IDENTIFYING DEVELOPMENT PRIORITIES TO ENSURE EFFECTIVE IMPLEMENTATION OF GIS IN URBAN UPGRADING UNITS, CAIRO GOVERNORATE – A PARTICIPATORY APPROACH

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ABSTRACT
The research involves identifying the agents of change and contributors that enable upgrading the role of GIS in Cairo governorate Urban Upgrading Units (UUUs).

This leads to better geographic information recordkeeping, improved communication, better decision making, better knowledge sharing and cost saving resulting from greater efficiency.

A participatory approach was followed throughout the study in gathering the information as well as discussing the resolutions of issues and obstacles faced by the UUU

The first stage of the study is concerned with identifying the agents of change and contributors that will help in the process of bridging the gap between the current status of the UUU and reaching the objectives.

The second is concerned with identifying priorities of application according to the rapid influence on improving the system, in addition to the analysis of these priorities and identifying the cofactors (agents of change), obstacles and contributors based on participatory approach involving the UUU staff, GIZ GIS representative and researchers.

KEY WORDS: Urban Upgrading Unit - Geographic Information Systems – Participatory Planning.

1- INTRODUCTION
Following the country’s efforts to develop the informal settlements and building the capacities of the UUU of the Greater Cairo region - specifically Cairo governorate UUU, this research was done through a participatory methodology to explore the elements of bridging the gap that enables an effective performance of GIS in Cairo governorate UUU.

This is done through the determination of the current role of GIS in the UUU as an effective tool to reach solid results that can be disseminated in order to improve the decision making process of the informal settlements development.

Hence, it became important to hold focus group meetings with the employees of the UUU so as to stress on the role of GIS within the UUU. Moreover, it was essential to study the current status of all the components of GIS in the units and hence, deducing the effective role of GIS in them and the reasons behind the failure of applying such a role.

This was done through a participatory methodology (workshops and problem tree) with stakeholders in order to determine the agents of change and the development priorities in order to bridge the gap and improve the performance of GIS in the UUUs.
2- OBJECTIVES
Determining the existing and effective roles of GIS in Cairo governorate Urban Upgrading Units and bridging the gap between them in order to improve the performance of GIS in the UUUs through a participatory approach.

3- METHODOLOGY
The methodology consists of two major stages illustrated in figure 1.

Fig. 1 - The Methodology of the research, Source: Researchers

4- FINDINGS
4-1 First, Analysis of Current Conditions:
The current status in terms of the main GIS components is illustrated in Table 1.

Table 1- GIS current conditions

<table>
<thead>
<tr>
<th>GIS Components</th>
<th>Cairo</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational Setup</td>
<td>GIS unit exists affiliating to the executive manager of the governorate UUU and performing relatively limited tasks(^2) (refer to fig. 2)</td>
</tr>
</tbody>
</table>
| Human Resources      | Two GIS specialists in the governorate unit  
Two GIS trained personnel in Southern Area UUU  
No GIS trained personnel in the Eastern Area UUU  
No GIS trained personnel in the districts UUUs |
| Data                | Databases of some urban upgrading areas based on the ikonos satellite images provided by the GIZ\(^3\).  
Databases of other urban upgrading areas based on google satellite images and data obtained from other governmental institutions and departments in the governorate  
Databases are verified and updated by field surveys (refer to fig 3). |
| Hardware and Software | GIZ provides the PCs and software (ArcGIS 9.1)\(^4\), but the GIS specialists use unauthorized updated versions of the software (ArcGIS 10.1) and personal laptops to handle the new technology UUUs don’t have plotters |

Source: Researchers

The following figure illustrates the administrative structure in Cairo; the role of GIS is allocated in the core of the UUU.

![Fig. 2 - Cairo UUUs organizational setup, Source: Researchers](image)

A figure 3 illustrates the sources of data used in the GIS process in Cairo governorate UUU where GIS is applied.

