Asian Development Bank

South Asia Urban Knowledge Hub

(Co-financed by the Sanitation Financing Partnership Trust Fund under the Water Financing Partnership Facility)

Case Study: EMIS – Sri JayawardhenapuraKotte Municipal Council, Sri Lanka

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December 2014

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Abbreviations

CMC - Colombo Municipal Council

EMIS - Environmental Management Information System

EPM - Environmental Planning and Management

GIS - Geographical Information Systems

ICT - Information Communication Technology

LA - Local Authority

LG - Local Government

MC - Municipal Council

MILES - Managing Information for Local Environment in Sri Lanka

MIS - Management Information System

SCP - Sustainable Cities Programme

SJPK - Sri JayawardenapuraKotte

SLILG - Sri Lanka Institute of Local Governance

UNDP - United Nations Development Programme

1. Summary

In Sri Lanka, the Local Authorities (LA), which areat the bottom-most tier of governance and state sector service delivery, presently manage their activities with conventional book keeping methods. This method has several limitations and causes many inconveniences to both the officials and the public. In this background the need fora Management Information System (MIS), which will facilitate convenient access, updated data base and interactive exchange of information related to the service delivery of local authorities, has been in discussion among many for a long time. Responding to the emerging need,the very first initiative for Environmental Management Information Systems (EMIS) in Local Authorities in Sri Lanka was noted under the Sustainable Cities Programme (SCP) and the most improvedone of them is the EMIS developed in Sri JayawardanepuraKotte (SJPK) Municipal Council.

The EMIS project of SJPK MC had to deal with the challenges of training a group of fresher staff with no ICT skills, fining methods to convert hard data into soft data, initiating methods of cross checkingthe accuracy of collected information, etc. Although the initiative was highly regarded and the project was well supported in many fronts at the beginning, as a result of the problems emerged within the LG setup and the hindrances of other forces in operation,the EMIS is currently is in an inactive state. The absence of the essentials of implementing an EMIS such as internalizing it to the institution, continuous deployment of technically qualified personnel, well established links to stakeholders and mapping groups and the mechanism to sustain the system was observed as the main reason for this situation.

Based on the experiences gained from SJPK MC EMIS, the broad objective of this study is to discuss the lessons learnt which will be useful to develop more comprehensive, robust and sustainable EMIS for LAs in Sri Lanka. The specific objective is to support the EMIS development work presently initiated under the ADB supported South Asia Knowledge Hub Project in two LAs, namely Kandy and Moratuwa Municipal Councils. Both lessons learnt from similar projects andnew ideas will be employed for the development of these EMISs.

2. Nature of the Problem

The local government system of Sri Lanka, which is considered the third and the lowest tier of governance, preceded by the Central and the 09 Provincial Governments, consists of 23Municipal Councils, 41 Urban Councils and 271PradeshiyaSabhas. Therespective laws of establishment charged these authorities with '*powers and functions of regulation, control and administration of all matters relating to public health, public utility services and public thoroughfares, and generally, with the protection and promotion of comfort, convenience and welfare of the people and the amenities*'[1]within the areas under their jurisdiction. At a subsequent stage (in the 1980s), out of the many services managed by the LAs, water supply and drainage, providing electricity and maintaining main thoroughfares, were excluded from the portfolio of LA's and vested with authorities under the central government. Yet, Environmental Sanitation that includes solid waste, waste water, septage and cleanliness of the physical environment (against epidemics and mosquito breeding) remains a major task assignedto the LAs. It is noted that the LAs have many difficulties in dealingwith the challenges emerging due to increasing urban populations, changing lifestyles and complex built environments. For example, the management of solid waste, which is a key aspect of environmental sanitation, has been a problem in urban areas of Sri Lanka, similar to many other countries. According to the Central Environment Authority (2005), which is the national level agency responsible for the management of the environment, this problem is aggravated mainly due to the absence of proper solid waste management systems at local authorities.

