PAPER 2

THE STUDY OF PUTRAJAYA AS A SMART CITY

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ABSTRACT

Established in 1995, Putrajaya has been declared as the administrative centre for Malaysia. Despite the extensive investment on city development and accolades received on its many achievements, Putrajaya still suffers from a number of issues which include the lack of vibrancy and the lack of diversity within the population that would contribute to the city's cosmopolitanism. In the era of trade liberalisation and borderless economy, a city has no choice but to adapt and improve to stay competitive.

This study aims to introduce the concept of Smart City into Putrajaya as a way to enhance the efficiency of the city management. It does not aim to change the city development concept currently adopted by Putrajaya, nor does it intends to introduce new initiatives for Putrajaya. Its approach is to learn from Smart City applications from identified comparable cities, identify current initiatives planned for Putrajaya and apply some of the identified best practices for Putrajaya. As such, the application of Smart City principles for Putrajaya is seen as complementary to its current city management plans, thus promoting its sustainability.

A three-stage methodology guides the operation of this study. The first stage entails a comprehensive literature review with the aim of establishing a Smart City definition and outlining the features of Smart City. The second stage involves identifying where Putrajaya stands against selected cities by comparing the cities' initiatives grouped under the Smart City concept. However, the literature review also cautioned how the functions of a city and prevailing local conditions may influence its application of the Smart City concept. To reflect the consideration of the city function, the third stage identifies the potentials of Putrajaya as a Smart City as perceived by its users.

It is found that Singapore, Seoul and Melbourne lead when it comes to the provision of smart city initiatives in almost all smartness dimensions. Each city was developed according to the visions of the city management that could be influenced by the greater national agenda. When comparison are made to the level of achievements for the initiatives under the six (6) Smart City dimensions, Putrajaya and Iskandar Malaysia may not have achieved the high level of provision as compared to the more developed cities. Both these cities have their own strength catering for the achievement of its vision and

mission. It has been observed that the Smart City dimension that has achieved the ‗Smart City Ideal' for Putrajaya is Smart Environment and this should be maintained in its quest of achieving Sustainable Putrajaya vision.

EXECUTIVE SUMMARY

1.0 RESEARCH PROBLEM

The sustainability of Putrajaya depends on its attractiveness to its residents, workers and visitors. Though Putrajaya has been described as a Smart Garden City (Malaysia Merdeka, 2014), there have been a few reports on the lack of vibrancy in Putrajaya by investment websites, citing lack of cultural, economic, social and intellectual development within the city. This problem is not unique to Putrajaya, but is also plaguing other administrative centres.

Other cities in the world have adopted the “Smart City” principles in their planning and operation in the move towards sustainability. Putrajaya is conceived as one of two 'intelligent cities' under the Multimedia Super Corridor (MSC) project. The MSC is a 15km-by-50km zone, to be occupied by high-technology companies that Malaysia envisions as its version of California's Silicon Valley. The main components of this corridor - Kuala Lumpur City Centre, Kuala Lumpur International Airport, Cyberjaya and Putrajaya - are bound by a fibre-optic network that provides high-speed computer links. Since Putrajaya sits at the centre node of this zone, users can count on high-speed Internet access and other electronic-superhighway conveniences, in line with the concept of electronic government. The other 'intelligent city' is Cyberjaya, a multimedia catalyst centre created for global R&D and designed with the capacity to be the operational headquarters for multinational firms wishing to direct their world-wide activities using multimedia technology. Smart City is therefore should not be an afterthought for Putrajaya, but rather a strategic step towards realising the city’s potentials.

2.0 OBJECTIVES OF RESEARCH

1. To identify Smart City variables from literature and past researches.

2. To benchmark Putrajaya against selected Smart Cities.

3. To make necessary recommendation on enhancement of Putrajaya as a Smart City.

3.0 METHODOLOGY

This research adopted the following stages in achieving the objectives.

