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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,

MIP is once again proudly to riposte its eleventh volume of Planning Malaysia. Since its inception in 2003, the Journal was well-received by the members as well as the academic fraternity. This is due to perhaps, the awareness for knowledge seeking and improvement among the members as the articles touch on wide spectrum of our daily planning issues. It is indeed a great achievement to the Institute as we strive to encourage more members and academics to write and share new ideas on planning and urban development.

Urban and Regional Planning is very broad based subject that covers technical and political process concerned with the control of the use of land and design of the urban environment, including transportation networks, to guide and ensure the orderly development of settlement and communities. The wide ranging topics in this issue reflect the various dimensions of sustainable cities and urban planning that is holistic and comprehensive. One of the key objectives of this issue is to provide a platform for town planners to share new ideas and experiences on cities and urban planning. Such new ideas are by research, studies undertaken or actual hands-on experiences of planners. Thus I hope this issue provides a better insight to all readers of the broad dimensions that urban or town planning has and the role of town planners play in growth and development of the nation.

Apart from the MIP's contribution to the planning circle, Planning Malaysia is also extended to various planning related organizations, institutions of higher learning as well as to all members of the institute. We anticipate to eventually extending the circulation of this journal to non-planning related organizations and institutions that has an indirect role in planning within and outside the country. We hope this issue will serve the purpose and welcome any feedback for the improvement in the forthcoming issue.

As a new preside President, I would like to acknowledge and congratulate the new journal's Editor-in-Chief, Professor Dato' Dr. Mansor Ibrahim and his team for the dedication and continuous support to the Institute.

Thank you and happy reading.

Md Nazri Mohd Noordin
PRESIDENT
(2013-2015)

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MALAYSIAN DEVELOPMENT PLAN SYSTEM: ISSUES AND PROBLEMS, ONE DECADE AFTER ITS REFORM (2001-2011)

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Abstract

In 2001, the Town and Country Planning Act 1976 (Act 172) was amended through Act A1129 (2001). The amendments included provisions to allow four levels of government involvement (Federal, Regional, State and Local Authority) in spatial planning, with the intention of establishing a more effective development plan system in Malaysia. However, an assessment of the relationship between legislative provision and the implementation of development planning is urgently required to consider a number of issues, including delays in adopting plans and the continued existence of out of date plans. Therefore, this paper discusses issues and problems encountered by selected local planning authorities in the implementation of the development planning system. The discussion focuses on the capacity and capability of these authorities with regard to legal aspects, administration, finance, human resource issues and technical support. The data were obtained through mixed methods i.e. postal surveys, interviews with representatives from selected local authorities and focus group discussions with selected professional town planners. The findings demonstrate that most of the issues and problems encountered in implementing the development plan system at each plan level in Malaysia are legal in origin.

Keyword: Development plan, planning system, planning reform, spatial planning

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INTRODUCTION

Statutory development plans play an essential role in the development control system. These plans are a type of blueprint or backcloth against which an application for planning permission is determined. Development plans act as the main tool in leading the future development as well as translating government policies into action (Baharom and Yusof, 2001).

Despite voluminous literature on planning laws (Collins, 1951; Haar, 1984; Yadav, 1986; Cardew &Cuddy, 1987; Mata, 1991; Salet 2002; Allmendiger, 2002; Bruton, 2007; Norton, 2007 and Hoetjes, 2009) there is not much literature within the field of planning theory that explicitly links development planning to policies assessment. The relationship between development planning and legislative context, in particular, demands more attention from international planning theory (Salet, 2002). Devas and Rakodi (1993) argued that, despite several weaknesses, a development planning approach continues to dominate the urban planning systems of many developing countries. The weaknesses identified by Devas and Rakodi include professional training and ideology of planners, vested interests of consultants, professionals, administrators, city managers, and politicians; and inappropriate legislative basis for planning in terms of plan preparation and implementation. Key impediments identified relate to excessive delays in plan preparation and approval process, weak institutional set up, lack of coordination among government departments, inadequate financial resources, legal lacunas, lack of dissemination of plans, and above all lack of political will.

Against this background, there is growing interest in the systematic evaluation of the quality of plans (Zhenghong and Brody, 2009; Berke and Godschalk, 2009; Laurien et. al., 2010). Thus, this study aims to identify issues and problems encountered by municipalities in the preparation and implementation of development plans outlined in *Act 172*. The methodology offers an objective and straightforward tool for studying plan quality and guiding plan preparation. With the purpose of understanding the interpretation of law in actual practice –and hence how the statutory development plans are being prepared and implemented – this study looked at the literature on the connection between development plans and legislative provision. The study focuses mainly on the Malaysian system, but discussions of tension between flexibility and legal certainty, and between development plans and legislative provision are widespread.

