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"Whoever travels in search of knowledge is on Jihād until he returns"

(Transmitted by Tirmidhi & Darimi)

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MESSAGE FROM THE PRESIDENT

Dear Readers,

The publication of this journal is one of the many activities undertaken by the Malaysian Institute of Planners (MIP) to disseminate knowledge and information pertaining to town and country planning to its members as well as to the public. This journal also acts as a medium for MIP members and others to engage in research and writing articles that could contribute to the advancement of the theory and practice of town and country planning.

In line with the digital age that we are living in now, the MIP has taken the initiative to publish the online version of this journal. This journal, can now be accessed online by MIP members as well as the public at *planningmalaysia.org*.

It is our hope that this migration of the journal to online platform would make the journal accessible to a much wider audience.

Thank you and happy reading.

Md Nazri Mohd Noordin
PRESIDENT
(2015-2017)

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MAIN CRITERIA IN THE DEVELOPMENT OF SMART CITIES DETERMINED USING ANALYTICAL METHOD

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Abstract

A smart city is one that is highly developed, innovative, environment-friendly, and incorporates relevant aspects of the economy, technology, mobility, quality of life and other aspects that contribute to the well-being of its residents. To achieve the status of a smart city, several requirements, criteria or indicators need to be considered. Strategic decisions by planners of a smart city play an important role in determining how the city uses resources and opportunities through the harnessing of modern technology to build a framework of innovation that nurtures a healthy society in an economy that is dynamic and environment-conscious. Smart cities focus on various elements of humanity, learning, the environment, technological infrastructure, social development, and urban growth. The aim of this study is to examine these requisites of a smart city, and to use the Analytic Hierarchy Process (AHP) methodology in assigning weightage to each element that is considered essential to its development. Smart environment and smart mobility were found to be the top two important factors in the successful building of a smart city. The actual values that shape smart cities are based on a balance of factors such as smart environmental practices, smart governance, smart living, smart mobility, smart people, and smart economy. These principal key elements work together to exploit the technologies that help bring about the realization of a smart city.

Keyword: Criteria, Smart City, Development, Analytic Hierarchy Process

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INTRODUCTION

The rapid transition to a highly urbanized population has created numerous challenges for the planning, development, and operation of cities. As a result, architects, urban planners, and designers need to adopt innovative ideas and strategies when developing smart cities (Harrison & Donnelly, 2012). In an ideal smart city, the needs of urban dwellers have to be taken into consideration (Hollands, 2008). The smart city can be described as a city where close attention is focused on economic development, environment preservation, quality of life and the management of natural resources, with information and communication technology (ICT) playing a leading role in these respects. "Cities need to evolve towards intelligent dynamic infrastructures that serve citizens by fulfilling the criteria of energy efficiency and sustainability from all aspects" (Pellicer et al., 2013).

While ICT is often associated with development of Smart City, there are also other considerations that are relevant in this respect. Six principal criteria have often been used to characterize and rank Smart City, *viz.* regional economic competitiveness, mobility in relation to ICT and transportation, natural resources, human and social capital, quality of life, and citizen involvement in local government. To a large extent, how well various services in the city are deployed reflects its success, this being especially true in the quality of life and regional competitiveness (Urzaiz et al., 2014). In view of the fact that any discussion on Smart City veers inevitably towards the elements of technology and mobility, we explore in this study whether technology is in fact the key component in defining Smart City. We examine if other variables such as the economy or social capital are of no less important in charting its success. In this regard, the Analytical Hierarchy Process (AHP) is used to assign weightage to various criteria commonly associated with Smart City, and to identify the principal determinants instrumental to its achievements. This study provides a foundation for planning a framework for the development of Smart City based on various indicators prioritized according to their importance and relevance. Hence, the objective of this study is to examine these requisites of a smart city using the AHP methodology in assigning weightage to each element that is considered essential to its development.

RESEARCH BACKGROUND

Smart Cities

The concept of smart cities is gaining popularity in scientific literature and international policies. Cities play vital roles in social and economic aspects worldwide, and have a huge impact on the environment (Mori & Christodoulou, 2012). Cities are populated densely with people from all walks of life, especially those employed in key sectors such as industry, commerce and services.

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Operationally, to ensure quality of living, cities are dependent on a number of core infrastructures such as energy, water, transport, information and telecommunications, as well as business activities, municipal services, participation of citizens, and provision of sanitation (Morvaj, Lugaric & Krajcar, 2012). With economic and technological changes brought about by globalization, cities now face the challenges of maintaining competitiveness and sustainable urban development concurrently. It is obvious that such challenges would have an impact on issues related to the quality of urban lifestyle in various aspects such as housing, economic, socio-cultural, living, and environmental conditions. While the main focus of urban studies tends to be on global metropolises, most urbanites are found in medium-sized cities, which face the challenge of coping with competition from larger urban centres on similar issues.

Definitions of Smart Cities

Many definitions of smart cities exist. Conceptual variants are often used by replacing the word "smart" with alternative adjectives such as "intelligent" or "digital". Still, smart city is an unclear concept and is used in ways that are not always consistent (O'Grady & O'Hare, 2012). Generally, a smart city is a high-tech intensive city that connects people, information, and city elements using new technologies and infrastructure to create a sustainable, greener city, competitive and innovative economy, and an enhanced life quality.

Smart cities can also be defined as ones that are prepared to develop a healthy and comfortable community under the challenging conditions that global, environmental, economic and social trends may bring. Smart cities have high productivity as they have a relatively high share of highly educated people, knowledge-intensive jobs, output-oriented planning systems, creative activities and sustainability-oriented initiatives (Kourtit & Nijkamp, 2012).

Smart cities of the future would need sustainable urban development policies where all residents, including the poor and middle-class, could live well. Such cities should offer residents a high quality of life while pursuing sustainable economic development through investments in human and social capital. They should provide modern communications infrastructure and advanced technology for transport. They should also manage natural resources through participatory policies. Hence, future smart cities should be sustainable with converging economic, social and environmental aspects.

Development of Smart Cities

Since the last two decades, sustainable urban development has become a crucial and widely pronounced concept, covering various economic, environmental, cultural and social objectives. In terms of economic sustainability, 'the ability to generate wealth and resources also means the ability to create wealth by

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increasing productivity and competitiveness of the city in a market environment' (Monfaredzadeh & Berardi, 2015).

In this connection, more than one half of the world population lives in cities, and the numbers keep increasing. Many government bodies and town planners are now warming to the concept of 'Smart City'. Smart city thrives through the widespread and innovative use of information and communication technology (ICT) in the planning and sharing of resources to build the economy, and enhance the environment and social well-being so that residents can enjoy a better quality of life.

In a smart city, as described by IBM's policy document for Philadelphia (IBM, 2011), marginalized residents would attain relevant skills before seeking jobs through social media-style educational applications on their smartphones. This vision of a smart city reflects a notion of "urban intelligence" developed to improve a city's economic competitiveness and then to improve inner city residents' employment opportunities. The city would need trained workers and smart people in order to compete in the globalized economy (Wiig, 2015). According to Manville et al. (2014), highly urbanized settlements require new and innovative ways to manage the complexity of urban living, to handle problems of overcrowding, energy consumption, resource management, as well as to ensure environmental protection and living quality.

The concept of 'smart city', considered by many as the new century's stage of urban development, has become fairly trendy in the policy and business arenas (Komninos, 2002). Approaches to it tend to deal with issues related to the use of ICT in various advancements. Accordingly, the availability and quality of ICT infrastructure have become determining factors for many cities to brand themselves as 'smart'. The capacity of the human capital in terms of higher education, skills, creativity and talent has emerged as the predominant driver of the evolution of smart cities (Paskaleva, 2009). And as the local quality of life becomes increasingly important in determining population clustering, a modern urban phenomenon, the significance of territorial amenities has become one of the major components of urban attractiveness and development, towards which progress should be principally measured.

Despite significant advancements in ICT, and urban research moving beyond technology and city growth fundamentals, the construct of the 'smart city' remains ambiguous and continues to be used in different ways. Recent research carried out by authors of the current issue for the development of the Wikipedia website on smart cities has revealed that up until now smart cities have been generally identified using six main dimensions, *viz.* smart economy; smart mobility; smart environment; smart people; smart living; and smart governance (Paskaleva, 2011).

A smart city with such characteristics would build on the 'smart' combination of endowments and activities of self-decisive, independent and

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knowledgeable citizens. To assess whether a city qualifies as a smart city, six criteria have been identified, *viz.* (1) Economy, (2) Mobility, (3) Environment, (4) People, (5) Living and (6) Governance. In Figure 1 the six axes model of smart city are illustrated.

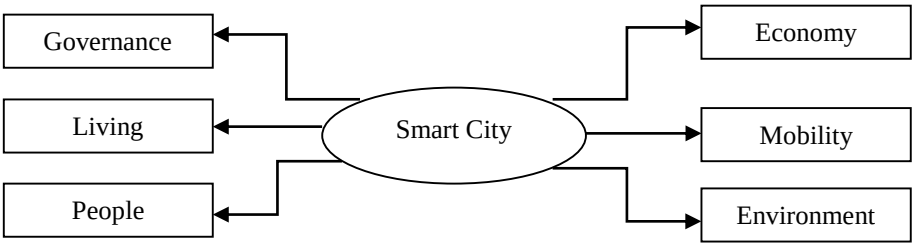

Figure 1 Model of a Smart City
Source: Peng et al., 2013

Criteria in the Development of Smart Cities

Various studies have been conducted concerning the evaluation and monitoring of smart city development. Caragliu, Del Bo and Nijkamp (2011) have used the European Union (EU) Urban Audit dataset to analyse factors which determine the performance of smart cities. The EU Urban Audit entails a collection of comparable statistics and indicators for European cities; it contains data for over 250 indicators across the domains of demography, social aspects, economic aspects, civic involvement, training and education, environment, travel and transport, information society, culture, and recreation. However, the dataset does not provide an index with which to measure smartness in cities specifically. According to Caragliu et al. (2011), attention to the urban environment, level of education, multimodal accessibility, and the use of ICT in the public administration are strongly correlated with urban smartness.

i. Smart economy

A smart economy is one that is driven by innovation, entrepreneurialism, economic image and trademarks, flexibility of the labour market, integration with international markets, and has the ability to transform (Giffinger et al., 2008; Monfaredzadeh & Berardi, 2015). A city with a high degree of economic competitiveness is considered as having one of the main drivers for a smart city (Giffinger et. al., 2013). However, competitiveness is a holistic concept, and economic growth, the business and regulatory environment, institutions, the quality of human capital, cultural aspects, and the quality of governance are all essential for sustaining economic growth while securing present and future competitiveness (Economist Intelligence Unit (EIU), 2013). As Friedman

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stresses, competition among cities is important not only for attracting consumers, but also for attracting investors and workers to secure a major global position. However, as much as economic growth increases the city's ability to attract capital, business, talent and visitors, it often does this by using more resources. Previous paths of economic development have often been characterised by the depletion of resources, resulting in serious consequences for future development (Monfaredzadeh & Berardi, 2015). Hence, it is important that smart cities manage the environment and natural resources carefully.

ii. Smart mobility

Smart mobility refers to local and supra-local accessibility, availability of ICT, modern, sustainable, and safe transport systems (Monfaredzadeh & Berardi, 2015). A smart city should make full use of existing ICT facilities to raise the level of its economy and competitiveness as an approach to building a successful and integrated city. Komninos (2002), in his attempt to delineate the intelligent city, (perhaps the concept most closely related to the smart city), cites four possible meanings. The first concerns a wide range of electronic and digital applications to communities and cities, which effectively work to conflate the term with ideas about the cyber, digital, wired, informational or knowledge-based city. A second meaning is the use of information technology to transform life and work within a region in significant and fundamental ways (somewhat akin to the smart communities' idea in the literature, see Roy, 2001). An intelligent or smart city can also refer to embedded information and communication technologies in the city, while a fourth definition refers to spatial territories that bring ICT and people together to enhance innovation, learning, knowledge and problem solving (the latter being related somewhat to the smart growth agenda). Komninos (2009) sees intelligent (smart) cities as territories with high capacity for learning and innovation, spurred by the inherent creativity of the population, the institutions of learning, and the information and communication infrastructure. A very popular concept of smart city is one that has adopted ICT as a way to revitalise economic opportunities and increase global competitiveness mobility. Smart initiatives range from small-scale applications of individual technologies to ambitious projects aimed at transforming entire urban areas through master planning and infrastructure development based on ICT (Monfaredzadeh & Berardi, 2015).

iii. Smart environment

A smart environment is defined in terms of attractiveness of natural conditions, lack of pollution and sustainable management of resources (Monfaredzadeh & Berardi, 2015). Factors that impact a smart environment include attractiveness of natural conditions, level of pollution, environmental protection, and sustainable resource management (Giffinger et al., 2013). Smart city definitions often

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highlight important aspects of sustainability, such as the need for responsible resource management and energy efficiency (Albino, Berardi & Dangelico, 2015). While smart cities hold the potential to manoeuvre within a system that is faced with ever-decreasing resources and ever-increasing demands, urban development within smart living may well result in resource depletion (Monfaredzadeh & Berardi, 2015).

iv. Smart people

Human and social capital, flexibility, creativity, tolerance, cosmopolitanism, and participation in public life are criteria that determine the kind of people needed in a smart city (Monfaredzadeh & Berardi, 2015). Other scholars include factors like the level of qualification, affinity to lifelong learning, social and ethnic plurality, flexibility, creativity, cosmopolitanism, open-mindedness, and participation in public life (Giffinger et al., 2013). Smart cities also require 'smart citizens' if they are to be truly inclusive, innovative and sustainable. Although smart city is supposed to create new ways of empowering its citizens to play a fuller and more equal role in emerging governance systems through their access to dynamic Internet enabled services, this is proving to be a big challenge as not everyone has equal access to the skills and opportunities that are supposed to be there.

v. Smart living

Smart living improves the quality of life by transforming the home, workplace, transportation and energy infrastructures into "smart" environments. Smart living increases our understanding of how people and technology interact by combining senses with physical action, social behaviour analysis, data analytics, engineering, technology, and communication. As a single, integrated concept, smart living also includes factors like cultural facilities, health conditions, individual safety, housing quality, education facilities, touristic attractiveness and social cohesion (Giffinger et al., 2013). Smart living also takes into consideration the quality of life, imagined and measured in terms of availability of cultural and educational services, tourist attractions, social cohesion, and personal safety (Monfaredzadeh & Berardi, 2015). Urban planning where the welfare of the people is deemed secondary is not smart. Smart living is about integrating all the elements that make up a meaningful and happy life, remembering always that it takes everything to make up the whole. Smart living areas feature smart grid and transportation systems, decision-making and governance, privacy and security. Smart homes and smart living that boast facilities enabled by the latest technology and support systems give rise to superior and modern living for its residents.

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vi. Smart governance

Smart governance is about the future of public services, greater efficiency, community leadership, mobile working and continuous improvement through innovation. Smart governance is about using technology to facilitate and support better planning and decision-making. It is about improving democratic processes and transforming the ways that public services are delivered. It includes e-government, the efficiency agenda and mobile working. Factors that impact smart governance include participation in decision-making, availability of public and social services, transparent governance, political strategies and perspectives (Giffinger et al., 2013), as well as transparency of governance systems and quality of political strategies (Monfaredzadeh & Berardi, 2015). Smart governance includes providing regular updates on Smart Governance issues, and encouraging innovation in public service delivery.

METHOD OF STUDY

In this study, to determine the ranking of criteria for the development of smart cities, the research problem was split into three hierarchal levels, beginning with the highest level, and followed by criteria and alternatives in the lower hierarchal levels. The selection of the essential information and criteria was based on the literature, and feedback from questionnaires and interviews. To obtain an understanding of the criteria and elements of smart cities, primary data were collected by the researchers through questionnaires and interviews in the field. The survey was based on the perception of 464 respondents in Cyberjaya and Putrajaya community to determine the ranking of criteria for the development of smart cities. Hence, the majority of respondents felt that the criteria for the development of smart cities were 'important', while their perception of the same procedures were 'high'. Data collection for the interview included the participation of 5 experts. The interview group consisted of experts who have knowledge about smart cities of this study. Three of the experts were from Federal Department of Town and Country Planning Peninsular Malaysia and two from the field of special education of Smart Cities. Furthermore, AHP technique was applied in determining the weightage for each criteria of smart cities through questionnaires and interviews. Using this technique, each element at a hierarchy level is compared pair-wise with another element in the hierarchy level above it. AHP allows a systematic assessment of the weightage of each element in preparing a structure that enables arriving at a solution to the research question.

FINDINGS AND DISCUSSION

'Pair-wise comparisons' were applied in determining the weightage for each factor in the AHP process, with scores calculated using Microsoft Excel. Scoring for the pairwise comparison matrix (PCM) is as shown in Table 1.

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Table 1 Scoring for the pairwise comparison matrix (PCM)

Level of Importance	***Definition***
1	Equal importance
2	Equal to moderate importance
3	Moderate importance
4	Moderate to strong importance
5	Strong importance
6	Strong to very strong importance
7	Very strong importance
8	Very to extremely strong importance
9	Extreme importance

Source: *Saaty (1980), see also Saaty et al., 1985*

Since the selected criteria in the Multi-Criteria Decision Analysis (MCDA) are not always identical in importance, a pairwise comparison matrix (PCM) was used to determine the weightage of each of the 6 criteria that influenced the development of smart cities (Tables 2 and 3). The PCM generated the matrix ratio used in the AHP. The ranking of the criteria by order of importance is shown in Table 4.

Table 2 PCM pair-wise comparisons of criteria in the development of the smart city

Mobility	9	8	7	6	5	4	3	2	1	2	**3**	4	5	6	7	8	9	Environment
Mobility	9	8	**7**	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Economy
Mobility	9	8	7	6	5	**4**	3	2	1	2	3	4	5	6	7	8	9	Living
Mobility	9	8	7	**6**	5	4	3	2	1	2	3	4	5	6	7	8	9	Governance
Mobility	9	8	7	6	**5**	4	3	2	1	2	3	4	5	6	7	8	9	People
Environment	9	**8**	7	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Economy
Environment	9	8	7	6	5	**4**	3	2	1	2	3	4	5	6	7	8	9	Living
Environment	9	8	**7**	6	5	4	3	2	1	2	3	4	5	6	7	8	9	Governance
Environment	9	8	7	6	**5**	4	3	2	1	2	3	4	5	6	7	8	9	People
Economy	9	8	7	6	5	4	3	2	1	2	3	4	**5**	6	7	8	9	Living
Economy	9	8	7	6	5	4	**3**	2	1	2	3	4	5	6	7	8	9	Governance
Economy	9	8	7	6	5	4	3	2	1	2	3	**4**	5	6	7	8	9	People
Living	9	8	7	6	**5**	4	3	2	1	2	3	4	5	6	7	8	9	Governance
Living	9	8	7	**6**	5	4	3	2	1	2	3	4	5	6	7	8	9	People
Governance	9	8	7	6	5	4	3	2	1	2	3	**4**	5	6	7	8	9	People

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Table 3 Normalized calculated PCM values

Pairwise Comparisons for Criteria						
Criteria	Mobility	Environment	Economy	Living	Governance	People
Mobility	1	0.3333	7	4	6	5
Environment	3	1	8	4	7	5
Economy	0.1429	0.125	1	0.2	3	0.25
Living	0.25	0.25	5	1	5	6
Governance	0.1667	0.1429	0.3333	0.2	1	0.25
People	0.2	0.2	4	0.1667	4	1

Table 4 Computing the eigenvector determines the relative ranking of criteria

	Ranking	**Criteria**
0.2781	2	Mobility
0.4132	1	Environment
0.0399	5	Economy
0.1639	3	Living
0.0295	6	Governance
0.0754	4	People

Following the construction of the PCM matrix (Table 2), the weightage for each criterion under consideration was calculated using the 'row-column' normalization procedure (Table 3). For the AHP analysis, six criteria were selected to determine the ranking of elements associated with the development of a smart city, *viz.* mobility, environment, living, governance, people, and economy. This selection was based on the views of respondents of the questionnaire survey and opinions of experts. The results from computation using the AHP technique (Table 4) showed that the "Environment" criterion gave the highest weightage (eigenvector) of 0.4132; making the most important factor in the development of a smart city. The criterion ranking second in importance was "Mobility" that has a weightage of 0.2781, followed by "Living", with a weightage of 0.1639, and "People", with a weightage of 0.0754. "Economy" (weightage: 0.0399) and "Governance" (weightage: 0.0295) took fifth and sixth places in importance respectively with regard to the development of a smart city.

With "smart environment" topping the criteria list in the development of a smart city, it was clear that respondents in this study viewed environment that encompasses green buildings, green energy and green urban planning, to name a few aspects, to be a matter of the utmost concern. A sustainable environment in a city can be achieved by making the best use of renewable resources in a safe manner.

In a smart environment, the authorities are committed to diverting wastes from landfills so that even with increasing population, future generations can live

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in a city where digital technology is in sync with environment-friendly practices that are harnessed to create a smart, sustainable city that offers quality living. Urban development through innovative advancement in technology, environment-friendly activities, and empowered consumer base will result in a smarter city.

Smart cities emerge not just as an innovative and technology transformation for future urban living, but as a key strategy to tackle poverty and inequality, unemployment, and energy management. Many cities around the world have adopted smart urban technologies with an aim to become smart cities. They maintain a scientific position of excellence to ensure economic competitiveness in the transformation and modernization of their societies.

"Mobility", which is the criterion ranked second in importance in smart city development, is reflected in the resources and facilities related to transportation and ICT. Investments in such resources would raise the level of the economy, social well-being and competitiveness, these being prerequisites of a successful and integrated smart city. Hence, the development of a smart city should incorporate the all-important elements of ICT from the outset of planning. Other than the basic infrastructure, the laying down of optic fibre cables and the setting up of a city-wide comprehensive network of transportation would facilitate the efficient running of a progressive and dynamic high-tech city. The use of ICT in the city dovetails into the government's concept and goal for an automated electronic government.

Although smart people and smart economy are vital to the establishment of a smart city, governance is also seen as an important factor. Some countries focus on ICT as a technology driver and enabler of smart city, while others include socioeconomic, governance, and multi-stakeholder aspects such as community participation as ways in which to enhance sustainability, quality of life, and urban welfare.

A smart city should also be one where protection of the environment and social well-being is well entrenched. Residents' involvement in decision-making in the running of the city can be facilitated through "e-participation". The overall results of this study pointed to an inter-linkage of the six criteria that were considered crucial to the successful development of a smart city. On a larger scale, a city that is wired to work efficiently and compatibly with technology to save energy, manage resources, connect buildings and individuals, and provide mobility is considered smart. Those who champion smart cities also attempt to provide participatory governance and quality of life characteristics. While all of these qualities are beneficial, what feels noticeably absent when reading about or discussing most smart buildings and smart cities is smart people. Without people, a smart building becomes little more than an interesting commodity and that alone is not very smart.

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CONCLUSION

A synergism of the six criteria examined in this study, *viz.* smart environment, smart mobility, smart living, smart people, smart economy and smart governance, is required when developing a smart city that addresses the problems of efficiency and sustainability in its administration. A smart city represents an approach to a conceptual ideal that makes the best use of human and technological resources to build a sustainable place of work and residence. The success of a smart city is the result of careful strategic planning in all important aspects of the environment, mobility, living, people, economy and governance. More and more cities in the world are adopting the platform of smart city to ease the problems of urbanization. The future of smart city rests on planning that provides all residents, including the poor, with a caring environment. Smart city offers an enhanced quality of life. The development of a vibrant economy through the sustainable exploitation of natural resources, an investment in people and social capital built upon an infrastructure of modern transportation and communication would help reach the goal of an equitable society balanced in economy, social well-being and the environment.

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UNDERSTANDING LAND IDLING AS A STRATEGIC BEHAVIOUR: A BRIEF NOTE USING THE REAL OPTIONS APPROACH

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Abstract

One possible explanation for land idling in a rapidly transforming economy can be found by looking at the value of the option to wait and hysteresis behaviour in the land market. If investors assume that the drop is temporary and that its long term prospects outweigh current holding losses, the market will observe some form of a zone of inactivity i.e., no selling and no additional buying. The fact that landowners elect to keep their valuable land underdeveloped for prolonged periods of time suggests that idled land is more flexible and valuable than what the current market price suggests. If the revenue from farming is insufficient to sustain the activity, land is left idle; although this operational decision is open to continuous revision. The numerical example shown in the paper shows that price of land can be substantially bolstered by the option to wait embedded in land. We argue that land market prices are based on more than the land's total present value of its future income stream. In a transforming economy, the option to wait and change land-use are especially important to consider. Policy-wise, the government can discourage land idling by ensuring appropriate and suitable zoning of agricultural areas, strong adherence to the zoning conditions/plans as well as more far-sighted land conversion decisions. These efforts can go a long way to reduce the source and degree of uncertainty which is the most important cause of real option premium in land prices. Based on the nature and type of data available, future directions of research should emphasize on empirical testing of real options premium in sale prices of agricultural land.

Keywords: agricultural land prices, real options. asset pricing, opportunistic behaviour

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INTRODUCTION

Today, land idling remains a major concern for Malaysia as the country attempts to reform its dwindling agricultural sector, enhance food production capabilities and improve farmers' income. The issue came to a head when a land survey carried out in 1981 by a special task force assembled the Ministry of Agriculture revealed that there are approximately 890,000 hectares of abandoned agricultural land, equivalent to roughly 20 per cent of all agricultural land in Peninsular Malaysia. Of that amount, 18% was paddy land (Sahak, 1986). In fact, more radical figures have been quoted about the real extent of the land abandonment in Malaysia. In an article published in 1995, the Director-General of Forest Research Institute of Malaysia estimated that 3 million hectares of farmland are not effectively cultivated (New Straits Times, 3 January 1995). A decade later, the 9th Malaysia Plan (Government of Malaysia, 2006, p.85) reports that 163,000 hectares are idled between the period of 2001 to 2005. In the 10th Malaysia plan, no official statistics were given but the government stated that it is acutely aware of the scarcity of suitable farmland for food production yet no new paddy-growing area is to be opened (Government of Malaysia, 2011, p. 137). The most recent data on idle agricultural land compiled by the Department of Agriculture is for 2014, where the total recorded acreage is 119,273 hectares; a land mass that is only slightly smaller than the state of Malacca.

Table 1 Number of Lots and Total Hectarage of Idle Agricultural Land in 2014

State	Number of Lots	Hectarage	Percentage of Agricultural land
Perlis	55	54.51	
Kedah	3,065	5,518.98	
Penang	267	419.30	
Perak	5,214	14,506.92	
Selangor	3,030	9,395.05	
Negeri Sembilan	6,404	10,309.14	
Melaka	2,568	3,629.97	
Johor	8,070	17,854.93	
Pahang	19,510	34,293.27	
Trengganu	11,604	12,309.22	
Kelantan	8,663	8,907.04	
Federal Territory of Labuan	1,284	2,.75.04	
Total	**69,734**	**119,273.04**	

Source: Department of Agriculture, Ministry of Agriculture Malaysia

Within the Malaysian National Land Code, abandoned agricultural land is defined as agricultural land which has been alienated to a private individual or firm but not cultivated after three years, or alienated agricultural land with suitable infrastructure for double-cropping (if paddy land) but is only cultivated once a year (National Land Code 1965 (Malaysia)). Causes of farm abandonment

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can be broadly categorised into physical, economic and institutional factors. In locations where development pressures are intense, e.g. at the urban fringe areas, poor-yielding farms are even more vulnerable to land idling. Elsewhere, farmers may be vulnerable to poor climate conditions and price fluctuations as well low profit due to middle-men's exploitation. Other issues unveiled in studies by Mamat (1986), Buang (2001) and Manaf (2007) include out-migration of farm labour, capital limitations for farm renewal and increasing costs of production. There are also formal constraints inflicted on active land utilization such as gazetting specific farmland areas into state parks such as in the case of Mersing, Johor (Omar et al., 2011, Manaf, Hussain, Saad, and Mokhtarroji, 2012) as well as general depopulation trends in the rural areas. For a large number of inherited agricultural plots, the issue has been mainly the lack of consensus about distribution and compensation to the heirs/beneficiaries for the use or sale of the land.

One may ask, if there are indeed physical and economic challenges in operating the land profitably, then why not sell the land to a much stronger (financially and technologically) bidder? Why leave the land idle for seemingly infinite number of years? Many studies have been made about landowner's inertia in the market. Buang (2001) found that the Malays, who make up the largest group of landowners concerned, are generally reluctant to sell or lease the land to private developers, whom they view as outsiders. For historical and political reasons, owning and keeping the land in the family is far more important than earning income from it. Another possible explanation is because of the scarcity of assets that Malay rural households typically own. If land is the only major asset of value, by selling the land at its current intrinsic price, the household appears to be throwing away their wealth deposit when there is close to zero realistic chance of acquiring a similarly important asset again.

However today, the younger generation are not as keenly opposed to selling their family land assets as their forefathers were, since many have now gained income from non-agricultural activities or have migrated to the cities. Their reluctance to sell could be because they are holding out for better prices, which, in a sense, is a form of strategic behaviour. Furthermore, if the prevailing development rate persists and spreads to the rural area, landowners learn to expect that market price for land will pick up eventually, despite whatever current returns from land activities. The result of this form of behaviour is that there would be some inertia in disposing the land.

Using an options-based framework, which has its origin in the corporate finance discipline, we can offer some explanation about this unique land ownership behaviour in which individuals or firms hold up land stocks for future use, despite zero current returns. The land may be unutilized or underutilized while the owner's wait for more information about land's future worth or while waiting for a higher bid price for the land to emerge. However, how much of a

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premium is considered enough? Is there a threshold price where the seller will know that this the time to sell and the buyer, the time to buy? An astute investor/speculator builds strategic agricultural land stock by either buying directly from private individual landowners or by acquiring another agricultural firm with substantial land assets. Of course, it can be suggested that the behaviour is a natural extension of a firm's hedging strategy. For instance, a rubber plantation firm stocks up on additional rubber land when the commodity market for rubber is particularly weak. This opportunistic behaviour ensures that the firm has a head start in delivering greater market supply when prices are restored to better levels, compared to firms which had failed to strategize in that respect. However, the real options (RO) theory actually goes a step further, by incorporating the possibility or a total and irreversible land-use change into the price of the land. Agricultural land is essentially sought after for its future development multi-potential (e.g. real estate, highways, mineral exploration, high-technology industrial plants, commercial complexes and so forth), a notion consistent with what Berry (1978) describes as the 'impermanence syndrome' with respect to land-use. The value of this flexibility is inevitably capitalised in its price and it follows that the more fluid the conditions in the economy (through rapid economic growth and/or through the gradual relaxation of land-use controls), the greater the value of this flexibility. It can be argued that uncertainty in future returns on land lead to the difference between the conventional present value of land in its current use and its actual sales value. Here lies the major advantage of using the Real Options theory over the classic Net Present Value (NPV) formula, especially for a rapidly transforming economy such as Malaysia. RO is entirely able to incorporate systematically and clearly the concept of opportunistic purchasing behaviour encouraged by uncertainties in the economy, whereas the NPV approach does not. Consequently, it is possible to separate the intrinsic value of the land's present contribution and the premium derived from its flexibility in future use.

