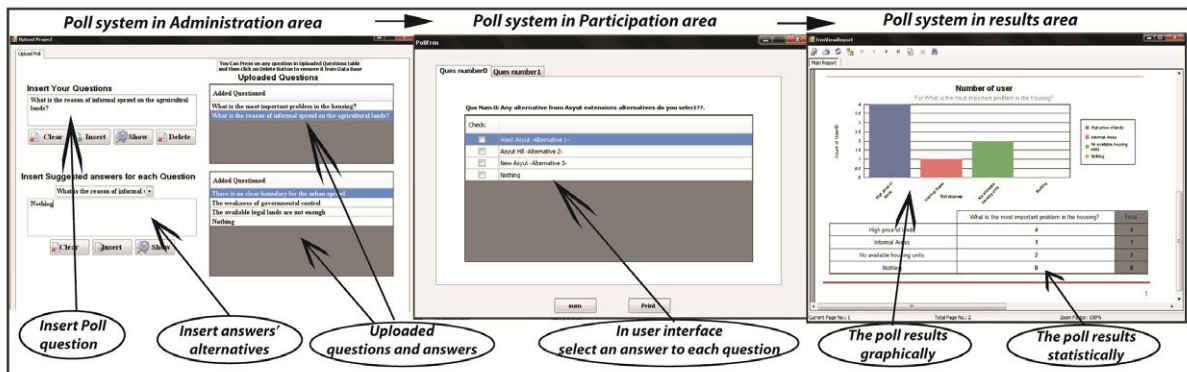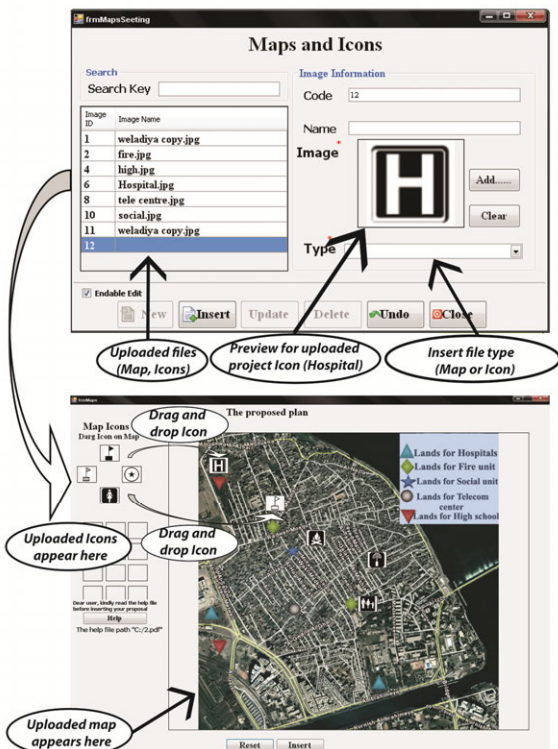
Fig. 7. Forum interface.

Fig. 8. Design game explanation (upper form for uploading the materials) and (lower form is user interface).

At the final meeting, the participants share in selecting appropriate locations for the agreed projects and services while the planners prepare alternatives for the available places. The system allows a design game for the user to devise his own plan, by dragging the icons of new project proposals to the desired locations to be chosen from among the alternatives shown on the map (Fig. 8). In contrast, traditional methods of consensus building require pre-determined plans to be presented to the participants. The new system enables the planners to change the projects locations in real-time based on the

discussions, so the participants can feel the impact of their discussion at the meeting itself. Finally, a decision on public priorities in project implementation can be agreed upon from the results of the poll system.

Fig. 9. VR for proposed development project.

4.3. Reports area

The Reports Area generates three reports for all the tasks that are conducted via the system (forum, poll, design game) through the participation activities. The reports include all the materials introduced in the official meetings (maps, sketches, presentations, and statistics). These reports have an important role in documenting and supporting the final decision, besides upholding transparency in decision-making.