SPATIAL PLANNING SYSTEM (1976 – 2012)

Although Malaysian urban planning is rooted from and modeled after the British planning system, there are some differences in the spatial planning framework. In Malaysia, spatial planning is implemented by three tiers of government system consisting of the federal government, the state governments (a region is an area situated in two or more states), and local authorities (city, municipal, and district councils). Each local authority is the local planning authority for its territory and is responsible to organize, plan and develop all land within the local plan boundary (Collins, 1951; Meng, 1991; Saleh, 2002; Baharom &Yusof, 2001). As of September 2012, there are 13 states (11 of which are in Peninsular Malaysia, the other 2 are in Borneo), 151 local authorities (comprised of 12 city councils, 39 municipal councils, 98 district councils and 5 modified local authorities).

The Town and Country Planning Act 1976 (Act 172) was enacted in 1976 pursuant to clause (4) of article 76 of the Federal Constitution. *Act 172* comprised of 9 parts with 59 sections and it was subsequently amended four times between 1993 and 2007. The main features of planning legislation in Malaysia are:

i. The duty on the state and local planning authorities to prepare development plans
ii. A comprehensive legal definition of development
iii. A requirement to obtain planning permission for that development
iv. The right of appeal against refusal of planning permission by the local planning authority
v. The power to remove unauthorized development
vi. Powers of the government in respect of dealing with planning applications and making or amending development plans
vii. Role of National Government: National Physical Planning Council (NPPC) sets the general policies and the overall policy framework, but overall responsibility for land-use planning lies with the relevant State Authorities
viii. Role of the Local Planning Authority (LPA): day to day administration and implementation.

The Act was amended in 2001 through the *Town and Country Planning Act 1976 (Amendment) 2001 (Act A1129)* to make provision for an improved system of statutory development plans in Malaysia. These amendments also aimed to address problems in the property sector and the role of federal government in town planning affairs. There were assertions that the previous

structure planning system was inefficient in facilitating physical development due to small areas covered and unrealistic projections due to overlapping figures used in technical analyses (Bruton, 2007). Some of the adopted plans caused development constraints to housing developers of which had led to increase house prices (Ibrahim, et al 2007). With the enactment of the *Town and Country Planning Act 1976 (Amendment) 2001 (Act A1129)*, the planning system in Malaysia underwent radical reform. The key principles of the reform were: (1) The development of regional planning and an emphasis on the regional tier of the planning system; (2) The development of federal authority in spatial planning through formation of the National Physical Planning Council.

The 2001 amendment demonstrated the government's commitment to the well-established principle of a plan-led system and further emphasized the planning system and planning control (Dasimah & Leh, 2009; Mustafa, 2010 and Yaakup 2010). The statutory development plan will continue to be the starting point for consideration of planning applications for the development of use of land (Section 18 of the Act). The changes in development plan system as a result of the amendment are shown by Table 1.

Table 1: Malaysian Development Planning Framework (Before and after 2001)

Level	**Before 2001**		**After 2001**	
National	**Responsible Body**	**Statutory Development Plans**	**Responsible Body**	**Statutory Development Plans**
	none	Vision 2020 5-Year Malaysia Plan	National Physical Planning Council	Vision 2020 5-Year Malaysia Plan Sectoral Policies/Plans National Physical Plan
Region (4)	none	none	Regional Planning Committee	Regional Plans Sectoral Policies/Plans
State (11)	State Planning Committee	none	State Planning Committee	State Structure Plan Sectoral Policies/Plans
Local Authority (151)	Local Planning Authority	Structure Plan Local Plan Action Area Plan	Local Planning Authority	Local Plan Special Area Plan

This development planning framework now involves all three levels of Government. At the national level, spatial planning is guided by the Five-Year Malaysia Plans (FYMP), the National Physical Plan (NPP) and sectoral policies/plans. These plans address the strategic issues of national importance

and provide the overall framework for subsequent drawing up of the other more detailed development plans.

Contextually, development planning in the country operates within the stated goals outlined in Vision 2020 (the year 2020 at which Malaysia is intended to achieve a developed country status) and the Third Outline Perspective Plan 2001-2010. These plans are subsequently interpreted into the State (Five-Year) Plan and Structure Plan respectively. Here, the Ministry of Housing and Local Government and Housing (MHLG) is the main institution working on issues such as urban planning, housing, and local government. The MHLG consists of the Department of Town and Country Planning, Department of Local Government, the Department of Housing and others. The Department of Town and Country Planning (DTCP) is charged with the responsibility of promoting orderly, coordinated and sustainable urban planning, and balanced regional development. The role of the MHLG is mainly that of policy making and supervision. Planning and regulation of actual development at city level is the responsibility of local authorities: City Councils, Municipal Councils and District Councils, with support from state authorities.

MALAYSIAN DEVELOPMENT PLAN SYSTEM

As mentioned in Section 2.0, Malaysia practices a plan-led development system that consists of National Physical Plan (NPP) prepared by the National Physical Planning Council (NPPC); Structure Plan (SP) prepared by each state planning authority (SA); Local Plan (LP) prepared by state planning authorities or the local planning authority (LPA); Special Area Plan (SAP) prepared by state planning authorities/the local planning authority (LPA). The relationship between all of these plans as specified by the Act 172 is shown by Figure 1.