In an RO framework, the acquisition of an undeveloped land grants the buyer a right, but not an obligation, to make follow-on investments to maximise potential returns from its use in the future. In short, agricultural land essentially represents an option to profit from investments in its highest and best potential use. If market prospects later turn out to be not as promising as it was thought to be, the landowner has the option to defer the follow-on investments. The RO theory also recognises abandonment of a project as a viable alternative that is actually contemplated at the outset. Williams (1991) states if the costs of carrying an undeveloped property exceed its operating revenues, the landowner has the option to dispose the asset. However, there are exceptional circumstances in which disposal may not occur. According to Turvey (2002), this could be a special case of RO pertaining to a behavioural characteristic called hysteresis. If the landowner believes that falling output prices is merely temporary, and that the

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land's long term prospects outweigh current holding costs, they might hesitate to dispose the land hastily. On aggregate, the market may enter a zone of inactivity i.e., no selling and no additional buying.

The primary purpose of this paper is to offer an explanation about the 'rationale' behind inactivity or land idling using the Real Options framework. Most studies with respect to idle land in Malaysia employ landowners' survey data of specific communities or locations to understand the key factors leading to land abandonment. However, there has not been any study, to the best of our knowledge, that adopted a more rigorous or full-fledged econometrics treatment, either in a hedonic price model, a contingency valuation model or a long-run causality model for a larger and more comprehensive set of data for the whole country. This is understandable with the given constraints of putting together a reliable dataset for land in Malaysia; although work is progressing in that direction. However, given the attractiveness of the RO theory for understanding the abandoned agricultural land issue, we took the initiative to first advance a theoretical description of how the three types of options introduced above can be embedded in a landowner's offer or reservation price for a parcel of land. It should subsequently lead to some clues as to why land idling remains an enduring characteristic of the Malaysian land market and what can be instituted to resolve the problem.

The paper is organized as follows. In the RO theoretical section, we describe the conceptual framework that underlies causes for hysteresis in landowner's market behaviour. In the numerical example section, we present a binomial decision-making model to show the potential extent of option to wait premium enjoyed by a landowner, and how land idling could end up being a 'rational' decision for the landowner. The final section concludes and provides some recommendations for solving the idle land problem and future research directions.

REAL OPTIONS: A THEORETICAL OVERVIEW

In finance, an option is a derivative whose value is dependent upon the value of another asset, called the underlying asset (e.g. stocks, bonds, commodities, currencies and indexes), as well as fluctuations in the value of the underlying asset. Option pricing theory was developed based on seminal papers by Black and Scholes (1973), Merton (1973), and Cox, Ross and Rubinstein (1979). It is basically a concept of pricing financial assets; eventually extended to pricing 'real' assets which exhibit option-like features, including land. The term "Real Options" (RO) was first discussed by Myers (1977) and has since been an important consideration in capital-budgeting decisions by firms. In summary, a real option represents the value to a firm of having the flexibility to accept, reject, or postpone making additional investment on the project. Certain investment

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decisions made early in the timeline are to allow the firm to take more profitable opportunities that may come its way in the future, even if the precise nature of opportunities or benefits are not yet known at the time of sale (Pike & Neale, 2003). The RO outlook encourages a 'wait and see' approach to a given investment and is valuable in the project design stage (Bowman & Moskowitz, 2001). Put in another way, by choosing not to purchase the option, a firm will lose out on potentially higher profit-making opportunities that may emerge in the future.

A call option gives its holder the right to purchase an underlying asset (share of a stock, index, interest rates) at a certain exercise price upon or before a specific date. Basically, the value of a option is nil if uncertainty is fairly limited but will be high if uncertainty is also high i.e. the return is unpredictable and possibly quite large. Today the options approach is widely applied on real assets to analyse corporate investment decisions which are undertaken in stages i.e. spread out over a period of time upon reaching certain minimum optimal conditions or 'hurdles' for each stage. Examples include decisions relating to acquisition of land for development, purchase of rights on internet innovations, license for oil exploration and brand names. A strategic asset is considered a call option because it gives its holder the right to stake his claim or make a transaction on another asset, which is called the underlying asset; by paying a specified exercise price, on or before an expiration date.

There are several important characteristics of land that lends itself well to the RO hysteresis theory. Firstly, land ownership essentially represents an investment which creates opportunities to make even larger investments (and therefore a substantial amount of profit) in the future. Money paid to purchase a parcel of land is payment made to acquire the call option on an underlying asset. On the other hand, the underlying asset can be almost anything: real estate, industrial plant, commercial complex, agricultural project and so forth. Note that it is the potential profit from the underlying asset that motivates the land purchase in the first place. Hence, land is essentially the call option here.

Secondly, investment in land typically involves large sunk costs and a high degree of asset specificity, such that reversing the investment would be costly, if not impossible. For instance, residential development on agricultural land is considered irreversible because of the high cost involved and the long period needed to rehabilitate and prepare the land for agriculture again. Hence, in the case of land which does not have a perceivable expiry date, it would make sense for the landowner to wait for the best time to move to the subsequent stage of investment. In finance, this is called exercising the option.

Thirdly, the amount of profit to be made from any completed land development project is subject to various sources of market and non-market uncertainties, hence it cannot be accurately determined at the time of the land purchase. In an option-based framework, the greater the uncertainty about final

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profit, the higher the value of the option embedded in the asset. This is because larger uncertainties increase the potential positive payoffs from the option, while potential loss is kept minimal (since land can always be re-sold and its value can never drop to zero).

Finally, uncertainty tends have an adverse effect on investment levels on land; firms wait for better signals from the market and invest conservatively in the meantime. Landowners hold on to the land in spite very poor or negative farming income (due to land idling) simply to preserve the option to make greater profits from land's underlying asset later.

By now, it is easy to see that in RO framework, buying land is not merely about buying cheap and selling high, which might be the basic game plan of a true land speculator. In RO framework, there is actually an underlying asset to be realised and purchase of land is a pre-condition for that to happen. The fact that landowners elect to keep their valuable land vacant or underdeveloped for prolonged periods of time suggests that vacant land is more flexible and valuable than what the current market price suggests (see for example, Yamazaki, 2001). Landowners stand to gain by "keeping the option alive" as long as they can, unless and until personal financial circumstances or the land authorities coerce them to utilise the land or transfer it to other agents. In short, landowners who view future uncertainties with an RO perspective tend to delay the supply of land to the market. If the revenue from farming is insufficient to cover costs, land is left idle; although this operational decision is open to continuous revision from time to time.

In summary, land idling (where there is no government subsidy or compensation involved) may be a result of hysteresis similar to the phenomenon often observed in financial markets. If landowners believe that land prices will eventually turn around at some point soon, they will increase their reservation offer prices. As this behaviour spreads, supply of land to the market will shrink so much that it will push prices upwards. This tends to happen even when there are no signals indicating that the land's income or productivity will become better. Ultimately, the belief that land prices will move upwards becomes a self-fulfilling prophecy (Turvey, 2002; Maart-Noelck & Musshoff, 2011; Musshoff, Odening & Schade, 2012). Marginal cost of farming can be viewed as the strike price on an option to farm. Therefore, when marginal returns from farming fall below marginal costs, farming activities will naturally cease. Under the capital asset pricing rule, an asset with negative cash flows is considered worthless. Yet the hysteresis behaviour dictates that the price would remain high. In any case, an option value is always affixed to whatever the present value of land's income and its expected growth potential.

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NUMERICAL ANALYSIS

Say that a parcel of agricultural land is perceived suitable for residential development. Hence, the underlying asset value is the final value of completed residential properties, V. The exercise price here is the cost of constructing the property, I. The payoff or profit to the investor would be the difference between the price of the underlying asset and the option's exercise price or (V - I). The time to the option's expiration, T, can be specified as the time by which the option holder must proceed with construction or let the option lapse. It is possible to find T if the planning permission approval document, as an option agreement for example, specifies the approval's expiry period. Otherwise, it can be assumed that $T = \infty$.

In the classic financial option-pricing model, an underlying asset is assumed tradable (e.g. Stocks, bonds or indexes). Therefore, it is possible to construct a hedged portfolio that can eliminate almost all investment risks (Ross, 1976; Cox et al., 1979). This can be done by maintaining a long position in the asset and a short position in the option. A long position in the asset means that the investor buys a security with the expectation that the asset will rise in value, whereas a short position in the option entitles the investor the right (not the obligation) to sell the asset to the market at a specified price. The overall effect is that the investor is able to do away with investment risks by purchasing an option to hedge his investment against a price decline.

With respect to real assets, risks in an investment project are hedged away by dynamically trading a perfectly correlated single asset or an equivalent portfolio of marketed assets that share the same payoff probability and risks as the land project. The existence of this "twin asset" allows the investor to calculate the fair value that would prevail if the land project was indeed 'tradable' in the market. Because of the perfect hedging possibilities, investors in the RO framework can adopt a 'risk-neutral valuation' of expected future payoffs from an investment. The rate of interest is selected by referring to the "twin asset" to provide essential market information about investment risks and returns (see Dixit, 1991; Dixit & Pindyck, 1995).

To illustrate, assume that there are only two state variables. Each year, the value of the residential project which is the underlying asset, V, either goes up as Vu or down as Vd according to a given percentage with a probability ratio, p. Shown below is a decision tree indicating the project's values, V, with the two possible paths that V could take at one time interval (see Trigeorgis, 1996). The risk-free interest rate is also assumed constant, and individuals may borrow or lend as much as they wish at this rate. In this one-period analysis, the gross value of the completed land project, V, and the price of its twin asset, S, move over the next period, as follows:

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In the traditional present value formula, the present value of the project, V_0, is dependent on the actual probability, p, and the expected risk-adjusted rate of return k. Since the outcome is uncertain, V_0, can be expressed as follows,

$$V_0 = E(V_1)/(1+k) = \frac{\left[pV^{u+} + (1-p)V^d\right]}{(1+k)} \quad \text{(Eq. 1)}$$

The value of a call option, denoted as C, moves in a manner that is positively correlated with the movements in its underlying asset, V or its twin, S. The higher the value of final asset and its twin, the higher is the value of the option. Instead of actual probability, the approach uses risk-neutral probabilities, p', i.e., the probability that the expected value of returns, discounted today at a risk-free interest rate equals the asset's current market value,

$$p' = \frac{\left[(1+r)S - S^d\right]}{(S^u - S^d)} \quad \text{(Eq. 2)}$$

Having identified the main parameters in RO framework through this numerical analysis, we use the simple land development example earlier to show the computations of the option to wait embedded in undeveloped agricultural land. The **option to defer** can be reflected in the landowner's decision to withhold land from the market, cultivated or idled.

For simplicity, it shall be assumed that once the houses are constructed, all units will be sold and no follow-on investment is needed. The housing project has a realisable sales value, V, of say, either RM170K or RM60K, depending on the local market's prospects. If it is assumed that the market for houses are efficient, then the two outcomes have equal probability (p = 0.5). Let S be the

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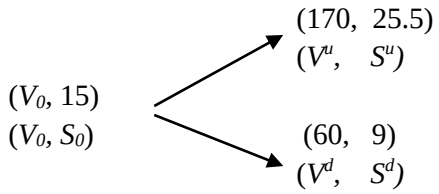
listed stock price of an identical development project which plays the role of the 'twin asset'; and is assumed to have a spot price of RM15. The value of the twin asset can change to RM25.5K (an increase of 70%) or to RM9K (a decrease of 40%), depending on housing market's current profitability outlook. Finally, because both the project and its twin security are perfectly correlated, presumably they would share the same expected rate of return, *k* and risk-free interest rate, *r*, which are assumed to be 15% and 4% respectively. To help find the project's present value at the beginning i.e., when the investment decision is being considered, V_0, the land development decision tree is presented as follows,



Because gross project value, *V*, is exactly proportional to the twin asset's price, *S*, the former also increases by 70 percent or fall by 40 percent for each period and with probability, $p = 0.5$. Hence, the present value of the project's final asset, V_0, can be obtained via the standard NPV formula by working backwards following Eq. 1 above.

Substituting the relevant values of *p* and k yields $V_0 = \frac{[(0.5\times 170)+(0.5\times 60)]}{(1+0.15)} = 100K$. Whereas, in the RO formula, the risk-neutral probability, p', is computed according to Eq. 2, where $p' = [(1.04\times 15)-9]/(25.5-9) = 0.4$. Substituting the relevant values of risk-free interest rate, *r* and risk-neutral probability, *p'* into Eq. 1 will yield

$$V_0 = \frac{[(0.4\times 170)+(0.6\times 60)]}{(1+0.04)} = 100K$$

.

Since an option is priced relative to the value of its underlying asset, *V*, the price of an option, C_0, can be expressed in a similar manner,

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$$C_0 = \frac{\left[p'C^u + (1-p')C^d\right]}{(1+r)} \quad \text{(Eq. 3)}$$

Using this basic formulation, it is possible to evaluate the option to defer investment in an asset (Trigeorgis, 1996). To complete the parameters of the model, assume that the cost of construction computed at the beginning of the investment period, I_0, is RM105K. The value of an option to wait is the difference between the final asset's value and the exercise price, or zero, whichever is greater,

$$\max (V- I_0, 0). \quad \text{(Eq. 4)}$$

At the beginning of the investment, the expected future value of the construction cost at the end of Year 1 is $I_1 = 105(1+0.04) = 109.2K$. Say that local building laws require construction to commence within one year of the planning permission approval. To correspond to probabilities that final asset value, V, can go up or down, the probable option price, C, can be computed based on Eq. 3,

$$C^u = \max(V^u - I_1, 0) = \max[170 - 109.2, 0] = 60.8\text{K}$$
$$C^d = \max(V^d - I_1, 0) = \max[60 - 109.2, 0] = 0$$

Using the two possible option prices, the timing option's present value is found to be equivalent to

$$C_0 = \frac{\left[p'E^u + (1-p')E^d\right]}{(1+r)} = \frac{\left[(0.4\times 60.8) + (0.6\times 0)\right]}{(1+0.04)} = 23.38$$

% of the project's present value, V_0, which was computed as RM100K earlier.

The example above shows that landowners stand to gain by "keeping the option alive" for as long as they can, unless and until personal financial circumstances or the law forces them to utilise or put the land on sale. In the example above option to wait is worth as much as 23 per cent of the value of the land. Whether or not the land is cultivated does not take anything away from the option-based price of the land. Basically landowners hold on to the land in spite very poor or negative farming income (due to land idling) simply to preserve the option to make greater profits from land's underlying asset at a future date.

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CONCLUSION

Land is viewed as a call option on future outputs of the land either in development or agricultural use. Both landowners and prospective buyers are aware of the flexibility in land-use and assume optimistic positions with respect to future returns, particularly if there are (expected) continuous high rate of economic growth and a rather lax land-control environment. It follows that the more fluid the conditions in the economy, the greater the value of land's flexibility and hence this option to wait. We used a binomial decision tree to provide a numerical example of how the different parameters in RO work as well how the final RO pricing decision differs substantially from what a classic net present value calculation would produce. By assuming specific values for the parameters, our example showed that the option to wait value can constitute up to 23% of the sales price of the land. In general, with each land purchase decision lying before them, landowners can adopt values for probabilities and risks to the same decision tree analysis above when deciding on the offer or reservation price that he wants for his land.

To summarize, ownership of land grants its owner various type of options namely: to complete, to defer or to reject potential project (underlying asset) in the future. The option to defer coupled with hysteresis in the land market may be responsible for the 'zone of inactivity' i.e., no selling and no additional buying, even when the land's intrinsic value is close to zero. Understanding the significance of the option to wait and the ability to measure its magnitude in relation to price may give some clues why land idling is technically a rational solution for landowners. Subsequently, the findings imply that government efforts which do not recognise the value of the option might fail to induce landowners to sell their land rather than keeping the land idle. For planners in general, we hope to show in a technical manner, that land valuations and market values are based on more than the land's total present value of its future income stream. In an economy that is undergoing rapid transformation, the option to wait and change land-use statuses are extremely important to consider. Policy-wise, the government can discourage land idling by ensuring appropriate and suitable zoning of agricultural areas, strong adherence to the zoning conditions/plans as well as more far-sighted land conversion decisions. These efforts can go a long way to reduce the source and degree of uncertainty which is, as explained in the theoretical part, the single most important cause of real option premium in land prices.

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SUSTAINABLE WELL-BEING: AN EMPIRICAL EXPLORATION ON HUMAN NEEDS AND HUMAN INTERDEPENDENCY

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Abstract

This study is a part of an ongoing research to discover subjective indicators of sustainable well-being for Malaysia. Initial findings recognized two important notions of subjective measures of sustainable well-being. The first notion suggested that sustainable well-being manifested in human interdependency. The second notion suggested that human interdependency is attained when human needs are fulfilled. Maslow's Hierarchy of Needs was adopted to indicate the stages and examples of each needs. There were eight stages of human needs which were adapted into 24 common human needs substituted under eight components of three human needs dimensions. The dimensions were (i) basic necessities, (ii) complimentary needs, and (iii) desired opportunities. It was hypothesized that human needs influence the level of human interdependency. This paper delivers an empirical analysis testing the effects of human needs on human interdependency. The study intends to determine the influence of human needs on human interdependency. Questionnaire survey was conducted and 894 reliable samples were gathered. 192 Independent Sample T-Tests were conducted to determine statistical difference in levels of eight components of human interdependency, between respondents who claimed difficult and respondents who claimed easy to attain 24 human needs in the past year. There were statistically significant differences in most of the components of human interdependency between groups of 24 human needs. The empirical study conducted in the central regions of a developing and multicultural country, Malaysia, is a useful reference to subjective well-being studies piloted in areas of similar characteristics.

Keyword: sustainable well-being, human interdependency, human needs

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INTRODUCTION

Human interdependency (HI) is growingly discussed in the field positive psychology as a strong determinant to sustainable well-being (Kjell, 2011; O'Brien, 2012). HI place attention on the change in one's well-being resulting from one's intentional and unintentional contribution to others well-being. Two recognized dimensions of human interdependency are (i) human interdependence with other humans (HIH), and (ii) human interdependence with the environment (HIE) (Bakar et al., 2015a, 2015b, 2015c). The concept of HI is similar to self-actualization and self-transcends of Maslow's Hierarchy of Needs (MHON) (Tay & Diener, 2011; Kjell, 2011).

MHON which often depicted in hierarchical pyramid was first introduced in 1943 to recognize pattern of human motivation in fulfilling human needs. The most urgent needs were placed at the bottom of the pyramid. In order for a person to be motivated in achieving higher needs, the lower needs must be fulfilled (Geller, 2015; Tay & Diener, 2011). The MHON was adopted in this study to indicate examples of human needs to represent every stage of MHON. 24 common human needs were identified and substituted under eight components of three human needs dimensions (refer to Table 2). Basic necessities represent survival factors that meant without it living system is disrupted. Complimentary needs comprise of needs which may cause difficulties in life if they were not met. Desired opportunities represent human needs that fulfil human potential, although without them lives would not be difficult. It was hypothesized that human needs influence the level of human interdependency (Tay & Diener, 2011).

METHODOLOGY

The survey questionnaires were conducted in Selangor, Putrajaya and Kuala Lumpur between November and December 2015. The survey was targeted at working Malaysians age from 18 to 65 years old. 1000 survey questionnaires were distributed and 894 samples were found reliable for statistical tests. The respondents were inquired to state whether fulfilling 24 human needs (refer to Table 1) were 'difficult' or 'easy' for them in the past year (2015). The respondents were also inquired to rate their levels of human interdependency under 80 self-reported statements. 40 of the statements account for HIH and the remaining 40 statements account for HIE. The components of HIH include (i) personal empowerment, (ii) positive relations, (iii) organizational opportunity, and (iv) community mobilization6,7. The components of HIE include (i) personality and lifestyle, (ii) interaction with nature, (iii) attitude and pro-environmental behaviour, and (iv) external condition to behavior5,7. Every 10 statements represent one component of HIH or HIE. Responses for the self-reported statements were on Likert-type scale that range from 0 = 'highly false' to 10 = 'highly true'. The scores were averaged to represent the overall score for each component of HIH and HIE (refer to Table 2).

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Table 1 Dimensions and Components of Human Needs – Independent Variables

Dimension	Components: MHON	Code	Human Needs	Diff. (%)	Easy (%)
(D1) Basic Necessities *Without it living system is disrupted*	C1: Biological & Physiological Needs *Survival elements*	HN 1	Nutritious food	6.6	93.4
		HN 2	Medical treatment	8.6	91.4
		HN 3	Clean water for washing and drinking	5.5	94.5
		HN 4	Well-functioned toilet	28.3	71.7
	C2: Safety & Security Needs *Long-term survival and stability:*	HN 5	Adequate electricity supply	7.6	92.4
		HN 6	Affordable house & surrounding amenities	22.3	77.7
		HN 7	Financial stability	49.6	50.4
		HN 8	Personal security	46.9	53.1
		HN 9	Clean air	42.8	57.2
		HN 10	Health and wellness assurance	43.6	56.4
(D2) Complimentary Needs *Without it, living system is not disrupted, but lives would be difficult*	C3: Belonging & Love Needs *Affiliation and acceptance*	HN 11	Balance between personal & work time	52.6	47.4
		HN 12	Social Tolerance	44.7	55.3
		HN 13	Communication line	3.9	96.1
		HN 14	Internet line/ hotspot	19.2	80.8
	C4: Esteem Needs *Achievement and recognition*	HN 15	Primary school education	3.0	97.0
		HN 16	Secondary school education	5.8	94.2
(D2) Desired Opportunities *Without it, living system is not disrupted, and lives would not be difficult*	C5: Cognitive Needs *Knowledge & understanding*	HN 17	Tertiary/higher education	12.1	87.9
		HN 18	Job opportunity	41.6	58.4
	C6: Aesthetic Needs *Order and beauty*	HN 19	Clean & well-maintained recreational park	42.7	57.3
		HN 20	Diversity of plants and animal species	46.0	54.0
	C7: Self-Actualization Needs *Realization of potential*	HN 21	Rights to choose leaders	59.3	40.7
		HN 22	Freedom of speech	64.8	35.2
	C8: Self-Transcends Needs *Self-functioning*	HN 23	Corruption free opportunities	69.9	30.1
		HN 24	Freedom to express arts & diversity	48.8	51.2

Table 2 Human Interdependency – Dependent Variables

Human Interdependency (HIH)	Code	Components of Human Interdependency	Mean
Human Interdependence with other Humans (HIH)	PE	Personal Empowerment	
	PR	Positive Relations	
	OO	Organizational Opportunity	
	CM	Community Mobilization	
	PL	Personality and Lifestyle	

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Human Interdependence with the Environment (HIE)	IN	Interaction with Nature
	AP	Attitude and Pro-Environmental Behaviour
	EC	External Condition to Behaviour

Independent sample t-tests were conducted to determine the levels of human interdependency (HI) of four components of HIH and four components HIE (refer to Table 1) between respondents who claimed 'easy' and respondents who claimed 'difficult' to fulfil 24 human needs (HN). The Independent T-Test assumed that the variance of the two groups being compared to be equal. The homogeneity of variance was tested using Levene's Test for Equality of Variances. It is to be observed that for some of the HNs, the number of respondents who claimed 'difficult' and the number of respondents who claimed 'easy' extremely differ. Thus violate the assumption of homogeneity and the tests can result to Type 1 error. In order to overcome the violation of the homogeneity assumption, the Welch-Satterthwaite method were used to adjust the degree of freedom (df) and resulted to increased p-value above the significance level of 0.05.

EMPIRICAL FINDINGS

Descriptive statistics in Table 3 indicated that the mean of all components of HIH was higher for respondents who claimed easy than those claimed difficult in fulfilling all of the HNs. Almost all mean of HIE components were higher for respondents who claimed easy than those claimed difficult in fulfilling all of the HNs. A few outputs yielded intriguing descriptive statistics for HIE components (HN 1, IN; HN 3, PL; HN 13, IN; HN 15, EC and AP).

Out of 192 statistical analyses conducted, 140 of them yielded significant outputs ($p < 0.05$). Thus implied that HI significantly differ between groups of HNs. Out of the 140 significant outputs, 65 of the tests were between groups of equal variance ($p > 0.05$) and 75 of the tests were between groups of unequal variance ($p < 0.05$) based on the Levene's Tests of Equality of Variance (refer to Table 3). The analyses on HIH components yielded slightly more significant statistical results (72 tests) compared to HIE components (68 tests) (refer to Table 4).

12 HNs out of 24 HNs had statistically significant effects on the mean of all HIH and HIE components. Majority of the mentioned HNs belonged in D1, which meant without fulfilment of these needs, living system would be disrupted. These HNs were HN 4, well-functioned toilet (C1, D1); HN 7, financial stability (C2, D1); HN 8, personal security (C2, D1); HN 9, clean air (C2, D1); HN 10, health and wellness assurance (C2, D1); HN 11, balance between personal and work time (C3, D2); HN 12, social Tolerance (C3, D2); HN 16, secondary school education (C4, D2); HN 19, clean and well-maintained recreational park (C6, D3); HN 20, diversity of plants and animal species (C6, D3); HN 22, freedom of

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speech (C7, D3); and finally, HN 24, freedom to express arts and diversity (C8, D3). Among the 12 HNs mentioned, one in particular (HN 16, secondary school education) had equal variance between groups in all of the tests. Overall, the results implied that the mean of HIH and HIE were statistically higher for respondents who claimed that attaining the mentioned human needs were easy compared to those who claimed difficult.

The mean of PE (personal empowerment) in particular significantly differ between groups of 21 HNs. 10 of the statistical tests had groups of equal variance. The HNs were HN 1, nutritious food (C1, D1); H2, medical treatment (C1, D1); HN 3, clean water for washing and drinking (C1, D1); HN 4, well-functioned toilet (C1, D1); HN 5, adequate electricity supply (C2, D1); HN 6, affordable houses and surrounding amenities (C2, D1); HN 14, internet line or hotspot (C3, D2); H16, secondary school education (C4, D2); HN 17, tertiary or higher education (C5, D3); HN 21, rights to choose leaders (C7, D3). The results implied that the level of personal empowerment was statistically higher for respondents who claimed that attaining the mentioned human needs were easy compared to those who claimed difficult.

The analysis yielded intriguing outputs for HN 13 and HN 15. There were no statistical differences in levels of all HIH and HIE components between groups of HN 13 (communication line) and HN 15 (primary school education). Similarly, HN 14 (internet connection or hotspot) and HN 6 (affordable house and surrounding amenities) also had only one significant statistical effect on PE. D2 represents HN 13, HN 14 and HN 15, which meant without these needs, living system would not be disrupted but lives would be difficult. HN 6 belongs in D1 which suggested that without it, living system would be disrupted. The results suggested that the level of HIH and HIE was relatively independent from fulfilment of (i) affordable house, (ii) communication line, (iii) internet connection, and (iv) primary school education.