For the development and maintenance of a proper solid waste management system or any kind of service delivery mechanism, a well maintained information base is a necessity. One of the major weaknesses in the present local government system is the lack of information management systemsthat could improve the efficiency and effectiveness of local governance with the aim of enhancing its contribution towards upgrading the public service delivery and improving socio-economic development (Hattotuwa, 2009). Presently, the LAs administer the related activities with conventional book keeping methods. This method has several limitations such as delays in updating data, inconvenience of sharing and accessinginformation and integrating transparency into operations. In one hand these limitations cause difficulties to LAs in the monitoring and timely allocation of needy resources, while on the other hand they prevent public from speedy reporting and effective receipt of services. Together the situation is compromising the LA's ability to service delivery, necessitating the LAs to find methods ofreal-time tracking and continuous updating of information which enable them to provide better services to their citizens.

Environmental Management Information System (EMIS) is capable of supporting LAs for this purpose. Evidently, many cities throughout the world have achieved commendable results through EMIS for the effective management of the areas under their jurisdiction. Yet, in Sri Lanka, the development of EMIS is beyond the capacities of the LAs as they are not equipped with the needy resources, mechanisms and savoir-faire.

In Sri Lanka, evidence forEMIS initiatives is available, but their sustainability and consistency within the existing LG setup has been problematic throughout. This case study investigates the EMIS initiative of the Sri JayawardanepuraKotte (SJPK) Municipal Council. SJPK is one of the second largest population agglomerations (200,000) in Sri Lanka and facilitates the spillover of urban activities of Colombo, which is the primate city of the island.

3. The Background and the Present Condition

Information management in state sector institutions in Sri Lanka still follows conventional methods. Raw data is maintained in the form of written and printed records which are not accessibleto all and are difficult to retrieve, and therefore, not easy to manage. Due to those difficulties, in the late 1990s, the Commission appointed to study the Local Government Reforms in Sri Lanka, identified the need forcomprehensiveand updated information in LAs. As a result,the idea of developing an information unit for SJPKMC was suggestedby the Ministry of Local Governmentwell before the commencement of the Sustainable Cities Programme in 1999.Realizing this idea, a primary information unit was established within the MCoffice with limited resources. The tasks of this unit were limited to handle primary data and basic informationin documents and spread sheets. The personnel engaged in these tasks had limited knowledge in systematic management of information and had notechnical skillsrequired for the operation of a sophisticated management system. Therefore, the unit could not develop any further.

The Sustainable Cities Programme (SCP), funded by the UNDP (United Nations Development Programme) came at this juncture. The "Sustainable Colombo Core-area Project (1999-2001)" initially piloted the adaptation of the SCP-EnvironmentalPlanning andManagement (EPM) process in the three main Municipal Councils of Colombo, Sri Jayawardanepurs-Kotte and Dehiwala-Mt.Lavinia.The scope of the project expanded in 2002-2004 into 10 additional cities at the Provinciallevel (Negombo, Wattala, Kolonnawa, Moratuwa, Panadura, Gampaha, Ratnapura, Kandy, Matale and NuwaraEliya)under the second phasetitled "The Sustainable Sri-Lanka Cities Project".

As an integrated part of the SCP, City Development Committees were formed to discuss the problems identified by the community in relation to the development of their cities.

Thesecommittees consisted of representatives of community organizations, politically and socially important persons of the areas, senior citizens, local authority officers and institutions whoengaged in local authority functions. The problems identified and the opinions given by the committeeswere discussed by the steering committees of the Municipal Councils. In order to discuss the issues in a more comprehensive mannerthe committees identified the requirement to present the relevant information spatially.A Geographic Information based EMIS was suggested by the project team as the solution. Thus, out ofthe three cities under SCP Colombo Core-area Project, SJPK MC was selected for the development of an EMIS, appreciating the information unit that had already been operating at the LA.

The EMIS was developed successfully with the positive attitudes and the contributions of the relevant officers of the LA and was active for a few years with the strengths of the municipal officers. However, it started to losethe attention, subsequent to the resignation of the personnelresponsiblefor working with the EMIS. There were no more personnel capable of handling the system within the LA office. The situation was augmented with some other issues within the institutional setup of the SJPK MC. The shift of power to new groups of politicians subsequent to LA elections and the change of the Mayors deflected the interest and the support required for the maintenance of the system. The EMIS is now idlingwith no effective use and the enthusiasm that the SJPK MC had atthefirst stages is no longer there.