It may be concluded, therefore, that the proposed system offers more advantages over the traditional method of urban planning in Egypt. The proposed system is equipped for the general public to access, process, and share information via the Internet. It allows the planners to take advantage of ICT techniques to address the difficulties encountered in the public participation process.

5. Evaluation of the
Proposed Decision Support System

Academic urban planners and GOPP officials were selected to conduct this evaluation since the system would be used and administrated mainly by them. This group would be expected to manage this system whether at official meetings or via the Internet. Moreover, members from this group had previously been involved in the community participation processes, and so they were familiar with the related problems and the manner by which they could be addressed.

This evaluation gives indicators about the feasibility of the system and its role in decision-making with regard to city and town development in Egypt. A questionnaire distributed to 90 planners elicited 52 responses. Two of these were excluded from the analysis because they were incomplete. Half of the completed questionnaires were collected following personal interviews with planners to introduce them to the system. The remaining questionnaires were distributed with guidelines for the system and its functions.

5.1. The proposed system feasibility

All planners who participated in the evaluation were already computer users in the areas of graphics, statistics or the Internet. Almost half (46%) of the planners thought that the proposed system would be effective and relevant to all steps aimed at improving public participation. Another 38% preferred to use this system specifically for the discussion of the future layout of the city. Sixteen percent opted to use the system only to discuss the city's present problems (Fig. 10). Members of the last group saw the advantages of the system's polling and forum functions that were time and cost saving in discussing current outstanding issues. Some among them were, nevertheless, hesitant in endorsing the proposed prototype for future planning; they felt it should incorporate 3D modeling. There was concern, however, that this particular feature would pose an untenable burden on the operating budget and, in any case, public participation might not commensurate significantly with the additional effort and costs.

Despite some concerns over increased costs in the participation process that could result from the overall implementation of the prototype, 96% of planners (50% strongly agreeing and 46% agreeing) felt that this tool might have a significant role in encouraging greater public participation

(Fig. 11). However, there were some concerns about the feasibility of employing the system over the Internet, even though more than half (52% of the planners, with 18% strongly agreeing and 34% agreeing) thought that it would be effective. Some 30% remained ambivalent while 18% (8% strongly disagreeing, and 10% disagreeing) were opposed to using the system via the Internet (Fig. 11) because e-services in Egypt were not sufficiently widespread. It was felt that better e-services had to be in place before the Internet could supplant the traditional approaches for this purpose. Nevertheless, the encouraging annual growth of Internet usage in Egypt justifies an optimistic projection for this channel to become widely available to Egyptians in the near future. In picking the tool that would give the greatest impact on the participation process (multiple selections were allowed), 72% of planners selected the virtual reality (VR) approach, 40% chose all the visualization tools in the system (3D models, animation, and video), 40% selected sharing the information in the forum, and 36% preferred to share the results in the poll system (Fig. 12). Planners who used the VR facility in the system commended the interactive environment that they felt would encourage greater participation by stakeholders in urban planning and development.

Among the possible obstacles to the project, 56% of planners thought funding was the most serious problem. Fifty-two percent thought limited computer access would be a serious factor if the scheme relied too much on the electronic network. Understanding the system as a whole was not seen to be a clear problem area and this concern was expressed by only 16% of those polled (Fig. 13).
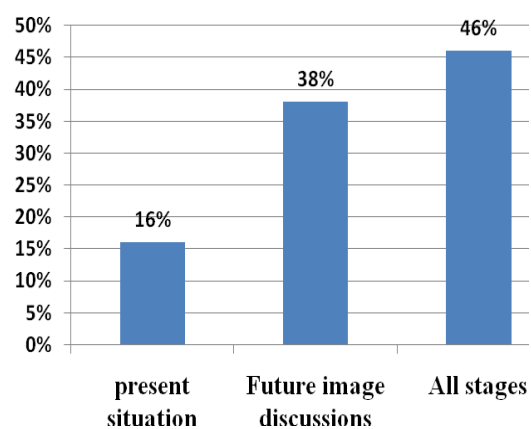