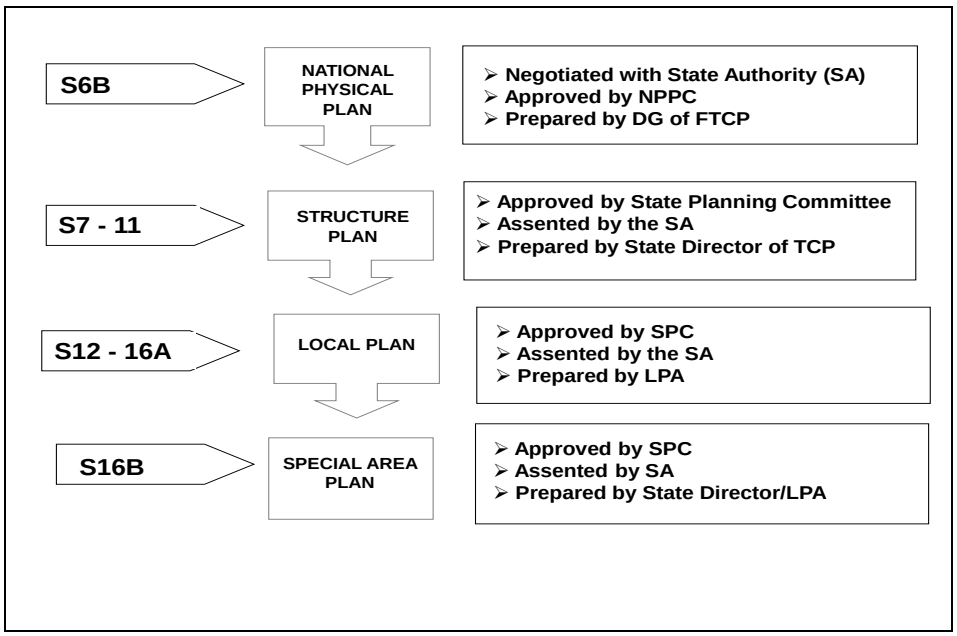

Figure 1: Development plan hierarchy in Malaysia according to Sections of Act 172
Source: Government of Malaysia, 1976 (revised 2001)

a) NATIONAL PHYSICAL PLAN (NPP)

The National Physical Plan (NPP) concept was introduced as a result of amendments to the Town and Country Planning Act in 2001. The Act defined NPP as a written statement formulating strategic policies for the purpose of determining the general directions and trends of the physical development of the nation. NPP is developed out of a collaborative process between the federal government and the states. The Federal Department of Town and Country Planning is responsible for drafting the plan. The NPP is formulated in accordance with the objectives of urbanization and other relevant sectoral policies.

The first NPP was approved in 2005 and it covers the period from 2006 to 2020. Pursuant to the Sub-section 6B (4) of the *Town and Country Planning Act 1976*, NPP must be reviewed every five years in tandem with the review of the Five Year Malaysia Plan (Government of Malaysia, 2010). The Second National Physical Plan (NPP-2) was approved by the National Physical Planning Council on August 13th 2010. The goal of NPP-2 is the establishment of an efficient, equitable and sustainable national spatial framework to guide the

overall development of the country towards achieving developed and high-income nation status by 2020.

Additional policies and measures formulated in NPP-2 include matters regarding climate change, protection of biodiversity, green and new technology, as well as sustainable tourism. Also included in NPP-2 are outline measures to achieve goals of six National Key Result Areas (NKRAs) such as reduction of crime rate, widening access to affordable and quality education, raising the living standard of the poor, improving infrastructure in rural areas and improving public transport, which were set out in the course of introducing an outcome-based approach into public sector programs.

NPP-2 sets out a national spatial strategy for Peninsular Malaysia known as "Concentrated Decentralization". Its key strategies are to: (1) focus development along potential growth corridors (e.g. urban and industrial development, agriculture, tourism, transportation network, infrastructure and urban services); (2) focus urban development in selected urban conurbations and key urban areas; (3) spread development to lagging and non-urbanized regions; and (4) provide access to ecotourism and agricultural resources

b) STATE STRUCTURE PLAN (SSP)

Section 8(3) of the Act defines a structure plan for the state as a written statement formulating the policy and general proposals of the State Authority in respect of the development and use of land in that State, including measures for the improvement of the physical living environment, the improvement of communications, the management of traffic, the improvement of socio-economic well-being and the promotion of economic growth, and for facilitating sustainable development. Structure Plans distribute the expectation of development within each state and propose major economic and infrastructure projects for the states. The time perspective for Structure Plans is 20 years commensurate with the time perspective of Vision 2020. Structure plans are drafted by each state with that state as the fundamental unit, while regional plans entail projects involving two or more states, and are prepared for areas that have priority development issues of an interstate nature that need to be addressed.

c) LOCAL PLANS (LP) AND SPECIAL AREA PLAN (SAP)

The state structure plans serve as the framework for spatial planning at the local level, in the form of a local plan or a special area plan. Section 12(3) of the Act defines local plan as a detailed land use plan (map) supported by written statements explaining proposals for the development and use of land in the area. The local plans can be prepared by the local planning authorities or the state planning department at any time during the preparation of, or upon the coming into effect of a structure plan.