To achieve Objective (1), this study combines the review and critical evaluation of past researches that have dealt with Smart Cities. A comprehensive review of the literature has been adopted as the predominant approach for handling this phase of the study. This review has taken into consideration the literature at local and international levels. The aim of this review was to examine the variables that have been used to define Smart Cities. According to Bellissent (2010), there are three types Smart Cities i.e. new cities purposely designed as Smart Cities, existing cities with enhanced Smart City elements and "non-cities" that are implemented with Smart City features. Visits have been made to Seoul, Singapore and Melbourne as existing cities with evident or enhanced Smart City elements.

Drawing upon the outcomes from Objective (1), an examination (in the form of observation and key informant interviews) of the international practices of identified smart cities has been made. The preliminary literature review revealed three identified Smart Cities. Key informants from these cities were contacted for obtaining relevant secondary data such government publications and other resources pertaining smart city initiatives undertaken at each city. From the information gathered at each city, the Smart City initiatives/factors are compiled and compared. The comparison was made to identify the variables and initiatives that are available in these cities so that common criteria can be identified for a Smart City standard definition. As such, a comparison matrix of the initiatives under the six (6) dimensions of: Smart Economy, Smart People, Smart Living,

Smart Environment, Smart Mobility and Smart Governance (i.e. through the adoption of Giffinger's model was earlier confirmed during the Iskandar Malaysia concepts) was made for Seoul, Singapore, Melbourne and Iskandar Malaysia.

Following the verification of smart city variables from the literature, the identified smart cities for this research and feedback from focus group discussion, a benchmarking exercise of the smart city variables for Putrajaya was attempted. Using content analysis, city initiatives were also compiled and collated from official government websites of each city to ensure an exhaustive list of initiatives. The data obtained above were used to generate a comparison matrix to reveal how the different cities (including Putrajaya) ranged against one another in terms of their 'city smartness'. The levels for descriptors for each dimension were identified. These descriptors provide a scheme for matching what level of initiatives provision corresponds to city smartness category, i.e. whether state-of-the-art or advanced or medium or just basic. To be capable of a quantitative treatment, the smartness category is then associated with numerical value, putting the smartness category on a scale of 1 to 4 with each scale corresponding to each category. The exercise is then repeated across all the dimensions to produce the above schema. Then the schema is then applied on initiatives information available to heuristically determine the smartness category for each city with respect to each dimension. Through the above exercise, the cities' smartness categories by dimensions are attained through levels of provision that are plotted on a radar chart depicting each city's achievement.

Taking into account a Focus Group panel's comment on fulfilling Putrajaya's Vision in undertaking this study, the approach to the study is to encompass both Vision-based perspective (based on Putrajaya's Structure Plan) and Needs-based perspective (based on a questionnaire survey on the RA and other stakeholders).

For the enhancement exercise for Putrajaya towards becoming a Smart City, a Gap Analysis is conducted. This exercise gauge Putrajaya as against its ideal Smart City framework (drawn from the main Putrajaya main vision), reviews of the relevant documents pertaining to its vision, purpose and role were made so that the planned programs under the Putrajaya Green City vision can be identified under each smart city dimension. As part of the reconciliation of the vision of and needs for Smart City elements

for Putrajaya, a questionnaire survey was conducted. The questionnaire survey variables were based on Smart City dimension and also from initiatives extracted from the Putrajaya Structure Plan 2025. This document has provided the outline of the vision to turn Putrajaya from a Garden to a Green city highlighting the four (4) main moves towards being green, vibrant, distinctive and connected. The main moves were then translated to eight (8) policies and thirty two (32) initiatives. An examination of these initiatives was then made to identify those relevant under each of the six (6) Smart City dimensions identified for this study. These initiatives under the Putrajaya's vision can be compared against the actual needs of the users. The main aim of the survey was to identify Smart City dimensions that are important to the users of Putrajaya (Smart Ideal). The user based perspective of smart city for Putrajaya could be gauged to identify the importance of each of the programs/initiatives within each smart city dimension. The findings from the survey would identify the gap between the Vision and Needs in the implementation of Smart City initiatives in Putrajaya. This gap would be measured against the Putrajaya's ideal Smart City initiatives which serve as the benchmark.

