

Information and Communication Technologies (ICTs) and a Smart City in Malaysia

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Abstract—This paper is intended to examine how culture, society and capacity play an important role in strengthening the involvement of ICTs by the local authority in managing their local areas. A smart city has been selected as a case study due to its significance of ICT used in the daily life of the community. An in depth interview was conducted to understand how these factors became critical success factors (CSFs) towards the implementation of good services to the local community. This study finds that the ICT only has become a culture for the administrator but not the resident community. This is in relation with the second factor, society, in which a majority of the community in the area is government servants where their work process is not heavily exposed to ICT but still depending heavily on manual and the paper-process. In terms of capacity, there are lack of skills, experience and knowledge by the employees of the local authority that will prevent the ability of the local authority to provide excellent infrastructure and restrict an innovative and creative process in the future. We also find that other than culture, society and capacity, a strong support from the central government is also critical for the ICT implementation in local areas.

Keywords—culture;society;capacity;local authority;smart city

I. INTRODUCTION

The significant growth in technology particularly information and communication technology (ICT) has changed the way of human lives. The impact of technology is substantial and the changes keep continuing rapidly and are often unpredictable, and any estimation and projection of the benefits and outcome are often surpassed. New technology is adopted and incorporated into the productive process. The diffusion or adoption of a new technology is now considered to be a major factor in driving the pace of economic growth [1].

These abnormal phenomena should be manipulated not only for the sake of improving wealth by the business and company but also other non-profit oriented bodies and entities [2]. The government for example can use technology as a tool to provide greater accountability, transparency and collective decisions made through better and more meaningful public access to government information [3]. Much information can be easily disseminated to the public such as events, festivals, news and emergency via website, email and mobile

communication. Feedback, opinions and complaints can reach the government 24/7 as this technology does not have any time boundaries.

Therefore, all levels of government and its related bodies and agencies should change how they interact with the stakeholders in managing their territory. Particularly, the local government must act as the frontrunner to take this opportunity as [4] posit that around 80% of citizen-government transactions take place at the local level.

This however is not an easy task for the government to incorporate and use technology in its work process. Many obstacles need to be overcome. Some of the barriers for the government to embark on ICT projects for the local community are infrastructure development, digital divide, education and marketing, workforce issues and cost structures. These physical barriers become of interests for the scholars in their research and investigations but non-physical hurdles such as culture, society and capacity do not draw an appropriate attention from the academic community [5].

The current study is then intended to fill this gap by examining the use of ICT by the local authority particularly the local authority that is the managing smart city.

II. LITERATURE REVIEW

This study is based on the conceptual framework proposed by [6]. [6] Argued that there are six (6) factors that influence the ability of the local authority to incorporate ICT into their organization namely policy, economy, technology, culture, society and finally, technology. In her study to compare the importance of these factors applied by the local authority that is managing Durban city in South Africa, with Brisbane, Australia, she concludes that only the first three factors are important while the last three factors play supporting roles and are considered as not critical. This gives an incentive to the current study to test the applicability of the last three factors in the other local authorities that are managing a smart city. We now discuss in detail all the three factors that have become the interest of this study.

A. Culture

Culture, as defined by [7] and [8] is a collective phenomenon, shared with people who live or have lived within the same social environment. It is a collective

programming of the mind that distinguishes a member of one group with other different cultural groups. Other scholars posit that culture is some kind of commonly shared symbols, values, beliefs, attitudes and their translation into everyday social perceptions, behaviour and material artifacts [9]. These can be divided into seven (7) different level concepts of culture - societies and nations, regional and local, business, organizational and corporate, functional subcultures at organizational level, social groups in the organization and finally professional and functional cultures [10]. This study will focus only on two groups of cultures – the culture of the local authority and the culture of the resident or community.

Cultural factors can influence the adoption, use and experience of ICT via society perception towards openness to technological innovation. Culture can be argued as the willingness and responsiveness of the community towards a new way of life that is using ICT as a part of the day-to-day activities.

For example, the study conducted by [11], [12] and [13] evidenced that the cultural in terms of cultural beliefs and technological cultures can influence the ICT outcomes and also the success of information technology transfers.