Similarly, special area plans can be prepared by the local planning authorities or the state planning department at any time during the preparation of, or upon the coming into effect of a structure plan or a local plan. A special area plan is a development plan prepared for the purpose of implementation, which is a Development Action Plan in the form of Layout Plan or Management Plan. The Plan is supported by a Detailed Development Specification and Development Action Schedule.

The following table summarizes the main elements of the four statutory development plans.

Table 2: Elements of development plans

Aspect	**National Physical Plan (NPP)**	**Structure Plan (SP)**	**Local Plan (LP)**	**Special Area Plan (SAP)**
Related Act	Section 6 B	Section 7, 8, 9 & 10	Section 12, 13, 14,15 & 16A	Section 16 B
Purpose	Interpret national socio economy into spatial dimension	Interpret National and State policy	Interpret policy of SP; Guidelines for development control	Implementation
Prepared by	Director of Federal Town & Country Planning Department	Director of State Town & Country Planning Department	State Planning Department/ Local Planning Authority	State Planning Department/ Local Planning Authority
Area affected	Peninsular Malaysia	Whole State	Whole area of local planning authority	Affected area; Size depend on type of SAP
Timeframe	2020	15-20 years	10-15 years	-
Process		Report of survey→ technical report → survey report → publicity → Draft SSP	Early publicity → preliminary report → findings report & development strategies →	Early publicity → research methods report → SAP preliminary draft → SAP draft →

		publicity → SSP approval and gazette	Draft LP publicity → LP approval and gazette	publicity → SAP approval and gazette
Main output (plan)	Indicative Plan 2020	Main diagram covering whole state, indicate components clearly	Proposed plan: land use detail ; subject plans; accompanying plans	Development Action Plan:- Layout Plan/ Management Plan or both
Explanation	Written statement summarizing strategic policy and direction of national physical planning	Written statement, explain policies and state strategic planning.	Proposed detail land use plans supported by written statements explaining the proposals	Detailed planning for implementation
Publicity	No publicity, only negotiations with State	Survey report and Draft SP, not less than 4 weeks	The public can get involved during the preliminary survey, draft LP/SAP and target group discussions. Not less than 4 weeks	

Source: Town and Country Planning Act 1976

These statutory development plans, therefore, provide the essential framework for planning decisions. Any development of land and buildings requires planning approval from the Local Planning Authority (LPA). Planning permission will be granted if the proposal is in conformity with the statutory Local Plan, fulfills technical agencies requirements and receives no objection from the neighbours.

THE IMPLEMENTATION OF DEVELOPMENT PLANS

As mentioned in Section 3.0, the first NPP was approved in 2005 and it covers the period from 2006 to 2020. The NPP-1 was reviewed and subsequently the Second National Physical Plan (NPP-2) was approved by the National Physical Planning Council on August 13th 2010. The following Table 3 summarizes the implementation status of Structure Plans, Local Plans and Special Area Plans from since 2001 until February 2012.

The Table 3 shows that all states except Perlis have successfully prepared and implemented their respective state structure plans. These plans were completed between the years of 2007 to 2011, whilst the duration for structure plan preparation and implementation range between five to ten years from the year the act came into force in 2001. A total of 93 local plans was planned to be implemented in all 11 states and 1 federal territory, but only 73

plans had been completed and gazetted by 2011. A total of 23 special area plans were also planned to be implemented in all 11 states but only 16 plans had been gazetted, with gazette years ranging from 2009 to 2011. Special area plans are now in place in all states except Kedah, Perlis and Penang.

As seen in the Table 3, the implementation of the statutory development plans has encountered serious problems in terms of time taken to prepare the plans and the process of adopting them. This has led, in turn, to development delays. There are also delays in the approval process since state authority consents are required before implementing the plan. While the development plan seeks to deliver the latest information to all, moreover, there have been problems and delays in bringing together the data held by various agencies, leading to longer waiting time and increased operating costs during the plan preparation. These problems are partly due to ineffective utilization of Information Technology (IT) tools for data management amongst the agency staffs (Tan, 2005; Mohd Ramzi & Foziah, 2010). The alternative of simply disseminating the available data could lead to inconsistencies through the use of different time-sets and out of date data which could jeopardize the implementation of the plan. But the delays in the preparation of a development plan can also lead to it being shelved as an out of date plan.