Table 3 Human Needs and Human Interdependency

		Descriptive Statistics		Inferential Statistics					
IV	DV	Diff.	Easy	F	Sig.	t	df	Sig.	MD
HN 1	PP	6.83	7.22	0.030	0.86	-2.389	892	0.02	-0.39
	PR	6.81	7.26	3.955	0.04	-2.271	63.5	0.03	-0.45
	OO	6.95	7.27	4.192	0.04	-1.622	63.7	0.11	-0.33
	CM	6.38	6.85	1.870	0.17	-2.729	892	0.01	-0.47
	PL	6.98	7.05	1.247	0.26	-0.439	892	0.66	-0.07
	IN	*6.72*	*6.68*	5.736	0.02	0.166	63.1	0.87	*0.04*
	AP	6.33	6.56	0.737	0.39	-1.131	892	0.26	-0.23
	EC	5.94	6.37	1.424	0.23	-2.140	892	0.03	-0.42
HN 2	PP	6.83	7.23	0.319	0.57	-2.760	892	0.01	-0.39
	PR	6.79	7.28	2.703	0.10	-3.284	892	0.00	-0.48
	OO	6.83	7.29	2.782	0.10	-3.043	892	0.00	-0.46
	CM	6.48	6.85	0.809	0.37	-2.443	892	0.02	-0.37
	PL	6.76	7.07	1.663	0.20	-2.125	892	0.03	-0.31
	IN	6.55	6.69	0.837	0.36	-0.906	892	0.37	-0.14
	AP	6.21	6.58	0.596	0.44	-2.064	892	0.04	-0.37

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	EC	5.99	6.37	1.860	0.17	-2.194	892	0.03	-0.38
	PP	6.76	7.22	0.088	0.77	-2.615	892	0.01	-0.46
	PR	6.82	7.26	7.333	0.01	-1.964	51.5	0.06	-0.44
H	OO	7.12	7.26	1.592	0.21	-0.758	892	0.45	-0.14
N	CM	6.64	6.83	1.115	0.29	-1.003	892	0.32	-0.19
	PL	*7.16*	*7.04*	0.007	0.93	0.671	892	0.50	*0.12*
3	IN	6.62	6.69	3.132	0.08	-0.356	892	0.72	-0.07
	AP	6.42	6.56	0.592	0.44	-0.600	892	0.55	-0.13
	EC	6.17	6.35	2.958	0.09	-0.828	892	0.41	-0.18
	PP	7.03	7.26	0.325	0.57	-2.491	892	0.01	-0.22
	PR	7.04	7.31	0.148	0.70	-2.884	892	0.00	-0.26
H	OO	7.09	7.32	0.340	0.56	-2.385	892	0.02	-0.22
N	CM	6.53	6.93	3.985	0.05	-4.227	892	0.00	-0.40
	PL	6.80	7.15	12.964	0.00	-4.129	536.6	0.00	-0.35
4	IN	6.46	6.77	0.055	0.82	-3.207	892	0.00	-0.32
	AP	6.25	6.66	3.870	0.04	-3.887	526.0	0.00	-0.41
	EC	5.95	6.49	4.090	0.04	-5.233	512.4	0.00	-0.54
	PP	6.83	7.22	1.670	0.20	-2.579	892	0.01	-0.39
	PR	6.60	7.29	0.064	0.80	-4.410	892	0.00	-0.68
H	OO	6.81	7.29	0.252	0.62	-2.993	892	0.00	-0.48
N	CM	6.73	6.83	0.126	0.72	-0.610	892	0.54	-0.10
	PL	6.69	7.08	2.672	0.10	-2.463	892	0.01	-0.38
5	IN	6.39	6.71	0.047	0.83	-1.865	892	0.06	-0.31
	AP	6.26	6.57	1.695	0.19	-1.601	892	0.11	-0.31
	EC	6.10	6.36	4.070	0.04	-1.591	83.6	0.12	-0.25
	PP	7.04	7.24	0.023	0.88	-2.084	892	0.04	-0.20
	PR	7.11	7.27	0.826	0.36	-1.596	892	0.11	-0.16
H	OO	7.22	7.26	0.348	0.56	-0.348	892	0.73	-0.04
N	CM	6.72	6.85	0.269	0.60	-1.211	892	0.23	-0.13
	PL	6.91	7.09	1.003	0.32	-1.761	892	0.08	-0.17
6	IN	6.72	6.67	0.004	0.95	0.505	892	0.61	0.05
	AP	6.43	6.58	4.045	0.04	-1.362	354.9	0.17	-0.16
	EC	6.28	6.35	7.279	0.01	-0.702	371.5	0.48	-0.08
	PP	7.06	7.33	9.347	0.00	-3.424	883.1	0.00	-0.27
	PR	7.12	7.35	8.972	0.00	-2.818	886.1	0.01	-0.23
H	OO	7.11	7.40	3.436	0.06	-3.432	892	0.00	-0.29
N	CM	6.61	7.02	9.828	0.00	-4.799	878.8	0.00	-0.41
	PL	6.89	7.21	9.380	0.00	-3.890	883.8	0.00	-0.32
7	IN	6.54	6.82	7.361	0.01	-3.239	882.4	0.00	-0.29
	AP	6.32	6.77	6.591	0.01	-4.531	880.9	0.00	-0.46
	EC	6.02	6.65	12.635	0.00	-6.662	879.6	0.00	-0.64
	PP	7.00	7.36	8.750	0.00	-4.500	891.7	0.00	-0.36
	PR	7.10	7.36	6.277	0.01	-3.166	891.5	0.00	-0.26
H	OO	7.12	7.37	1.903	0.17	-3.049	892	0.00	-0.26
N	CM	6.64	6.98	9.011	0.00	-3.952	891.9	0.00	-0.34
	PL	6.83	7.24	6.704	0.01	-5.131	891.0	0.00	-0.42
8	IN	6.50	6.84	4.397	0.04	-3.874	891.7	0.00	-0.34
	AP	6.31	6.75	3.968	0.04	-4.383	891.9	0.00	-0.44
	EC	6.07	6.57	15.110	0.00	-5.186	889.2	0.00	-0.50
	PP	7.10	7.26	4.859	0.03	-2.022	857.1	0.04	-0.16
	PR	7.11	7.33	8.984	0.00	-2.711	869.1	0.01	-0.22
H	OO	7.10	7.37	4.154	0.04	-3.253	856.8	0.00	-0.27
N	CM	6.61	6.97	6.748	0.01	-4.259	869.0	0.00	-0.36
	PL	6.93	7.14	4.636	0.03	-2.464	845.8	0.01	-0.20
9	IN	6.56	6.78	1.865	0.17	-2.436	892	0.02	-0.22
	AP	6.34	6.70	8.790	0.00	-3.603	882.1	0.00	-0.36
	EC	6.10	6.52	0.716	0.40	-4.318	892	0.00	-0.42

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	PP	7.04	7.31	11.697	0.00	-3.330	880.8	0.00	-0.26
	PR	7.08	7.35	13.156	0.00	-3.394	884.7	0.00	-0.28
H	OO	7.04	7.42	8.981	0.00	-4.514	867.3	0.00	-0.38
N	CM	6.58	7.01	21.280	0.00	-5.170	889.7	0.00	-0.43
	PL	6.76	7.27	15.788	0.00	-6.364	883.1	0.00	-0.51
10	IN	6.53	6.80	7.946	0.01	-3.071	879.6	0.00	-0.27
	AP	6.28	6.75	7.156	0.01	-4.665	873.9	0.00	-0.47
	EC	6.00	6.60	5.128	0.02	-6.342	867.0	0.00	-0.61
	PP	7.08	7.33	6.566	0.01	-3.101	862.6	0.00	-0.25
	PR	7.13	7.34	4.938	0.03	-2.528	871.8	0.01	-0.21
H	OO	7.11	7.41	5.203	0.02	-3.557	871.6	0.00	-0.30
N	CM	6.65	7.01	10.794	0.00	-4.211	856.0	0.00	-0.36
	PL	6.86	7.26	8.756	0.00	-4.935	851.3	0.00	-0.41
11	IN	6.54	6.84	1.286	0.26	-3.389	892	0.00	-0.30
	AP	6.26	6.87	0.626	0.43	-6.113	892	0.00	-0.61
	EC	6.02	6.69	0.342	0.56	-6.895	892	0.00	-0.66
	PP	7.07	7.29	9.487	0.00	-2.810	887.5	0.01	-0.22
	PR	7.12	7.33	9.411	0.00	-2.501	883.0	0.01	-0.20
H	OO	7.12	7.36	10.817	0.00	-2.916	882.1	0.00	-0.24
N	CM	6.60	6.99	13.523	0.00	-4.605	888.5	0.00	-0.39
	PL	6.81	7.24	20.994	0.00	-5.287	891.2	0.00	-0.43
12	IN	6.59	6.76	9.432	0.00	-1.991	883.3	0.04	-0.18
	AP	6.30	6.75	4.017	0.04	-4.433	880.0	0.00	-0.45
	EC	6.02	6.59	1.282	0.26	-5.893	892	0.00	-0.57
	PP	6.99	7.20	0.018	0.89	-1.026	892	0.31	-0.21
	PR	6.93	7.25	0.843	0.36	-1.475	892	0.14	-0.31
H	OO	7.14	7.26	0.179	0.67	-0.518	892	0.60	-0.11
N	CM	6.55	6.83	0.092	0.76	-1.278	892	0.20	-0.28
	PL	6.91	7.05	0.343	0.56	-0.666	892	0.51	-0.14
13	IN	*6.72*	*6.68*	0.329	0.57	0.157	892	0.88	*0.04*
	AP	6.22	6.56	0.509	0.48	-1.297	892	0.20	-0.34
	EC	6.29	6.34	0.271	0.60	-0.192	892	0.85	-0.05
	PP	6.83	7.28	1.015	0.31	-4.510	892	0.00	-0.46
	PR	7.22	7.24	4.407	0.04	-0.181	240.9	0.86	-0.02
H	OO	7.11	7.29	3.754	0.05	-1.682	892	0.09	-0.18
N	CM	6.71	6.84	0.474	0.49	-1.193	892	0.23	-0.13
	PL	6.84	7.10	12.024	0.00	-2.255	234.1	0.03	-0.26
14	IN	6.56	6.71	0.439	0.51	-1.290	892	0.20	-0.15
	AP	6.51	6.56	0.619	0.43	-0.339	892	0.74	-0.04
	EC	6.26	6.36	1.343	0.25	-0.772	892	0.44	-0.10
	PP	6.90	7.20	0.059	0.81	-1.285	892	0.20	-0.30
	PR	6.84	7.25	0.024	0.88	-1.677	892	0.09	-0.40
H	OO	6.94	7.26	0.410	0.52	-1.280	892	0.20	-0.32
N	CM	6.75	6.82	1.425	0.23	-0.271	892	0.79	-0.07
	PL	6.96	7.05	1.942	0.16	-0.363	892	0.72	-0.09
15	IN	6.57	6.69	1.881	0.17	-0.457	892	0.65	-0.12
	AP	*6.69*	*6.54*	0.538	0.46	0.501	892	0.62	*0.15*
	EC	*6.57*	*6.33*	1.003	0.32	0.849	892	0.40	*0.24*
	PP	6.58	7.23	0.007	0.93	-3.794	892	0.00	-0.65
	PR	6.54	7.28	0.189	0.66	-4.193	892	0.00	-0.73
H	OO	6.39	7.31	0.946	0.33	-5.124	892	0.00	-0.91
N	CM	6.37	6.85	0.060	0.81	-2.623	892	0.01	-0.48
	PL	6.40	7.09	1.932	0.17	-3.902	892	0.00	-0.68
16	IN	6.10	6.72	0.112	0.74	-3.249	892	0.00	-0.62
	AP	6.13	6.57	0.054	0.82	-2.024	892	0.04	-0.44
	EC	6.02	6.36	3.056	0.08	-1.636	892	0.10	-0.34
H	PP	6.76	7.25	0.036	0.85	-4.010	892	0.00	-0.49

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N	PR	6.67	7.31	0.025	0.88	-5.162	892	0.00	-0.65
	OO	6.70	7.33	0.973	0.32	-4.898	892	0.00	-0.63
17	CM	6.43	6.87	0.946	0.33	-3.374	892	0.00	-0.44
	PL	6.72	7.09	0.042	0.84	-2.983	892	0.00	-0.38
	IN	6.41	6.72	0.121	0.73	-2.297	892	0.02	-0.31
	AP	6.40	6.57	2.132	0.15	-1.046	892	0.30	-0.16
	EC	5.97	6.39	8.157	0.00	-3.096	147.4	0.00	-0.42
	PP	7.12	7.25	1.423	0.23	-1.635	892	0.10	-0.13
	PR	7.14	7.30	0.001	0.98	-1.917	892	0.06	-0.16
H	OO	7.11	7.35	2.769	0.10	-2.874	892	0.00	-0.25
N	CM	6.67	6.92	3.705	0.06	-2.901	892	0.00	-0.25
	PL	6.85	7.19	5.621	0.02	-4.054	839.2	0.00	-0.33
18	IN	6.59	6.75	1.041	0.31	-1.821	892	0.07	-0.16
	AP	6.40	6.65	2.947	0.09	-2.494	892	0.01	-0.26
	EC	6.05	6.55	5.666	0.02	-5.171	830.6	0.00	-0.50
	PP	7.04	7.31	4.560	0.03	-3.445	852.2	0.00	-0.28
	PR	7.01	7.40	4.740	0.03	-4.669	844.4	0.00	-0.38
H	OO	7.05	7.41	1.750	0.19	-4.238	892	0.00	-0.36
N	CM	6.58	7.00	6.378	0.01	-4.887	858.4	0.00	-0.41
	PL	6.88	7.18	19.493	0.00	-3.699	883.4	0.00	-0.30
19	IN	6.50	6.82	4.231	0.04	-3.620	862.0	0.00	-0.32
	AP	6.23	6.78	0.250	0.62	-5.419	892	0.00	-0.55
	EC	5.89	6.68	3.949	0.04	-8.321	844.1	0.00	-0.79
	PP	7.09	7.28	4.878	0.03	-2.412	884.6	0.02	-0.19
	PR	7.04	7.40	6.570	0.01	-4.443	886.4	0.00	-0.36
H	OO	7.08	7.40	1.480	0.22	-3.689	892	0.00	-0.31
N	CM	6.57	7.03	4.943	0.03	-5.430	877.6	0.00	-0.46
	PL	6.91	7.17	14.561	0.00	-3.236	891.7	0.00	-0.26
20	IN	6.48	6.86	1.073	0.30	-4.268	892	0.00	-0.38
	AP	6.30	6.76	1.329	0.25	-4.462	892	0.00	-0.45
	EC	5.93	6.69	4.667	0.03	-8.070	883.4	0.00	-0.76
	PP	7.12	7.30	8.060	0.01	-2.097	734.9	0.04	-0.17
	PR	7.19	7.30	2.091	0.15	-1.389	892	0.17	-0.12
H	OO	7.20	7.33	4.430	0.04	-1.486	743.0	0.14	-0.13
N	CM	6.70	6.99	3.093	0.08	-3.267	892	0.00	-0.28
	PL	6.91	7.25	3.017	0.08	-4.118	892	0.00	-0.34
21	IN	6.60	6.80	1.449	0.23	-2.203	892	0.03	-0.20
	AP	6.40	6.76	6.011	0.01	-3.375	725.5	0.00	-0.36
	EC	6.12	6.66	0.113	0.74	-5.474	892	0.00	-0.54
	PP	7.06	7.43	9.705	0.00	-4.281	596.1	0.00	-0.37
	PR	7.15	7.39	5.567	0.02	-2.707	606.3	0.01	-0.24
H	OO	7.15	7.44	5.340	0.02	-3.152	607.2	0.00	-0.28
N	CM	6.71	7.02	4.337	0.04	-3.418	597.1	0.00	-0.31
	PL	6.88	7.35	8.468	0.00	-5.337	579.8	0.00	-0.47
22	IN	6.56	6.91	4.448	0.04	-3.753	596.7	0.00	-0.36
	AP	6.39	6.84	6.582	0.01	-4.083	586.7	0.00	-0.45
	EC	6.09	6.80	3.791	0.05	-7.186	892	0.00	-0.72
	PP	7.12	7.37	5.828	0.02	-2.764	476.4	0.01	-0.25
	PR	7.20	7.31	3.730	0.05	-1.255	892	0.21	-0.11
H	OO	7.22	7.33	6.034	0.01	-1.211	473.3	0.23	-0.12
N	CM	6.76	6.95	1.876	0.17	-2.056	892	0.04	-0.19
23	PL	6.98	7.21	8.905	0.00	-2.490	452.1	0.01	-0.24
	IN	6.61	6.85	1.549	0.21	-2.445	892	0.02	-0.24
	AP	6.46	6.76	8.832	0.00	-2.553	448.3	0.01	-0.30
	EC	6.20	6.67	1.381	0.24	-4.476	892	0.00	-0.47
H	PP	7.08	7.30	9.516	0.00	-2.738	888.6	0.01	-0.22
N	PR	7.13	7.33	17.587	0.00	-2.353	882.5	0.02	-0.19
	OO	7.10	7.39	13.925	0.00	-3.482	888.9	0.00	-0.29

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24	CM	6.66	6.97	12.100	0.00	-3.572	887.3	0.00	-0.30
	PL	6.85	7.24	16.449	0.00	-4.776	878.7	0.00	-0.39
	IN	6.49	6.86	4.676	0.03	-4.169	890.9	0.00	-0.37
	AP	6.31	6.78	5.863	0.02	-4.705	889.6	0.00	-0.47
	EC	6.00	6.66	3.064	0.08	-6.844	891.9	0.00	-0.65

Table 3 Summary of Statistical Outputs

Human Needs		HIH				HIE				Total Count
		PE	PR	OO	CM	PL	IN	AP	EC	
D1	HN 1	*S	S	*NS*	*S	*NS*	*NS*	*NS*	*S	3*S / 1S / 4*NS*
	HN 2	*S	*S	*S	*S	*S	*NS*	*S	*S	7*S / 0S / 1*NS*
	HN 3	*S	S	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	1*S / 1S / 6*NS*
	HN 4	*S	*S	*S	*S	S	*S	S	S	5*S / 3S / 0*NS*
	HN 5	*S	*S	*S	*NS*	*S	*NS*	*NS*	*NS*	4*S / 0S / 4*NS*
	HN 6	*S	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	1*S / 0S / 7*NS*
	HN 7	S	S	*S	S	S	S	S	S	1*S / 7S / 0*NS*
	HN 8	S	S	*S	S	S	S	S	S	1*S / 7S / 0*NS*
	HN 9	S	S	S	S	S	*S	S	S	1*S / 7S / 0*NS*
	HN 10	S	S	S	S	S	S	S	S	0*S / 8S / 0*NS*
D2	HN 11	S	S	S	S	S	*S	*S	*S	3*S / 5S / 0*NS*
	HN 12	S	S	S	S	S	S	S	*S	1*S / 7S / 0*NS*
	HN 13	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	0*S / 0S / 8*NS*
	HN 14	*S	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	1*S / 0S / 7*NS*
	HN 15	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	*NS*	0*S / 0S / 8*NS*
	HN 16	*S	*S	*S	*S	*S	*S	*S	*S	8*S / 0S / 0*NS*
D3	HN 17	*S	*S	*S	*S	*S	*S	*NS*	S	6*S / 1S / 1*NS*
	HN 18	*NS*	*NS*	*S	*S	S	*S	*S	S	4*S / 2S / 2*NS*
	HN 19	S	S	*S	S	S	S	*S	*S	3*S / 5S / 0*NS*
	HN 20	S	S	*S	S	S	*S	*S	S	3*S / 5S / 0*NS*
	HN 21	*S	*NS*	*NS*	*S	*S	*S	*S	*S	6*S / 0S / 2*NS*
	HN 22	S	S	*S	S	S	S	S	*S	2*S / 6S / 0*NS*
	HN 23	S	*NS*	*NS*	*S	S	*S	S	*S	3*S / 3S / 2*NS*
	HN 24	S	S	S	S	S	S	S	*S	1*S / 7S / 0*NS*
Total Count		10*S 11 S 3 *NS*	5*S 12 S 7 *NS*	11*S 5 S 8 *NS*	8*S 10 S 6 *NS*	5*S 13 S 6 *NS*	9*S 7 S 8 *NS*	7*S 9 S 8 *NS*	10*S 8 S 6 *NS*	65*S 75 S 52 *NS*

NS : No statistical significance between groups
S : Statistically significant between groups of equal variance not assumed
*S : Statistically significant between groups of equal variance assumed

SUMMARY AND CONCLUSION

There were three general yet inquisitive findings recognized from the statistical results. The following points summarized these findings.

1. The descriptive statistics suggested that fulfilments of HN 1 (nutritious food), HN 3 (clean water for washing and drinking), HN 13 (communication line) and HN 15 (primary school education) were likely lowering the levels of HIE. Yet the mean differences were trivial and the analyses did not yield significant statistical results.
2. In comparison to HIE, HIH was slightly more dependent on HN, particularly PE (personal empowerment). This could be resulting from the fact that the concept of PE is more related to self-actualization in

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MHON, which is closer to the rest of the needs compared self-transcend (refer to Table 2).

3. HIH and HIE were almost independent from HN 6 (affordable housing and surrounding amenities), HN 13 (communication line), HN 14 (internet connection or hotspot) and HN 15 (primary school education). That is, neither difficulties nor ease in fulfilling the mentioned HNs were strongly influencing levels of HIH and HIE.

The future direction of the research is to empirically model HIH and HIE with items representing subjective well-being (SWB) using Structural Equation Modelling. The research will also explore the variance of HIH and HIE between groups of HNs through more robust statistical model.

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INFORMATION QUALITY FOR FLOOD RISK REDUCTION IN SITE PLANNING: TOWN PLANNERS' PERCEPTION

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Abstract

One of the main tasks of a town planner in Malaysia is to prepare a Development Proposal Report (DPR) to be submitted together with the layout plan to get planning permission from the local planning authority (LPA). Incorporation of flood risk reduction aspects in site planning in the DPR is important to allow the LPA to make good and effective planning decisions. This study examines town planners' perception on information quality for the incorporation of flood risk reduction in site planning in the context of five town planning reference instruments, namely the Town and Country Planning Act 1976, Selayang Municipal Council Local Plan 2020, Town and Country Planning Department Planning Guidelines, Selangor Manual and Planning Guidelines 2nd Edition and DPR Manual 2nd Edition that assist them to prepare the DPR for obtaining planning permission from Selayang Municipal Council, Selangor, Malaysia, where the study was carried out. The findings show that there is a need to improve existing town planning reference instruments and access to information to generally enhance town planners planning activities and specifically improve DPR quality in the future.

Keyword: Town planners, Information quality, Town planning reference instruments, Site planning, Flood risk reduction

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INTRODUCTION

The word information has been used in many different ways to refer to different things in different circumstances. Information is the structure of any text that is capable of changing the image and reaction structure of a recipient (Cover & Thomas, 1991; Belkin & Robertson, 1976). Buckland (1991) identifies three main definitions of information: (1) information as process; (2) information as knowledge; and (3) information as thing. When information is selected, analysed, judged and organized, it can be used for informing and reduce uncertainty in decision making (Higgins, 1999; Taylor, 1986).

Institutions and individual depend on information in their daily decision making routine. Therefore, the quality of information is one of the key determinants to achieve quality decision making. Information quality can be defined as information that is fit for use by information consumers (Gustavsson & Wanstrom, 2009; Wang & Strong, 1996). According to Kahn and Strong (1998), information quality is the characteristic of information to meet or exceed customer expectations and meets user specifications or requirements. While Eppler (1999) states that information quality is the characteristic of information to meet the functional, technical, cognitive and aesthetic requirements of information producers, administrators, consumers and experts.

Information will influence the choice of decision makers and can change how the user makes decisions as well as the results (Fisher et al., 2011). It is clear that if information is wrong, decisions based upon that information might be wrong. The 'garbage in, garbage out' phrase often show the importance for user using quality information as a basis before any decision is taken. Decision taken without using quality information will result in mistake of action, reduced customer satisfaction, increased expenses, reduced job satisfaction, hindered business strategy, and affects operational, tactical and strategic decision making (Fisher et al., 2011; Stvilia et al., 2007).

This study was conducted to get insights on town planners' perception on information quality for the incorporation of flood risk reduction in site planning in five town planning reference instruments, namely the Town and Country Planning Act 1976, Selayang Municipal Council Local Plan 2020, Town and Country Planning Department Planning Guidelines, Selangor Manual and Planning Guidelines 2nd Edition and DPR Manual 2nd Edition that assist them to prepare the DPR for obtaining planning permission from Selayang Municipal Council, Selangor, Malaysia, where the study was carried out. This study will help the information providers to these professionals to know how far the quality of information on the incorporation of flood risk reduction in site planning that they have provided in five town planning reference instruments from the town planners point of view.

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THE IMPORTANCE OF QUALITY INFORMATION FOR TOWN PLANNERS' DECISION MAKING

In town planning, information is needed in different planning processes and stages such as in the first stage where information is needed to identify planning problems that need to be solved. In later stages, information is needed to produce several planning alternatives and to identify positive and negative effects related to those particular planning alternatives. Information is also needed to later evaluate planning alternatives before choosing the preferred alternative and also evaluate planning alternative that has been implemented for that particular area (Wagemans, 1990). According to Han and Kim (1990), information is needed by town planners to minimize uncertainties in decision making. Town planners are responsible to provide and use quality information to help themselves make good planning decision. If poor quality information is used, it will lead to less effective planning decision making (English, 1999; Redman, 2001; Wand & Wang, 1996).

Information influences planning activities by becoming deeply set within the thoughts and practices of town planners and in that way influencing their actions. For making the best decision, town planners need quality and complete information. There are two types of information in town planning which include formal information such as various requirements of laws and planning procedures and informal information such as personal judgments, hunches, hearsay and personal experiences (Burch, Felix & Gary, 1979).

According to Inness (1998), town planners will provide the decision makers with information that is based on identified planning problems. These information sources include surveys, feasibility studies, predictions, reports and studies based on calculations and scientifically validated knowledge. Town planners need to produce quality analysis in understandable formats for decision makers, who later will use the information to decide policies, plans, and related regulations (Intan Afida & Halimaton Saadiah, 2014). If the information does not meet the quality criteria, planning and decision making will have flaws and will lead to poor decision outcomes (Chengular-Smith, Ballou & Pazer, 1999; Fisher et al., 2003; Laudon & Laudon, 2012).

INFORMATION QUALITY DIMENSIONS

Information quality is generally thought of as a multi-dimensional concept with various dimension characteristics, depending on the author's viewpoint (Klein, 2001). Information quality dimension vary depending on context (Mai 2013; Shankar & Watts, 2003) and intended use (Katerattanakul & Siau, 1999).

Table 1 below summarizes various information quality dimensions by previous authors in various studies.

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Table 1 Information quality dimensions

Year	Author	Information quality dimensions
1996	Wang & Strong	Accuracy, objectivity, believability, reputation, accessibility, security, relevancy, value added, timeliness, completeness, amount of info, interpretability, ease of understanding, concise representation, consistent representation
2000	Naumann & Rolker	Believability, concise representation, interpretability, relevancy, reputation, understandability, value added, completeness, documentation, customer support, objectivity, price, reliability, security, timeliness, verifiability, accuracy, amount of data, availability, consistent representation, latency, response time
2001	Leung	Accuracy, security, recoverability, availability, understandability, operability, luxury, clarity, helpfulness, explicitness, customizability, time behaviour, analysability, stability, testability, manageability
2002	Kahn et al.	Free of error, concise, representation, completeness, consistent representation, appropriate amount, relevancy, understandability, interpretability, objectivity, timeliness, security, believability, accessibility, ease of manipulation, reputation, value added
	Klein	Accuracy, completeness, relevance, timeliness, amount of data
2007	Stvilia et al.	Accuracy, cohesiveness, complexity, semantic consistency, structural consistency, currency, informativeness, naturalness, completeness, accessibility, complexity, relevance, security, verifiability, authority, volatility
2008	Bocij et al.	Timeliness, currency, frequency, time period, accuracy, relevance, completeness, conciseness, scope, clarity, detail, order, presentation, media, reliability, confidence in source, appropriateness, received by correct person, sent by correct channels
2009	Gustavsson & Wanstrom	Complete, concise, reliable, timely, valid, accessible, appropriate amount, credible, relevant, understandable
2010	Foley & Helfert	Accessibility, ease of operations, security, system availability, usableness, assistance, convenience of access, ease of use, privacy, obtainability, flexibility, robustness
2012	Laudon & Laudon	Accuracy, integrity, consistency, completeness, validity, timeliness, accessibility
2013	Mai	Accurate, appropriate, authentic, authoritative, balanced, believable, complete, comprehensive, correct, credible, current, good, neutral, relevant, reliable, objective, true, trustworthy, understandable, useful, usability, valid

Source: Various authors as stated in the table

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INFORMATION QUALITY DIMENSIONS AND ATTRIBUTES USED IN THE STUDY OF SELAYANG MUNICIPAL COUNCIL, SELANGOR, MALAYSIA

Table 2 below summarizes the information quality dimensions and attributes used by the researcher in the study of five town planning reference instruments used in Selayang Municipal Council, Selangor, Malaysia.

Table 2 Information quality dimensions used in this study

Information quality dimensions	Attributes
Believability	• Believable
Reputation	• The reputation of the information source
	• The reputation of information
Accuracy	• Accurate in context
	• Content error-free
	• Format error-free
Completeness	• Detail explanation
	• Various scope
Relevancy	• Relevant to context
	• Usable
Ease of understanding	• Easily understood
	• Clear explanation
Accessibility	• Accessible format
	• Easy to find
	• Available
Timeliness	• Up to date
Concise representation	• Well presented
	• Well formatted
	• Compact
	• Aesthetically pleasing
Consistency representation	• Compatible with other sources
	• Consistently formatted
Value added	• Add value to operation
Appropriate amount	• Amount of information

FLOOD RISK REDUCTION ASPECTS USED IN THE STUDY OF SELAYANG MUNICIPAL COUNCIL, SELANGOR, MALAYSIA

Table 3 below summarizes the flood risk reduction aspects that need to be considered by respondents when evaluating the quality of information for site planning in five town planning reference instruments used by the Selayang Municipal Council, Selangor, Malaysia. Flood risk consists of two main aspects namely hazard and vulnerability. When one of the risk aspects changes, the other one will change too (Banzhaf et al., 2012). Therefore, it is important to consider and incorporate flood risk reduction aspects in site planning, as that information is crucial for town planners to prepare good and effective DPR.

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Table 3 Flood risk reduction aspects and elements

Flood Risk Reduction Aspect	Flood Risk Reduction Elements
Hazard	• Flood risk location • Frequencies of flood occurrence • Flood magnitude including duration time of flood occurrence, flood water depth, flood water velocity, rate of flood water rises and flood water quality • Factors influencing flood hazard
Vulnerability	• Total people exposed to flood • Total and value of property exposed to flood • Environmental effects due to flood • Vulnerability level of people to flood • Vulnerability level of property to flood • Factors influencing vulnerability of people and property to flood hazard

Source: Department for International Development, 2012; Hawkesbury-Nepean Floodplain Management Steering Committee 2006; Schanze, 2006; United Nations Development Programme, 2010; Wang, 2012; Yan, 2010

METHODOLOGY

This study adopted a quantitative approach where postal survey method was used to obtain data from respondents. This method was selected as it could easily reach respondents living in different geographical areas, protect the confidentiality of respondents and also give sufficient amount of time to respondents to think and make reference before completing the questionnaires (Creswell, 2014; Gray 2011; Lodico et al., 2010). Simple random sampling technique was used to select the respondents from the name list of town planners who prepared the selected DPR used in this study by using the aid of random number generator software by StatTrek.com. Sixty Malaysian Town Planners, whom their DPRs for lowland area developments and which received planning permissions from Selayang Municipal Council, Selangor, Malaysia from the year 2012 to 2014 were chosen as samples in this study.

Two academicians validated the questionnaire that was prepared by the researcher on the aspects of the questionnaire construct and content. A pilot study was conducted on six Malaysian Town Planners (not included as samples), equivalent to 10% of the total respondents as suggested by a previous study (Connelly, 2008). The pilot study was conducted to check the suitability of questionnaire and problems faced by the respondents during answering the questionnaire. Amendments on a few questions in the questionnaire, such as sentences style and addition of detailed definitions were done after feedbacks were received from four of the respondents.

The final questionnaire was sent out to 60 respondents who were requested to return them to the researcher within seven days. Only 34 questionnaires were returned after seven days (1st round) with response rate of

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56.7%. Even though the response rate of 50% is acceptable for postal survey method (Creswell, 2014), the researcher wanted to maximize the response rate for this study. A new questionnaire with a reminder was sent out to the balance of 26 respondents on day eleven and they were given seven days (2nd round with reminder) to complete and return it to the researcher. Fifteen out of 26 respondents returned the questionnaires. Altogether, the researcher managed to get back 49 questionnaires with a response rate of 81.7%.