Other than the SJPK MC example, the Sri Lanka Institute of Local Government (SLILG)has also undertaken to establish an EMIS at SLILG for the Colombo Municipal Council (CMC)and the Batticaloa Municipal Council under the Managing Information for Local Environment in Sri Lanka (MILES) project funded by the UNHABITAT in 2004. However, thisinitiative too could not proceed to the expected levels, mainly due to theirdetachment from the internal set up of the respective LAs. The processes of the development, the products and their operations were not institutionalized within the LAs and therefore, perceived more as an additional element to the LAs' day to day functional apparatus rather than an integrated element of their supportive systems.

4. The Approachand the Content of EMIS in SJPK MC

The EMIS is a tool for collecting, organizing and applying information relevant to urban development and environment management. It is designed to assist in clarifying issues, formulating strategies, implementing action plans, monitoring progress and updating information. The EMIS expects to address a combination ofEnvironmental Planning and Management concerns and issues, with a carefully structured management information system, using mapping and Geographical Information Systems (GIS) as essential components for presentation, analysis and modeling[ii].

Since recorded data in the EMIS isgenerally concise, reliable and accurate to the dot, it is easy to make use of them for efficient and effective decision making. In SJPK MC, the EMIS was expected to provide a basis for more reliable information for better informed decisions which would be more justifiable than decisions made without it. These decisions were also expected to support improved service delivery to the community,and thereby improve the quality of life (for example: developing a proper drainage network and maintaining it, provision of sanitary facilities where needed and effectivecollection and disposal of solid waste). Community participation for providing reliable information at real ground was regarded as an efficient input method at the bottom level for the information to flow towards the professionals that engaged with decision making at the city level[iii].

A private sector organization, EML Consultants, developed the proposed EMIS for SJPKMC. Due to the importance of a system of this nature and the specialty of the activities related to

the Information System management, a special team of the staff of the Municipal Council was formulated for this project. The team was provided with the required training on the management and the maintenance of the EMIS. The training includedboth the handling of computer equipment as a majority of the members of the team had limited ICT skills, andthe collection of data in the required format, processing of data into relevant information, and mechanisms of continuous updating of such information.

Once the system was developed, at the initial stage, the information unit prepared maps based on data received from both the community and the field officers. The services of the community were regarded as important as the services of the field officers because the first had more precise and updated information about locations and landmarks than the periodic updates that the local authority officers had. The training of technical staff and field officers included a GIS workshop aiming to provide them with the required skills in entering data and updating maps with community participation.