To establish the gap between the Ideal Smart City and the actual provision of the development initiatives (Smart Actual) considered under the six (6) smart city dimensions, we relied on our own observation during fieldwork in Putrajaya The analysis of the gap survey was made through the use of Adjusted Level of Provision (ALP) or also known as the 'Smartness Gap', which represent the extent to which current level of initiatives provision falls short of the ideal. This gap analysis involved a comparison of Putrajaya's 'smartness ideal' against its 'smartness actual' to compute the difference. Through the analysis, the enhancements of smart city for Putrajaya are proposed.

4.0 THE STUDY FRAMEWORK

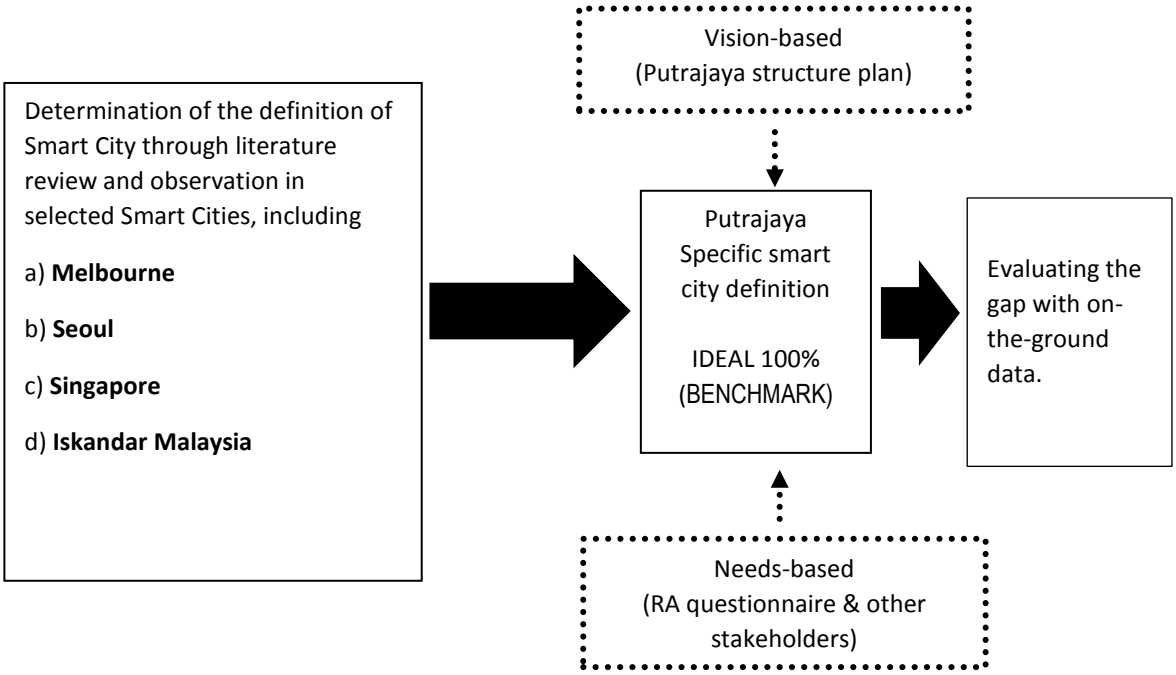

Figure 1: Study Framework

5.0 MAJOR FINDINGS

For the achievement of Objective 1, a review and examination of the literature and past researches on Smart City was carried out. Having reviewed the literature on city development concepts, the criteria for each concept are compared side-by-side within the sustainable development framework. It is widely accepted that there are three major dimensions of sustainable development i.e. economy, environment and social. Comparable to other city types, Smart City places significant interest in social and environmental developments as well. As described in the literature, Smart City concepts highlighted the utilisation of available softwares and sophisticated computing systems which need to be operated, managed and used by a community that can adapt to the new technology.