For the local authority, culture here also can be referred to as the working culture of the staff and management in an organization. Top management support is very crucial so that its direction and tone can be followed by the staff.

B. Society

Society factors in the context of ICT is closely related to social-economic issues like income earned, educational background, social composition and standard of living that reflects public acceptance towards the local authority's effort to promote ICT. The level of education for example may shape the use of ICT including its understanding the benefits offered by ICT. In addition, as the majority of information content and its related applications are based in English, ICT will give greater benefits to the English speakers.

To be recognized as an information society, the life of the community must depend on electronic information network and allocate a substantial portion of their resources to information and communication activities [14]. In other words, society should have a social and economic structure where productive usage of resources such as information, as well as knowledge-intensive production performs a prominent role and where individuals, such as consumers and workers use information extensively [15].

This informative society can be measured based on its information infrastructure, application of information technology, capacity of information technology workforce and production of information technology [16].

It is also argued that the society involvement during the policy formulation will improve access, meaningful use and social appropriation on ICT. In Europe, one of the key drivers for them to establish a knowledge society is to

encourage all citizens to participate in inclusive knowledge society, being an active member in society and giving support to certain groups such as older people that may need special attention [17]. The society could also assist the local authority to understand their needs better, help in integrating public voices and concerns in the ICT policy and increase transparency and accountability in the regulatory framework and policy process.

C. Capacity

Capacity generally can be divided into physical capacity and non-physical capacity. This study however will only concentrate on the assessment of non-physical human capacity such as capacity building.

Capacity building is related to the effort of increasing the abilities and resources of individuals, organizations and community to manage change. It starts with an excellent policy and planning on training and can be sustained through training and continuous improvement of practices [18].

Capacity can exist in terms of skills, expertise, experience and infrastructure provided by the local authority to use ICT in its operation and promote ICT literacy to the community [6]. These elements are essential in putting ICT into practice and the local authority must ensure these elements are sustainable and equipped for its staff. The skills, expertise and experience can be enhanced and developed through proper training especially on the technical aspects. Besides that, the work force should also be knowledgeable enough to be able to carry out the complicated and challenging ICT tasks.

For the organization, it is critical for the organization to have a capacity to innovate by its ability to recognize useful information and assimilate the information for the purpose of its benefits. Some of the factors that may influence the ability of organization to innovate include knowledge sharing through communication linked internally and externally, flexibility to improve competitive position and good managerial information technology knowledge [19].

III. RESEARCH METHODOLOGY

The case study method is conducted using the holistic single-case design method as we only want to examine the other global nature of the city and the influence of culture, society and capacity on the ICT. The conclusion could be arrived at a more general perspective. Thus, a holistic design is more appropriate and suitable to achieve the objectives of this study [20].

There were three data collection methods employed namely observation of the website, examination of records and documents and interviews.

The website of the local authority was examined and analyzed thoroughly with the focus of the analysis on the interaction of the local authority with a wide range of stakeholders, its ability to deliver information to a

community and as a means of an electronic forum for communication.

Examination of records and documents was used to review the news and articles written on the city and its administrators in magazines and newspapers. In addition, its annual reports and related documents were verified to determine its level of commitment in using ICT in its operations as well as promoting the use of ICT to the public.

The face-to-face interview session was carried out with the officer of the Information System Division. This officer is directly responsible in managing any ICT related matters both for the city and the local authority itself. The interview questions consisted of specific topics as a guide. Two weeks prior to the interview, a list of the detailed interview questions was mailed to the individual concerned to enable him to prepare adequately before the actual interview was carried out.

IV. FINDINGS AND DISCUSSION

The summary of the findings is summarized as below:

TABLE I. ANALYSIS ON CULTURE, SOCIETY AND CAPACITY ITS OUTCOME

Factors	Analysis	Outcome
Culture	Active participation of top management by approving decision and recommendation on ICT was perceived as a culture by the staff	ICT has been used extensively as a part of working process and decision making by the staff and top management
	Less support from local community	Waste of money on the technology developed as it was not widely used by the local community
Society	Majority of the local community comprise of government servants with 80% are from the support group	May affected the usage rate of the ICT facilities provided by Local authority because these communities not heavily exposed to the ICT working culture
	No direct involvement by the society in any policymaking	The feedbacks only will be received by Local authority after the policy has been implemented, not at the beginning
Capacity	Lack of skill, expertise and experience of the staff	Knowledge cannot be absorbed to the maximum value by staff Possibility of Local authority to become a user forever.