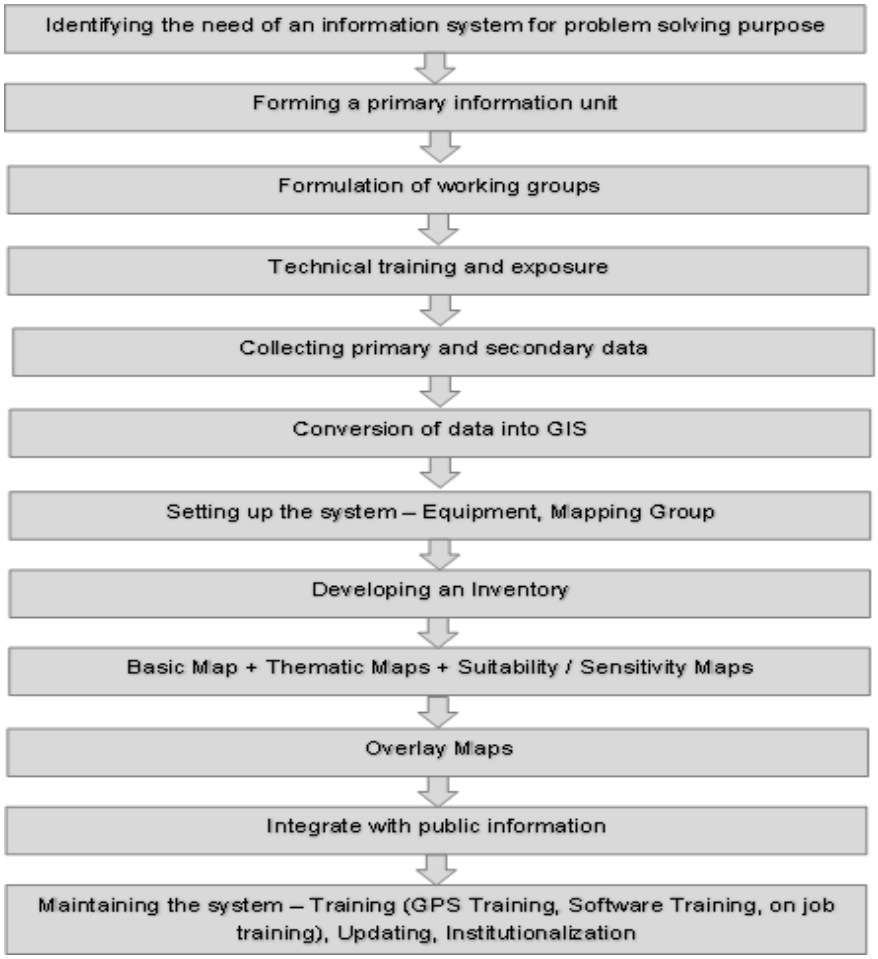

Figure 1: The approach of the EMIS in SJPK MC[iv]

The implementation of the EMIS requireda suitable space for its operations, committed staff to operate it, equipment and software to effectuate it, and background data to preparebase maps.

In SJPK MC, boththe Environmental Planning and Management (EPM) unit and the Technical Support divisionwere considered for the location of the workstations of the EMIS. Since the EPM unit was linked with the SCP working group, it was selected as a more

suitable place to locate the EMIS operations.The unit needed three officers - an EMIS officer and two assistants - for the operations. The EMIS officer was assigned with the tasks of making decisions and coordinating with the issue specific working groups to develop participatory mapping, acquisition of data and the analysis of those data.The EMIS assistants were there to digitize, input data, and make map layers from those data.

The key hardware used for the input and output of datawere desktop computers with sufficient capacity (20GB hard disk, processors withspeeds up to 1000MHz, and 512 RAM, and integrated CD-ROM writer). In addition, an A0 size scanner to overview maps, A0 inkjet plotter to print maps and aGlobal Positioning System (GPS) for quick surveys in the field, were provided with the unit.Out of the commonmapping and GIS software packages available at that time, theArcView GIS 3.2a was preferred by the project team for its more frequent use by Sri Lankan SCP partner cities, the Survey Department and other government organizations in Sri Lanka at that time.

Before the preparation of base maps it was important to take stock of maps which had already existed in paper format or digital format with various agencies. For this project the maps were obtained from the Survey Department, Ministries and Local authorities (thematic maps regarding their field of work), Urban Development Authority, Universities (eg: The Department of Town and Country Planning of the University of Moratuwa and the Departments of Geography of Colombo, Kelaniya and Sri Jayawardenapura Universities), Department of Census and Statistics (for socio-demographic and economic data) etc. The maps available in different formats were obtained by the Unit for the use of the EMIS before developing a new set of maps.

For an EMIS to be fully successful, it is important to link it to its users from the very beginning. Having this in mind, the project team identified the key users of the system as the main stakeholders: both men and women in issue specific working groups. Mapping groups were provided with necessary information by the issue specific working groups. Mapping groups played an advisory role between GIS technicians and issue specific working groups.