From the review of the various models that have been introduced for Smart City, Giffenger's model has described as a smart city that encompass the three (3) pillars of sustainable development and potrayed six (6) characteristics through the development of a transparent and easy hierarchic structure, where each level is described by the results of the level below. The six (6) 'smart' characteristics that had been identified are: economy, people, governance, mobility, environment and living. These six (6) characteristics known as dimensions were regarded as the relevant group characterising a smart city. Smart Economy includes factors all around economic competitiveness as, entrepreneurship and productivity. Smart People may not only described by the level of qualification or education of the citizens but also by the quality of social interactions regarding integration and public life and the openness towards the "outer" world. Smart Governance comprises aspects of political participation, services for citizens as well as the functioning of the administration. Local and international accessibility are important aspects of Smart Mobility as well as the availability of modern and sustainable transport systems. Smart Environment is described by attractive natural conditions (climate, green space etc.), pollution, resource management and also efforts towards environmental protection. Finally, Smart Living comprises various aspects of quality of life as culture, health, safety, tourism etc.

It is found that Iskandar Malaysia is the only city in Malaysia that has Smart City framework that has been adapted from Giffinger's model. It is also noted that the Iskandar model have included the six (6) Smart City dimensions which ascribed to the three (3) sustainable development pillars i.e. economy, environment and social pillars. Taking into consideration of Iskandar Malaysia's framework and other smart city models, this study has adapted Giffinger's Smart City model encompassing the six (6) dimensions of Smart Economy, Smart People, Smart Living, Smart Mobility, Smart Governance and Smart Environment.

For the achievement of Objective 2, a comparative analysis was undertaken to benchmark Putrajaya's 'smartness' among four (4) other selected cities. Two (2) main findings were revealed from this exercise, namely i) the current placement of Putrajaya against these cities and ii) the achievement of smartness achievement for each city in relation to the functions of the city and the city's prevalent institutional structure. Singapore, Korea and

Melbourne were observed to outpace Iskandar Malaysia and Putrajaya in terms of smartness. Singapore led as the smartest city among the selected group of comparable cities, whereby results from the heuristic analysis indicated the highest score in all of its Smart City Dimensions. It is submitted that Singapore had no choice but to employ the smart agenda to ensure its survival as a city state. Thus, its highest place in the ranking was assured by its full commitment in using ICT to improve all facets of city development. Seoul follows, with comparable strengths on all dimensions except smart economy and smart people, while Melbourne excels on smart living. On the other hand, Putrajaya it lags behind on almost all dimensions compared to the three cities, comparable only with Iskandar.

In contrast, Putrajaya was not planned to be a Smart City. It was established following a specific function, i.e. to be an Administrative City that was planned based on the Intelligent Garden city concept. Nevertheless, cities need to adapt and evolve to stay relevant. The rapid growth in ICT has espoused the Smart City movement, whereby cities take advantage of the technology to increase efficiency, encourage users' engagement in city building and enhance the attractiveness of the city. Whilst Putrajaya did not rank high in the benchmarking exercise, the revelation of Putrajaya's smart gap can pave the way for improvements in the areas that could augment Putrajaya's smartness.

It must be understood that the above analysis represents a visual reflection of the selected cities at 'first instance' i.e. without considering the functions and prevalent conditions that have shaped the cities in the past. Each city was developed according to the visions of the city management that could be influenced by the greater national agenda. For instance, Singapore was supported by its status as a city-nation whereby as both a city and country, there was a strong motivation for it to be as 'smart' as possible bearing its small size and limited resources.

For the achievement of Objective 3, several steps have been undertaken to identify the city smartness level for Putrajaya. A gap analysis involving a comparison of Putrajaya's 'smartness ideal' against its 'smartness actual' attempted to indicate where Putrajaya lies in relation to being perfectly smart in its own right i.e. in its drive towards the achievement of the city's vision of Sustainable Putrajaya and taking into account of the

existing users' expectation. By ascertaining the rating of the actual provision as against the users' expectation and through the use of Adjusted Level of Provision (ALP), the levels of achievement of all the initiatives for each Smart City dimensions have been identified. Smart Environment has scored ALP more than 100%. Since the ALP level for the initiatives under the Smart Environment level have exceeded 100%, efforts should be made to increase ALP for the initiatives under the other dimensions.

In summary, the ALP achievements for the other dimensions are as follows: the ALP for Smart Mobility is at 79.1% and therefore efforts can be made to increase the level of achievement. Another dimension that needs improvement would be under the Smart Living dimension which has attained ALP of 82.9%. Other Smart City dimensions i.e. Smart Economy, Smart People and Smart Governance have attained ALP of 85%, 86.45 and 91% respectively. Although these scores are considered as high, an examination of the individual initiative under these dimensions has uncovered initiatives that have scored low ALP. Thus necessary steps can be taken to examine these initiatives that have scored low in ALP to improve the level achievement and elevate Putrajaya towards Smart City status.