Table 3: Status of Preparation and Implementation of Structure Plan, Local Plan and Special Area Plan as of September 2012

State	**Structure Plan (SSP)**		**Local Plan (LP)**		**Special Area Plan (SAP)**	
	Draft	**Gazette**	**Draft**	**Gazette**	**Draft**	**Gazette**
Perlis	1	-	1	-	2	0
Kedah	-	1	1	10	3	0
Pulau Pinang	-	1	4	-	1	0
Perak	-	1	4	11	0	2
Selangor	-	1	-	13	1 cancelled	3
Negeri Sembilan	-	1	-	7	0	2
Federal Territory KL	-	1	1	-	1	1
Melaka	-	1	-	3	1	2
Johor	-	1	1	7	0	2
Pahang	-	1	1	10	0	3
Terengganu	-	1	-	7	0	2
Kelantan	-	1	5	5	0	2
Total	**1**	**11**	**18**	**73**	**9**	**16**

Source: Department of Town and Country Planning, 2012

METHODOLOGY OF STUDY

The literature identifies a set of inter-relationship between the development plans, planning controls and the land development which provides the basis for designing survey instruments. Secondary data that cover various types of publications, reports and documents will demonstrate the secondary evidence of the outcomes of these inter-relationships. Primary data at the preparation and the implementation stages, obtained through postal questionnaires from selected local authorities in each state of Peninsular Malaysia, were analyzed to reveal empirical evidence of the factors that affect outcomes of the inter-relationships between the planning system, the planning controls and land development. A total of 50 sets of questionnaires were analyzed from a total of 150 sets sent out to town planners in the public sector (federal, state and local government levels). The Mean Score for each investigated item was based on a *likert* scale of 5 points, ranging from "strongly disagree" to "strongly agree". The analysis of the findings from these questionnaire indicate answers to the questions about key implementation factors driving effective or ineffective planning system since the TCP Act 172 was amended in 2001.

FINDINGS AND DISCUSSION

This section reveals and discusses issues in the preparation and implementation of development plan with regard to legal, administration and financial, human resources and technical aspects.

Issues and Problems at the Plan Preparation Stage

Generally four main aspects have been successfully analyzed at the preparation stage consisting of legal, administration and finance, human resource and technical aspects. Only items with a mean score of more than 3 are reported in this section.

Legal Aspects

The legal aspects were categorized into 4 main issues. As the Table 4 shows, the mean points for legal aspect were ranged from point 3 to point 5. This suggests that all respondents tended to agree that the four investigated aspects were significant in the preparation of the development plans. The mean score of more than 4.5 relating to the delay in gazetting development plans indicated that this is the major issue in the preparation of all development plans.

With respect to issues of the compatibility of higher level plans with the lower level plans and the interpretation of the plans functions, as shown in the second row of Table 4, the mean score was ranging from 2.8 to 3.5 which indicate the nearly neutrality of respondents regarding these issues.

Table 4: Mean Score of Legal Aspects

Investigated Items	**NPP**	**SSP**	**LP**	**SAP**
Difficulties in interpreting the function of development plans based on TCP Act 172 and A1129	3	3.2	3.2	3.1
Policies in higher level development plans are not relevant to the lower level	2.8	3.0	3.5	3.2
The public were unable to express their needs and values	4.8	3.8	3.2	3.8
Delay in gazetting the development plan	4.6	4.6	4.5	4.5

Source: Questionnaire Survey 2012, N=50

Administration and Financial Capacity

The administration and financial capacity were categorized into 8 issues as shown by Table 5.

Table 5: Mean Score of Administration and Financial Capacity

Investigated Items	**NPP**	**SSP**	**LP**	**SAP**
Project manager`s and the team was unable to manage the project within the given time frame	4.2	4.4	4.3	4.1
The main consultant was unable to lead and coordinate the study satisfactorily	4.2	4.4	4.3	4.1
Scheduling for meetings, focus group discussion, publicities, report submission were inefficient monitored	4.0	3.8	3.8	3.0
Event dates and project mile-stone were not regularly monitored	4.0	3.6	3.4	3.2
Insufficient financial allocation to development plan study	4.5	4.2	4.8	4.5
Unclear demarcation of Local Plan and Special Area Plan areas	4.2	4.3	4.1	4.3
Local Planning Authority was not prepared	4.6	4.8	4.5	4.8
Lack of cooperation amongst team members	3.3	3.7	3.5	3.3

Source: Questionnaire Survey 2012, N=50

The mean score of more than 4.5 points was given to the item "Local Planning Authority was not prepared" across all four development plan levels, followed by the capacity of the main consultant to prepare the plans, the

capacity of project's managers to manage the project, demarcation of the coverage area for the LP and SAP. Insufficient financial allocation is also an issue at the LP and SAP with the mean score point of more than 4.

Human Resource/Planning Staffs Capacity

The human resource aspects were categorized into the following 7 main issues as shown by Table 6. Of all the issues, lack of qualified town planners in the local planning authority was seen as the main issue since the mean score for this issue is more than 4.5, followed by the issue of lack of capacity of technical committee members to contribute and provide feedback effectively to further enhance the development plan, lack of capacity of sectoral consultant to carry out and contribute effectively to produce the development plan, insufficient innovations in planning procedure and/or plans produced and insufficient effort to incorporate contemporary planning ideas, approaches and tools to solve current planning problems in the study area.