The questionnaire consists of six parts namely Part A to Part F. For the purpose of this paper, only two parts in the questionnaire, which is Part A and Part E, will be discussed. Part A is related to town planners' demographic background and Part E is related to town planners' perception on information quality on the incorporation of flood risk reduction in site planning in five town planning reference instruments in helping them to prepare the DPR for planning permission in Selayang Municipal Council, Selangor, Malaysia.

Four (4) questions in Part A and one (1) question in Part E (with 24 sub-questions) were discussed in this paper. All questions in Part A discussed are close-ended questions using multiple choice answers and all questions in Part E are close-ended questions using 4 point likert scale, namely *absolutely disagree*, *disagree*, *agree* and *absolutely agree*. Because this is a 4-point likert scale, the data was analyzed as ordinal data (Bishop & Herron, 2015; Blaikie, 2003; Jamieson, 2004).

Internal consistency was sought for likert type questions to determine the reliability of the questions used and measured using Cronbach's Alpha value. Cronbach's Alpha value was calculated for each information quality dimension that has more than one attribute (Klein, 2001). Cronbach's Alpha values that were obtained for the five town planning reference instruments are between 0.75 to 0.97, which are in category of *acceptable* to *very good* (George & Mallery, 2003). This means that the questions are reliable to measure information quality dimensions consistently.

Data was analysed using IBM SPSS Software Version 21. Descriptive statistical analysis has been employed to get the results.

RESULTS

Town Planners' Demographic Background

Most of the respondents (30.6%) are below the age of 28 years. Only 4.1% are 49 years old and above. 59.3% of the respondents hold a bachelor's degree, followed by diploma holders with 20.3%, certificate and master's degree each with 10.2% of respondents. 69.4% of the respondents are town planners, followed by 20.4% are assistant town planners and only 10.2% are technician town planners. The largest number of respondents, 32.6% has been working in the urban and regional planning area for the last 6 to 10 years. 30.6% have less than 5 years of working

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experience in this area, followed by 18.3% with 11 to 15 years of working experience and 18.4% have more than 15 years of working experience.

Town Planners' Perception on Information Quality on Incorporation of Flood Risk Reduction in Site Planning

The comparison between levels of agreement on information quality on the incorporation of flood risk reduction in site planning for five town planning reference instruments are shown in Table 4. Top three information quality attributes according to levels of agreement for each town planning reference instruments are as in Table 5.

All town planning reference instruments share the same *absolutely agree* responses for *reputation of information* and *reputation of information sources*. Other than that, top three information quality attributes stated with *absolutely agree* responses for each town planning reference instruments include *content free-error, add value to operation* and *aesthetically pleasing* (Table 5).

Four out of five town planning reference instruments share the same *agree* responses for the same information quality attributes, the *reputation of information* where the respondents felt confidence with the validity of related information in each document and *reputation of information sources* where they felt confidence from where the related information come from (Table 5).

Three town planning reference instruments namely Town and Country Planning Act 1976, Selangor Manual and Planning Guidelines 2nd Edition and DPR Manual 2nd Edition have the same *disagree* responses for they are *easy to find* where the respondents felt that the related information is hard to get from the town planning reference instruments. Other than that, top three information quality attributes stated with *disagree* responses for each town planning reference instruments are *easily understood* where the respondents felt that related information are not explained clearly; *various scope* where the respondents felt that related information are not variety enough; *detail explanation* where they felt that the information are not explained thoroughly; *accurate in context* where they felt that related information are not explained according to context, *consistently formatted* where they felt that related information are not presented in consistent format; *compatible with other sources* where they felt that related information are not suitable to be used together with other information from different sources; *well-presented* where they felt that related information are not presented properly; *well formatted* where they felt that related information are not presented using appropriate format; *available* where they felt that related information do not exist; and *accessible format* where they felt that related information are not prepared in easy form to use format (Table 5).

Four town planning reference instruments other than Town and Country Planning Act 1976 have the same top three information quality attributes with *absolutely disagree* responses, that is on the *amount of information* where the

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respondents felt that related information is not sufficient*; various scope* where they felt that related information is not varied enough; and *detail explanation* where they felt that the related information is not explained thoroughly (Table 5).

From the summary above, it can be seen that the information quality attributes that get the most positive responses (*agree* and *absolutely agree*) for all town planning reference instruments are *reputation of information* and *reputation of information sources* while information quality attributes that get the most negative responses (*disagree* and *absolutely disagree*) for all town planning reference instruments are that they are *easy to find*, *amount of information*, *various scope* and *detail explanation* (Table 4 and Table 5).

Table 4 Comparison of levels of agreement on information quality for incorporation of flood risk reduction in site planning in five town planning reference instruments

Information quality attributes	**Levels of agreement on information quality for incorporation of flood risk reduction in site planning in five town planning reference instruments**																			
	Absolutely disagree *f* (%)					**Disagree *f* (%)**					**Agree *f* (%)**					**Absolutely agree *f* (%)**				
	A	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**
Believable	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.0)	3 (6.1)	33 (67.3)	27 (55.1)	30 (61.2)	12 (24.5)	28 (57.1)	15 (30.6)	21 (42.9)	17 (34.7)	36 (73.5)	18 (36.7)	1 (2.0)	1 (2.0)	2 (4.1)	0 (0.0)
The reputation of the information source	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (4.1)	1 (2.0)	1 (2.0)	7 (14.3)	18 (36.7)	38 (77.6)	39 (79.6)	40 (81.6)	34 (69.4)	31 (63.3)	9 (18.4)	9 (18.4)	8 (16.3)	8 (16.3)
The reputation of information	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	6 (12.2)	1 (2.0)	3 (6.1)	7 (14.3)	18 (36.7)	34 (69.4)	38 (77.6)	34 (69.4)	34 (69.4)	31 (63.3)	9 (18.4)	10 (20.4)	12 (24.5)	8 (16.3)
Accurate in context	0 (0.0)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	14 (28.6)	41 (83.7)	27 (55.1)	28 (57.1)	25 (51.0)	34 (69.4)	7 (14.3)	22 (44.9)	21 (42.9)	24 (49.0)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

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Information quality attributes	Levels of agreement on information quality for incorporation of flood risk reduction in site planning in five town planning reference instruments																			
	Absolutely disagree *f* (%)					Disagree *f* (%)					Agree *f* (%)					Absolutely agree *f* (%)				
	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E	A	B	C	D	E
Clear explanation	7 (14.3)	5 (10.2)	12 (24.5)	8 (16.3)	9 (18.4)	19 (38.8)	31 (63.3)	24 (49.0)	28 (57.1)	31 (63.3)	23 (46.9)	13 (26.5)	11 (22.4)	13 (26.5)	9 (18.4)	0 (0.0)	0 (0.0)	2 (4.1)	0 (0.0)	0 (0.0)
Easily understood	1 (2.0)	0 (0.0)	5 (10.2)	5 (10.2)	0 (0.0)	23 (46.9)	35 (71.4)	30 (61.2)	30 (61.2)	39 (79.6)	23 (46.9)	14 (28.6)	12 (24.5)	14 (28.6)	10 (20.4)	2 (4.1)	0 (0.0)	2 (4.1)	0 (0.0)	0 (0.0)
Usable	13 (26.5)	2 (4.1)	1 (2.0)	0 (0.0)	2 (4.1)	9 (18.4)	25 (51.0)	30 (61.2)	31 (63.3)	35 (71.4)	27 (55.1)	22 (44.9)	18 (36.7)	18 (36.7)	12 (24.5)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Relevant to context	6 (12.2)	1 (2.0)	3 (6.1)	3 (6.1)	6 (12.2)	20 (40.8)	26 (53.1)	27 (55.1)	30 (61.2)	32 (65.3)	16 (32.7)	22 (44.9)	19 (38.8)	16 (32.7)	11 (22.4)	7 (14.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Various scope	5 (10.2)	18 (36.7)	16 (32.7)	10 (20.4)	18 (36.7)	34 (69.4)	30 (61.2)	25 (51.0)	29 (59.2)	25 (51.0)	10 (20.4)	1 (2.0)	8 (16.3)	10 (20.4)	6 (12.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Detail explanation	8 (16.3)	21 (42.9)	15 (30.6)	13 (26.5)	17 (34.7)	30 (61.2)	27 (55.1)	26 (53.1)	26 (53.1)	27 (55.1)	11 (22.4)	1 (2.0)	8 (16.3)	10 (20.4)	5 (10.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Format error-free	0 (0.0)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	9 (18.4)	37 (75.5)	26 (53.1)	26 (53.1)	30 (61.2)	11 (22.4)	11 (22.4)	23 (46.9)	23 (46.9)	18 (36.7)	29 (59.2)	0 (0.0)	0 (0.0)	0 (0.0)	1 (2.0)
Content error-free	0 (0.0)	3 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)	9 (18.4)	33 (67.3)	27 (55.1)	30 (61.2)	28 (57.1)	11 (22.4)	12 (24.5)	22 (44.9)	19 (38.8)	21 (42.9)	29 (59.2)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)

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Information quality attributes	Levels of agreement on information quality for incorporation of flood risk reduction in site planning in five town planning reference instruments																			
	Absolutely disagree *f* (%)					Disagree *f* (%)					Agree *f* (%)					Absolutely agree *f* (%)				
	A	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**
Accessible format	4 (8.2)	0 (0.0)	1 (2.0)	1 (2.0)	0 (0.0)	30 (61.2)	35 (71.4)	34 (69.4)	31 (63.3)	37 (75.5)	13 (26.5)	14 (28.6)	14 (28.6)	17 (34.7)	12 (24.5)	2 (4.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Easy to find	3 (6.1)	0 (0.0)	1 (2.0)	1 (2.0)	0 (0.0)	31 (63.3)	35 (71.4)	34 (69.4)	35 (71.4)	37 (75.5)	13 (26.5)	13 (26.5)	14 (28.6)	14 (26.5)	12 (24.5)	2 (4.1)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)
Available	12 (24.5)	4 (8.2)	3 (6.1)	6 (12.2)	7 (14.3)	22 (44.9)	32 (65.3)	35 (71.4)	31 (63.3)	30 (61.2)	13 (26.5)	13 (26.5)	11 (22.4)	12 (24.5)	12 (24.5)	2 (4.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Up to date	0 (0.0)	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	30 (61.2)	31 (63.3)	30 (61.2)	23 (46.9)	31 (63.3)	18 (36.7)	13 (26.5)	13 (26.5)	21 (42.9)	18 (36.7)	0 (0.0)	5 (10.2)	6 (12.2)	5 (10.2)
Well presented	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	8 (16.3)	18 (36.7)	35 (71.4)	38 (77.6)	37 (75.5)	32 (65.3)	28 (57.1)	11 (22.4)	11 (22.4)	12 (24.5)	9 (18.4)	3 (6.1)	3 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)
Well formatted	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	2 (4.1)	16 (32.7)	36 (73.5)	38 (77.6)	35 (71.4)	35 (71.4)	26 (53.1)	10 (20.4)	11 (22.4)	14 (28.6)	12 (24.5)	7 (14.3)	3 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)
Compact	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	14 (28.6)	37 (75.5)	26 (53.1)	23 (46.9)	41 (83.7)	26 (53.1)	9 (18.4)	23 (46.9)	26 (53.1)	8 (16.3)	8 (16.3)	3 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)
Aesthetically pleasing	1 (2.0)	0 (0.0)	0 (0.0)	0 (0.0)	3 (6.1)	18 (36.7)	36 (73.5)	27 (55.1)	21 (42.9)	40 (81.6)	28 (57.1)	11 (22.4)	22 (44.9)	28 (57.1)	6 (12.2)	2 (4.1)	2 (4.1)	0 (0.0)	0 (0.0)	0 (0.0)

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Information quality attributes	Levels of agreement on information quality for incorporation of flood risk reduction in site planning in five town planning reference instruments																			
	Absolutely disagree *f* (%)					Disagree *f* (%)					Agree *f* (%)					Absolutely agree *f* (%)				
	A	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**	**A**	**B**	**C**	**D**	**E**
Compatible with other sources	2 (4.1)	0 (0.0)	0 (0.0)	0 (0.0)	2 (4.1)	22 (44.9)	38 (77.6)	24 (49.0)	30 (61.2)	35 (71.4)	19 (38.8)	11 (22.4)	25 (51.0)	19 (38.8)	12 (24.5)	6 (12.2)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Consistently formatted	2 (4.1)	0 (0.0)	0 (0.0)	0 (0.0)	6 (12.2)	22 (44.9)	38 (77.6)	29 (59.2)	33 (67.3)	34 (69.4)	22 (44.9)	11 (22.4)	20 (40.8)	16 (32.7)	9 (18.4)	3 (6.1)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)
Add value to operation	0 (0.0)	3 (6.1)	3 (6.1)	5 (10.2)	3 (6.1)	26 (53.1)	18 (36.7)	25 (51.0)	22 (44.9)	29 (59.2)	17 (34.7)	24 (49.0)	11 (22.4)	11 (24.5)	13 (26.5)	6 (12.2)	4 (8.2)	10 (20.4)	10 (20.4)	4 (8.2)
Amount of information	16 (32.7)	16 (32.7)	17 (34.7)	18 (36.7)	24 (49.0)	22 (44.9)	33 (67.3)	30 (61.2)	30 (61.2)	17 (34.7)	11 (22.4)	0 (0.0)	2 (4.1)	1 (2.0)	8 (16.3)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)	0 (0.0)

n= 49
A= Town and Country Planning Act 1976; **B**= Selayang Municipal Council Local Plan 2020; **C**= Town and Country Planning Department Planning Guidelines; **D**= Selangor Manual and Planning Guidelines 2nd Edition; **E**= DPR Manual 2nd Edition

Table 5 Top three information quality attributes according to levels of agreement for each town planning reference instrument

Levels of agreement	Top three information quality attributes
Town and Country Planning Act 1976	
Absolutely agree	Reputation of information (63.3%), reputation of information source (63.3%) and content free-error (59.2%)
Agree	Accurate in context (69.4%), up to date (63.3%) and believable (57.1%)
Disagree	Various scope (69.4%), easy to find (63.3%) and detail explanation (61.2%)
Absolutely disagree	Amount of information (32.7%), usable (26.5%) and available (24.5%)
Selayang Municipal Council Local Plan 2020	

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Levels of agreement	**Top three information quality attributes**
Absolutely agree	Reputation of information (18.4%), reputation of information source (18.4%) and add value to operation (8.2%)
Agree	Reputation of information source (77.6%), reputation of information (69.4%) and add value to operation (49.0%)
Disagree	Accurate in context (83.7%), consistently formatted (77.6%) and compatible with other sources (77.6%)
Absolutely disagree	Detail explanation (42.9%), various scope (36.7%) and amount of information (32.7%)
Town and Country Planning Department Planning Guidelines	
Absolutely agree	Reputation of information (20.4%), add value to operation (20.4%) and reputation of information source (18.4%)
Agree	Reputation of information source (79.6%), reputation of information (77.6%) and format error-free (46.9%)
Disagree	Well presented (77.6%), well formatted (77.6%) and available (71.4%)
Absolutely disagree	Amount of information (34.7%), various scope (32.7%) and detail explanation (30.6%)
Selangor Manual and Planning Guidelines 2nd Edition	
Absolutely agree	Reputation of information (24.5%), add value to operation (20.4%) and reputation of information source (16.3%)
Agree	Reputation of information source (81.6%), reputation of information (69.4%) and aesthetically pleasing (57.1%)
Disagree	Well presented (75.5%), easy to find (71.4%) and well formatted (71.4%)
Absolutely disagree	Amount of information (36.7%), detail explanation (26.5%) and various scope (20.4%)
DPR Manual 2nd Edition	
Absolutely agree	Reputation of information (16.3%), reputation of information source (16.3%) and aesthetically pleasing (12.2%)
Agree	Aesthetically pleasing (81.6%), believable (73.5%)

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Levels of agreement	Top three information quality attributes
	and reputation of information source (69.4%)
Disagree	Easily understood (79.6%), easy to find (75.5%) and accessible format (75.5%)
Absolutely disagree	Amount of information (49.0%), various scope (36.7%) and detail explanation (34.7%)

n= 49

CONCLUSION

In conclusion, this study has discovered town planners' perceptions on information quality on the incorporation of flood risk reduction in site planning in five town planning reference instruments, namely Town and Country Planning Act 1976, Selayang Municipal Council Local Plan 2020, Town and Country Planning Department Planning Guidelines, Selangor Manual and Planning Guidelines 2nd Edition and DPR Manual 2nd Edition in helping them prepare the DPR for planning permission from Selayang Municipal Council, Selangor, Malaysia. From 24 information quality attributes studied, four information quality attributes have similar negative responses (*disagree* and *absolutely disagree*) from the respondents in more than three town planning reference instruments, namely *easy to find, amount of information, various scope* and *detail explanation*. To enable town planners to prepare good site planning analysis in DPR, they need to get easy access to a lot of information with various scope, accompanied by detail explanation on what, where, which and how every aspect of flood risk reduction need to be incorporated in site planning in the DPR. A good site planning analysis involves a complete evaluation of opportunities and constraints of a potential development site in relation to the development program, environmental impact, and impacts on the community and adjacent properties. Good site planning analysis is important in a development project as it can reduce the risk of disaster including flooding and minimize the development cost. The DPR quality is very important to the LPA, as they need quality DPR to facilitate efficient assessment of planning permission applications. There are needs for all information providers to improve existing town planning reference instruments to enhance town planners planning activities and specifically improve DPR quality in the future. The town planning reference instruments need to be as detail as possible in terms of information related to flood risk reduction to ensure town planners are provided with good and complete references for their planning analyses.

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A STUDY ON THE EFFECTS OF ROAD HUMPS IN REDUCING SPEED ALONG LOCAL ROADS IN RESIDENTIAL AREAS: CASE STUDY OF TAMAN SETIAWANGSA

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ABSTRACT

The increasing number of vehicles along local roads in many residential areas has created unconducive environment and safety risk due to the increase in the speed passing vehicles. To control the speed of the vehicles, road humps were installed along local roads. This paper evaluates the effects of road humps on the speed of vehicles in Taman Setiawangsa, which is one of the residential areas in Kuala Lumpur. The field observational survey was carried out to collect data on design characteristics of the road humps. A spot speed survey was administered to collect spot speed of vehicles at different points near the road humps and the spot speed data at and near road humps were analysed using measures such as descriptive statistics and dependent t-Test. The design characteristics of the road humps were also compared with the existing road hump guidelines published by the authorities. The major finding of this study depicts the effectiveness of road humps in reducing speed in relation to the road hump's profiles.

Keywords: traffic calming measures, speed, road hump, residential area

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INTRODUCTION

According to Hamsa (2013), frequent changes in traffic component characteristics such as speed, capacity, road design and safety are considered as the implication of the increasing number of vehicles in a city or town. Reducing speed of vehicles in residential areas is not only necessary to protect pedestrian and bicyclists, but also other road users.

In global status report on road safety by World Health Organization, there are only 59 out of 114 countries which implemented the urban speed limit of 50 kilometre per hour (kmh) or less. Various residential areas have deteriorated in the living environment aspect due to the issues such as increasing of traffic volume, excessive speed, road alignment and other related factors (Hamsa, Miura, Inokuma & Nishimura, 2006). Consequently, the lifestyle of the residents is likely to get affected due to these factors, for instance; the sense of belonging and social interaction among the residents is in the risk to become worse as time goes by, particularly if there are no further alternatives to control the speeding vehicles.

In general, speed humps are well thought out as a viable and attractive measure in controlling speed of the vehicles since the drivers are forced to slow down their vehicles towards the speed hump. As mentioned by Roess, Prassas & Mcshane (2004), the purpose of setting up speed humps is to reduce vehicle speed to tolerable level at certain pre-determined location along the residential road. Additionally, road accidents can be reduced, simultaneously improving the residents' well-being.

This paper aims to analyse the effects of road humps in reducing vehicle speed along the residential road in Taman Setiawangsa, Kuala Lumpur.

LITERATURE REVIEW

According to the Traffic Calming Guidelines in Malaysia, traffic calming has been defined as a method in which enables behavioural changes of drivers, pedestrians and other road users, who often interact on roads and sidewalks in the communities (HPU, 2002).

In order to create a safe living environment for the residents, the speed of the vehicles is reduced by installing speed humps along residential roads. This is supported by the Auckland Transport whom agreed that speed humps may improve the safety and amenity in a residential area (2013). In terms of safety, Appleyard (1981) recommended that when traffic volume increases beyond what is considered normal by the local residents, or when the vehicles speed increases because of street design, social street activities are greatly reduced, and the feeling of well-being in the affected neighbourhood is threatened.

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Road Hump and Speed

Road hump or speed hump is one of the traffic calming measures installed mainly to control the speed of vehicles within permissible speed limit. To achieve lower speed, speed humps are installed at the desired locations mainly along residential roads. Road humps are able to create vehicle rocking motion that causes driver discomfort, thus results in most vehicles slowing down to about 20 mile per hour (mph) at the hump (ITE, 1999).

A study showed that vehicles tend to accelerate and achieve its initial approach speed at a certain distance after the hump compared to the speed at the hump (Karim, Ibrahim & Arif, 2003). As road humps are placed mainly along residential roads having not more than two lanes and speed limit of 30mph, it is considered safe for the residents to use the roads equipped with road humps.

Speed humps are normally three to four inches high and 12 to 22 feet long. The interval between road humps is 200 to 600 feet. The most common speed hump is usually 12 feet in length and 3 to 4 inches high with rounded, flat or parabolic shaped top (Johnson & Nedzesky, 2004).

In Malaysia, there are limited studies and guidelines on the relationship between hump geometric designs, speeds and vibration (Manan & Hoong, 2009; Zainuddin, Adnan, Rahman & Diah, 2010). As a result, the implementation and outcomes of the traffic calming measures vary from one location to another (Marizwan et al, 2009).

Varhelyi (2002) discusses appropriate highest speed in different conditions (on wet or slippery road, at sharp curves, in darkness, and in decreased visibility), and a system that limits the maximal speed of the vehicle in the actual situation via in-vehicle equipment is proposed. It is estimated that the proposed system would result in 20% to 40% reduction of injury accidents in Sweden. Observing vehicle speed is one way to measure travel safety on the road. Essentially, high speed carries high risk, whereas low speed is considered as relatively safe.

In general, the impacts of traffic calming measures particularly road humps with regard to speed and safety varies greatly with type, geometry, location, spacing and other factors. A study conducted by Ewing (1999) in residential areas in North America shows the average percentage change of 85% speed after the installation of road hump is approximately 23%. Another study in 2004 discovers that the average speed is reduced from 36.4 to 24.4 kmh, which is about 33% of reduction after the introduction of road humps in residential areas.

Sumner and Baguley (1979) state that the installation of road humps in certain residential areas in Britain appeared to be effective in that there has been a consistent reduction in vehicle speed. It has been found that no driver was observed to exceed 35 mph with the humps in place. Traffic speed has been reduced to a level more tolerable to the residents and drivers who used the road.

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RESEARCH APPROACH

This section outlines the research objectives, methodology and limitations of this study.

Research Objectives

The objectives of this study include:

i. To estimate the vehicle speed distribution at selected points near road humps along residential road.
ii. To analyse the relationship between the characteristics of road humps and the speed of vehicles at and near the road humps.
iii. To recommend measures in reducing speed of vehicles in residential areas for a safe living environment.

BACKGROUND OF STUDY AREA

Taman Setiawangsa is a residential area which consists of low and high density housing, and a few commercial centres and public amenities. It is located in Setiawangsa, an area on the eastern suburb of Kuala Lumpur. It is surrounded by other residential neighbourhoods such as Wangsa Maju, Ampang Hilir and Keramat (Figure 1).

The housing areas in Taman Setiawangsa are provided with facilities such as mosque, schools, college and a hypermarket, which attract people and resulting in the increase of traffic volume in the area. Access to the area is via Jalan Taman Setiawangsa, which is connected to Jalan Jelatek. The Duta – Ulu Kelang Expressway (DUKE) has also made the area well connected by road network. Jalan Persiaran Setiawangsa, a residential road, was selected for this study. Besides, this road carries high traffic volume.

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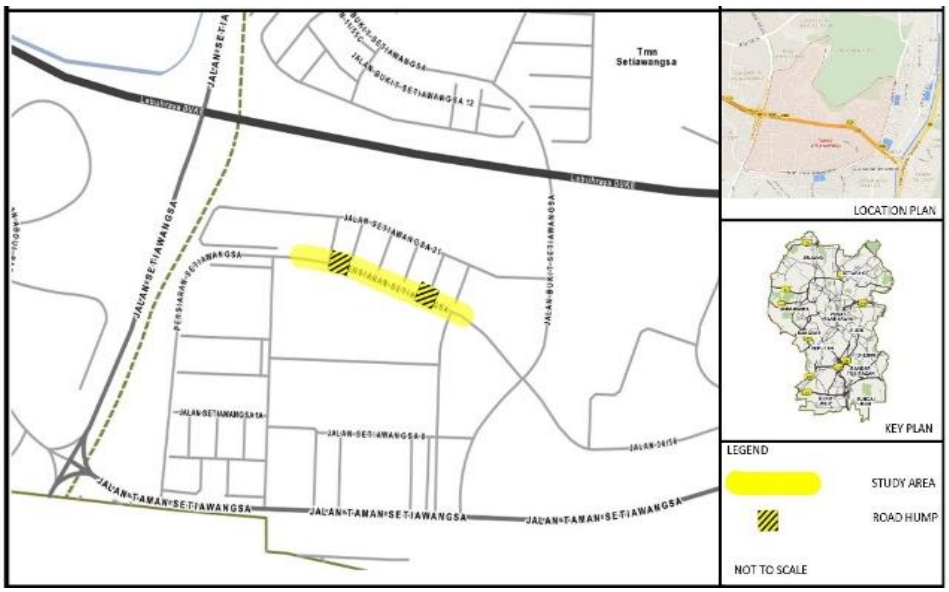

Figure 1 Location of Study Area
Source: http://kulsubmission.dbkl.gov.my/dbkl/kul_gis.html

In 2012, there was a landslide incident in Bukit Setiawangsa, near to Taman Setiawangsa. The main road to Bukit Setiawangsa where the landslide took place was closed due to reconstruction work. As a consequence, traffic volume at Persiaran Setiawangsa is slightly increased due to the change of traffic flow.

INVENTORY SURVEY ON THE DESIGN CHARACTERISTICS OF ROAD HUMPS

According to Bonsall & O'Flaherty (as cited by Nur Shuhadah, 2014), inventory surveys, which are also referred to as condition surveys, are usually done to assist the identification of the suitable site for data collection, and at the same time to produce and update maps that will be used by researchers for data collection (1997). Therefore, certain secondary data in the study area were extracted before conducting the inventory survey. In this research, the inventory survey was administered to collect data on the design characteristics of road humps.

The design characteristics of road humps are used to identify the selection of road humps for determining the location for the spot speed survey. However, dimension of road hump (width, height and length) and spacing between the road humps were focused in this research.

Spot Speed Survey

A systematic sampling technique was applied for the selection of vehicles to measure spot speed. Every 2nd car was targeted near the road humps to measure

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the spot speed of the car. A total sample size of 150 cars was selected for the measurement of spot speed.

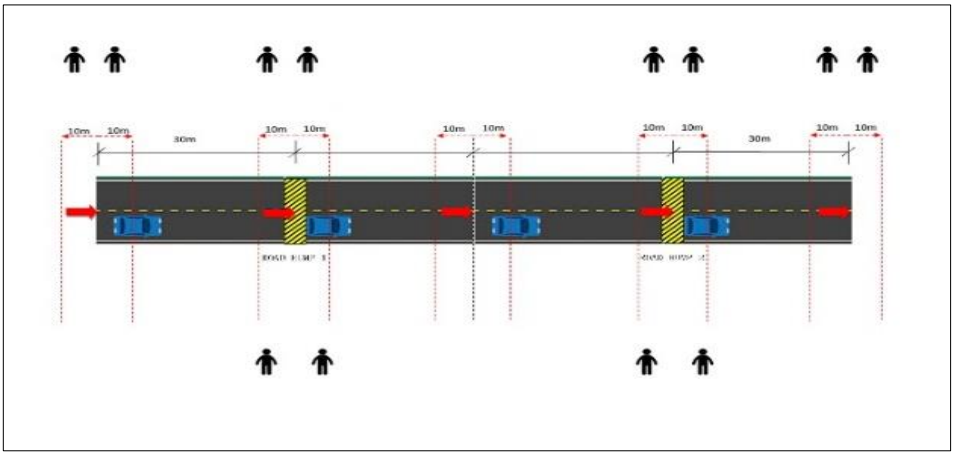

Figure 2 Spot Speed Location
Source: Site Survey, 2015

In this research, the spot speed of car was measured by applying direct-timing procedures. Two road humps, Road Hump 1 and Road Hump 2 were selected along the residential road for the measurement of spot speed.

A total of five different points near the two road humps was chosen; the first point at a distance of 30 metres before Road Hump 1, the second at the Road Hump 1, the third between Road Hump 1 and Road Hump 2, fourth at Road Hump 2 and finally fifth point at the distance of 30m after Road Hump 2 (Figure 2).

Method of Analysis

The data were analysed using descriptive analyses and dependent t-Test. Descriptive analysis comprises measures of central tendency such as mean speed, median speed, measures of relative position such as 85^{th} percentile speed and measures of variability such as standard deviation of the measured speed. Meanwhile, a dependent t-test was also applied to test the statistical difference in speed at different points of the two selected road humps.

ANALYSIS AND FINDINGS

Road Hump Design Characteristics

Based on the observation and analysis, both Road Hump 1 and 2 were circular in shape with 3.6 meters in length and 70 millimetres in height. The Guidelines by the Ministry of Works (2002) has indicated that the maximum height of a road

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hump should be 75 millimetres whereas minimum and maximum length is 3.7 m and 4.25 m respectively. The design characteristics of the selected road humps were provided by following the related guidelines on road humps.

Table 1 shows the comparison of design characteristics between the studied Road Humps and the guidelines provided by the Ministry of Works. The distance between the road humps is 34 meters which is far below the recommended distance of 60m to 180m as suggested by the guidelines.

Table 1 Comparison of Design Characteristics of Road Humps

Design Characteristics	Road Hump 1 & 2	Ministry of Work Specification
Height	70 mm	75 mm – 100 mm
Width	12 m	12.5 m
Length	3.6 m	3.7 m – 4.25 m
Distance	34 m	60 m – 180 m
Colour	Black – yellow striped	Black – yellow striped

Source: Site Survey, 2015

A study on the relationship between speed humps, speed, volume and crashes by Portland Bureau of Transportation in 1998 has indicated how much distance is available for vehicles to accelerate and decelerate between humps based on its clear spacing. Generally, shorter spacing between humps results in lower speeds as the vehicles generally have less time to accelerate and decelerate between the humps.