![Fig. 3 - Cairo UUU sources of data, Source: Researchers](image)

Using interviews, questionnaires and observations on the level of UUU and relevant parties in the governorate, the information gathered regarding the data flow, work flow and organizational setup led to the following:

In Cairo Governorate, any requested task of work is done through various steps, the governor sends the task to the supervisor of the UUU, who forwards the requested tasks to the head of the unit, afterwards, the unit distributes the work according to each specialization, respectively\(^5\).

The GIS specialist collects data from relevant departments by an official request with the help of researchers or field surveys. In addition, the specialist analyzes the work required, see fig.4,5.
The researchers observed the existing role of GIS, which is allocated in four cycles: Database Design, Data entry and management, Data Analysis and Output, Knowledge Sharing and Training.

Currently in Cairo governorate, the GIS role is limited to being a major or secondary input to some of the urban upgrading process stages. Database design functions have no input in any stage of the urban upgrading process, the Database formation and design functions have some major inputs in the first stages of any upgrading initiative and no input in the other stages of the process.

Database analysis and output functions have no input in any stage of the urban upgrading process, the Database formation and design functions have some major inputs in the first stages of any upgrading initiative and no input in the other stages of the process. Information sharing is very limited to the level of other governmental departments and requires paper work and permissions.

As deduced, the current GIS role is:

"Database preparation for the urban upgrading areas, performing necessary analysis and output in the form of maps and tables as visual tools for the decision makers"

Using the problem tree analysis and researchers observations, issues and shortcomings are deduced and illustrated in terms of the five main components of GIS (hardware, software, human resources, organizational setup and data). The issues and obstacles were found as follows:
- Staff Deprived from incentives in the case of working in the UUU only.
- Trained qualifications efflux.
- Inaccuracy in implementation.
- Lack of utilization of the available potentials.
- The unavailability of integrated data.
- Slow procedures of accomplishment.
- Difficulty in the fulfillment of the tasks assigned to the GIS staff.
- Incapability of taking the right decisions.

4.2- Second, Identifying Agents of Change and Contributors (Bridging Gaps)

Using the objective tree analysis, ways of overcoming issues and shortcomings (agents of change) are suggested in terms of the five main components of GIS (hardware, software, human resources, organizational setup and data). The agents of change were suggested as follows:
- Raising the output accuracy.
- Utilization of the available potentials.
- Facilitating procedures of accomplishment.
- Taking the right decisions.
- The availability of integrated data.
- The fulfillment of the tasks assigned to the GIS staff.
- Identification of job descriptions, working hours and incentives.
- Attraction of Trained Qualifications.

Using the correlation matrix analysis between the GIS functions and urban upgrading phases, the expected role of the GIS in the UUU is identified. In order to achieve the most efficient role of GIS through the whole urban upgrading process, each input is weighted according to its influence in each stage to ensure the integrity of the work flow.

The input of GIS functions is stronger in initial steps to unify data types and integrate the whole developed system. After the upgrading cycle moves towards a new initiative, the GIS will provide the database for the following new cycle. As deduced from the matrix as well as the analysis of the objective trees, the expected GIS role is:

“A tool for the observation, documentation and analysis of the Informal Areas Current Status, Monitoring the Updating, Monitoring the Development Plans and Post implementation evaluation to provide technical support to the decision makers.”
The effective implementation of the proposed role of GIS leads to better geographic information recordkeeping, improved communication, better decision making, better knowledge sharing and cost saving resulting from greater efficiency.

Based on a participatory approach involving the UUU staff, GIZ GIS representative and researchers, priorities are identified according to the rapid influence on improving the system. The researchers conducted workshops to meet the stakeholders to prioritize the tasks, which are proposed in order to achieve the most efficient role of GIS in UUUs. The tasks were evaluated in terms of the following criteria

- Responding to stakeholders expectations.
- Available Resources
- Accomplishment Potentials
- Sustainability
- Comparing costs with results
- Time frame

Table 2 shows the scores given by the workshop participants of Cairo governorates. Each participant gave each component a score from 1 to 4. The higher the score, the more important this component is. The scores were summed up for each component according to each criterion.