A. Culture

The local authority perceived ICT as a culture to be adopted in the daily operations and work process among its staff. This culture is enhanced and assimilated through comprehensive training, enhancement of knowledge, continuously seeking ways to increase ICT competency, literacy and skill among its staff. There are also ICT awareness programmes conducted by the local authority from time to time for its staff.

The support by the committed leadership was very encouraging. The organization chart of the IS Division

reveals this fact (Figure I). The ICT Governance in local authority is led by its head, designated as Chairman, assisted by the Board Members, Management Committee and ICT Drivers Committee. The participation of the top management of the local authority by approving decisions and recommendations on ICT, continuously taking notes on the progress of implementation, knowing the problems and possible solutions faced by the local authority shows the importance and their support towards any ICT action taken by the local authority. The strong support from the top management together with the positive ICT culture, brings to the extensive use of ICT in the working process and decision making by the staff and top management

Besides that, a RM1 million computer borrowing fund was created and approved by the Board Members in 1997. This fund is specially provided to the staff of the local authority to purchase a computer at a lower cost.

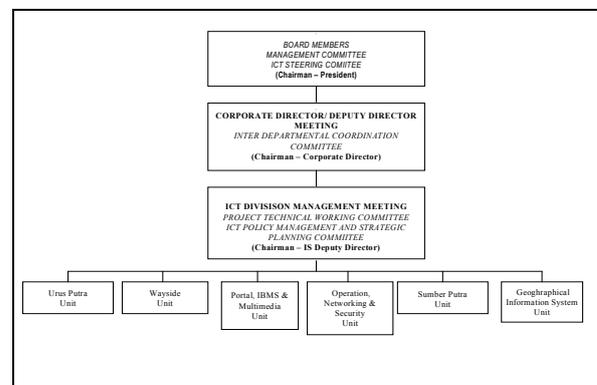


Figure 1. Organizational Structure of Information System Division

The culture of the local community on ICT however is rather disappointing. This can be seen from the number of registered users in the *MySmartcity.net* portal. According to the interviewee, less than 10% of the total 50,000 residents in the city are registered as users. It looks like the community is still not aware of the potential gain that can be offered by the ICT to change their daily lives, especially the benefits to interactively communicate with each other without any face-to-face meeting.

Observation through the website also supports the above findings. The portal has provided the means for the community to interactively communicate with each other. However, this channel has not been fully utilized by the community up to the optimum level.

TABLE II. NUMBER OF REGISTERED GROUP IN *MySmartcity.net* PORTAL¹

Type of communities	Registered group	Online articles	News	Activities
Local	nil	nil	nil	nil
Neighbourhood	2	nil	yes	yes
Business	nil	nil	nil	nil
Educational	nil	nil	nil	nil

¹ As at 20th February 2006

Type of communities	Registered group	Online articles	News	Activities
Club and society	1	nil	nil	nil
Communities of interest	nil	nil	nil	nil

As shown by the table above, with the exception of the neighborhood and club and society communities, no other group has registered in the channels. A neighbourhood community is a channel that provides space to communities that live near the city and not in the city. This scenario reveals that people who live outside the city are more interested to use the facilities provided by the local authority as compared to the local communities themselves. It is a waste of money as the technology provided was not widely used by the local community.

B. Society

Society and culture are the two elements that are closely related to each other. The values, beliefs, attitudes, perceptions and behaviors may be influenced by the educational background and standard of living of an individual. Education is the most important factor in improving user's ability to take advantage of the opportunities offered by ICT. Conversely, ICT also helps users acquire education where they were previously unable to do so.

The majority of the local community in the smart city comprise of government servants. Almost 80% of this group comes from the non-professional staff (known as support staff) with a lower level of educational background such as a certificate and secondary school. This level of staff also is not heavily exposed to the ICT working culture. In addition, this group of people earns a lower income than the professional group. This low income may impact their decisions to invest in ICT equipment like computer, internet and ICT-based learning materials. These factors are argued to be the possible factors of the low usage rate of the ICT facilities provided by the local authority.