Spot Speed Analysis

The lowest speed recorded at 30 meters before approaching the road hump was 30.86 kmh and the speed dropped to 2.92 kmh at the first road hump. However, the speed began to increase (32.3 kmh) between the road humps and again decreased to 2.85 kmh at the second road hump. Speed began to increase again to 44.44 kmh after passing the second road hump (Figure 3).

On the other hand, the highest speed 30 meters before road hump was 93.1 kmh and reduced to 10.2 kmh at Road Hump 1. The speed increased to 75.09 kmh between the road humps and dropped to 9.6 kmh at Road Hump 2. After passing Road Hump 2, the speed increased to 53.73 kmh (Figure 3).

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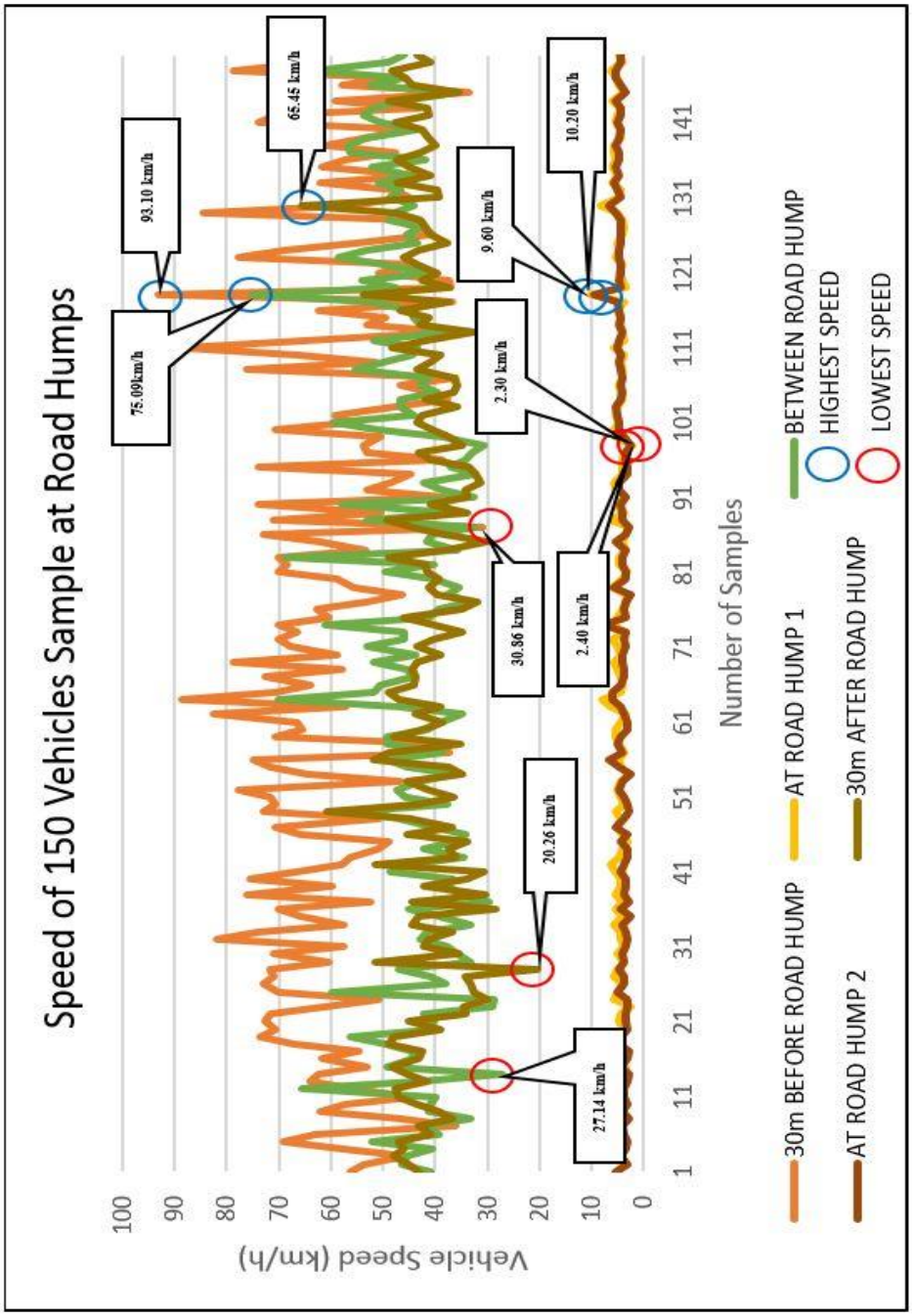

Figure 3 Speed of 150 Vehicles Samples
Source: Site Survey, 2015

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Generally, acceleration took place between the road humps. The lowest speed recorded between the road humps was 27.24 kmh and after leaving Road Hump 2 was 20.26 kmh. On the other hand, the highest speed recorded between the road humps was 75.09 kmh, and 30 meters after Road Hump 2 was 65.45 kmh.

The average speed of the cars at each point varies between one another. The average speed of cars 30 meters before Road Hump 1 was 59.93 kmh while 30 meters after Road Hump 2 was 41.27 kmh. At Road Hump 1, the average speed was 4.63 kmh, while at Road Hump 2 was 4.2 kmh. Furthermore, the average speed of cars between the road humps was 42.5 kmh (Table 2).

Table 1 Measures of Central Tendency

CENTRAL TENDENCY	MEAN SPEED	MODAL SPEED	MEDIAN SPEED
30m before Road Hump 1	59.93 km/h	72.5 km/h	60 km/h
At Road Hump 1	4.63 km/h	4.5 km/h	4.56 km/h
Between Road Hump 1 & 2	42.5 km/h	42.5 km/h	44 km/h
At Road Hump 2	4.2 km/h	4.5 km/h	4.15 km/h
30m after Road Hump 2	41.27 km/h	42.5 km/h	41.6 km/h

Source: Site Survey, 2015

Modal and median speed can be referred from Table 2. Most of the cars were moving above the posted speed limit which is 35 kmh. The highest speed between all points was 72.5 kmh, which was 30 meters before Road Hump 1. Yet, the speed at both humps reflected the efficiency of the humps. The modal speed at both humps measured at 4.5 kmh. Roughly, 37% of the cars drove at the speed of 42.5 kmh after Road Hump 2.

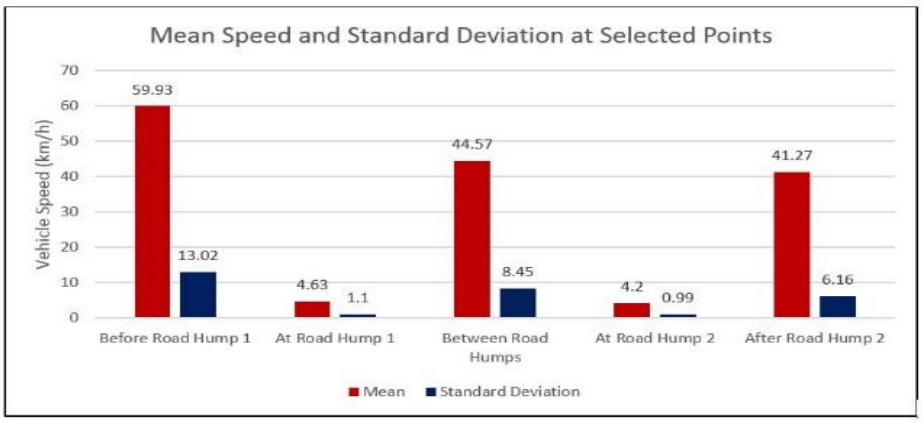

Figure 4 Mean Speed and Standard Deviations at Selected Points
Source: Site Survey, 2015

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Mean speed of vehicles decreased while approaching the road humps and increased after leaving the humps. The speed reduced about 38.3 kmh to 55.3 kmh before road humps compared to the speed after road humps which increased up to 37 kmh. The installation of the road humps has induced the vehicles to slow down effectively below the stipulated speed limit but it is not the case at other points either before, in between or after the road humps.

As illustrated in Figure 3, the variation in speed at all points were differed specifically at point before, between and after humps. The standard deviation of speed at both humps was low, but high at other points.

The 85th percentile speed (Table 3) shows that 85 percent of the cars at Road Hump 1 were moving at the speed of 5.65 kmh or below, and at Road Hump 2 at 5.86 kmh or below. Consequently, the installation of the road humps has proved effective in curbing the speed of the vehicles and eventually helps to achieve the safe allowable speed limit of the residential areas.

Table 2 85th and 15th Percentile

LOCATION	30m before Road Hump 1	At Road Hump 1	Between Road Hump 1 & 2	At Road Hump 2	30m after Road Hump 2
85th PERCENTILE	73.58 km/h	5.65 km/h	52.76 km/h	5.86 km/h	46.31 km/h
15th PERCENTILE	44.75 km/h	3.05 km/h	35.94 km/h	3.22 km/h	34.46 km/h

Source: Site Survey, 2015

The difference in speed which before and at Road Hump 1 (Pair 1) and at Road Hump 1 and Road Hump 2 (Pair 2) were tested for statistical significance by using t-test. The results show that both tests were statistically significant at 95% confidence interval (Table 4 and 6).

The findings show that there was a significant difference in the speed of vehicles for both pairs. In addition, there was also significant decrease in speed before road hump (M = 59.93, SD = 13.02) to Road Hump 1 (M = 4.63, SD = 1.1), t (298) = 51.83, p<.0001. Pair 2 also shows significant decrease in speed from Road Hump 1 (M = 4.63, SD = 1.1) to Road Hump 2 (M = 4.2, SD = 0.99), t (298) = 3.56, p<.0004 (*Refer Table 5 and 7*).

Table 4 Paired Samples Statistics for Vehicle Speed

	Mean	N	Std. Dev.	Std. Error Mean
Pair 1 Before Road Hump 1	59.93	150	13.02	1.06
At Road Hump 1	4.63	150	1.1	0.09

Source: Site Survey, 2015

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Table 5 Paired Samples Test for Vehicle Speed

	Paired Differences					t	df	Sig. (2 – tailed)
	Mean	Std. Dev.	Std. Error Mean	95% confidence interval of the difference				
				Lower	Upper			
Pair 1 Before - At	55.3	13.068	1.067	53.2005	57.3995	51.8341	298	0.0001

Source: Site Survey, 2015

Table 6 Paired Samples Statistics for Vehicle Speed

	Mean	N	Std. Dev.	Std. Error Mean
Pair 2 At Road Hump 1	4.63	150	1.1	0.09
At Road Hump 2	4.2	150	0.99	0.08

Source: Site Survey, 2015

Table 7 Paired Samples Test for Vehicle Speed

	Paired Differences					t	df	Sig. (2 – tailed)
	Mean	Std. Dev.	Std. Error Mean	95% confidence interval of the difference				
				Lower	Upper			
Pair 2 At - At	0.43	1.482	0.121	0.1922	0.6678	3.5586	298	0.0004

Source: Site Survey, 2015

CONCLUSION

Overall, road humps are considered effective in reducing the speed of vehicles in residential areas. However, installing more road humps can also attribute to undesirable effects on the surrounding environment by increasing air and noise pollution due to sudden and frequent acceleration and deceleration of vehicles. Based on the findings, the speed of vehicles was greatly reduced at road humps.

The findings also show that the spacing between the selected road humps, which was 34 meters, is considered inadequate since the traffic calming guidelines suggested it should be at least 100 meters. Shorter spacing between road humps will contribute high air pollution and fuel consumption. Research in Austria shows that cars negotiating along a mile long stretch of road with six humps at 40 kmh speed limit had emitted nitrogen oxides as high as 10 times, poisonous carbon monoxide as high as 3 times, and additional 25% carbon dioxide when compared with vehicles maintaining a constant speed. The study also show that the fuel consumption of the vehicles has increased from 7.9 litres to nearly 10 litres per 100 km.

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It is evident that road humps can help in controlling the speed of the vehicles, nevertheless at the same time it also creates unnecessary air and noise pollution which could be detrimental to the well-being of the society in the long run. To help alleviate the problem of speeding especially along residential roads, it is imperative to apply strict enforcement in order to control the driving behaviour of the motorists. On the other hand, the speed of vehicles can be reduced by avoiding a very long and straight road stretch especially in residential areas.

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WHAT BRINGS YOUTH TO RECREATIONAL PARKS?

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Abstract
Locations of recreational parks are said to have a direct influence on youth physical activities. However, there is still a lack of studies on youth activities at recreational parks. Thus, this study examines the relationship between reasons and habit of youth going to recreational parks through a questionnaire survey. Variables that are measured include enjoying the outdoors, use a particular facility at the park, play sports, picnic and general activities, walk or ride a bicycle for exercise and meeting friends. Logistic regression analysis reveals youths are most likely to visit the park for playing sports, walking or riding a bicycle, provided the facilities and amenities are available. Hence, planning, implementation and maintenance of recreational park play a significant role in promoting outdoor activities and active lifestyle among the youth.

Keyword: physical activity, recreational facilities, habit, youth, recreational parks, logistic regression analysis

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INTRODUCTION

The rapid advancement of information technology in the millennium period has changed the way people live today, and this has impacts on everyone including youth (United Nations, 2005). Youth is a young person aged between 15 and 24 years old (United Nations Education, 2009-2014) and is sensitive towards the introduction of new technology. The current youth generation was born with technology surrounding them (Mesch, 2009). It is rather alarming to note that a study carried out in the United States discovers American youth aged 8 to 18 years old, spent 8.08 hours a day consuming on various types of media. The types of media include television, video game, recorded music, computer, cell phones and the internet and the total media usage has been on the increase since 1999 (Rideout, Foehr, & Roberts, 2010). Watching television, video game, listening to a music recorder, playing computer and other inactive activities are examples of sedentary activities (Bennett, Winters-Stone, Nail, & Scherer, 2006; Pate, O'Neill, & Lobelo, 2008). Watching television daily for more than two hours is unhealthy as it can lead to not only reduced physical and psychosocial health but also may result in increased risk of cardio-metabolic disease and high body mass index (BMI) (Proper, Singh, Mechelen, & Chinapaw, 2011; Tremblay et al., 2011).

Also, the insufficient physical activity can also result in high rates of obesity (Babey, Hastert, Yu, & Brown, 2008). More than 1.9 billion people aged 18 years and above are estimated to be overweight and more than 600 million were obese (World Health Organization, 2015). The rate of obesity is more than double since 1980 until 2014 globally. Therefore, youth needs to reduce sedentary behaviour and acquire active living to prevent such diseases. Proper et al. (2011) also propose that interventions intended to reduce sedentary behaviour are required. Thus, playing sports at recreational parks, for example, can reduce body mass index (BMI) and promote healthy living (Zulkia, Zainol, Zainol, Nordin, & Ahmad, 2014).

Despite the highlights on the benefits of physical activities, recent studies have shown that youth makes little use of recreational parks (Gardsjord, Tveit, & Nordh, 2014; Loukaitou-Sideris & Sideris, 2009). These are due to several factors which include lack of interest in the current park activities, lack of time, safety, accessibility, recreational facilities, maintenance and renovation (Cohen et al., 2009; Gardsjord et al., 2014; Loukaitou-Sideris & Sideris, 2009). While studies have shown the lack of interests in park activities, some of these factors may have positive impacts on youth's motivation to go to the parks. Also, parks are also able to provide social cohesion. It offers local daily experiences shared by a variety of people. It also promotes intercultural interactions (Peters, Elands, & Buijs, 2010).

Therefore, this study intends to examine the relationship between reasons and habit of youth going to recreational parks.

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YOUTH AND PHYSICAL ACTIVITY

There are two categories of young people according to age. First, the category is teenagers whose age is between 15-19 years. The balance aged 20-24 years old is considered young adolescents. Between these two groups, the former is most hit by the impact of technologies (Tremblay et al., 2011). They have the most leisure time as compared to another youth group. Youth always tries to find new ways to fulfil their leisure time both out of necessity and of choice. According to United Nations (2005), leisure time plays a vital role in promoting social inclusion, access to opportunities and overall development among young people. Thus, this leisure time should be fulfilled with beneficially as it may have a high impact on youth development mentally and physically (United Nation, 2004).

According to Garsjord et al. (2014), people are more active physically if they were physically active during their teenage years. Therefore fulfilling leisure time productively with promoting active living among youth will results in higher number of active life among adults at a later time. Physical activity behaviour refers to active recreation such as playing football and participating in other active activities (Must & Tybor, 2005) and active living equals to a healthy lifestyle (Edwards & Tsouros, 2006). Previous studies have shown youths are attracted to low cost and well-maintained facilities and also active young participants (Ries, Gittelsohn, Voorhees, Roche, Clifton, & Astone (2008). A study by Wilson, Williams, Evans, Mixon and Rheaume (2005) shows, boys prefer playing basketball, football, soccer and baseball. Girls, on the other hand, prefer playing basketball, swimming and roller-skating. This may differ based on cultural background.

Sedentary behaviour, however, refers to a passive recreation activity such as watching television and playing online games (Must & Tybor, 2005). However, the current pattern shows low participation among them for active recreational activities (Heath, Pratt & Kann, 1994). Also, previous studies have also found girls are less fit than boys due to the amount of time spent on passive recreation by the former contributes to this matter further (James & Embrey, 2002; Raithel, 1987). This behaviour can be reduced among youth if parks are located with the proximity of the neighbourhood and they participate in physical activities (Epstein et al., 2006).

Influencing Factors That Affect Youth Decision to Go to Recreational Parks

The availability of parks nearby their homes influences the youth's physical activities directly. Studies by Cohen et al. (2009), Cohen et al. (2006), Kirby, Levin, and Inchley (2013) and Ries et al. (2009) found that park availability and proximity are crucial to youth's physical activity. Gardsjord et al. (2014) discover that studies on access to green space by youth have received a lot of attention by

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many scholars. The higher green space coverage and the closer the distance, the greater number of youth will be using the park. Nevertheless, safety (Heitzler, Martin, Duke, & Huhman, 2006; Holt et al., 2009; Loukaitou-Sideris & Sideris, 2009) and maintenance of facilities (Humbert et al., 2006; Loukaitou-Sideris & Sideris, 2009) also have an impact on the frequency of youth's visiting the park.

Besides sites, facilities and safety, ability to perform physical activities also play a significant role in attracting youth to recreational parks (Baran et al., 2013). The use of the park by youth is strongly associated with organised after school activities and identification of a team motivator (Perry, Saelens, & Thompson, 2011).

METHODOLOGY

This study employs a quantitative approach. A questionnaire survey was carried out at all recreational parks that provide youth's facilities such as football/rugby field, badminton court, street soccer court, basketball court and skateboard plane in Subang Jaya, Selangor. This survey was conducted from October 2014 to December 2014.

Study Area

Subang Jaya is a township managed by the Subang Jaya Municipal Council. It consists of Old Subang Jaya and USJ. Subang Jaya township was the fastest growing community in the Petaling District between 1991 and 2000. It has a total population of 170,498, the highest number of population as compared to other towns under the same local authority (Department of Statistics, 2010). Subang Jaya has 33,144 youths, the largest number of youth aged 15 to 24 years old as compared to other nearby townships.

There are about 174 recreational parks in Subang Jaya USJ. These include playground, playing field, neighbourhood park, local park and urban park. However, not all of the parks provide facilities for the youth. Facilities that youth required include a basketball court, street soccer court, badminton court, football field, skateboard platform other than jogging track and bicycle path. Some of the parks may even provide outdoor gymnasium set. Figure 1 shows the location of all recreational parks that provide facilities for youth.

Sampling

This study involved respondents aged 15 to 24 years old. The distribution of questionnaire survey adopted simple random sampling method within the research population of 33,144. This approach enhances the equal chance of the sample to be selected randomly (Saris & Gallhofer, 2007). Overall, 397 respondents participated in this study. They were randomly chosen at all the recreational parks that attract youth. Krejcie & Morgan (1970) stated that the

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minimum sample size for a population of 40,000 should not less than 380. Thus, the sample size for this study is acceptable and valid.

Data Collection

Data collection was based on questionnaire consisted of multiple-choice questions, Likert-scale questions and open-ended questions. The first section of the questionnaire inquiries about respondent information and the second section asks about the visits to recreational parks.

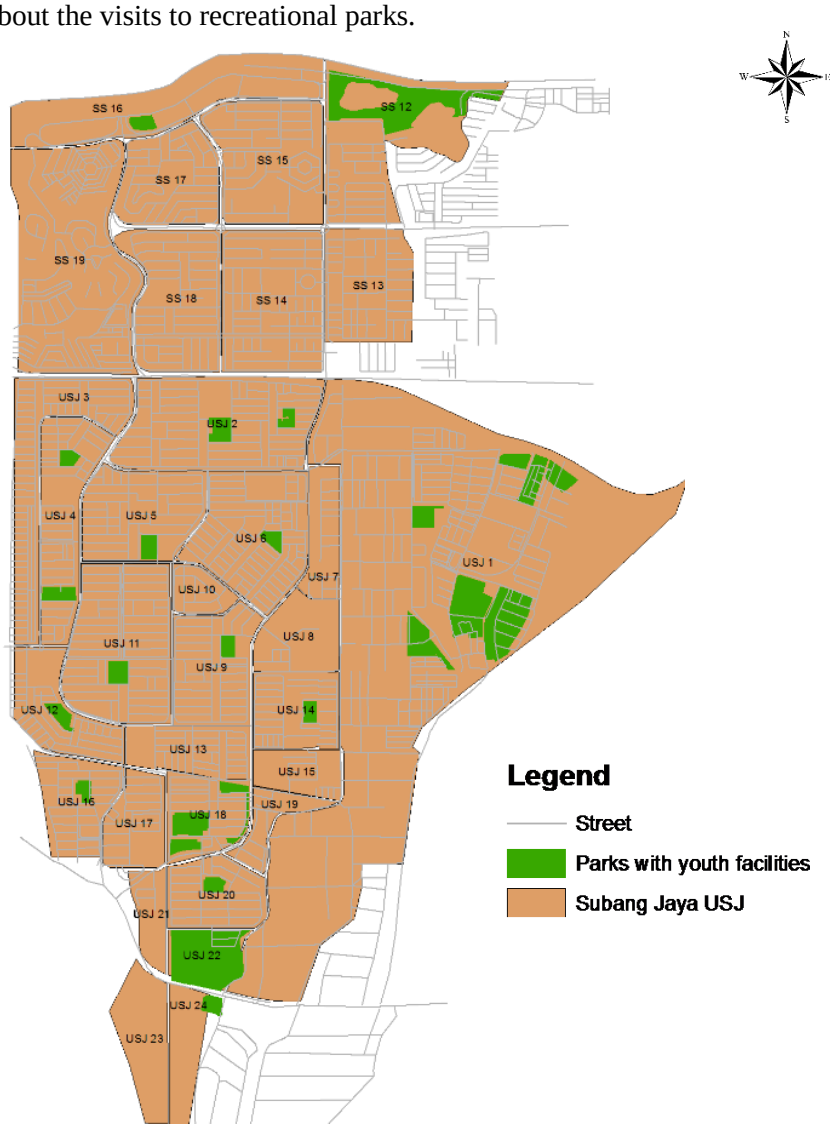

Figure 1: Recreational parks that provide facilities for youth
Source: Field study, 2015

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Method of Analysis

The reliability analysis is conducted for the variables of reason to visit the park to confirm the reliability of data. The purpose of this test is to examine the constancy of the scale of data (Leech, Barrett, & Morgan, 2011). The Cronbach's alpha coefficient for the reasons of going to park is 0.784. The coefficient of more than 0.70 indicates good reliability.

Spearman rank-order correlation test is run to establish the relationship between the reasons and habit of going to the park via Statistical Package for Social Science (SPSS) (Diamond & Jefferies, 2006). It is appropriate to analyse either or both ordinal variables (Graziano & Raulin, 2010).

Subsequently, this research adopts the binary logistic regression to formulate the prediction model for the habit of going to the park. Whereby, the logistic regression measures the probability of an event (Chua, 2009). Theoretically, the equation of logistic regression is as follow:

$$Z = \beta_0 + \beta_1 X_1 + \beta_2 X_2 + ... + \beta_k X_k + \varepsilon \qquad (1)$$

Where,
Z = latent variable
$X_1, X_2, ... , X_k$ = independent variables
β_0 = constant
$\beta_1, \beta_2, ... , \beta_k$ = change in Y for a change of one unit in $X_1, X_2, ... , X_k$ respectively
ε = error term
Z value is computed using a link function to find out the probability of the event occurring. In this study, the link function to obtain the probability of the habit is as follows:
P [habit of going to park] = $e^z/1+e^z$, the value is between 0 and 1.

RESULTS AND DISCUSSION

In this study, the respondents are the youth in different ages. The mean age of the respondents is 18.99; while the mode of the respondents' age is 19, which covers 13.6 percent of the total respondents. Then, more than half of the respondents (59.9 percent) are at the age range of 15 to 19. The majority of the youth at this age range are still studying in secondary or high school. They have more leisure time to visit the recreational park. On the other hand, the majority of the youth at the age of 20 to 24 are either studying in higher-level education institution (college/university) or working in the community. So, they tend to have lesser leisure time.

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Relationship between Reasons and Habit of Going to Park

There are eight reasons of going to park identified as the independent variables; while the habit of going to park as the dependent variable. The relationship between the reasons and habit of going to park is then analysed through correlation analysis as shown in Table 1. Generally, below 0.3 correlation coefficient indicates weak relationship; 0.3 to 0.5 coefficient reflects moderate relationship; and above 0.5 coefficient shows a strong relationship between two variables (Gray & Kinnear, 2012; Saunders, Lewis, & Thornhill, 2009). Nevertheless, SPSS confirms the significant relationship between two variables with the significance value of 0.05 or below. The test identifies six independent variables that are significantly correlated to the habit of going to park, namely:

- Enjoy the outdoors or nature
- Use a particular facility at a park
- Play sports
- Picnic and general leisure activities
- Walk or ride a bicycle for exercise
- Meet friends

Table 1 Correlation analysis between reasons and habit of going to park

Reason	Habit of Going to Park	
	Correlation Coefficient	Sig. (2-tailed)
Enjoy the outdoors or nature	0.197**	0.000
Use a particular facility at a park	0.261**	0.000
Play sports	0.404**	0.000
Picnic and general leisure activities	0.102*	0.042
Walk or ride a bicycle for exercise	0.210**	0.000
Meet friends	0.166**	0.001
Participate in family activities	0.068	0.178
Attend special events concerts	0.023	0.645

**. Correlation is significant at the 0.01 level (2-tailed).
*. Correlation is significant at the 0.05 level (2-tailed).

Indeed, the significant relationships as shown in Table 1 can reflect the action to be taken for improving the recreational parks. The main reason of the youth going to the park is to play sports, at a correlation coefficient of 0.404 ($p < 0.01$). The result demonstrates that the youth visit to the recreational park to use the available sports facilities, such as football field, basketball court, badminton court, and others. It reflects the need of having sports facilities at the recreational park to attract the visits of youth. Thus, the result supports the study outcomes by Cohen et al. (2009), Cohen et al. (2006), Kirby et al. (2013) and Ries et al. (2009), which revealed the necessity of park availability to youth's physical activities.

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Then, another significant reason of youth visiting the park is to use a particular facility at the park ($r = 0.261$, $p < 0.01$). For instance, they go to the park for skateboarding, using gymnasium facilities, and others. Thus, availability of these specific facilities can be an attraction point for the youth to visit the park. These activities are indeed the physical activities that can promote an active lifestyle. Some people might see these activities as an entertainment and help in releasing stress. Again, the findings validate the statements of Cohen et al. (2009), Cohen et al. (2006), Kirby et al. (2013) and Ries et al. (2009).

Thirdly, walking or riding a bicycle for exercise is a significant reason for youth to visit the park, with correlation coefficient 0.210 ($p < 0.01$). Walking and biking are the common activities done by the public, including the youth. Availability of walking and riding paths are the most important criterion to promote these activities. Also, to promote more physical activities like walking and biking, the recreational park should always be equipped with walking and biking paths. Meanwhile, they must always be in good and safe conditions as mentioned by Heitzler et al., (2006), Holt et al. (2009) Loukaitou-Sideris & Sideris (2009) and Humbert et al. (2006).

Furthermore, the youth like to enjoy outdoor and nature views, provided there are some attractive features. For instance, the recreational park with beautiful landscaping, water features, or nature scenery would attract more people to visit. Many recreational parks become tourist spot because of their beautiful nature features. Inevitably, the findings confirm the statement of Gardsjord et al. (2014), showing that the youth tends to visit the park for enjoying outdoor and nature scenery, at a correlation coefficient of 0.197 ($p < 0.01$).

In fact, the visit of youth to the park for the discussed activities requires the availability of facilities or features at the recreational park. Hence, planning of recreational park plays a significant role in promoting the outdoor activities and active lifestyle among the youth.

Prediction Model on Habit of Going to Park

According to the correlation analysis result, six reasons of going to park are found to be significantly correlated with the habit of going to park. Logistic regression analysis is run using the six significant reasons as the predictors, to confirm the correlation analysis result and to demonstrate the significant predictors of the habit of going to park. Then, the test will include all the significant predictors (with a significant value of less than 0.05) in and exclude all the insignificant predictors (with a significant value of more than 0.05) from the prediction model.

In the analysis, the habit of going to park is coded with the value 0 and 1. Whereby, “no” and “yes” are labelled as 0 and 1 respectively. By using the forward stepwise method, SPSS produces two steps to include the predictors that significantly contribute to the logistic regression model. Step one reveals that play sports significantly predicts the odds of the habit of going to park with $X^2 = 80.76$,

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$p < 0.05$. Then, Step 2 computes the walking or riding with $X^2 = 5.20$, $p < 0.05$. Thus, there are two independent variables significantly predicting the habit of going to park ($X^2 = 85.96$, $p < 0.05$).