<table>
<thead>
<tr>
<th>Administrative System Improvement</th>
<th>Hardware and Software</th>
<th>Providing Human Resources</th>
<th>Data &amp; Information Integration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Responding to Stakeholders Expectations</td>
<td>participants 47</td>
<td>35</td>
<td>24</td>
</tr>
<tr>
<td>GIS specialists 24</td>
<td>9</td>
<td>15</td>
<td>16</td>
</tr>
<tr>
<td>Available Resources</td>
<td>participants 29</td>
<td>40</td>
<td>38</td>
</tr>
<tr>
<td>GIS specialists 9</td>
<td>18</td>
<td>20</td>
<td>14</td>
</tr>
<tr>
<td>Sustainability</td>
<td>participants 35</td>
<td>37</td>
<td>35</td>
</tr>
<tr>
<td>GIS specialists 17</td>
<td>14</td>
<td>16</td>
<td>16</td>
</tr>
<tr>
<td>Comparing costs with results</td>
<td>participants 34</td>
<td>33</td>
<td>37</td>
</tr>
<tr>
<td>GIS specialists 18</td>
<td>11</td>
<td>17</td>
<td>12</td>
</tr>
<tr>
<td>Comparing costs with results</td>
<td>participants 29</td>
<td>36</td>
<td>34</td>
</tr>
<tr>
<td>GIS specialists 16</td>
<td>16</td>
<td>16</td>
<td>12</td>
</tr>
<tr>
<td>Time Frame</td>
<td>participants 19</td>
<td>42</td>
<td>35</td>
</tr>
<tr>
<td>GIS specialists 9</td>
<td>21</td>
<td>15</td>
<td>15</td>
</tr>
<tr>
<td>Total score given by participants</td>
<td>193</td>
<td>223</td>
<td>203</td>
</tr>
<tr>
<td>Total score given by GIS specialists</td>
<td>93</td>
<td>71</td>
<td>79</td>
</tr>
</tbody>
</table>

Analysis of the priorities and identifying the cofactors (agents of change), obstacles and key performance indicators (KPIs) based on participatory approach involving the UUUs staff, GIZ GIS representative and researchers (please refer to Table 3).

5- CONCLUSION AND RECOMMENDATIONS

5-1 Conclusion

*In order to have an effective implementation of GIS in urban upgrading, effective contribution of the key stakeholders and the activation of the agents of change determined through the study is essential.

*Effective implementation of cofactors (agents of change), overcoming obstacles and reinforcing key performance indicators (KPIs); better geographic information recordkeeping, improved communication, better decision making, better knowledge sharing and cost saving resulting from greater efficiency can be achieved.

5-2 Recommendations

*Reflecting the governorates’ needs and priorities in a complete capacity development plan.

*Determination of UUUs needs from: well trained staff, software and hardware in order to reach effective performance from the UUUs.

*Preparation and implementation of an effective training program on the software and hardware that are expected to be needed for the UUUs to perform effectively in the field of GIS.