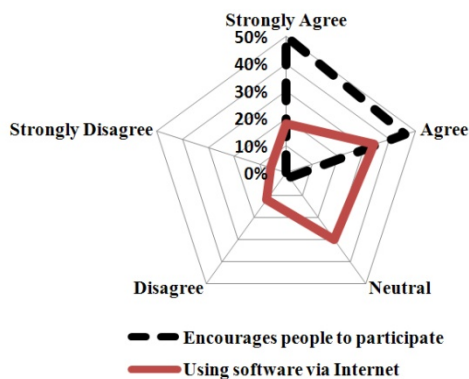**Fig. 10. Stage that respondents prefer to use this system.**

Fig. 11. Encouraging participation and using via Internet.
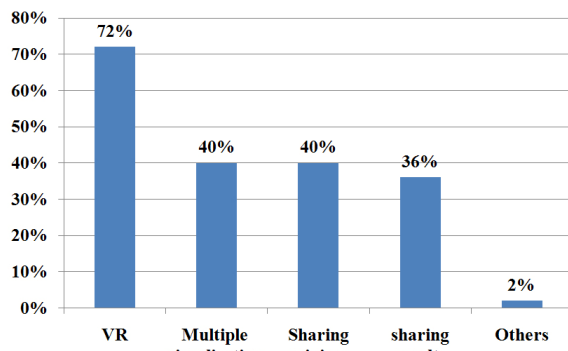

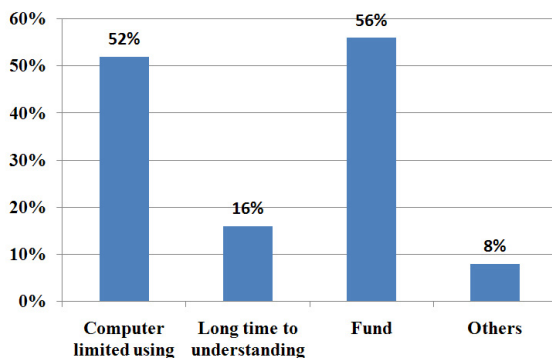**Fig. 12. The most encouraging tool in the system.**

Fig. 13. Obstacles may affect the system using.

After the many concerns mentioned above have been taken into consideration, it needs to be emphasized that the implementation of the system would not invoke very substantial costs. Most meetings venues are already equipped with at least a computer and a projector and meeting materials can be uploaded using the existing prototype system without additional expenditure. The only major outlay would be that required for the development of the 3D modeling module that would be expected to generate significant returns when it is made available.

5.2. The proposed role of the system in decision-making

The evaluation of the expected role of the system in decision-making was encouraging. Forty two percent of the planners selected three benefits (sharing planning information, categorizing collected data, and using multiple tools to deliver data). Forty-four percent selected two benefits. Of the benefits selected, the greatest benefit (chosen by 78% of the respondents) was categorizing the collected opinion with two filters (image and opinion category). The use of multiple tools for delivering the idea found favor with 74% of the poll respondents, while 68% chose sharing the planning information as an important feature (Fig. 14).