In this case, 40.6% of the habit can be predicted from the reason of playing sports (PS) and walking or riding (WR). Overall, the model predicts 91.4% of the cases correctly (see Table 2). Meanwhile, the p-value for Hosmer-Lemeshow goodness of fit is 0.773, which is more than 0.05. Therefore, the model adequately fits the data. Then, the logistic regression equation is produced as follows (see Table 3):

$$Z = -4.677 + 0.805\ PS + 0.209\ WR \qquad (2)$$

As a result, play sports and walking or riding are the significant reasons that are influencing the probability of habit of going to park. To further increase the occupancy or usage rate of the parks, relevant authorities may enhance the amenities of parks based on the significant reasons of the youth to visit the parks. Previous studies have also highlighted the issues of attracting youth to recreational parks by providing more amenities (Floyd et al., 2011) and proper maintenance of facilities (Humbert et al., 2006; Loukaitou-Sideris & Sideris, 2009). Organised activities at the park such as playing sports affect youth's likely reasons to go to the park (Perry et al., 2011).

Table 2 Classification table

			Predicted		
			Go Park		Percentage
	Observed		No	Yes	Correct
Step 1	Go Park	No	12	28	30.0
		Yes	7	350	98.0
	Overall Percentage				91.2
Step 2	Go Park	No	12	28	30.0
		Yes	6	351	98.3
	Overall Percentage				91.4

a. The cut value is .500

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Table 3 Variables in the equation

		B	S.E.	Wald	df	Sig.	Exp(B)
Step 1[a]	Play Sports	0.845	0.113	55.833	1	0.000	2.328
	Constant	-3.684	0.741	24.708	1	0.000	0.025
Step 2[b]	Play Sports	0.805	0.115	49.359	1	0.000	2.236
	Walking/Riding	0.209	0.090	5.351	1	0.021	1.232
	Constant	-4.677	0.907	26.591	1	0.000	0.009

a. Variable(s) entered on step 1: Play Sports.
b. Variable(s) entered on step 2: Walking/Riding.

RECOMMENDATIONS

To attract the youth to visit the parks, planning and provision of park amenities must be improved to fulfil the needs of them. This study demonstrates the main reasons for youth to visit the park include play sports and walking or riding. So, proper amenities can be proposed to the planning of recreational parks. For example, the planning authorities may recommend the sports facilities in the parks, such the football field, basketball court, futsal court, badminton court, and others. Moreover, the planning of walking and riding paths must be appropriate including the width, capacity, connectivity, accessibility, quality and condition, availability of shade or covered path, availability of street furniture, lighting and others.

Further study is recommended to explore the type of sports that are popular in different geographical areas, as well as the design of the walking and riding paths that the users are seeking. By fulfilling the requirements of the users, the occupancy and usage rate of the parks will be increasing significantly.

In addition, local authorities, society, city leaders and decision makers are responsible for ensuring active living among youth and the leisure needs of young people must be considered in the process of urban planning and rural development (United Nations, 2005). Currently, it is encouraged that youth participates in community development decision-making as their voices and engagement can help improve planning outcomes (Santo et al. 2010; Passon et al. 2008).

CONCLUSION

Promoting physical activities among youth will help reduce the number of obesity among them. Since youths who are active in their younger age will most likely stay active when they are older, the number of obesity among adults also can be reduced. In addition, visits to the parks and actively participating in physical activities will also promote social integration among them. Therefore, the availability of facilities and amenities in the recreational parks is of important to attract the visit by youth. Also, the facilities and amenities at these parks should

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be maintained and monitored regularly. Local authorities and community associations should also engage youth in their planning for youth activities.

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NEIGHBOURHOOD SATISFACTION AND QOUL IN MIDDLE-INCOME HOUSING IN KUALA LUMPUR CITY, MALAYSIA

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Abstract

This paper is based on the subjective perception of the residents about the neighbourhood environment and their quality of urban life. The neighbourhood satisfaction provides a generalized view into the well-being of the residents, and it has been viewed as a significant aspect of the quality of urban life (QOUL). As a contributor to life satisfaction, neighbourhood satisfaction is influenced by individual and household socio-economic variables, along with the neighbourhood characteristics. However, there is limited understanding of how neighbourhood environments influence neighbourhood satisfaction and the quality of urban life. This paper intends to examine the relationship between residents' neighbourhood satisfaction and their quality of urban life in a middle-income housing area in Kuala Lumpur City, Malaysia, by using 100 sample respondents that fulfilled a confidence level of 90% of the population. The findings of the study indicate that the residents are satisfied with their existing QOUL, but if no actions are taken it will deteriorate. Therefore, several recommendations are made for improving the residents' QOUL.

Keyword: Neighbourhood satisfaction, Quality of Urban Life (QOUL); Middle-income housing; Socio-economic variables.

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INTRODUCTION

Malaysian economy has grown steadily in the past three decades transforming the country into a middle-income nation from an agriculture and commodity-based economy. The per capita GDP has increased significantly, and the urban population in the country has increased from 25% in 1960 to 72% in 2010. It is projected that 86% of the population will be urbanised by 2050 (United Nations, 2012). The rapid urban growth has led to a significant pressure on local and state governments on providing urban infrastructures that are intended to improve the quality of urban life. The Malaysian Quality of Life Index (MQLI) has been developed in 1999 by the Economic Planning Unit (EPU) with eleven components. Although the overall MQLI has increased by 7.0 points during 1990 to 2000 and further to another 11.9 points from 2000 to 2010, there exists a regional variation among different states with the Federal Territory of Kuala Lumpur having the highest quality of life index (Mohit, 2013b). This achievement of Kuala Lumpur can be attributed to it being the national capital and the vision of the City plan 2020 to be "a world class city" in which good quality of life is emphasised. Most studies of quality of life (QOL) in Malaysia present subjective analysis and there is a lack of literature that could explain the relationship between the neighbourhood satisfaction and quality of urban life (QOUL) in different housing areas of Kuala Lumpur City. Therefore, this paper intends to examine the relationship between neighbourhood satisfaction and QOUL in terrace housing through a case study in Kuala Lumpur City, Malaysia.

OBJECTIVES

The aim of the study is to determine the relationship between neighbourhood satisfaction and quality of urban life through the following objectives:

a. To investigate the level of satisfaction of the residents about the neighbourhood and quality of urban life.
b. To explore the relationship between neighbourhood satisfaction and quality of urban life.
c. To identify the key determinants of neighbourhood satisfaction and quality of urban life.
d. To suggest measures towards improving the neighbourhood satisfaction level and hence, the quality of urban life.

LITERATURE REVIEW

Quality of Life (QOL) and Quality of Urban Life (QOUL)

Quality of life (QOL) refers to 'goodness of life' and being able to live successfully and happily within the environment. There is neither a universal definition nor a standard form of measurement for quality of life, and this has made studying it more challenging and interesting for researchers (Cummins,

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1997). Different people in different parts of the world have defined QOL differently based on their cultures, social environment and level of economic development (Mohit, 2013a).

In spite of this, World Health Organization (WHO) has prepared a cross-culturally comparable quality of life assessment instrument called WHOQOL-BREF, and defines QOL as-

> "An individual's perception of his/her position in the context of culture and value systems in which they live in and in relation to their goals, expectations, standards and concerns. It is a broad ranging concept incorporating in a complex way, the person's physical health, psychological state, level of independence, social relationships, personal beliefs and relationships to salient features of the environment" (WHOQOLGroup, 1998).

As the world is becoming rapidly urbanised, it is estimated that more and more people will be living in urban areas. As the urban population grows, maintaining the quality of life in the urban areas becomes more difficult, and it becomes a matter of concern. Therefore, studies on quality of life in urban areas become a necessity as QOL can –

a) Provide the necessity for public action (Dahmann, 1985), (Lu, 1999);
b) Affect the liveability of urban areas and provide a set of indicators that help policy makers and planners to assess the effectiveness of their policies (Marans, 2012);
c) Impact the choice for residential location in the city (Golledge & Stimson, 1987); and
d) On a broader scale affect the patterns of regional migration, economic growth, and environmental sustainability (Kemp et al., 1997).

In the 1980s, the perception of QOL was becoming imperative in studies focusing on the quality of a place or the geographic setting at various scales (country, city, community and neighbourhood). These kinds of studies referred to as quality of urban life (QOUL) dealt mainly with assisting urban policy development and resource allocation to urban needs (Marans, 2012). This focus is conceptually distinct from individual QOL research that has examined factors impacting individual's well-being. Thus, the concept of the quality of life is divided into two distinct types – (a) Individual QOL that includes family life, friends, partner satisfaction, and (b) Environmental QOL which involve the quality of urban life that interest the environment behaviour researchers. The second group ranged in scale from the individual dwelling, community, neighbourhood, city, region, or even to the state or nation. It has been remarked

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that where people live, will influence their lives and, therefore, their overall QOL (Marans & Stimson, 2011).

Neighbourhood Satisfaction and Quality of Life

The concept of neighbourhood satisfaction is very much linked with the quality of life studies (Sirgy & Cornwell, 2002). Researchers often use these two terms interchangeably. The neighbourhood satisfaction and quality of life ultimately measure different aspects, both of which are important to urban planners and policy makers. Morris and Winter (1978) pointed out that a family evaluates a neighbourhood based on the following normative criteria: (a) the area should be predominately residential; (b) it should be accessible to quality schools; (c) the area should have quality of streets and roads; and (d) it should have homogeneity regarding social class, race, and ethnic group. Thus, Lu (1999) contends that neighbourhood satisfaction has been shown to be an important predictor of housing satisfaction. Residential satisfaction does not only rely on the dwelling units itself; neighbourhood plays an important role in residential satisfaction (Nurizan & Hisham, 2001; Salleh, 2012).

Studies have found that neighbourhood dissatisfaction, however, occurs about distances travelled to school by children, to employment and medical centres and the geographical location of housing estates. Also accessibility to the public transportation, community and shopping facilities and physical environment variables were identified as predictors of neighbourhood satisfaction. Another author has thus observed that location characteristics are important considerations for understanding the formation of residential satisfaction among public housing tenants. While housing is likely to be a source of satisfaction, neighbourhood conditions such as level of crime (Mulligan et al., 2004) or lack of amenity or industrial development or workplace location, are likely to be the sources of neighbourhood dissatisfaction. Alison, et al. (2002) contend that although socio-demographic factors were much less important than residents' perceptions in helping to predict neighbourhood dissatisfaction, the type of neighbourhood remained a significant independent predictor of dissatisfaction even when the residents' views were taken into account.

Yancy (1971), in a study of Pruitt-Igo, St. Louis, remarked that the main reason for the failure of Pruitt-Igo, was the lack of neighbourhood cohesion and social order associated with the dissatisfaction of the neighbours. Djebarni and Al-Abed (2000), in their study of public low-income housing in Sana'a, Yemen, found that the residents attach great importance to the level of satisfaction with their neighbourhood, particularly with the privacy that reflects the cultural background of Yemeni society.

The neighbourhood satisfaction reflects residents' complex evaluations about how well a neighbourhood meets their physical and social needs (Galster & Hesser, 1981). Quality of life is more holistic taking into consideration overall

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well-being, rather than actual conditions of the neighbourhood itself. The neighbourhood quality of life can be conceptualized as aspects of the residents' living situation that enable them to feel better, maintain independence, and physically, mentally, and socially improved (Fisher & Fuzhong, 2004). Assessing quality of life from neighbourhood satisfaction has been studied by Oktay and Ahmet (2011) in the walled city of Famagusta. There are different methods by which the relationship between neighbourhood satisfaction and quality of life can be established. For example, Sirgy & Cornwell (2002) tested three hypotheses while trying to find a relationship between the two.

Studies on the relationship between neighbourhood satisfaction and life satisfaction presents mixed findings. Oktay et al (2009) found no relationship between neighbourhood satisfaction and the QOUL in the walled city of Famagusta, North Cyprus. On the contrary, Sirgy and Cornwell (2002) analysed three models to examine the relationship between neighbourhood satisfaction and life satisfaction, and found that the relationship is positive through some mediating variables. In Dhaka, Bangladesh, it was found that the overall socio-physical features of the neighbourhood and community influence life satisfaction more than the physical features of the individual dwelling (Mridha & Moore, 2011). Sedaghatnia et.al (2013) studied the QOL and neighbourhood satisfaction in a mixed use high density neighbourhood in Kuala Lumpur city centre, and found that 68% of the residents were satisfied with the overall QOL while 32% were not.

The foregoing review of empirical studies about the relationship between neighbourhood satisfaction and QOL indicates that there are mixed findings. Therefore, there are opportunities for further research towards investigating the relationship between neighbourhood satisfaction and QOL that can be pursued by housing types, tenures, countries and cultures and that further research are required to determine QOUL on case-specific context to guide the directions of housing and urban public policies (Mohit, 2014).

METHODOLOGY

Methodology is a systematic approach adopted to explain about the research design, sampling frame, techniques of data collection and analysis.

Research Design and Sampling Frame

The main purpose of the study is to examine the relationship between neighbourhood satisfaction and quality of urban life. Hence, satisfaction levels of the respondents about the physical, social and economic conditions of the neighbourhood were measured along with satisfaction levels of the home, the neighbourhood and the QOUL. These levels are obtained through the primary data collected through a questionnaire survey. The research was carried out based on the subjective perception of the residents about the neighbourhood

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environment and the quality of life. For measuring the satisfaction levels, a five-point Likert-scale with '1=very unsatisfied…5=very satisfied', was used. Based on the literature review, three types of variables -dependent, independent, and control, were used in the research design. The dependent variables are overall satisfaction levels. The independent variables are the physical, social and the economic conditions of the neighbourhood. The control variables are the demographic and socio-economic characteristics of the respondents.

By using a confidence level of 90%, the sample (n) required for a population of 4725 (N= Study area population) was 99, but we used 100 respondents/ residents for survey. Due to time and budget constraints, it was not possible to increase the sample size. This is one of the limitations of the study.

Many researchers have argued that, the quality of any entity has a subjective dimension that is perceptual as well as having an objective reality. Therefore, both objective and subjective components of QOL are necessary to provide an understanding of it (Marans, 2012). Hence, in this study, assessment of residents' quality of life was done through their subjective well-being as it is closely related to the ways residents perceive or evaluate their neighbourhood condition to achieve life satisfaction.

Data Collection

Two types of data - primary and secondary were collected for this study. The primary data was obtained through observation, interview and questionnaire survey. A questionnaire was developed with five sections. Section-1 contained the demographic and socio-economic characteristics of the respondents. Section-2 was about the satisfaction with the physical features/ conditions of the neighbourhood. Section-3 was about the satisfaction with the social conditions of the neighbourhood. Section-4 was about the satisfaction with the economic conditions of the neighbourhood. Section-5 contained three questions, viz., their house, neighbourhood and QOUL. A total of 110 questionnaires were used for the survey, but ten questionnaires were rejected as they contained defective responses. The survey was carried out during weekends for two months i.e. December 2012 and January 2013.

Data Analysis

Both descriptive and inferential statistics were used for data analysis. Socio – demographic characteristics of the respondents were analysed through descriptive statistics. The mean satisfaction levels of the physical, social and economic conditions of the neighbourhood, home, overall neighbourhood and QOUL were analysed through descriptive statistics. Correlation analysis was employed to find an association between the variables and the satisfactions. AMOS version of Structural Equation Modelling (SEM) was employed to find out the determinants of neighbourhood satisfaction and QOUL.

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Study Area and Limitations of the Study

The housing area selected for study is Setiawangsa - an eastern suburb of Kuala Lumpur City that is located less than 4 kilometres from the city centre. The study was carried out in one type of housing, i.e., the middle-income terrace housing. Because of time and resource constraints, the study was limited to 100 samples from a population of 4725 middle-income families. However, the study cannot be used to generalise the phenomenon. For generalization, further studies in different parts of the city and covering other types of houses are required.

FINDINGS AND ANALYSIS

Socio-Economic and Demographic Characteristics

The majority of the respondents (84%) were male and a majority of them (56%) were between 21 to 50 years of age followed by 26% who were in the age group of 51-60 years. Only 5% of the respondents were more than 60 years. Whereas 60% of the respondents were married, 37% of the respondents were single/unmarried with 3% who were widowed/divorced. 84% of the respondents were Malays followed by 8% Indian, 3% Chinese, and 5% of other races. Whereas 62% of the respondents were Graduates/Diploma holders, 18% completed SPM (O' level) followed by 13% who had postgraduate degrees. 3% of the respondents completed STPM (A' level) while another 3% completed Ph.D. degree, and only 1% had other educational qualifications.

The majority (34%) of the respondents were in others job category, followed by 32% professional/technical job holders and 15% occupied managerial/administrative positions while 12% were involved in business. The mean household size was 5.4. The mean earning members in the household is 2.5. While 73% of the respondents had more than RM5000 as monthly household income, 11% reported having monthly household income of RM3001 - RM4000. The rest 26% had income below RM3000. The majority of the respondents (84%) were house owners and 16% were renters. Also, 91% of the respondents owned at least one car while only 9% did not own a car. The mean age of respondents' houses is 16.8 years. The mean residency is 12.8 years.

Satisfaction with the Physical Conditions of the Neighbourhood

Residents' satisfaction with the physical conditions of the neighbourhood shows that the mean satisfaction score (MSS) of most of the neighbourhood physical features are below the overall MSS of 3.7, with the exceptions of nearness of neighbourhood to facilities (MSS=4.6) and the accessibility to public transport (MSS=4.1). Upkeep of the housing area and urban design/aesthetics of the neighbourhood has MSS of 3.7 each, indicating a moderate level of satisfaction. Landscape/greenery, street lighting in the neighbourhood and noise level have similar MSS of 3.6 which indicates that residents are "moderately satisfied".

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Finally, the satisfaction level for crowding in the neighbourhood is also at moderate level with a mean of 3.5. The correlation coefficients *(r*) show that except the variable of noise level, all seven variables representing physical conditions of the neighbourhood, have significant positive correlations with satisfactions with overall neighbourhood physical conditions.

Satisfaction with the Social Conditions of the Neighbourhood

Residents' satisfaction with the social features and conditions of the neighbourhood shows that the MSS with the overall social condition is 3.7 - slightly over a moderate level. Respondents rated a high score of satisfaction on privacy at home (MSS=4.00), followed by the neighbourhood cohesion and race relations in the community, in which the MSSs are 3.8 each. Social interaction with neighbours and ties with people in the community, both have the same MSS of 3.7, while the MSS for outdoor play spaces/open spaces of the neighbourhood is 3.6. Respondents revealed relatively lower satisfaction levels with crime (MSS=3.3) and safety (MSS=3.5) in the neighbourhood. The variables of the component have significant positive correlations (*r*) with satisfaction with neighbourhood social condition. However, safety, race relations, people living, and open spaces, have higher (*r*) values than the other variables in the component.

Satisfaction with the Economic Conditions of the Neighbourhood

Residents' satisfaction with economic conditions of the neighbourhood shows that the MSS for the overall economic conditions is 3.7 - slightly above the moderate level. MSS with the value of the house has a mean of 4.00 which indicates a high level of satisfaction. Respondents' MSS to all other economic indicators of the neighbourhood like socio-economic status, neighbourhood improvement/ development and the cost of living, are at moderate level with MSS ranging from 3.5 to 3.7. The correlation coefficients (*r*) show that all the variables have significant positive correlations with the component. However, improvement, management, socio-economic status and value of the house, have higher correlations with the component compared with cost of living.

Residents' Satisfaction with the Home, Neighbourhood and the QOUL

The analysis of the respondents' satisfaction about the home, neighbourhood and QOUL (Table 1) shows that the residents are very satisfied with their homes (MSS=4.2), followed by their neighbourhood (MSS=4.00). The satisfaction with the overall quality of urban life is the lowest among the three with an MSS of 3.8. Hence, they are between "slightly satisfied to satisfied" for this parameter.

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Table 1. Distribution of residents' satisfaction with QOUL

Satisfaction with	Very unsatisfied (%)	Unsatisfied (%)	Slightly satisfied (%)	Satisfied (%)	Very Satisfied (%)	Mean	S.D	Pearson (*r*)
The home	-	1	12	50	37	4.2	0.7	.42**
Neighbour-hood	1	-	21	55	23	4.0	0.7	.40**
QOUL	-	5	22	61	12	3.8	0.7	1.00

Source: Field Survey, 2012-13.
*Note: **Significant at 0.01 level (2-tail).*

STRUCTURAL EQUATION MODELING (SEM)

Structural equation modelling uses confirmatory factor analysis. It is hypothesised that QOUL depends on the satisfaction with neighbourhood which in turn is dependent on the satisfactions of various physical, social and economic conditions of the neighbourhood. The model is "Fit" since the minimum is achieved. The variables were classified into two types based on the hypothesis as observed endogenous variables and observed exogenous variables. Observed endogenous variables are the dependent variables, and these are - satisfaction with physical neighbourhood features, satisfaction with neighbourhood social conditions, satisfaction with neighbourhood economic conditions, satisfaction with neighbourhood and satisfaction with QOUL.

The regression weights obtained from the path analysis in the model (Table 2) shows that the satisfaction score of the neighbourhood physical features is highly dependent upon the urban design/aesthetics of the neighbourhood with a value of 0.40, followed by the variable of nearness to facilities having a value of 0.21. Lower regression weights ranging from .03 to 0.15 were obtained with street lighting, landscape/greenery, Upkeep of the housing area, and crowding in the neighbourhood. The remaining two factors - access to public transport and noise level in the neighbourhood have the negative effect upon physical features of the neighbourhood.

Sense of safety in the neighbourhood having a regression weight of 0.41 is the most important factor for satisfaction with social conditions of the neighbourhood. The next variable is community cohesion in the neighbourhood with a regression weight of 0.18 followed by race relations with a regression value of 0.16. Lower regression weights ranging from .04 to 0.16 were obtained with open spaces, sense of privacy at home, and ties with the people in the community. The other two variables - social interaction with neighbours and crime level in the community, have negative weights.

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Satisfaction with economic conditions of the neighbourhood is most affected by neighbourhood developments/improvements with a regression weight of 0.33. Socio-economic status and management/maintenance of the neighbourhood has a regression weight of 0.22. The value of the house in the neighbourhood has a regression weight of 0.05. The only factor which has a negative value (-0.01) is the cost of living in the neighbourhood.

Among the three factors - satisfactions with physical, social and economic conditions of the neighbourhood, satisfaction with the economic conditions of the neighbourhood with a regression weight of 0.32, affects most the satisfaction with the neighbourhood. This is followed by the satisfaction with the physical features with a value of 0.30. The least regression weight (0.07) is by the satisfaction with the social conditions of the neighbourhood. However, all three factors have positive effects on the satisfaction with the neighbourhood. Satisfaction with the overall quality of urban life is influenced positively with a regression weight 0.39 by overall neighbourhood satisfaction.

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Minimum was achieved

Chi-square = 1198.871

Degrees of freedom = 300

Probability level = .000

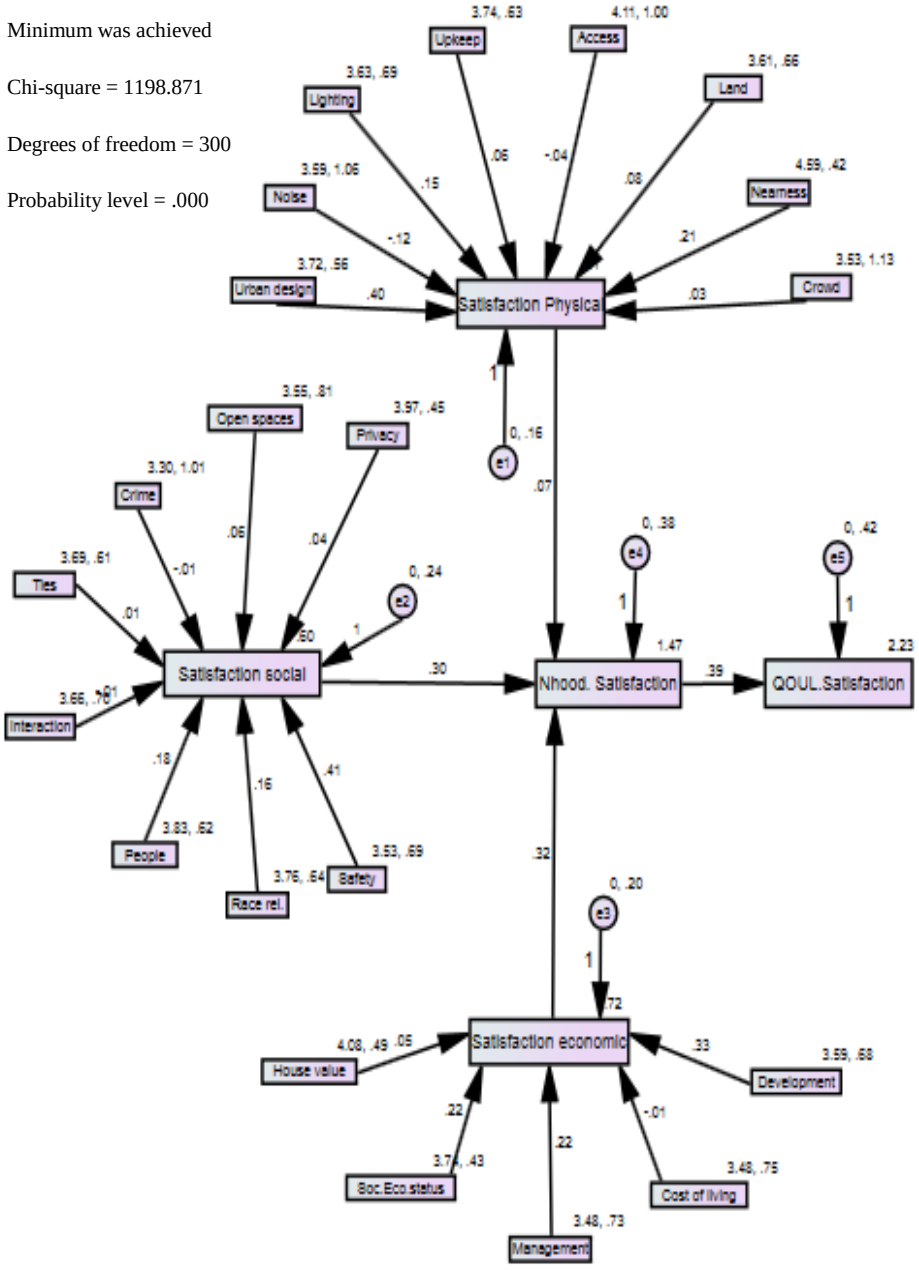

Figure 1 Structural Equation Model
Source: Data analysis

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Table 2: Regression weights obtained from path analysis of SEM

			Estimate	S.E.	C.R.	*p*
SOC.CONDITIONS	<---	PRIVACY	.04	.07	.54	.59
SOC.CONDITIONS	<---	INTERACTION	-.01	.06	-.21	.84
SOC.CONDITIONS	<---	TIES	.01	.06	.09	.93
SOC.CONDITIONS	<---	OPENSPACES	.06	.05	1.14	.25
SOC.CONDITIONS	<---	SAFETY	.41	.06	6.96	***
SOC.CONDITIONS	<---	CRIMELEVEL	-.01	.05	-.12	.90
SOC.CONDITIONS	<---	COM.COHESION	.18	.06	2.94	.00
SOC.CONDITIONS	<---	RACERELATIONS	.16	.06	2.65	.01
ECO.CONDITIONS	<---	MANAGEMENT	.22	.05	4.22	***
ECO.CONDITIONS	<---	HOUSEVALUE	.05	.06	.75	.45
PHY.FEATURES	<---	CROWDING	.03	.04	.83	.40
PHY.FEATURES	<---	NEARNESS	.21	.06	3.40	***
PHY.FEATURES	<---	UPKEEP	.06	.05	1.15	.25
PHY.FEATURES	<---	PUB.TRANS	-.04	.04	-.92	.36
PHY.FEATURES	<---	URBANDESIGN	.40	.05	7.30	***
PHY.FEATURES	<---	NOISE	-.12	.04	-2.94	.00
PHY.FEATURES	<---	LANDSCAPE	.08	.05	1.66	.10
PHY.FEATURES	<---	LIGHTING	.15	.05	3.12	.00
ECO.CONDITIONS	<---	DEVELOPMENT	.33	.05	6.21	***
ECO.CONDITIONS	<---	COSTOFLIVING	-.01	.05	-.17	.87
ECO.CONDITIONS	<---	SOC.ECO.STATUS	.22	.07	3.19	.00
NHOOD.SATISFACTION	<---	SOC.CONDITIONS	.30	.10	2.97	.00
NHOOD.SATISFACTION	<---	PHY.FEATURES	.07	.11	.62	.53
NHOOD.SATISFACTION	<---	ECO.CONDITIONS	.32	.11	2.92	.00
QOUL.SATISFACTION	<---	NHOOD.SATISFACTION	.39	.10	4.06	***

S.E = Standard Error, C.R= Critical Ratio, *p* = Probability
Source: Field Survey, 2012-13.

CONCLUSION AND RECOMMENDATION

As a contributor to life satisfaction, neighbourhood satisfaction is influenced by individual and household socio-economic variables, along with neighbourhood characteristics. The study found that among the three neighbourhood factors - satisfactions with physical, social and economic conditions, satisfaction with the economic conditions are highly correlated, followed by the physical conditions with the neighbourhood satisfaction. The least effect is by satisfaction with the social conditions of the neighbourhood. But all three factors have positive effects on the satisfaction with the neighbourhood. Satisfaction with the overall quality of urban life is influenced positively by the overall satisfaction with the neighbourhood.

Although, for most of the factors, the respondents are very satisfied, there are some factors for which their satisfaction level is low. So the following recommendations are made for improving them.

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a. Density of people in new residential developments should reduce crowding with which the residents are found just satisfied.
b. More surveillance measures should be undertaken to reduce crime and enhance neighbourhood safety to enhance residents' satisfaction with them.
c. The management/ maintenance of the neighbourhood should be improved to enhance neighbourhood satisfaction and QOUL.
d. Finally, public participation and consultation must be undertaken by the authorities for future planning and development.

Overall, the residents were moderately satisfied with the existing QOUL. But if no further actions are taken, it may deteriorate. So the following recommendations are made for improving the QOUL.

a. Since the relationship between QOUL and neighbourhood is established from the findings, steps to improve the neighbourhood satisfaction must be undertaken by the local authorities.
b. Assessments of QOUL should be made from time to time by the local authorities as the needs of people might change with time.
c. Since economic factors are vital to affect QOUL compared to other factors, the government should take necessary measures to improve the economic conditions of residents so the overall quality of life of the people in general can improve.