*Improvement of the organizational setup.
<table>
<thead>
<tr>
<th>GIS components</th>
<th>Action</th>
<th>Cofactors</th>
<th>Limiting Factors</th>
<th>Proposed Solutions</th>
<th>Contributors</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organizational setup Administrative System Improvement</td>
<td>*The existence of an administrative entity in the governorate (UUU) that is capable of continuing efficiently and supportive to the following units.</td>
<td>*The unclear vision of the regions and districts UUUs roles.</td>
<td>*Organize workshops for the districts chiefs and leads to introduce the role of the UUUs within the wider framework.</td>
<td>*Ministry of Local Development.</td>
<td>*The cabinet provides the satellite images.</td>
</tr>
<tr>
<td>*The country’s orientation towards informal areas development.</td>
<td>*Separation of the UUUs from the administrative structure of the region or district</td>
<td>*Establish a manual for the job descriptions in the districts UUUs, and revising the role of the main UUU within the frame-work of its current and future roles.</td>
<td>*The cooperation and coordination between the deputy, the main UUU and the personnel affairs department of the governorate.</td>
<td>*The job descriptions and roles of the UUUs and their staff are determined with the cooperation with the main UUU, which takes the governor’s approval then addressing the Ministry of local development as shown in the following.</td>
<td></td>
</tr>
<tr>
<td>Human resources Providing Human Resources</td>
<td>*The existence of cooperative qualified staff in the main UUU.</td>
<td>*The lack of roles of the UUUs staff.</td>
<td>*Address the districts chiefs about the necessity of the separation between the UUUs job tasks and the tasks of the rest of the Housing departments.</td>
<td>*The deputy governor.</td>
<td>*The cabinet provides the satellite images.</td>
</tr>
<tr>
<td>*The existence of capacity development plans for the UUUs</td>
<td>*The poor distribution of human resources in the different departments.</td>
<td>*Redistribute the human resources to suit the tasks of each department.</td>
<td>*The cooperation and coordination between the deputy, the main UUU and the personnel affairs department of the governorate.</td>
<td>*The main UUU determines the tasks, takes the governors approval and addresses the Ministry of Local Development as shown in the following.</td>
<td></td>
</tr>
<tr>
<td>Data Developing a Framework for Data and Information Exchange</td>
<td>*The existence of governmental initiatives to unify the definitions.</td>
<td>*The lack of a unified satellite image distribution on the different departments and organizations.</td>
<td>*Provide satellite images through the donors or governmental support.</td>
<td>*The cabinet provides the satellite images.</td>
<td></td>
</tr>
<tr>
<td>*Basic geodatabase base exists in the UUU and the informatics center.</td>
<td>*The lack of a unified database structure to deal with the special data of the informal areas.</td>
<td>*Provide Google Earth Pro license until the purchase of the satellite images.</td>
<td>*Periodical meetings are done by the UUU for the stakeholders as a part of the UUU’s coordination role.</td>
<td></td>
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</tr>
<tr>
<td>*Existence of tabular data in the services departments.</td>
<td>*Difficulties in data exchanging</td>
<td>*Design of a general and comprehensive geographical database for the UUUs through the coordination between the stakeholders.</td>
<td>*ESDF designs the databases of informal areas.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Donors interested in informal areas development.</td>
<td></td>
<td>*Provide financial support through the responsible stakeholders.</td>
<td>*The information and decision support center in coordination with the rest of the institutions related to data acquisition perform the construction of databases.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Hardware and Software Providing Hardware and Software</td>
<td>*The government orientation towards informal areas development.</td>
<td>*The lack of a clause for purchasing hardware and maintenance.</td>
<td>*Review the annual budget to redistribute the maintenance allocations.</td>
<td>*According to the consultants suggestions and the GIZ support and the recommendations introduced to the governor, Plan and follow-up department.</td>
<td></td>
</tr>
<tr>
<td>*The governorate contract with maintenance companies.</td>
<td>*The deficiency in dealing with the constantly developing sophisticated software.</td>
<td>*Provide human resources in all disciplines.</td>
<td>*The governorate provides the specialized human resources according to the UUU’s needs, they will be trained by the GIZ at the beginning until the UUU develops its own budget and become self-sufficient.</td>
<td></td>
<td></td>
</tr>
<tr>
<td>*Donor agencies interested in informal areas development.</td>
<td>*The lack of a designated staff for the development of hardware and software.</td>
<td>*Optimize the current human resources.</td>
<td></td>
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<tr>
<td></td>
<td>*The lack of periodical trainings that cope with the rapid development</td>
<td>*Train the different disciplines according to their scope of work with the concentration on the management and leadership trainings (on the UUU’s level).</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

6- Bibliography


3- German Development Cooperation (GIZ), 2013, Dialogue Workshop with Counterparts Workshop Report (Cairo governorate).

German Development Cooperation, 2012, Methodology of using GIS In Participatory Urban Development.

4- برنامج التعاون الإتحادي الألماني، وحدة نظم المعلومات الجغرافية، 2013، استخدام سلوب المشاركة في إداة المعلومات.

5- برنامج التعاون الإتحادي الألماني، برنامج التنمية للمشاركة في المناطق الحضرية، وحدة نظم المعلومات الجغرافية، 2013، سلسلة الدورة التدريبية للعاملين بوحدات تطوير العواطف.