Since Smart Mobility scored the lowest Adjusted Level of Provision (ALP) at 79.1% i.e. the dimension that has achieved the lowest ALP, it is recommended that Putrajaya's smartness could be augmented with Smart Mobility improvements as a short term immediate strategy. Thus, it is recommend that Putrajaya city managers focus on:

i. Provision of infrastructure that supports the public transport system such as 'smart board' communications system, integrated transportation, directional signage that is informative, smart parking, etc. This initiative yielded ALP of 57.87%.

ii. Programmes to develop an environment that encourages pedestrian comfort and safety. This initiative yielded score of 62.81%.

For the medium to long term period, it is also recommended that other Smart City dimensions be looked at. The other Smart City dimensions that can be improved are Smart Living, Smart Economy and Smart People. Under Smart Living, an initiative under this dimension that has particularly scored low ALP of 56.18% is the provision of affordable and inclusive housing environments. Putrajaya can certainly make the effort to examine other forms of provisions to accommodate the gap for the fulfilment towards an ideal Smart Living dimension. The initiatives that require improvement is the provision of affordable and inclusive housing environments such as low-cost housing, elderly-friendly and persons with disabilities (PWDs). This initiative yielded ALP of 56.18%. With such score, an extensive effort can be made to improve this provision although affordable housing provision is a national issue which requires immediate attention.

As for the Smart Economy dimension, the initiatives that have scored low ALP of 61.27% and 63.29% are the provision of environmental services and business which are conducive to green business and international business environment. Thus, steps can be taken to improve the business environment provision so as to increase the ALP and elevate the level of attainment for the initiatives under the Smart Economy dimension. Extensive and aggressive efforts have to be made by the city managers of Putrajaya to create an environment that is conducive to business whilst attracting the private and international organisations. Additional efforts could be made to attract these sectors through the introduction of incentives as well as programmes via public-private partnerships and smart collaboration.

Under the Smart People dimension, an initiative that has achieved a low ALP of 63.96% is the creation of a resource and referral center for the city of Putrajaya such as galleries and special libraries. It can be observed that there is a limited number of resource centre such as libraries and museums which would be considered as a referral centre for the country generally and Putrajaya specifically.

On the Smart Governance initiatives, all of them have attained ALP of more than 80% which could be translated as achieving high level of smartness under this dimension.

Overall, it can be observed that Putrajaya has certainly attained the advance level of smartness when measured against its users' expectation within the provision of the existing initiatives. However, such achievement has to be consistently monitored should a different set of users have different levels of expectation. There are many on-going private housing and commercial developments which in turn may bring in a more cosmopolitan population although currently the majority of the users within Putrajaya are those in the public sector.

It can also be recommended for Putrajaya to emulate the initiatives of the Smart City dimensions of Seoul, Singapore and Melbourne although these initiatives are provided and created in relation to the purpose and role of each city. Such initiatives could be used as references towards the improvement of the smart city dimensions achievement for Putrajaya. Since Putrajaya had the initial status of an intelligent garden city, it certainly has the credentials to turn into a Smart City in realising its potential.

6.0 RESEARCH SIGNIFICANCE

This research enables Putrajaya authorities to consider the application of Smart City principles in the existing development initiatives. In essence, the Smart City concept entails the usage of IT and ICT in promoting efficiency and innovation in promoting and enhancing aspects of the environment, economy, mobility, population (people), governance and living. As such, the integration of the Smart City concept as part of Putrajaya's city development strategy is seen as adding value to initiatives already planned for the city, not conflicting with the city development plans.

Another contribution of this research is in producing a framework in which Smart City concept may be proposed within the requirements of the city's vision and its users' needs. This research acknowledges that each city is unique in terms of its purpose and institutional make up, and rejects a one-size-fits-all method of applying the Smart City concept. The proposed framework may be used for other cities that aim to incorporate Smart City concept into their development strategies.