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IDENTIFYING FACTORS INFLUENCING URBAN SPATIAL GROWTH FOR THE GEORGE TOWN CONURBATION

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Abstract

Urban growth, which caused spatial land use and land cover changes has affected various physical environment, social, and economic activities. Thus, in order to understand the dynamic process of urban spatial growth, researchers throughout the world have implemented diverse approaches, where spatial models have been developed to predict and simulate future urban growth. Those models were developed based on the driving forces that stimulate urban spatial growth. Therefore, in ensuring reliable models to be developed will be able to forecast future changes and their potential environmental effects, the driving forces must be identified. The objective of this paper is to identify possible driving forces that promote urban spatial growth of the George Town Conurbation. The study was conducted based on reviewing recent publications in journals and an on-line survey. An on-line survey was generated and distributed to academicians and urban planners to identify factors influencing urban spatial growth and their weights. The findings indicated that distance to public amenities, cheap housing price, and distance to the workplace are among factors that are important determinants of urban development. The results provide valuable insights in modelling urban growth in future research.

Keyword: Urban Spatial Growth, Driving Forces, George Town Conurbation

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INTRODUCTION

Urbanisation is among the most significant process that has shaped land use activities and has drawn a great deal of attention throughout the world. It is estimated that urban population will rise from 3.57 billion in 2010 to 6.34 billion in 2050 where almost 70 percent of the world's population is expected to live in the cities (United Nations, 2014). This immense figure is mainly due to migration from rural to city in search of better quality of life generated by urban activities and services (Deng, Wang, Hong & Qi, 2009).

However, an increase of urban population has forced cities to expand vertically or horizontally, encroaching into agricultural land and natural boundaries, and changing land use and land cover without us realizing it (Su, Jiang, Zhang & Zhang, 2011). The George Town Conurbation is no exception as exemplified by the two revisions made by Federal Department of Town and Country Planning (FDTCP, 2015a) on George Town Conurbation's boundaries due to rapid urbanisation caused by George Town city. Deeper understanding of the concepts or mechanisms underlying the urban growth can assist toward formulating appropriate policies of urban growth management, and thus, lessening the negative impacts of urbanisation while maximising the positive impacts (Aguayo, Wiegand, Azócar, Wiegand & Vega, 2007).

In understanding urban growth and development, spatial model has been developed and implemented (Batty, 1971; Briassoulis, 2008). These models have the ability to simulate the spatial changes of land use and land cover of a city and forecast the possible urban development according to data received (Hu & Lo, 2007). In order to develop reliable models that can be used in forecasting urban change, various factors or driving forces that stimulate urban change in a very complex manner needs to be considered (Deng et. al., 2009). Thus, determining and studying the factors or driving forces that stimulate urban growth is the fundamental step in the development of such model (Verburg, Schot, Dijst & Veldkamp, 2004; Briassoulis, 2008).

Aguayo et. al. (2007) emphasise that the factors that stimulate urban development, especially those factors that can be used to predict future changes and their potential environmental effects must be identified and analysed in order to understand the spatial and temporal dynamics of these processes. However, this may be difficult since various stakeholders and expert opinion need to be considered. Multi Criteria Evaluation Approach (MCE) can potentially be used since this approach allows various choice possibilities and criteria to be considered in decision making (Malczewski, 1999). Therefore, the objective of this paper is to identify and analyse possible driving forces that promote urban spatial growth in the context of urban growth in Malaysia, which will then be included in modelling the George Town Conurbation spatial growth.

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BACKGROUND OF THE STUDY

To date, various studies that identify and utilise driving forces urban growth model have been conducted throughout the world (Lo & Yang, 2002; Aguayo et. al., 2007). For example, Aguayo et. al. (2007) revealed that urban growth areas are stimulated by distance and density of specific elements which implies proximity and neighbourhood are two important driving forces to urban development. It is difficult to develop an area if the road network is not well constructed because roads open many opportunities, especially for business by attracting higher population migration. Residents' desire to live at a location with easy access to other destinations helps to explain the construction of nodes and highways in many urban areas. Road network not only facilitates residents' daily lives but also reduces construction cost for amenities like shopping malls and hospitals (Li, Zhou & Ouyang, 2013).

Industrialisation or commercialisation which implies economic factor is also one of the important determinants in promoting urban development (Lu, Wu, Shen & Wang, 2013; Liu, Wang & Long, 2008; Lo & Yang, 2002). It offers many job opportunities which attract employees to stay in the vicinity and also influences road network development to stimulate economic factor in regional trade (Lu et. al., 2013). Lo and Yang (2002), for example, found that industrial and commercial activities are located at high-density urban area, which proved that these two activities are also important forces in developing an area. The increase of investment in secondary and tertiary industries has boosted land for residency and become the direct factors of land conversion for development (Liu et. al., 2008). Furthermore, urban growth is more likely to be expanded if the location is closer to urban centres.

In addition, Briassoulis (2008) proposed that urban model should consider bio-physical driving forces which consist of characteristics and processes of the natural environment. Suitability of a location to develop can be impacted by bio-physical factors, for instance, slope layer needs to be taken into consideration in urban expansion model (Verburg et. al., 2004). Hu and Lo (2007) proposed that steep and elevated areas are less likely to be developed due to the cost of construction and higher risk of land instability. Factors like economic gains and insufficiency of land availability might lead developer to consider developing despite the high cost and risk of slope and elevation. Apart from that, zoning status or legally protected areas have produced the best result in sensitivity analysis of developed urban model which signify it as one of important factors of urban expansion (Poelmans & van Rompaey, 2010).

Kuang, Chia, Lu and Dou (2014) recognised that urban planning, management strategies and policies have become major driving forces that need to be considered in modelling urban growth as they can affect other drivers. China, for example, has experienced unprecedented speed of urbanisation rate since government setting up special economic zone which has emerged as

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China's commercial and industrial hub. On the contrary, the United States remained relatively stable urbanisation rate due to introduction to variation of distinct zone to manage rural and urban area (Kuang et. al., 2014). Instead of exercising land use policy to direct physical development, it can also serve as a platform to promote economic, social, environment and other goals which indirectly stimulate urban development (Briassoulis, 2008).

As indicated by studies undertaken in various countries, socio-economic, economy, bio-physical and political factors played an important role in stimulating urban spatial growth (Li et. al., 2013; Liu et. al., 2008; Briassoulis, 2008; Kuang et. al., 2014). Similarly, in Malaysia, rapid urbanisation was due to various driving forces that influenced urban spatial growth especially in major urban conurbations namely Kuala Lumpur, George Town, Johor Bahru and Kuantan. These conurbations have been identified in National Physical Plan 2 (NPP2) and prioritised to facilitate urban planning process (Hashim, 2011). All the above mentioned conurbations were named after the major cities that trigger rapid urbanisation to its surroundings (FDTCP, 2015b). Although urban development brought economic benefits to the country, it may also cause negative impact to the agricultural and natural areas if proper planning is not in place (Samat, Ghazali, Hasni & Elhadary, 2014).

METHODOLOGY

Data

The primary objective of this paper is to identify and analyse possible driving forces that promote urban spatial growth, especially those that can be employed to predict future changes and their potential environmental effects. The identified driving forces were then being adapted in Malaysian context to model urban growth of George Town Conurbation. In order to achieve the objective, data from recent research journals and articles regarding modelling urban growth were reviewed. In addition, an on-line survey was conducted to gather data on driving forces of urban development. The questionnaire consists of 5 items to gather information about respondents' demographic backgrounds and another 6 items to assess their knowledge of urban development. The survey contains open-ended and closed-ended questions using Likert scale rating 1-to-9 (Saaty, 1992). Through purposive sampling, the surveys were distributed to planners from Department of Town and Country Planning (DTCP), academicians and researchers of public universities in Malaysia, private urban modellers and developers. This survey aimed to assess their perception on urban land use transformation and also to measure the weight of potential drivers or factors that stimulate urban spatial growth in Malaysia. The study managed to obtain 39 respondents with the majority of the respondents (69.2%) aged more than 40 years old. This implies that this group of respondents have witnessed and

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experienced urban growth and development since year 1990. Apart from that, 84.6% of the respondents (33 respondents) are directly involved or are well aware of urban development. 24 respondents (61.5%) are academicians specializing in urban studies and 9 respondents (23.1%) are urban planners. The reliability of the online survey has been tested, especially for question related to determine the importance of a driving force in urban growth. The result, Cronbach's Alpha value of α=0.789, indicates that the instrument is reliable. Quantitative data was analysed using Microsoft Excel 2010 and qualitative data, in the form of direct quotations, are used to supplement the findings.

Identifying Weights for Drivers of Urban Growth

In understanding the urban development phenomenon, there are factors or drivers inevitably influencing the process either explicitly or unwittingly. For example, the existence of institutions or administrative offices in an area will directly attract developers to build residential area nearby, which consequently forces local authorities to enhance public amenities and infrastructure for the community. This situation unwittingly will result in the existence of another new town which in future will expand into city. Due to the variety of factors influencing urban development, it is necessary to figure out weights or relative importance of each identified factor, which is useful for urban planners and urban modellers.

Pairwise comparison method was chosen to compute weights of drivers as this approach is a popular approach to analyse Likert Scale questionnaire (Beynon, 2002; Hossain, Adnan & Hasin, 2014). Relative importance is computed from the ratings assigned from Likert Scale and then form a "suggestion Matrix" in order to calculate weights using Pairwise comparison method (Hossain et. al., 2014). "Suggestion matrix" in determining weights of factors are shown in the following Table 1 and Table 2 below.

Table 1 Pairwise comparison matrix considering all factors

#	1	2	3	4	5	6	7	8	9	10
1	1									
2	0.86	1								
3	1.00	1.17	1							
4	0.73	1.00	0.86	1						
5	0.86	1.17	0.86	1.00	1					
6	1.00	1.36	1.00	1.17	1.17	1				
7	0.73	1.00	0.73	0.86	1.00	0.86	1			
8	0.86	1.17	0.86	1.00	1.17	0.86	1.00	1		
9	0.86	1.17	0.86	1.00	1.17	0.86	1.00	1.00	1	
10	0.86	1.17	0.86	1.00	1.17	0.86	1.00	1.00	1.00	1

1=Distance to workplace **2**=Distance to city centre **3**=Cheap housing price **4**=Population density or neighbourhood **5**=Distance to health centre eg. public hospital, public clinic, etc. **6**=Distance to public amenities eg. school, university, etc. **7**=Distance to main road or highway **8**=Distance to commercial or industrial area **9**=Proximity to parks and natural features **10**=Proximity to area that support new and growing business

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Table 2 Pairwise comparison matrix considering some factors

#	1	3	4	5	6	7	10
1	1						
3	1.00	1					
4	0.86	0.86	1				
5	1.00	0.86	1.00	1			
6	1.17	1.00	1.17	1.17	1		
7	0.86	0.73	0.86	1.00	0.86	1	
10	1.00	0.86	1.00	1.17	0.86	1.00	1

1=Distance to workplace **3**=Cheap housing price **4**=Population density or neighbourhood **5**=Distance to health centre eg. public hospital, public clinic, etc. **6**=Distance to public amenities eg. school, university, etc. **7**=Distance to main road or highway **10**=Proximity to area that support new and growing business

Study Area

The study was carried out in the George Town Conurbation, which involves the Penang State and parts of neighbouring states of Kedah and Perak as proposed by Penang State Department of Town and Country Planning (PDTCP, 2015) and in line with NNP2 of Malaysia (Hashim, 2011). It is located in the northwest coast of Peninsular Malaysia between latitude 4º 50' N and 5º 52' N and longitude 100º 10'E and 100º 51'E, with an area approximately 3,938 square kilometres (See Figure 1). George Town Conurbation is a metropolitan area with a total population over 2.5 million people and it is estimated to exceed 3 million residents by 2020 (Department of Statistics, 2010). As this conurbation spreads across three states, the proposed boundary of George Town Conurbation was determined by economic criteria, distance travelled and mega projects in George Town's neighbouring districts (PDTCP, 2015).

George Town Conurbation was selected as the study area because this area has experienced rapid development, especially in the industrial manufacturing, trade, commerce and services sectors (Samat et. al., 2014). In addition, its strategic location in establishing relationships and cooperation with regional countries and bordering regions are also one of the reasons for selecting this conurbation as the study area. This strategic location will intensify the northern territory's role in contributing to major economic development of the country (FDTCP, 2015b). Furthermore, George Town Conurbation is one of the four major conurbations that have been highlighted in NPP 2 which implies that the study area is very significant in the development of Malaysia (Hashim, 2011).

George Town Conurbation had also experienced a tremendous land use changes influenced by the spillover of Penang Development. Many people have been forced to sell their agricultural land as they are not able to earn maximum yield due to the development surrounding the land (Samat et. al., 2014). As a result, development has expanded based on land availability instead of following regulation made by the local authority.

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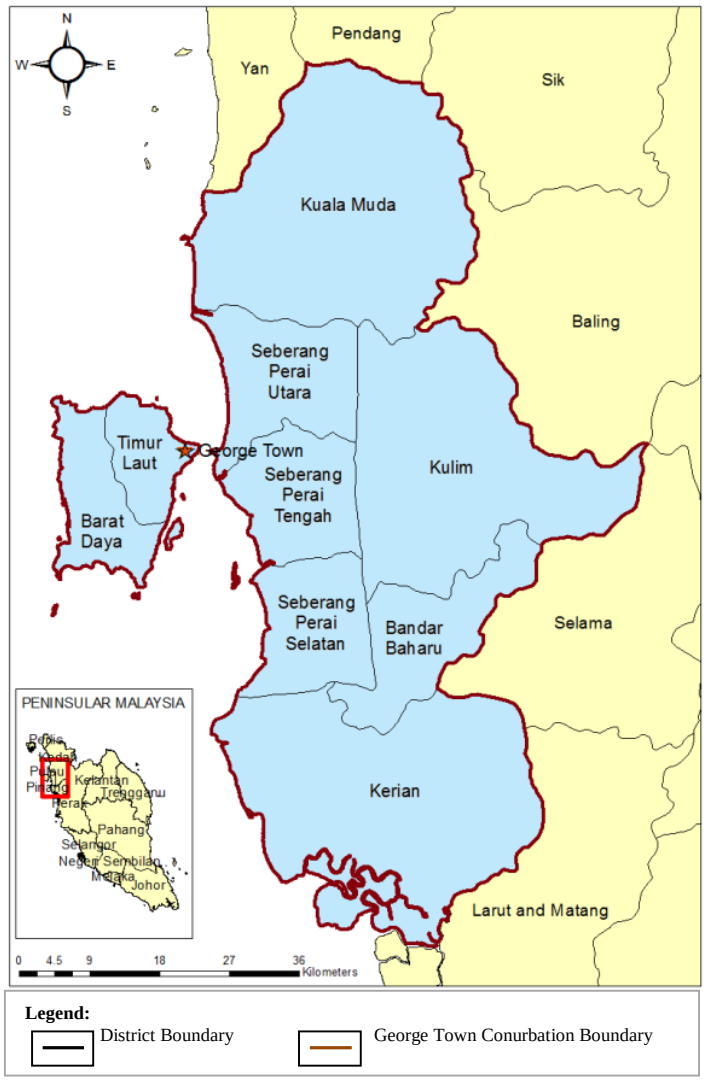

Figure 1 The Study Area (George Town Conurbation)
Source: Penang State Department of Town and Country Planning (PDTCP, 2015)

Due to that reason, Landsat images of the study area have been downloaded from the United States Geological Survey (USGS, 2014) and processed using Erdas Imagine software 2014 to assess the spread of development in George Town Conurbation.

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Figure 2 Landsat Image of Year 2002 (left), Year 2009 (centre) and Year 2014 (right)
Source: United States Geological Survey (USGS, 2014)

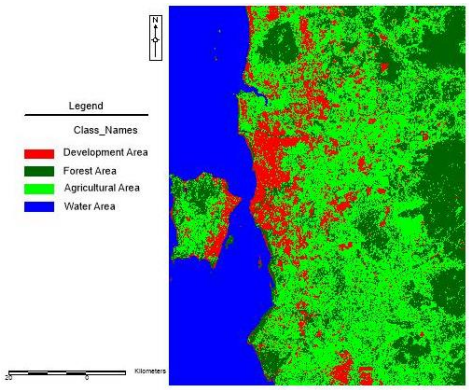

Figure 3(a) Land Cover, 2002

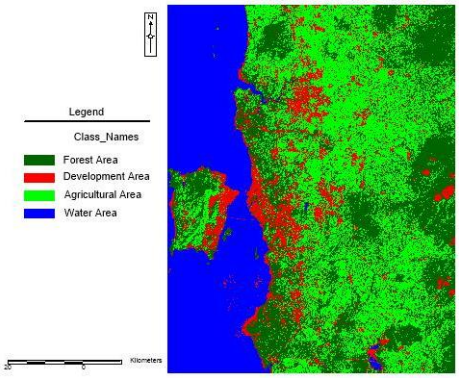

Figure 3(b) Land Cover, 2009

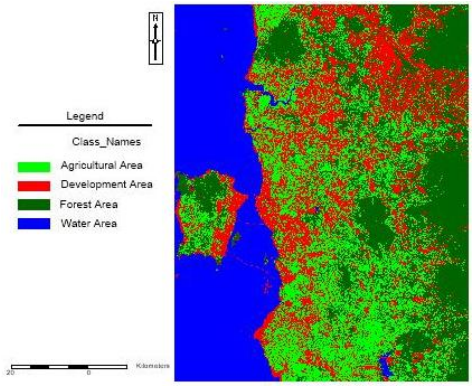

Figure 3(c): Land Cover 2014

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Table 3 Area (Hectares) Changes for Each Class Period

Class Name	2002 to 2009	2009 to 2014
Water Area	1,202	1,254
Forest Area	32,580	-41,255
Development Area	8,197.3	97,718.5
Agricultural Area	-41,979	-57,718

Table 4 Area of Each Class for Different Year Period

Class Name	Area (Hectares)		
	2002	2009	2014
Water Area	186,999	188,201	189,455
Forest Area	209,821	242,401	201,146
Development Area	68,843.2	77,040.5	174,759
Agricultural Area	284,572	242,593	184,875
Overall Classification Accuracy (%)	*80.08*	*83.59*	*81.25*
Overall Kappa Statistics	*0.7366*	*0.7713*	*0.7474*

Based on the image classification results (Table 3 and Table 4), it can be seen that developed areas has increased from 68,843 hectares to 174,759 hectares (more than 150% increase) from 2002 to 2014 respectively. The increase of developed areas is at the expense of agricultural land which decreased from 284,572 hectares in 2002 to 184,875 hectares in 2014 (total changes of -99,697ha). Forest area also experienced a decreasing change, from 209,821 hectares in 2002 to 201,146 hectares in 2014. These results show that George Town Conurbation has been experiencing rapid urban growth over the last decade or so.

RESULTS AND DISCUSSIONS

Based on the driving forces identified and gathered from published articles in journals, this study utilized online survey to determine weight for each factor in influencing urban spatial growth. These weights and factors will later be used in modelling the dynamic urban spatial growth of the study area. Table 5 shows the weights for each factor as indicated by the data gathered from the survey.

Table 5 Factors with Respective Weighting Value

Factors	Weight 5a	Weight 5b
Distance to public amenities e.g. school, university, etc.	0.1122	0.1589
Distance to workplace	0.1141	0.1457
Proximity to area that support new and growing business	0.0977	0.1393

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Distance to health centre e.g. public hospital, public clinic, etc.	0.0950	0.1333
Distance to main road or highway	0.0906	0.1276
Distance to commercial or industrial area	0.0977	-
Proximity to parks and natural features	0.0977	-
Distance to city centre	0.0879	-
Cheap housing price	0.1123	0.1589
Population density or neighbourhood	0.0948	0.1362
Consistency Ratio	*0.004*	*0.001*

Weight 5a in Table 5 are weighting values for all factors rated by the respondents, whilst Weight 5b are weighting values after removing three factors with lowest mean rated by the respondents. Distance to workplace, cheap housing price and distance to public amenities have been rated by the respondents as the most important factors that affecting urban development with weights of 0.1141, 0.1123 and 0.1122 respectively. Similarly, according to Samat (2007) proximity to employment centres have been rated as most influence factor in urban growth. In addition, the study by Samat, Hasni & Elhadary (2011) also proved that Northern Seberang Perai in Penang has experienced an increased rate of urban growth with the development of education institutions especially in Bertam. As a result of the development of the institutions, many sites neighbouring those institutions developed rapidly while other areas grow much slower (Samat et. al., 2011).

On the other hand, the respondents have rated distance to commercial or industrial area (0.0977), proximity to parks and natural features (0.0977) and distance to city centre (0.0879) as less important in stimulating urban development. Another researcher also found that proximity to population centres which is residential area have been weighted as lowest influences factors when modelling industrial activities in urban growth model (Samat et. al., 2011). This may be due to people were not comfortable to live in surroundings near to industrial area and at the same time people prefer to live in an environment free from commercial or industrial waste which can affect health of nearby communities. Another reason that may have contributed to the finding is that more efficient road network will shorten travelling time, thus distance to city centre becomes less important in promoting urban development. Samat et. al. (2011) notice that investment on transportation network such as North-South Expressway and Butterworth-Kulim Expressway in Northern Region of Peninsular Malaysia has facilitated many people to move from one district to another in a short time period.

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CONCLUSION

A good dynamic urban model should be able to account identified driving forces in order to utilise land within a boundary optimally. Based on the literature review, it was found that three major driving forces stimulate urban development namely: physical landscape, socio-economic and environment. Meanwhile, respondents of the survey conducted during this study have rated distance to workplace, cheap housing price and distance to public amenities as factors with most influence on urban growth. The respondents also provided valuable data (weight) for modelling urban growth. However, some respondents also proposed that political factor should be considered in predicting urban growth. Findings from previous research proved that this political factor does have a significant impact to urban growth but it is very difficult to quantify it. Therefore, future research could investigate political factors, which influence urban growth using qualitative approach.

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THE CRITIQUES TO POSITIVISM DIRECTION OF INQUIRY IN COMPREHENDING THE COMPLEXITY OF GOVERNANCE IN MANAGING CITIES COMPETITIVENESS

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Abstract

The complexities in managing cities are real in the ethos of global cities competition and indeed, the governance of urban complexities are further compounded by the discoveries of new tangible and intangible determinants, vehemently contributed by the increased structural changes on a global scale ceased to be the main axes and reference points in societal organization. Whilst deterministic about deploying competitive cities interventions, the initiatives have always exposed local authorities to other related issues in the governance of complexity, which usually infers to their organizing capacity in attaining organizations competitiveness. For most modernists' scholars, they tend to agreed that learning is associated with efficiency and thus, it exposed organizations to learn new impositions of social artefacts. Exaggerated from realist ontology definitive foundation of structural functionalism, it clearly underlined Weberian positivism bureaucratic efficiency, which echoed local authorities in attaining the balancing act between 'de jure' and 'de facto' that constitutionally empowered in managing cities in the ethos of globalization. On the contrary, the realism in local authorities suggested otherwise, which perhaps lead to epistemological debates on the governmentality. Apparently, local authorities are facing dramatic challenges not only reframing to achieving global interventions on cities competitiveness and urban sustainability interventions – de jure; but also intensely faced-off with severe ignorance, resentment and dissonance from the entire workforce itself – de facto. As such, it warrants this paper to explore the validity on the dominant used of positivism direction of inquiry among social sciences researchers' on organizational bureaucratic efficiency, when most positivism line of inquiry researchers suggested that local authorities are learning organization entities, or is it so?

Keyword: Learning organization, positivism causal law, heretic behaviours

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INTRODUCTION

The subject to this insight dwelled with the credence of local authorities in managing cities in the ethos of global cities competition. For analytical purposes, it is not the intend to negates on how local authorities deploying competitive urban policy, but most importantly is to evaluate the merits of local authorities to response to the dynamic notion of management innovation, which lead to questions their organizing capacity in translating those competitive cities management policies into practices. The term management innovation, coined from Mehta (1998), refers as the dynamic concept of urban governance of local authority in their efficacious efforts in translating competitive cities management. In due process, it implies to the capabilities of decision makers in local authorities *to shape* and sanction management innovation and the executive management *to manage*, and the urban managers to *implement* it. Compelled to view the issues entailed from interpretative perspectives that encumbered organizing capacity of local authorities, it subsequently leads this insight to evaluate the underlined phenomena of endemic behaviours that impeding learning values in organization, which posit the notion of learning organization.

As evolutionary as the paradigm of competitive cities management to-date, so does the management of local authorities, exposing them to the only constant attribute, the dramatic changed environment. Evidently, the neo-liberalism approaches are behind this long-winded movement of the global cities competitiveness. Reckoned on the intensity, the UN Millennium Declaration was conceived in 2000, supported the idea of cities sustainability whilst encouraged local authorities to re-invent in its strategic response. At this point, issues relating to governance of urban complexities are central, consistently highlighted by most urban management scholars in obviating cities marginalization and social exclusion. Nevertheless, literatures in relation to city governance are abound, but seminal works from Azmizam, et al (2009), and Hamzah and Azmizam (2008) are much related to local flavours since they did emphasize on the complexities, and presenting Kuala Lumpur city-regions in detailing the challenges endured in the governance of urban complexities in the ethos of global intensities. Despite to the similarity in line of inquiry between them, they reckoned the importance of global cities circuits, which ontologically, merits local authorities to manage these issues in tandem with the global concerned and to response amicably to accommodate the governance complexities.

Imbued by the idea of organizational efficiency, local authorities are further circumspect to re-visit their own organizing capacity, which is yet another plausible rule that needed attentive effort. In view of its importance in balancing between *de jure* and *de facto*, the management innovation and public sector capacity for good governance initiatives was later endorsed during the summit of Mexico 2003 Global Forum on Reinventing Government Capacity. Seemingly,

all these intervention necessitates the efficacious attempt by local authorities to re-consolidate their organizing capacity, where all aspects of cities innovation systems are a priori to cities competitiveness and sustainability blueprint. In due processes, it warrants local authorities to un-learned their present approaches and be transformative structurally, in coveting competitive cities management – the lessons endorsed throughout the global interventions. However, prior to comprehend the importance on the framework of cities innovation systems, it is important to theorize local authorities as learning entities, as the term entailed a compelling meanings representing a powerful institution in sanctioning competitive cities management.

THEORIZING LOCAL AUTHORITIES AS LEARNING ORGANIZATION ENTITIES

Let us begin by quoting to some of significant captions from Zuboff's (1988) in her works "*In the Age of the Smart Machine",* where she equated learning capacity as values in attaining organizations competitiveness. In her attempts, she highlighted that in *"today's organization may indeed have little choice but to become a 'learning institution', since one of its principal purposes will have to be the expansion of knowledge – not knowledge for its own sake, but knowledge that comes to reside at the core of what it means to be productive. Learning is no longer a separate activity that occurs either before one enters the workplace or in remote classroom settings. Nor is it an activity reserved for a managerial group. The behaviours that define learning and the behaviours that define being productive are one, and the same. Learning is the heart of productive activity. To put it simply, learning is the new form of labour"*. Obviously, that idealism signified her concerned, hedging learning values to some deliverable [economic] inputs, as organization assets. Indeed, she did lay a definitive foundational that situates learning as every workforce affair, responsibilities to attained and uphold with honour. The tenet to her idealism is when she put the thrust, believing that every workforce is able to solve problem amicably by his or her own innate culture for efficiencies, a culture that becomes the repository for lessons learned, which situates workforce as asset in organization.

However, the realism turned out to be different, leading to pertinent questions involving the 'capacity in need' required in translating good governance that supposedly build by everyone. Indeed, the reality is when local authorities are facing with dramatic challenges from both ends, not only accountable to achieving global benchmark in competitive cities management interventions but also, concomitantly facing an intense apprehension from the entire workforce itself, from within. As represented in Figure 1, it exhibited the dynamism of organizing capacity of local authorities, depicting their purposive attempts to response to the global competitive fundamentals in managing cities competitively. This representation holds to addressed complexities of governance

by way of continuous knowledge acquisition, for one competencies and skills enhancement through lots of training investments. The intention is simple when the acquired knowledge would reciprocate with competencies and skills. Such induced and control behaviours would allow to the construction of systemic self-auditing artefacts in organization. Resembling the Weberian approaches of bureaucratic induction for efficiency would often leads to efficient forms of social control that enabled individuals to govern and behave.

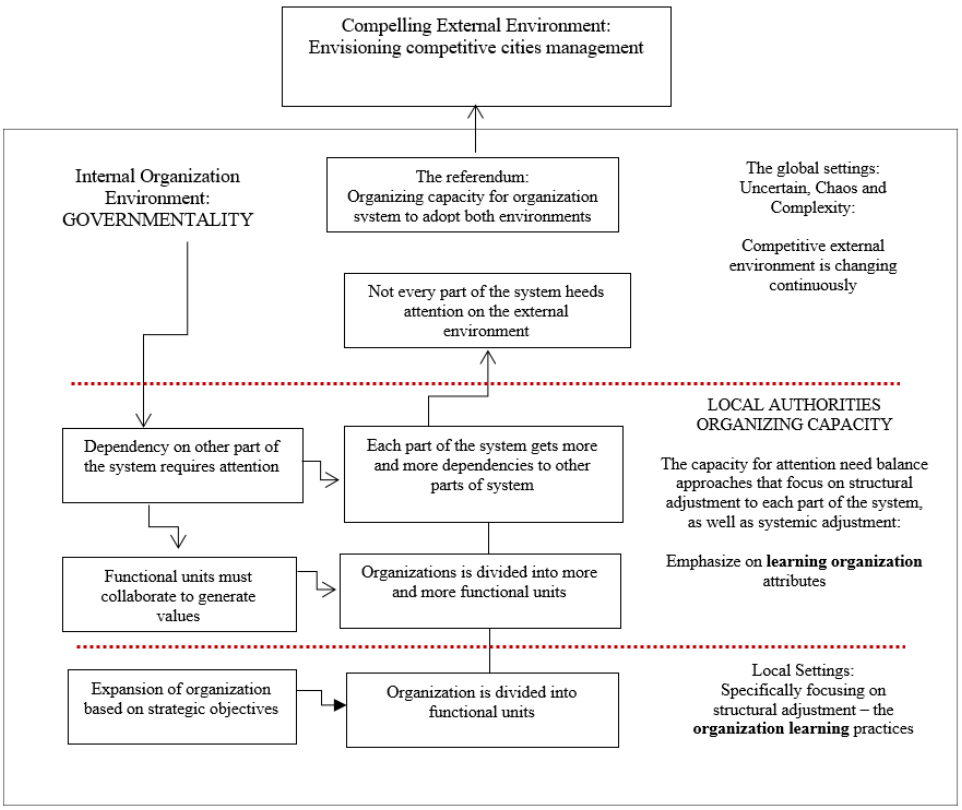

Figure 1 Organization dynamics and the probabilistic causation relationships
Source: Faizul A. 2015

Against the globalization intensities and uncertainties, it could certainly have promised one thing; the interactions and integration of global cultures, politics, businesses and intellectual elements have profoundly infiltrated and transformed the cultural cognitive and intuitive for most organizations and local authorities are not sparred either. Now, the interesting part is viewing the standardized 'bureaucracy for efficiency' approaches favourably adopted in most organizational transformation plan. Sometimes, it is 'too old fashion' when

inducement of social artefacts usually resembled a regimented, top-down, single ways of communication flows, but often seen as norms in organizational development, and robustly supported with streams of trainings methodologies, on the premised in enhancing individual competencies and skills. However, the sustainable of training methods and the acquisitions of knowledge is questionable, when the dissemination and utilization of acquired knowledge is yet to be tested. Seemingly, the approach to good governance is open for further contestation when the issue now lies on how each individual in organization behaves and act systemically to their purposive actions, where their praxis of governmentality is now inferring in redressing the complexity of governance.