Despite the benefits of the proposed system, there were some concerns regarding unintended outcomes that could arise from the project. Some planners (52%) thought that increasing the collected opinions could lead to more conflicts that would require even more meetings to resolve. Another 22% of the planners thought that the system would be time-consuming and that this could detract from the main objectives of the public meetings (Fig. 15). The above concerns notwithstanding, 84% of the planners (with 26% strongly agreeing and 58% agreeing) were of the opinion that co-opting the system at meetings could help raise the quality of collected opinions. In this connection, 14% remained undecided. Overall, 60% of planners (12% strongly agreeing and 48% agreeing) thought that this system would lend greater transparency to the decision-making process. Twenty percent of the planners polled disagreed, while the remaining 20% were not committed either way (Fig. 16).
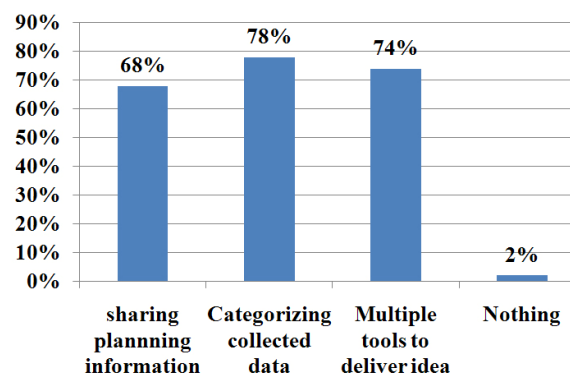

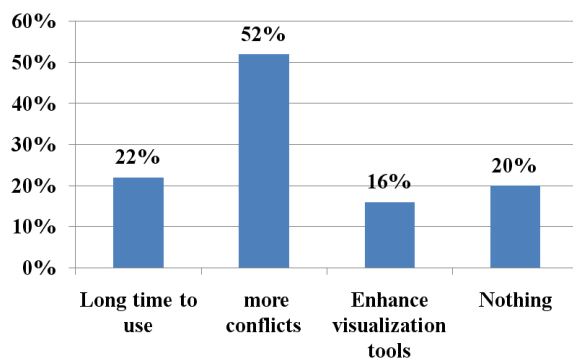**Fig. 14. The system benefits on the decision making.**
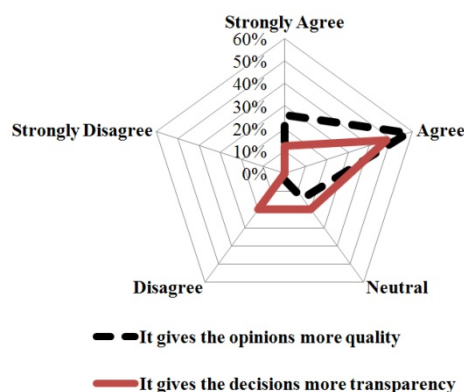
Fig. 15. The system negative aspects.

Fig. 16. The system effectiveness.

From the interviews with the planners, non-approvals regarding the final decisions stemmed mainly from the fact that some planners remained unconvinced that inviting the public to participate in the decision-making process would invariably raise the transparency and quality of the decisions made. This problem might be traced to the Unified Construction Law in Egypt (which handles the process of participation in decision-making) that does not compel government decision makers to be bound by decisions arising from the outcome of public participation. Essentially, there is no recourse to a formal system of accountability or follow-up to ensure that decisions made during the participatory process are acted on. Until appropriate changes are made at the legislative level, the impact of public participation in decision-making may tend to be limited.

In the final decision, 76% of the planners (10% strongly agreeing, 66% agreeing) thought that the feedback about system (forum, poll, design game) provided important and helpful indicators towards arriving at the final decision. Some 20% of those polled reserved judgment until they had the opportunity to test out the system more with other results in various projects. In any event, 78% of planners (with 30% strongly agreeing and 48% agreeing) felt that the

continual development of such systems could play an important role in improving the participation process in Egyptian town and city planning (Fig. 17).
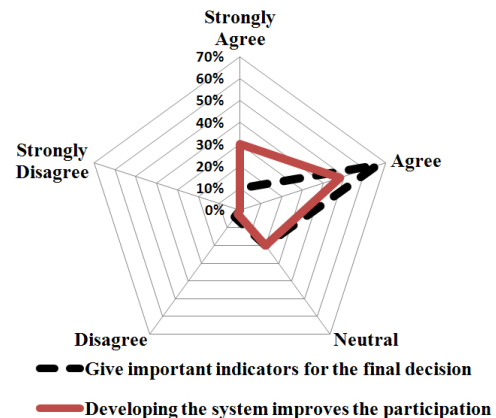

Fig. 17. The system role in the final decisions.