There is no direct involvement by the society in any policymaking regarding ICT. Any policy, plan and strategy formulated are based on the National IT Agenda and requirementst of the Smart city Development Master Plan.

However, although there is no direct involvement by the community, the local authority responded that they always listen, take note and search up to the grassroots level on the requirements and needs by the society. The initiatives and implementation on ICT however is still subject to changes that suit the current situation, society and environment requirements.

The local authority has also argued that the community has been given adequate and appropriate channels to give their comments and feedbacks but there is still a lack of participation. Therefore, there is no strong argument to invite the community to sit in any committees in local authority either as an observer or policy maker.

This approach however shows that local authority is still exercising traditional ways of government administration - "implement first, feedback later" which should be the case with ICT usage.

The local authority also argued that the city that was developed from scratch without the existence of any community in the beginning. The 15 years plan and policy was already created and completely documented for administration, residence and commercial. Everything was already in place and people were invited to live, work and open their business there. Thus, less participation from the community was already expected. In fact today participation is expected to be more in focusing on protection and maintenance rather than development of the city.

C. Capacity

The capacity of the local authority in terms of skills, expertise and experience of the staff pose major issues to this administrator. Currently, the number of staff is inadequate to cope with the technology transferred by the vendors or consultants. There is a lacking in the capacity of staff to absorb the tremendous wealth of knowledge and skills from the latest technology and systems developed in the smart city. It is clear that 10% of every contract price to the vendors and consultants is related to the training program of the staff of the local authority. Hence, it is a waste of money if this knowledge cannot be absorbed to the maximum value by the staff. It is the intention of the local authority to form a strategic partnership on a win-win situation with the consultants rather than become a user forever.

There are also infrastructure issues in the city. This is much on the readiness of the sites like buildings and roads to implement ICT applications. The system is already completely developed, but the assets or infrastructure is not in place or has yet to be completed to execute the system.

D. Other factors

In addition to the above three factors that may influence the local authority capability to incorporate ICT in its operation, this study also found that there is one additional important factor that may underpin the capability of local authority to implement all its ICT initiatives.

The support from the Federal Government is crucial to determine the capability of the local authority to capitalize on the opportunities presented by ICT. Physical support in terms of adequate funds is the most important factor as the local authority needs a substantial amount of money to acquire the leading edge technology including the equipment, software and the skill. The funds from the Federal Government should be released when required to ensure all the ICT projects and its implementations can be executed on time.

According to the interviewee, although much money has been budgeted for the development of ICT in the city, the local authority still faces a cash flow problem from the

government. There are a few experiences in which the payment to the vendor and consultant cannot be made on time due to the late payment released by the Federal Government. Although the funds have been allocated, it looks like the series of payment is subjected to the unnecessary bureaucracy process.

V. CONCLUSIONS AND RECOMMENDATIONS

The study finds that culture, society and capacity is found not to be critical and has no impact to drive the application of ICT. Only the ICT provider that is the administrator of the smart city that is blending their normal routine tasks with ICT while no serious commitment has been shown by the community of the city to make ICT as part of their life culture. This may be due to a lacking in terms of educational background, no involvement in ICT policy making and the fact that the majority of the residents are government servants who do not use English as their medium of communication. There are also unresolved issues on capacity such as skills and experience of the city's administrators that can become a threat against success in incorporating a fully integrated city with ICT applications. The study also finds that support from the fund providers such as the central government is more important and crucial as compared to the three factors examined in the survey.

VI. LIMITATIONS AND SUGGESTIONS FOR FUTURE RESEARCH

This study only used one city or local authority as a sample of the study. The fact that Malaysia at the time of study conducted only had one smart city that was resided by the local community make the findings of this study generalized with a precautions.

Future studies can be conducted on a few local authorities and make a comparison between the samples to get more accurate and representatives' findings. Various data collection methods such as surveys, focus group interviews, observations and content analysis can be conducted together to get better and richer information with more sophisticated data analysis .

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