For the term governmentality, it is devised from Foucault (1991), when he refers to the "art of government" or governing, that includes the used of development approaches that is consistent with appropriate theory, policy and practices by local authorities that have had the consequential effects on urban governance. Nonetheless, it should not be construed to the meanings with the simple act of governing in a strict sense, because it may also include the way the mayor or the president, executive directors and urban managers governs or conduct and behaves themselves. However, by giving much attention to served urban communities and stakeholders, their credence is sometimes being challenged from their own backyard. This is when the issue of governmentality arise that could be destabilized the practices [de facto]. These are the realities, when their own workforce impeding their organizing capacity internally, with apparent ignorance, resentment and dissonance assimilated by myopic pre-judgment and dogmatic perceptions among workforce. The repercussion is obvious when most organizations [including local authorities] are experiencing hard failed transformation plan due to these endemic values. Perceived as the irredeemable behaviours and indeed, it could turn out as liability to local authorities when un-productive and un-operative individual self-have had dominated organizations culture, which clearly demonstrated that institutional interdependency among leaders [decision makers and urban managers] and the entire workforce are fragile.

For the term institutional interdependency, it is a composite terminology derived, based on reviews from the scholarly works. It refers to dynamic notion of cohered relationships of being mutually consented between individual that is ascribed to 'unity of essential will' ethos. While collaborating through untraded dependency (Storper, 1998) to any responsibilities assigned, they shared basic assumptions pattern (Schein, 1993) and systemic envisioning (Senge, 1990) to execute common values based on ethical and moral principles (Bandura, 1997) with others individual or unit in public agencies. In the absent of cohered institutional interdependency, the *'unity of essential will'* is far-fetched. The acculturations of learning values are unconceivable where the entire workforce is unable to envision organizational strategic objectives through shared vision. But

the realities would not work in tandem to the defined meanings, as most performance-based management instrument turned out to be a 'punishment' artefact for workforce and not well accepted by the majority. It is now important to determine the causal to the ignorance, resentment and dissonance behaviours that reciprocate to weakened institutional interdependency. In response, it is analogous to the question on *'how'* the mayor or the president, executive directors and urban managers *behave* in their attempts to practice good governance.

As such, it warrants this paper to theorize their cognitive choices based on free volition, inspired by the *'need to response and act consistently to their purposive actions'*, which subsequently leads to explain the existence of dialectical relationship in organizations. The equation is clear, where cogent organizing capacity is significantly dependent on cohered institutional interdependency. Underlined this direct causal, it posits further into another epistemological debates, when the dialectical relationships among workforce is theorize as the main attributes in destabilized the pattern of governmentality. Subsequently, de-stabilized pattern of governmentality would characterize local authorities as not the learning entities. It depicted that dialectical relationships are the reflection of antagonistic strains existed in organizations, which normally, the resultant effects are into their behaviours. Severe apprehension from workforce in any changed program initiatives aligned to organizational transformations is obvious. Even though, the epistemological interpretation varies, the circumstantial evidences often led to social marginalization and exclusion to the entire workforce in local authorities. It surely raises concerned among scholars and practitioners, when most progression to strategic roles and responsibilities during organizational transformation are not well received, instead held back by these endemics.

These are testament in local authorities, when heretic behaviours have had infiltrated profoundly as intervening cultures that affects the credence of local authorities' organizing capacity. Rephrasing Cohen (1987) definition, the heretic refers 'when workforce see themselves whose beliefs do not wholly conform as productive and learning staffs, and yet they think themselves as prominent and privilege appointed staffs'. In due process of organizational transformations, the divisional of thought within the whole organizational structures disintegrated, undo relational fragility and these values could increase the likelihood of resistance, the prevalent situation of incongruity of thought in local authorities. The tensions of incongruity encourage workforce to continuously negate and resent to any program initiatives, which situates difficulties in attaining organizational vision and mission. The heretical behaviours would in turn reciprocate to their praxis of knowledge, on being inoperative and unproductive workforce, and therefore, considered as liabilities to local authorities' performances. It is destructive values exhibited and in a long run would instigate to complexities of governance.

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Clearly, the complexities of cities governance should not solely dependent on how well competitive cities policies are being adopted, but also to give emphasize to the aspiring 'willingness of the involved workforce' during the progression of organizational transformation. It would be very unfortunate for local authorities to side-line the power of the mass that make up from their own workforce. Indeed, most management scholars have deliberated and agreed that workforce is regarded as the asset to organizations including local government. Therefore, it is appropriate to seek justification on the importance of these salient imperatives - the learning workforce, in enhancing organization capacity for non-profit organizations by the acculturation of learning aptitude in local authorities. Relatively, this representation is consistent with Baker (2002) when he re-emphasized on the development of learning organization, and viewing organization capacity is much dependent on the development of every individual's efficacious attempt within the organization and acknowledged that learning as competitive values.

THE CRITIQUES TO THE SCHOLARSHIPS OF LEARNING ORGANIZATION

In the early 1980s, the concept of learning organization [LO] conceived and regarded as powerful management tools, developed for organizational efficiency and competitiveness especially in the epoch of globalization. Anew contemporary organizational development paradigm, it emphasizes on the 'reintegration' or inclusiveness of workforce into organizations. It is an un-conventional attempt against traditional organizational management, when soft-tacit knowledge workforce is reckoned as organizations' assets. Nonetheless, this proposition is supported with theoretical strands, as envisaged by major proponents, as well as the founders of LO. Among them, the major proponents and advocators includes Schon (1983), Senge (1990), Pedler, et al, (1991), Garvin (1993), Argyris (1995), DiBella, et al (1998), Marsick, et al (1999) and Marquardt (2010) and they are highly refereed modernist-contemporary organizational management gurus. From the founder and proponent of LO him-self, Senge (1990) defined learning organization as one that is continually expanding its capacity to create its future. It is a commendable proposition, when he equated organization values to competitive advantage, which derived from continuous learning from workforce and in due processes, interdependent relationship developed and leads to the highly referent learning flagships. From here, the definition leads to the fundamental in theorizing that learning organization as competitive values in enhancing organizing capacity. Its values are embraced when workforce tend to put aside their old ways of thinking (mental model), continuously learns to be open with others (personal mastery).

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Understand how organization works (system thinking) is a priori and form a plan that everyone can agree on (shared vision) and subsequently, exerting efficacious efforts in tandem with others (team learning). Since then, streams of learning organization theories evolved, and most are giving emphasized on the interdependent relationship between individual and organizational learning, and viewing individual as the agent of organizational learning and change. As represented in Table 1, it displayed some of the contemporary literatures on the notion of a learning organization. Upon extensive reviews from previous empirical researches on learning organization, mostly are predisposed to the precept of organizational learning theoretical strands, and this is when the negations start, when this paper discovers the gap that lead to chaotic in research clarity on learning organization. This, as both terms 'organizational learning' and 'learning organization' are interchangeably used, and for that, often caused ambiguity in the attempted researches, as envisaged by DiBella, et al (1996). Since then, the emergent of various terms are obvious, deliberately defined and described in almost countless different ways, and to the extent it caused confusion to the thematic clarity, definitions and usually enticed to further criticism and negations upon fundamental theories.

Table 1 Learning organization and culture of building organizing capacity

	Theorizing Learning in Organization	Author/year
1	A bureaucracy embarks on a course of reflective practice, allowing workforce to experience confusion and uncertainty, subjecting his frames and theories to conscious criticism and change, and may lead to increasing his capacity to contribute to significant organizational learning.	Schon, 1983
2	Is continually expanding its capacity to create its future through applying a range of learning disciplines among workforce and emphasized that anyone who wants to be part of a learning organization must first go through a personal change.	Senge, 1990
3	Facilitates the learning of all its members and continuously transforms itself.	Pedler et al., 1992
4	Encourages double-loop learning, where the internal commitment by employees to seek truth, transparency, and personal responsibility in the workplace are encouraged, and challenged workforce to think constantly and creatively about the needs of the organization, and to fill workforce with as much intrinsic motivation and as deep a sense of organizational stewardship.	Argyris, 1990
5	Learning organization are not built overnight, any organizations that wishes to become a learning organization can begin by fostering an environment that is conducive to learning	Garvin, 1993

6	Organizations can be thought of as learning systems, when values, norms, procedures and business performance data are communicated broadly and assimilated by members, starting with early socialization and continuing through all types of group communications, both formal and informal.	DiBella, et al., 1995
7	Learning organization as one that is characterized by continuous learning for continuous improvement, and by the capacity to transform itself.	Marsick, et al., (1999)
8	A learning organization is seen as a form of organization that enables the learning of its members in such a way that it creates positively valued outcomes, such as innovation, efficiency, better alignment with the environment and competitive advantage.	Huysman (1999)
9	To obtain and sustain competitive advantage in this new environment, organizations will have to learn better and faster from both success and failures. They will need to continuously transform themselves into learning organization, to become places in which groups and individuals at all levels continuously engage in new learning processes.	Marquardt, 2010

Source: Faizul A. 2015

Consistently, Elkjaer (1999) works seek to re-affirmed the causal to the ambiguity, in which she expertly noted that most previous researchers are seemingly "drifts away with new definitions and approaches that break up rather than construct a theory" in their interpretations, which lead to various bearing of organization entities into being a learning organization. It is very unfortunate, despite knowingly the divergence in the directions of theorizing, the interests from researchers in viewing social reality from the perspectives of learning organization are vigorous. To surmise, most extended empirical researches are premised into two separate directions of theorizing and yet, used similar and related strands of literatures - the *organization learning* and as such, this insight can conclude that the previous researchers' interests are classified and categorically summarizes as follows:

i. Mostly are based on organizational setting, and using the behaviourism approach that is hedged to structural functionalism line of inquiry and as such, do not reflect the realism of the subliminal attributes from the mass – the cognitive relational and other unknown variables that influenced social artefacts.

ii. Most are focusing on firms' and private organizational competitiveness, instead of giving emphasized on the non-profit organizations and public agencies.

iii. Focusing on learning organizations but the foundational to the research thematic clarity is often drawn upon ideas from *organizational learning* theoretical streams.

iv. Predisposed to strict structural functionalism approaches, instead of symbolic-interpretivism approaches in the line of inquiry.

v. Giving emphasizes to evaluate organizations on social settings instead of cognitive settings.

It is pre-requisite to acculturate learning values in organization where every workforce is encouraging to continuously '*learn to unlearn*' the present thinking of doing things. The purpose is to obviate dogmatic and myopic thinking that succumbed to pre-judgment. Therefore, encouragement to symptomatically envisioning organization competitiveness is crucial, and this proposition is consistent with scholarly finding from Marquardt (2010), when he suggested that enabling learning values are seemingly the most appropriate tools for organizations to hedge competitiveness. Back to the thematic gaps, it is important in the next explanatory to construct the learning continuum and subsequently lead to explain to the gapping, the divergent in the research clarity using a similar theoretical line of inquiry.

THE CONSTRUCT OF LEARNING ORGANIZATION AND ORGANIZATION LEARNING CONTINUUM

It is crucial now to focus the thematic clarity by deciphering the organizational learning [OL] and learning organization [LO] continuum. To simplify the congruent notion and differentiate the continuum, this paper would aptly expand the work from Festinger, et al (1950) and Elkjaer (1999). For the former, they envisaged that the construct of these "forces" and "bonds" among individual are categorically differs between ideation relationships and relational relationships and yet for both, it holds the group together among members of the group, and that would be analogous to the defining meanings. Further reviews on the causal differentiation to the underlined gestalt, it revealed that an *ideational* archetype refers specifically to the psychological perceived needs relationships, or this paper termed it as the cognitive relationships among members within a group. Secondly, it refers to the *relational* archetype that correspond to the emergent property that exhibit some form of induced-based archetype, which also denotes to some linkages among members. Nonetheless, it is still premature to precisely categorize the themes since both archetypes are profoundly focus on the structural relationships in organizations that signify the capability to construct social solidarity and commitment. However, upon further reviews from Elkjaer's (ibid) work, the differences are indeed make more sense to avoid ambiguous as she laid

the fundamental in deciphering the organization learning and learning organization continuum.

In her expertly reviewed, she positioned her reviews based on the positivism perspectives, which conclusively revealed that OL deals with the meanings on how learning occurs but an induced environment with impounding social facts. Reckoned that learning is inevitable part of participating in social life and practices, the explanatory suggested that learning did take place whenever social facts and structural settings to organizations environment, and therefore, organization learning signifies the processes engaged duly in any organizational change. However, too focusing on social facts and structural settings would induced to the building of relational network, inclined to 'unity of arbitrary will' relationships, which in a long run could spike the formations of groupthink. It is just like attending a training sessions or workshops, on a premised in enhancing competencies and skilled, but on the other score, it is often associated with triad or dyad formation, comforting within their own tolerance values. Indeed, it could be true but in the epoch of competition, training should go beyond learning. As agreed by Marquardt (2010), when learning should be emphasizing, instead much focuses on trainings. While reckoned the importance of training for competencies, it however, signifies a one-way transfer of established wisdom or skill from the expert instructor, whereas learning varies in its approach while giving emphasize on bottom-up approaches. Technically, learning involves not only absorbing existing information but also creating new solutions to problems that is not fully understood by the majority. Learning may take place with or without instructors [teachers] because it is a personnel, group and organizational ability. As represented in Table 2, it depicted some of the significant contrast in defining the meanings between training and learning.

Table 2 Contrast between training and learning

Training	Learning
From the outside in, done by other	From the inside out, learner motivated
Assumes relative stability	Assumes continuous change
Focuses on knowledge, skills, ability and job performance	Focus on values, attitudes, innovation and outcomes
Appropriate for developing basic competencies	Helps organization and individuals learn how to learn and create novel solutions
Emphasizes improvement	Emphasizes breakthrough (metanoia)
Not necessarily linked to organization's mission and strategies	Directly aligned with organization's mission and requirements for success
Structured learning experiences with short-term focus	Formal and informal, long-term future oriented, learner initiated

Source: Marquardt, 2010

When too much focusing on training, it would subjugate the acculturation of learning values when apparently, trained, skilled and competent individual does not guaranteed collectivism bearing to "the purpose of existence" among workforce, and subsequently it does not guarantee learning organization. Underlined these representations, it demonstrates the second line of inquiry is of valuable to comprehend, adopted from Elkjaer's work in setting the framework to establish the taxonomy, when she envisaged that LO is reckoned as tools for developing tacit, establish cognitive relationships and thinking abilities of individual members in organizations. Underlined this representation, she clearly equates LO as management tools used continuously in enhancing management innovation and most importantly is when she did emphasize on the 'cognitive relationships', which personal mastery. It is consistent with Festinger, et al (ibid) on the ideation relationships seems capable in enhancing group or team mastery build over shared vision and eventually attaining institutional interdependency among workforce. Nonetheless, these relationships resonated Durkheim's precept to the 'unity of essential will' and concomitantly resembled Senge's systemic thinking towards envisioning the common purpose of existence among workforce and their relationships are based on the 'willingness' subject to Bandura's principal of morality and ethic.

Therefore, the above representation would have laid the foundation in the construct of the continuum, where basically, *organizational learning* signifies the processes that represent the organizational realism by emphasizing the development of performances measurement and training and techniques and that the expected outcomes are hedged to a desirable efficiency. On the other hand, *learning organization* represents the organizational idealism by envisioning of 'what should it be, the convictions to uphold and the purpose of existence' which is a philosophical thought indoctrinated. By combining both approaches, the composite to the construct between OL and LO continuum is established, as represented in Figure 2.

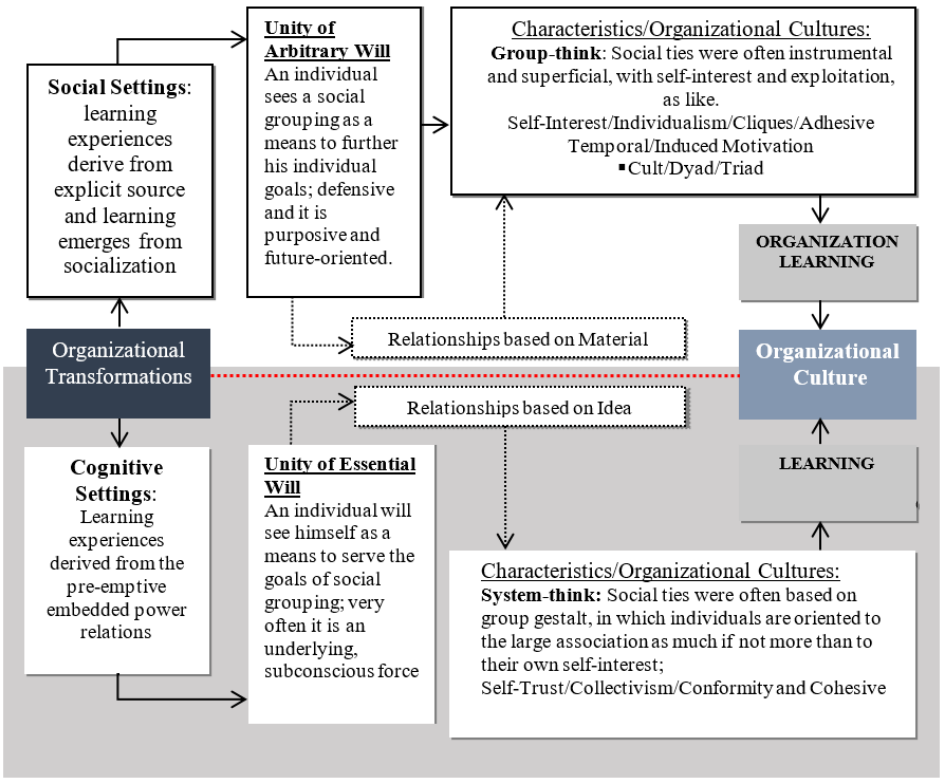

Figure 2 The continuum between organization learning and learning organization
Source: Faizul A. 2015

THE DEDUCTIVE LOGIC TO INTERPRETIVISM DIRECTION OF INQUIRY

For most positivists, they viewed dialectic relationships as the reciprocating processes of self-realization of individual beings as responses to new formation of social artefacts deployed in organizations. Indeed, positivism is widely used references to obtained scientific explanation to the direct causal relationships that influence human behaviours. This representation is consistent with the dialectic relationships reviewed extensively by Maesen, et al (2005) in his interpretive works based on Jurgen Habermans's Theory of Communicative Action (1989). However, their critiques are winched to the realist ontology continuum when assumptions are laid in justifying the bearing to the relationships. If there is any feature representing dialectical relationships, it is normative in most organization. Even if it does give repercussions to organizational efficiency, the normality is to have another anew impositions of social facts that are assumed capable to stabilized chaos. For that, it clearly underlined positivism sturdy principles and the direct causal explanation to any social reality is usually hedged the

foundational framework to the *'what'* factors to have caused the dialectical relationships.

As such, for most erudite positivist researches, they are inclined to descriptive research design. In the context of this paper, assumptions are laid in justifying that the severity of globalization have to some degree gives impact to the *de jure* of local authorities and therefore, situate them to some adjustments, strategic and structural reforms in reshaping the practices [*de facto*]. Hence, adopting the competitive cities policies and procedures are seemingly appropriate and prevalent, which again gives credence to positivism line of inquiry when they established the *'what'* direct causal on the impacts onto organizations. They ardently hold the intensities of the global competition as only additives and for that, organizations could have bolstered it to any competitive urban policies and localized it in suiting their organizing capacity. As the results, appropriate social facts are established and new performance-based management procedures are always induced, in maintaining rules and order. For positivists, they are too deterministic in constructing the direct causal explanation and assuming that the new social artefacts would stabilizes chaos.

On the contrary, this paper viewed the realities otherwise and questioning the sustainability of the instruments used in future. The premise to this argument is by comprehending De Vaus (2001) literatures, and his concerned in the nature of matured organization that "is odd and hard to conceived" to any anew artefacts, which leads to the existence of social marginalization and exclusion in organizations. The resultant to these behaviours of "odd and hard to conceive" will invariably resulted in not so meaningful outcome to any change initiatives of organizational transformation in local authorities. Nonetheless, complexities in governance are beyond organizational change, where the endemics behaviours have imbued organizational cultures and values. To note, this innate cultures are powerful packed cognitive evolution that leads to the endemic behaviours. From the nominalist ontology standpoint, it will never be possible to justify the 'what' factors to explain any direct causal positivistic statements. Clearly, this argument debunked positivist limitations, when they give less emphasized in explaining the 'why' factors to the issues in explaining the credence of institutional interdependency in local authorities. Thus, it leads this paper to explore the fundamental to the 'why', even though trainings over huge investments are allocated and implemented that supposedly enhancing organizational organizing capacity through the development of human capital in local authorities. Over time, it seems certain to predict that the heretical behaviours could intensify chaos and complexity in local authorities and the credence of organizational capacity are fast fading.

These circumstances could impute to the phenomenal disintegrations among units in local authorities, which justified De Vaus (ibid) concerned on

social marginalization and social exclusion in organizations itself. From the above elaboration, due to its rigidity, this paper could conclusively view that positivistic line of inquiry has delimit in its perspectives in explaining the 'why' factors that underlined the existence of unknown subliminal which causes untoward social reality in organizations. In summary, they [positivists] mostly undermined other subliminal subjectivities and always downplays individual's subjectivity or internal reasons or any sense of free choice or volition, and is less central that exert regimented choices over needs and aspirations. Fundamentally, this drawback has prompted this paper to holds on to another mode of inquiry and this is when interpretivism approach comes to the fore. As it is explanatory research design, the used of interpretivism approach is apparent as it attempts in explaining on the *'why'* factors to determine the causal relationships that impute to organizational heretical behaviours that encumbered the credence of institutional interdependency. Usually, interpretivist always regarded individual as having dominant volition and being able to make conscious choices and most chosen choices are induction-free from social artefacts. In other words, subjectivities that one has cherished could profoundly influence them and other individual in making the choices.

THE DEFINITIVE CAUSAL EXPLANATION TO THE DIALECTIC RELATIONSHIPS

As the line of inquiry is established, this paper would further support the provisional assumptions in explaining the in-direct causal on the strenuous relationships among workforce. As regarded earlier, the underlined fragility in the institutional interdependency have profoundly ingrained as organizational cultures and values. As such, the provisional assumption that this paper anticipates is that the successes or failures of organizational management innovation are significantly dependent on the institutional interdependency among the social unit in organizations. Meanwhile, the values of learning in organization is determined as the intervening variables and it is based on the precept of learning organization, and NOT hedged on the principles of organizational learning as most previously studies have empirically concluded. In support, scholarly research conducted by Ingraham, et al (1999) and Kaplan (2003) are much anticipated. Upon comprehending both reviews, this paper could have surmised that hard failed organization change initiatives are mostly due to the element of subjectivities that it is less explored. Therefore, the provisional assumption to heretical behaviours encountered in most public agencies' against organizational transformations initiatives should therefore be hedged to the salient enabler in acculturation of learning values in organization - the organizational systemic thinking.

However, system thinking could be spurious when it is regarded as the antecedent test variable to both institutional interdependency and management

innovation. Indeed, Nueman (2011) concerned on spurious relationships deemed justified when two variables in any association can be fallible, where these variables are associated but not casually related, due to other unknown and unseen third factor. Earlier, Babbie (2009) have also asserted his concerned that the test variable is antecedent in nature to the causal relationships where it can both be independent and dependent variables. In the attempt to obviate antecedent variable, this paper anticipates, there are links of unknown intervening variables forming a more complex causal relationship whereby the unknown or unseen variables may probably more apparent that underlined the real cause to the fragility in institutional interdependency. As such, a deductive logic to determine the third unknown variable is to theorizing one psychological behaviour against the expectancies outcomes by emphasizing from the streams of interpretivism perspectives. As such, it holds to the precept of self-efficacy that is principally hedged to the pattern of governmentality, where the praxis of governmentality is based on precept of free volition, which is consistent with Bandura (1994) reiteration as stated, *"A strong sense of efficacy enhances human accomplishment and personal well-being in many ways. People with high assurance in their capabilities approach difficult tasks as challenges to be mastered rather than as threats to be avoided. Such an efficacious outlook fosters intrinsic interest and deep engrossment in activities. They set themselves challenging goals and maintain strong commitment to them. They heighten and sustain their efforts in the face of failure. They quickly recover their sense of efficacy after failures or setbacks. They attribute failure to insufficient effort or deficient knowledge and skills that are acquirable. They approach threatening situations with assurance that they can exercise control over them. Such an efficacious outlook produces personal accomplishments, reduces stress and lowers vulnerability to depression".*

Conclusively, it is important to consider self-efficacy as the subliminal attributes that exhibited the ability to invigorate and unifying four other values within the precept of learning organization, as envisaged earlier by Senge (1990) that includes the personal mastery, mental model, team learning and shared vision. This mediator or intervening variable suggests the importance of governmentality and its significant relationships would cause the mayor/president, executive directors and urban managers demonstrate consistencies to the pattern of institutional interdependency. Hence, the definitive causal relationships would explain how the pattern of governmentality is dependent on internal psychological event of self-efficacy. This cogent ideation relational demonstrates that individual self-efficacy towards cities management is consistent throughout the organization and eventually leads to consistent pattern of in governmentality, and in return established a cohered institutional interdependency in local authorities. The definitive causal law would now able to measures the psychological aspects of individual self-efficacy embedded by the

councillors, executive director and urban managers in governing to the ascribed roles, based on the precept of self-efficacy. Therefore, as represented in Figure 3, the termed self-efficacy would now refer to the cognitive and beliefs consistencies throughout workforce in translating into one's actions as ascribed roles and that is what they do, to shape, manage and implement urban competitive policies.

In summary, the definitive causal relationship is established whereby the spurious intervening of systemic thinking is obviated and replaced by now the known subliminal intervening variable – self-efficacy. Subsequently, the construct to the measures will determine the patterns of governmentality among workforce engender – the heretic behaviours that thus, the pattern of institutional interdependency is established. The tenet to the measurements is to seek explanation on the cognitive consistencies among the management tiers that represent a cohered governmentality. Further, on, the measures would also establish and explain the existence of heretical behaviours, embedded by ignorance, resentment and dissonance in their thought that situates to the pattern of institutional interdependency. However, the questions remain on what are the variables involved that would subjugate organizational pattern of governmentality, that complete the task in determining the definitive causal relationships.

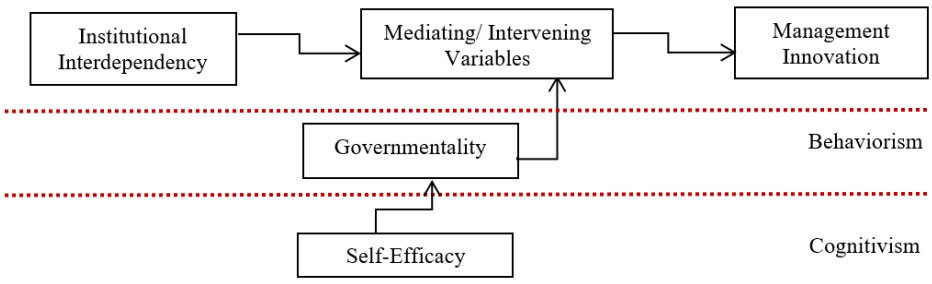

Figure 3 The definitive causal law to the in-direct probabilistic causal relationships
Source: Faizul A. 2015

CONCLUSION

To end, this paper could conclude that being a learning organization and the acculturation of its values are arduous task ever tolerated by most public agencies, including local authorities. To this regards, and if left unchecked it may further expose local authorities into being an unlearned entity, vulnerable in its organizing capacity in the construct of cities innovation systems. The concrete evidences to the formation of heretics as organizational cultures would further instigate the formation of triad or dyad, the sacred groupthink. It happened when individual transmits and receives symbolic communication [cognitive] through their socially interaction, and the worse is when the transpired communications

contained fallible information that leads to myopic thinking. Everyone is trapped under the unruly perceptions, which entail to 'divisional of thought' between workforce, and thus, it further reciprocates to the disintegration of institutional interdependency. Antagonistic relationships between workforce and the management are seemingly dominantly present as organizational culture, even though the "de jure" for good urban management are in place. Justifying the concern on the endemic behaviours where ignorance, resentment and dissonance that are apparent among workforce, it obviously suggests the importance of institutional interdependency embraced in local authorities. Their existence, without any mitigating and purposive responses would lead local authorities into not being a learning organization, in managing cities competitively. However, it is interesting to note, that moving away to interpretivism line of inquiry to understand the reasons of hard failed initiatives sanctioned in local authorities towards efficiency is of valuable. At least, the intangible perspectives would lay the generic framework in determining other unknown, subliminal subjectivities in explaining the circumstances that imbued endemic behaviours in local authorities. Furthermore, it also gives alternative option available for social scientist to identifying the other intervening variables that aptly influenced the level of anticipations [the acceptance or resentment] by workforce involved in sanctioning and executing organizational transformations. As such, the admission to cognitivism-interpretivism line of inquiry is thus justified through the construct of the definitive in-direct causal explanation to the relationships. It is hope, through this insight, all public agencies including local authorities will in better competitive position in acculturating learning values as the enabler to the construct of organizing capacity towards the management for competitive cities as a whole. For one, the findings on the measurements in determining the pattern of governmentality will be elaborated in our next paper.

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