Once the EMIS was developed, city development committees could prepare maps and visualize the problems through the system. The Municipal Council used the EMIS not only to manage information in a systematic way, but also to solve many of the problems that occurred due to lack of reliable information. One such example was that they could identify the root cause for flash flood incertain locations within the MC area and came up with important decisions to avoid them. In another instance, the process of admission of children to primary schools, which needsa certified document of the aerial distance from home to school, from local authorities, was supported with reliable information obtained from the EMIS. This would otherwise have depended upon the rough estimates of the technical officers. Political leaders were another group that acquired benefit out of this as they could easily obtain required demographic information within a very short period.

Accordingly, EMIS and the Information Unit of SJKMC became an important section of the MC office and it was developed further by adding many computer units and other hardware devicesalong with theregular updating of the database with the help of field officers and technical staff. The Municipal Council was willing to obtain funds and approvals in order to maintain the system for better service provision to the municipality.

There were six type of maps used in the EMIS in the SJPK MC which could be described as follows;

a) ***A Basic Map -*** A basic map included the main features in a citysuch as, major rivers, main roads, basic land forms, administrative boundaries, etc... *(See figure 2)*

b) ***Thematic Maps -*** Map focuses on a specific topic. Thematic maps in the EMIS will strictly show facts. *(See figure 3)*

c) ***Suitability Maps -*** Suitability Maps show evaluated information or policy rules and regulations for development issues. A suitability map might show areas highly, moderately, less or not suitable for a development activity like agriculture.*(See figure 4)*

d) ***Sensitivity Maps –*** Sensitivity Maps show evaluated information or policy rules and regulations for environmental issues. The map might show areas highly, moderately, less or not sensitive to an environmental issue like flooding.*(See figure 5)*

e) ***A Service Delivery Map -*** A Service Delivery Map Shows the extent and type of infrastructure and services in the different parts of the city such as water, sewerage, solid waste, energy and transport.*(See figure 6)*

f) ***An Action Plan Map -*** Shows the site where a demonstration project is planned which is intended to improve the environmental situation at the particular "hot spot". These maps show clearly the existing situation of a particular site.*(See figure 7)*