5.3. Observations from the results of evaluation

The results of the poll showed that planners welcomed the proposed system, and were inclined to heed public opinion through a participatory process. Feedback on the tools and functions of the system was encouraging (Table 1). Most of the concerns were with regard to the potential high cost of participation. In a developing country like Egypt, cost is understandably an important factor in determining the practicality and applicability of such systems. Until recent years, strategic planning has been conducted centrally without substantial local participation partly because of the lack of funding. The computer system discussed in this paper incorporates multiple functions to facilitate public participation. Most of these functions can be implemented without substantial additional costs. Planners can use the functions according to their budget constraints. In addition the system can help to reduce costs related to analyzing, disseminating, and storing data.

On the other hand, feedback from the evaluation was not very encouraging regarding the points related to the governmental policies. From our hearing to the planners, this feedback is due to the fact that planners were skeptical of the transparency of decision-making involving public participation, given that many sectors in Egypt are controlled centrally by the Government and the required legislation is not yet in place. Another cause for concern is that e-participation requires the government to expand ICT infrastructure and implement policies to increase awareness of e-services. The planners do not think it would be possible as such efforts would be costly.

Table 1. Observations from the evaluations results

Criteria	Queries	Results		
		▲	△	◆
System feasibility	The stages of using		●	
	Encouraging people to participate	●		
	Using via Internet			●
	Most encouraging tools	●		
	Obstacles may affect the system using		●	
The system role in the decision making	Its benefits on the decisions	●		
	Its negative aspects		●	
	It gives important indicators	●		
	Developing the system improve the participation		●	
	Give the opinions more quality	●		
	Give the decisions more transparency			●
▲ Encouraging	△ Encouraging with concerns		◆ Not encouraging	

6. Conclusions and Future Plan

The process of participation in decision-making during the preparation of strategic plans in Egyptian cities was conducted through a number of meetings with the public. A Decision Support System (DSS) developed on an Information and Communication Technology (ICT) platform was introduced in this study. An evaluation of this proposal saw a positive reception to the new system. The planners found in the system many useful aspects that could help disseminate planning information to the local people, including the illiterate, at the meetings. The system introduces an opinion forum and a system of polling that capture participants' opinions and enable the results of discussions and questionnaires to be analyzed promptly. The system also incorporates effective visualization tools to enable a better grasp of the urban planning projects. The design game tool is a progressive approach that can replace the traditional methods of presenting proposals and suggesting alternatives. This system operates best when planners make use of the range of multiple functions (especially the visualization functions) that the computer system offers. The system is cost effective in closing decisions made by planners, with the participation of the public, and in disseminating them for public consumption.

With such tools in place, there is the need for the central government to draw up appropriate policies and guidelines for public participation. These should contain appropriate safeguards and guarantees of transparency on the part of the government when responding to calls for action that arise from participatory decisions. Additionally, the successful use of the system via the Internet will be a future goal, the success of which will hinge on e-services development in Egypt.

Finally, ICT by itself is not a solution to all the concerns arising from public participation. Nevertheless, it can serve to bridge the gap between the decision makers and the public. ICT facilitates and motives. It has the power to drive the participation process positively, but it cannot work in isolation. Its full potential is realized only when it is exploited in tandem with a full commitment towards participation at all levels (planners, decision makers and the public). Decisions that reflect the people's needs are those that are needed to address the problems of urban development in Egypt.

As a future plan, the proposed system should be applied on a public group or a well represented sample of it, to increase the generalization feature of the results. In this study, the proposed system was evaluated by experts group to know the mean features and problems, however, the evaluating by a public group is also very important.

References

Arima, T.; Yasonary, T. and Takeru, S. "Decision-making Support VR System for Citizen Participation to Urban Design." *5th International Symposium on City Planning and Environment Management in Asian Countries*, Tahara, Japan, (2006).