Table 6: Mean Score of Human Resource Capacity

Investigated Items	**NPP**	**SSP**	**LP**	**SAP**
Consultant members did not fully understand the overall current development situations	4.5	4.1	4.0	4.1
Lack of sub-consultant staffs and resources to carry out the study sector	4.2	4.3	4.4	4.3
Technical committee members were unable to contribute and provide feedback effectively	4.4	4.3	4.5	4.1
Lack of knowledge on issues of the practicality of the proposed spatial plans/policies/project	4.3	4.5	4.3	4.4
Insufficient innovation in planning procedure and products	4.1	4.1	4.2	4.3
Insufficient effort to incorporate contemporary planning ideas, approaches and tools to solve current planning problems	4.1	4.1	4.3	4.2
Lack of qualified town planners in local planning authority	4.8	4.9	4.9	4.5

Source: Questionnaire Survey 2012, N=50

Technical Support Capacity

The technical capacity was categorized into 7 main issues as shown by Table 7. Based on the issues listed under the technical aspects, "the problems of

acquiring and/or collecting data for the study and the incorporations of local values and needs into the development plan" received a mean score of more than 4.5 and followed by other issues that have the mean score between 3 - 4.4 that refer to the lack of understanding and interpreting the current economic and social development, and the existing development policies.

Table 7: Mean Score of Technical Capacity

Investigated Items	**NPP**	**SSP**	**LP**	**SAP**
Difficulties in interpreting existing development policies into study area	3.3	3.3	3.1	3.5
Difficulties in translate existing development policies into the study area	3.7	3.1	3.4	3.8
Difficulties in understanding & interpreting current economic development in study area	3.3	4.4	4.2	4.1
Difficulties in understanding & interpreting current social development in study area	4.2	4.4	4.3	3.7
Difficulties in understanding & interpreting current spatial development in study area	4.1	4.3	4.1	4.0
There were problems in acquiring and/or collecting data for the study	4.6	4.8	4.8	4.8
Local needs and values were difficult to be incorporated in development plan proposals	4.6	4.6	4.6	4.8

Source: Questionnaire Survey 2012, N=50

IMPLEMENTATION OF DEVELOPMENT PLAN

The implementation of development plans has been examined in 4 aspects of legal, administration &finance, human resource and technical. The data obtained by the survey are summarized in Table 8.

Table 8: Issues at the Implementation Stage of Development Plans.

	NPP	SP	LP	SAP
Legal Aspect	55%	50%	30%	8%
Administration & financial	20%	15%	40%	38%
Technical	5%	25%	20%	23%
Human Resources	20%	10%	10%	31%

Source: Questionnaire Survey 2012, N=50.

The survey found issues in the implementation of development plans in relation to all four reviewed aspects. Table 8 shows that legal aspect scored the

highest with 55% and 50% at the level of NPP and SP respectively while a much lower score for SAP of 8 %. This result shows that issues related to the legal aspect were more apparent at the higher level plans of NPP and SP, in which the broader strategies, objectives and policies were formulated. At the local level, i.e., LP and SAP, legal issues seem not significant but issues related to the administration and financial aspects, instead, scored higher percentages for LP and SP with 40% and 38% respectively. This result suggests that at the local implementation stage, the administration and financial aspects are the main hurdles in ensuring successful implementation of the plans. Table 8 also shows that, there were fewer technical issues at the NPP level, but these were more important at the SP, LP and SAP levels. Human resource aspects were noted as more important at the SAP and NPP, indicating a relative lack of skilled and semi-skilled workers in the implementation of development plan at the highest level and the lowest level. This result implies that there is a lack of skilled town planners at those particular levels. Technical issues were not important at the NPP level, but were at the SP level, LP and SAP.

The overall results of the survey demonstrate the impression of the respondents with regards to issues and problems in the preparation and implementation of development plans throughout Peninsula Malaysia. Figure 2 shows the summated results highlighting the main issues in the preparation and implementation of all development plans according to the four aspects studied.