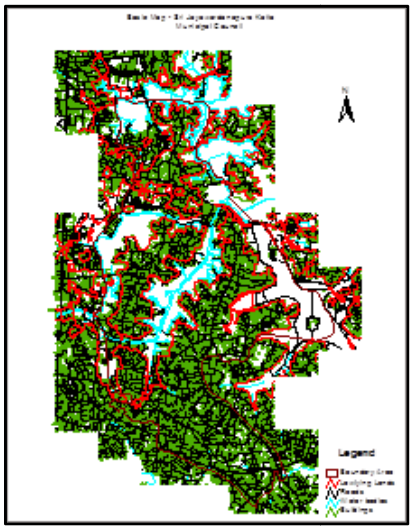

Figure 2: A Basic Map

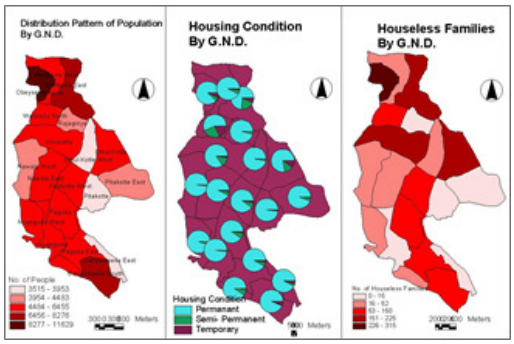

Figure 3: Thematic Maps

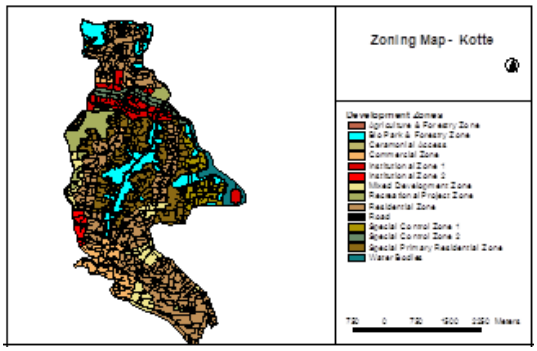

Figure 4: Suitability Map

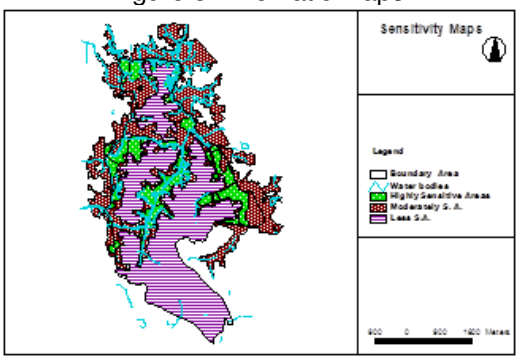

Figure 5: Sensitivity Map

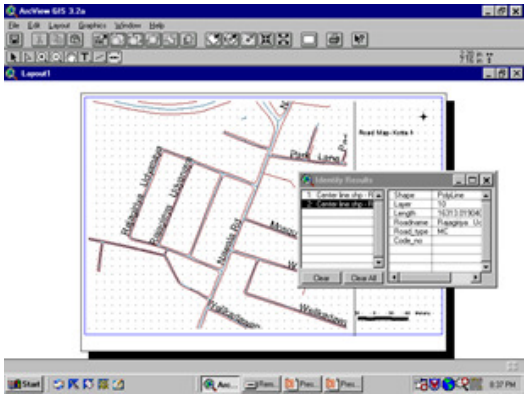

Figure 6: A Service Delivery Map

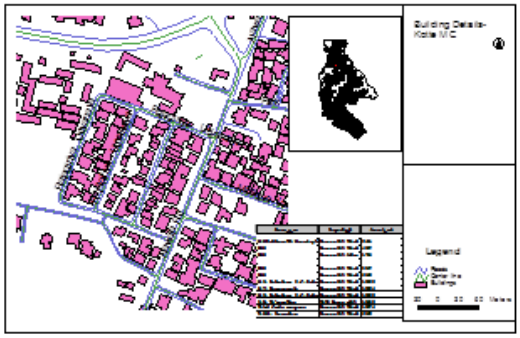

Figure 7: An Action Plan Map

However, soon after the system was handed over to the SJPK MC from the SCP, a few key persons involved in the project resigned from their posts in the MC and left for better employment in other organizations. The MC did not have persons capable of handing the operations of the system. This partially paralyzed the EMIS. This was followed by the LA elections and the change of the ruling political figures elected to the Council. The new Mayor had no good understanding of the EMIS and its benefits as he was new to the system, which by then was partially inactive. There was no intention to reactivate the system in the absence of required resource allocation and appreciation, and in the presence of other priorities.

5. Strengths, Weaknesses, Challenges and Successes

The EMIS of SJPK MC is not a total success story, but it is a case which could be used to draw lessons to inform future EMIS projects in Sri Lanka. In that sense, it's important to review the context, content and the contributions of the EMIS developed at SJPK MC as well as to identify the gaps and drawbacks in the process of its development. To that end, representatives of different parties involved in the process of development and the operations of the EMIS such as the Municipal officers, specialist consultants responsible for the development of the system infrastructure and the members of the community those who participated in working groups, were interviewed to obtain their views related to the successes and failures of the project. Parallel to that objective observations have also been made by the authors of this case study.The following table summarizes the strengths, weaknesses, Challenges and Successes identified through that review.

Strengths

- Political and Bureaucratic support and willingness to establish an EMIS in the MC
- The support and commitment of the internal staff of the MC for enhance the service delivery through EMIS
- The fund allocation for the EMIS from the Municipal Budget
- Provision of one-time training for the MC staff to maintain and update the EMIS
- Availability of funds for project initiation through the Cities Programme (SCP) funded by UNHABIAT