CAPMAS (Central Agency for Public Mobilization and Statistics). *The Population and Housing Census*. Egypt, (2006).

GOPP (The General Organization for Physical Planning). *References' Book for Preparing the Strategic and Detailed Plans of Egyptian Cities*. Governmental Document, Egypt, (2007).

GOPP (The General Organization for Physical Planning). *The Strategic Plan of Asyut City Report*. Governmental Document, Egypt, (2008).

Hanzel, M. "Information Technology as a Tool for Public Participation in Urban Planning: A Review of Experiments and Potentials." *Design Studies: Special Issue Participatory Design*, Vol. 28, No. (3), (May 2007), 289-307.

Laurini, R. *Information Systems for Urban Planning: A Hyper Media Co-operative Approach*. Taylor and Francis, (2001), 349 p.

Madboly, M. "Sustainable Development of the Egyptian Countryside through Strategic Planning of the Egyptian Villages." *The Proceeding of the Arab Regional Conference: The Interdependence between the Rural and the Urban*, The General Organization of Physical Planning (GOPP), Cairo, Egypt, (2005).

Mahmoud, H. and Arima, T. "The Public Participation Policy as a New Approach to Solve the Urban problems in Egypt: A Case Study Asyut City." *Journal of Habitat Engineering*, Vol. 2, No. (2), (2010), 57-86.

MCIT (Ministry of Communication and Information Technology). *The Future of the Internet Economy in Egypt*. A Statistical Profile, Governmental report, Egypt, (2009).

نظام دعم قرار لتحسين عملية المشاركة العامة في
مشاريع التخطيط العمراني للمدن المصرية

حاتم محمود فتحي*، وتاكافومي أريما**

*قسم العمارة، كلية الهندسة أسوان، مصر

hatem3us@hotmail.com

**أستاذ مساعد في كلية دراسات الإنسان والبيئة، جامعة كيوشو، اليابان

ملخص البحث. تواجه مصر تحديات النمو العمراني المتزايد، وقد قامت الحكومة المصرية (منذ عام ٢٠٠٥م) ممثلة في هيئة التخطيط العمراني بتقديم مبادرة لاعتماد المشاركة العامة في عملية اتخاذ القرار في مشاريع التخطيط العمراني بهدف تحسين إدارة العمران. كسياسة جديدة تواجه عملية التطبيق بعض الصعوبات والمعوقات منها ما يتعلق بالتواصل بين المواطنين والمخططين في أثناء الاجتماعات، والقصور في تنوع المشاركين. تقدم هذه الدراسة نموذجاً حاسوبياً مبدئياً لنظام دعم قرار يتميز بوجود عدد من الأدوات تهدف إلى تحسين مخرجات عملية المشاركة خلال الاجتماعات. تم تطوير هذا النموذج على ثلاثة مراحل وهي: أولاً جمع معلومات عن مهام المشاركة التي تتم في الاجتماعات وإعداد نموذج أولي حاسوبي لها، وثانياً تقييم فاعلية النموذج المبدئي وتجميع اقتراحات تحسينه، بالإضافة لتقييم نقاط الضعف والقوة لاستخدام مثل هذه النماذج في عملية المشاركة وذلك من خلال استبيان عينة من ٥٠ مخططاً حضرياً قاموا بالمشاركة وإدارة اجتماعات مماثلة، وثالثاً إنهاء النموذج وربطه بقاعدة بيانات بناء على نتائج الاقتراحات والاستبيان. لقد أظهرت نتائج الاستبيان أن استخدام أداوت تعتمد على تكنولوجيا المعلومات والاتصالات قد تؤدي إلى تحسين مخرجات عملية المشاركة خلال الاجتماعات، لكن لابد أيضاً من عوامل أخرى حتى تكون هذه النماذج فاعلة أهمها تحسين السياسات الحكومية تجاه المشاركة في مجال إعداد المخططات وإعطائها أهمية أكبر.