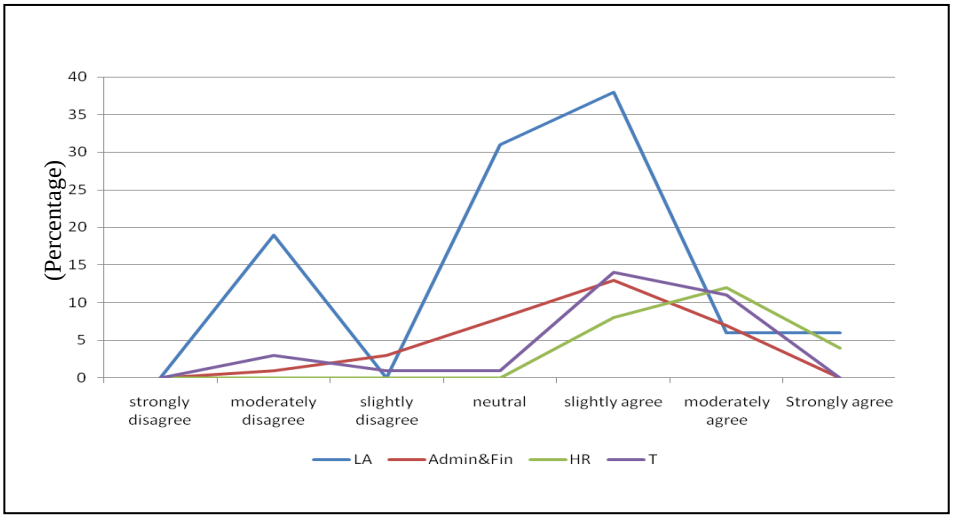

Figure 2: Summary of issues of development plans' implementation
Source: Questionnaire survey 2012, N=50

Legal aspects were identified as the main issues in implementing the development plan as indicated by Figure 2 above. Legal aspect (LA) attained the highest percentage among the four aspects studied, followed by human resources, technical and administration and financial aspects. Results revealed that there are many factors required for implementation, including: creating a comprehensive terms of reference, educating staff on planning principles, working with a planning consultant, involving a variety of stakeholders in the process, having the plan available to the public, and creating a method for reviewing and updating the plan.

CONCLUSION AND OUTLOOK

The enactment of the *Town and Country Planning Act 1976 (Act 172)* established in essence a well-structured hierarchy of development plans for Malaysia. The Malaysian development plan system is rooted in the earlier British planning system and was enhanced with the amendment of the *Act 172* in year 2001. The formulation of a planning system, particularly with regard to a development planning system, must be practical from the stage of preparation until its implementation. However, the preparation and implementation of the plans can face delays within the development plan process (Cullingworth and Nadin, 2006), caused by, amongst other things, a lack of skilled town planners to interpret and formulate development policies (Mohd Razali, 2002), and by a lack of financial resources (Devas and Rakodi, 1993; Goh, 1997).

Weaknesses of the development planning approach identified by Devas and Rakodi (1993) pertaining to legislative basis for planning are evident in this study where the empirical data demonstrate that most of the issues and problems in the preparation and implementation of development plans at each level of the plans are primarily legal in origin. Although the development plan system stipulated under the *Act 172* clearly demarcated the hierarchy of plans that should be prepared by levels of government agencies, the effectiveness of implementation of the development plan system relies on the capability of the local level to interpret higher level policies and legal requirement in development plans towards a more humanistic and livable environment. The study also found that the planning process should include: thoughtfulness when creating the terms of reference, extensive public consultation, effective staff consultation, frequent council input, consultation with a recreation planner, and a method for updating and reviewing the plan.

Malaysia is one of the developing countries in which the planning system was strongly influenced by the colonial ruler, but it is imperative that the

development plan system should consider the local institutional set-up pertaining to legal, administrative, financial, human resources and technical capacity. In order for plan-making procedures and techniques to be more effective in Malaysia, the training or education of professionals (government officials and consultants) to make the best use of plan-making procedures and techniques and the security of sufficient financial resources must be given top priority. The capacity of different government and private agencies to effectively discharge their responsibilities should be enhanced through adequate training and sharing of information and knowledge of good practice. The professional courses conducted by Malaysian Institute of Planners (MIP) can be a good platform for this purpose which can be attended by all (government officials and consultants) who involve in spatial planning including planners in the academic line who can improve the teaching curriculum of urban planning courses.

Land use planning through the development planning system is a complex process involving geographic, social and economic questions which can be affected by jurisdictional frameworks and planners' values and experiences (Forrester, 1984). The ability of local planning authority to produce effective and pragmatic plans to guide and to grant approval for development in the fastest possible time would be much appreciated by the public (Allmendinger, 2002). Therefore, the amendment of the act itself would not be sufficed to ensure efficient implementation of the plans on the ground. Lack of coordination among government departments and technical agencies as identified by Devas and Rakodi (1993) which is also evident in this study should be given serious attention by the Ministry of Urban Wellbeing, Housing and Local Government perhaps to establish a coordination unit/agency as similar as One Stop Center (OSC) and improving the availability of up-to-date online information through efforts to increase of 'IT' literacy rate among staffs of government departments and technical agencies (Tan, 2005; Mohd Ramzi & Foziah, 2010).

This study has enriched the rational planning theory by indicating the need to build higher competency level of planning staffs and the theory of pragmatism by suggesting the need for more regular plan-updating procedures to achieve practical, consistent, and systematic development planning process that can eventually improve the quality of the plan. To this end, town planners should look forward toward attaining stronger collaborations with players in sustainable development especially from all bodies involve in urban development such as Department of Environment (DoE), Public Work Department, Real Estate and Housing Developers Association (REHDA), public transport providers, professional institutions, etc. In addition, further researches

are needed especially to study the relationship between the development planning system and national economic planning in order to ensure that the implementation of development plan proposals are in-line with the Five-year National Plans.