Weaknesses

- The accuracy of the deliverable could not be assessed and compare since there were no such efforts in the SL context had been implemented.
- There were no continuous training programmes to update the knowledge of the staff on EMIS dynamics.
- There was no acceptable mechanism for logistic and other resources management for carryout continuous proceedings of the EMIS such as carryout field visits, regular updating, etc...
- The problems of institutionalizing the EMIS in the LG setup had been difficult over the conventional practices
- The fragileness of the spatial information dissemination and sharing due to the civil conflict existed during project implementing period
- Conflicts of interest of inter-institutional organizations regarding the accuracy, ownership, reliability of the deliverables and deficiencies and different ideologies of the mapping group
- The EMIS had started in the latter part of the SCP project and hence, the initiative could not be monitored and pump the resources for the long term sustainability

Challenges

- Trainingfew people to maintain and update the databases of EMIS wasneeded. First technical officers were given a GIS training and later field officers were trained to use GPS to update maps by themselves. The challenge was to train a group of fresher staff without any ICT background with limited physical and human resources.
- Conversion of hard data into soft data was a challenge as all these are in different formats with different scales. The conversion from book keeping tradition to soft format was a big challenge.
- Although a well-organized data and information system was there, officers were reluctant to share that information with others.
- The accuracy of the information that was stored could not be checked since there was no specific method to cross checks the collected information

Successes

- The programme could able to change in the attitude of the officers in the MC on EMIS
- The EMIS initiatives and training provided involved in the capacity building of the staff
- The programme could establish an EMIS center which had equipped with required hardware and software

6. Lessons Learned, Best Practices

The review of the case of the EMIS of SJPKMC, enable to carve out four key lessons, whichcould be considered in the development of similar systems in future.

- The SPJK MC has many enthusiastic parties involved in the process, but there was no 'Champion' who was determined to drive the project towards success, by winning the attention within the institution as well as within the broader institutional setting of the country. The development of a novel ideas and products has to accompany a Champion figure to take them towards greater heights and to obtain due recognition.

- A system works well through 'organizational learning' that facilitates the evolution of a system ceasing the individuals' capabilities (Love,et al, 2000). Organizational learning is possible only with equal engagement of capable personnel at all levels of the organization. The equal capabilities in EMIS handling were not seen inthe selected officersof the top and bottom levelsof the SJPK MC. The officers at the medium level were the drivers of the project and their leaving of the organization office paralyzed the system. Neither the officers at the top level nor the ones in the lower level were not capable of undertaking the tasks performed by the mid-level officers.

- Systems are prolonged through embodying them into the culture and the routine of the relevant institutions. They work through recursively organized sets of rules and resources, saved in instantiations and coordination as memory traces, marked by the absence of the subject (Giddens, 1984). For an operating system integrate intothe culture and the routine of an institution there should be an institution-wide policy related to that system. In case of SJPK MC, there was no policy to institutionalize the EMIS, while there is no national policy to mainstreaming EMIS within the LG institutional setup. Hence, the initiators will have to think of alternative mechanisms to institutionalize the systems as part of the design of the system.

- Allocation of funds and other resources for continuous motivation and training of staff is an essential requirement for the sustainability of any operating system. In SJPK MC case,continuation of the EMIS was hindered by the lack of continuous promotion to use the system and to provide required training to the staff.Since most of the staff engage in service delivery and information management activities of the LAs are not equipped with ICT education it is necessary either to recruit personals with ICT skills or to provide compulsory training for the recruited staff for theimplementation of an EMIS. The resignation of the first set of officers involved in the EMIS of the SJPK MC held it in a standstill.

7. Alternatives/Choices/New Ideas

In addition to the lessons learnt locally, lessons could be drawn from the examples of the EMIS implemented in other countries.

An Environmental Management Information System (EMIS) For Iringa Municipality, Tanzania: Rather than conducting one GIS/EMIS training for staffs and expecting them to distribute the knowledge to other technical staffs and management, it was successful to conduct Top-Down Training Approach separately for municipal staff "experts", executives or top managers technical officers and working group members, then the data capture/digitizing team and the data collectors.

Georgia - Developing a Geospatial Urban Water Supply and Sanitation Utility Management System: Developing custom web mapping application for accessing data from Internet; and Analyzing asset condition in Georgia's urban centers and plan capital improvement and rehabilitation work

Water and Sanitation Information System for Timor-Leste-SIBS (SistemaInformasaun Bee no Saneamentu): Relay field information via mobile phone SMS messages to the database, which links to a mapping system. As there's a limited internet access across Timor-Leste, they used mobile phones to enter data and sent the data via SMS. This was efficient and cost effective. The following simple but best practices could be identified within this system which was helpful for the better functioning of the system:

- Management and resourcing of staff for data collection and updating data on time.
- Use appropriate people to collect data who have knowledge about the data they collect
- Providing knowledge of Internet and IT challenges for the officers to access information on-line. This would be part of a training program.
- Linking the database with other institutions where data and information could easily accessible and making it publicly available
- Collecting data and information by someone who is in the community which would be easy to collect information as they know the situation of the area

8. Recommendations

There are both lessons learnt and best practices observed inthe EMIS within the SJPK MC.Thefollowing recommendations are made for the future implementation of an EMIS within the LG institutional setup in Sri Lanka.

1. ***Mainstreaming the EMIS in the LG institutional setupat the national level as well as at the institutional level:***National and institutional policies should be implemented to ensure consistency when using the EMIS. A separate working department/ division, designated staffs, coordinating committee, and other resources could be absorbed into the EMIS center once it becomes a mandatory requirement.

2. ***Identify'champions'to address*** **day to day challenges, convince management about the importance of the EMIS and manage for better service delivery and functioning of the EMIS**. The person should be a self-motivated, influential and dynamic character who can work as a permanent carder at the institution. Further, other junior staff should be trained to take over the activities in the absence of the above person.
3. ***Facilitate staff motivation and allocation of sufficient resources:***Creating responsible and dedicated posts will guarantee the continuity and consistency of the EMIS. Practically, specialists in the IT field are not willing to work in government institutions since the salary scale and other remunerations are comparatively lower than the private sector*(Reference: Discussion with resource person at SJPK MC)*. Hence, introducing a better package with incentives could be one of the motivations to retain such staff within the EMIS center. In addition, allocating adequate annual funds through the municipal budget, flexible logistic arrangements, payments for overtime working hours, and provision of the latest technology are other possible motivations.

   Further, continuous training on EMIS dynamics which allows innovative ideas for the EMIS, should be an integral part for running the EMIS as a productive means for improved service delivery in sanitation and environment management

4. **Create an inter-institutional platform to promote information sharing.** The platform should enable linkage between the database and other institutions where data and information could be accessedeasily by all,so as toenhance the popularity and the use of the EMIS witha wide range of users.

7. Conclusion

It is evident that the EMIS can play a major role to overcome the problems encountered by the LGs and to address many of the issues related to environmental management and sanitation.However, the establishment of an EMIS within the present institutional setup of LAs has to facemany challenges. The first is the handling of internal and external forces,both institutional and political, that affects the establishment of the system and the management of information.The second is finding appropriate mechanisms to institutionalize the system within the LAs and mainstreaming the EMIS with policy initiatives. Finding strategies for staff motivation, inter-agency coordination and attitude change of the officials is yet another challenge.

In an overall context the EMIS has very high potential to be extended into Local Government Management Information Systems in the LAs. For a process that make such systems common in LAs in Sri Lanka, the initiators have to first identify LAs, where figures with high levels of political will and enthusiastic bureaucrats are readily available, in order to set up afew exemplary projects. Educating and convincing the relevant key political and bureaucratic figuresof those LAs and the communitiesof the areas, of the benefits of such systems will be an essentialfirst task. It is necessary to design the effectuation of the system with a mechanism that assures the sustenance of the system, and which will promote the officers both at the top and the bottom levels of the operations with various incentives as an integrated part of it.

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[i] Section 4 of the Municipal Councils Ordinance (Amended), 1987, and Urban Councils Ordinance (Amended 1987) and PradeshyaSabhas Act 1987.

[ii] *Sustainable Cities Programme,www.unhabitat.org*

[iii] *Discussions with three resource persons engaged in EMIS for SJPKMC*

[iv] *Prepared based on the discussion with resource person at SJPK MC*