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PERCEPTIONS ON QUALITY OF LIFE IN MALAYSIA: THE URBAN-RURAL DIVIDE

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Abstract

Spatial strategy then known as regional planning, was conceptualized and formally institutionalized in the Second Malaysia Plan, to be among the major instruments of the New Economic Policy (NEP). Urbanization in this context was envisaged to help achieve the spatially balanced development target of the NEP, serving as a means to improve the socioeconomic status of the population in general, and increase the participation of Bumiputras in particular, in the modern urban sector (2nd Malaysia Plan, 1971). Conscious planning which characterizes the country's development since independence has placed Malaysia currently to be among Asia's best. The challenge of the concomitant rapid rate of urbanization however, continues to remain one of bridging the multidimensional urban-rural gaps. The National Urbanization Policy (NUP) and National Physical Plan (NPP) while fully cognizant of the potentially divisive globalization effect on national development, stress the enhancement of overall living qualities for sustainability. This paper seeks to explore the differences between the importance and satisfaction in living qualities between the urban and rural dwellers in 14 quality of life domains. These domains are Population and Family, Participation in Education, Human Resource, Health, Income, Expenditures and Savings, Housing, Environment, Transportation, Culture and Entertainment, National Unity, Communication and Technological

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Change, Social Participation, Public Safety and Social Security. Quality of Life Index in this study which is based on a questionnaire survey on 3,500 respondents was derived using the Customer Satisfaction Index. It revealed a gap between the perceived importance and satisfaction rating for most of the quality of life domains studied. This gap prevailed for both rural and urban respondents.

Keywords: regional planning, urbanization & quality of life.

INTRODUCTION

Research and discussion on the quality of life (QOL) is pursued in a detailed and elaborate manner since the early 80s (Marcouiller, & English, 2001; Dissart & Deller, 2000). Marans and Stimson (2011) recently summarized major efforts covering the theory, methods and empirical research on quality of life studies. One of the more important aspects of QOL research throughout literature is its definition which generally refers to the degree of well-being felt by the community or individual. Many researchers have expanded their research using multivariable criteria for assessing a good quality place (Norainah A.R., Dasimah O. and Abdul Ghani S., 2012). Szalai (1980) defines quality of life based on the degree of excellence or satisfactory character of life. While covering many, the two basic components of quality of life which underpin many efforts to quantify quality of life are physical and psychological. The physical component covers areas such as health, nutrition, and protection from disease while the psychological component deals with issues such as stress, entertainment and leisure.

As a concept the meaning of quality of life (QOL) can infer to the notions of "well-being," focusing on the individual, to "good society", to "good place/city" focusing on the location (Dissart & Deller, 2000). According to Zapf (2000), QOL does not only encompass living conditions but also the subjective aspect of living conditions. This necessarily requires that indicators for quality of life besides including the process and provision of, and access to a better environment and better facilities further incorporate the manner of delivery of goods, services, or facilities; and the experience associated with consumption of goods and services (Massam, 2002). Considered from this perspective, QOL has a number of implications for planning, more so in the context of a rapidly urbanizing society such as that of Malaysia's. Indeed, the main concern of the planners is the promotion of the general welfare or the public interest. The comprehensive nature of quality of life research furthermore corresponds well

with the planner's long-standing concern for comprehensive planning (Myers, 2007).

Conscious planning which characterizes the country's development since independence has placed Malaysia currently to be among Asia's best. This adds to the considerable degree of consensus regarding the notion that development, defined in terms of economic growth, is positively linked with quality of life as its concomitant effect. In fact, despite the difficulties associated with proving causality in the social sciences, historical evidence suggests that increases in levels of urbanization and development throughout the world have almost always been associated with economic gains (measured in terms of such economic indicators as GNP and GDP). However, it remains to be shown that these economic gains translate into improved human conditions i.e. quality of life. The challenge of the rapid rate of urbanization however continues to remain one of bridging the multidimensional urban-rural gaps. More importantly, have economic gains caused a rift in the quality of lives among the more prosperous compared to the other regions?

In Malaysia, urbanization *viz* development planning was envisaged to help achieve the spatially balanced development target of the NEP, serving as a means to improve the socioeconomic status of the population in general and increase the participation of Bumiputras in particular, in the modern urban sector (2nd Malaysia Plan, 1971). Diffusion of urbanization in Malaysia has contributed to the general improvements of the living environment through the provision of infrastructure and services such as conventional housing, water and electricity supplies, sanitation, sewerage, transport and telecommunications and so forth. Urbanization creates more employment opportunities which are varied, highly specialized and yield higher incomes, promotes modern lifestyles and contributes to a higher socioeconomic standard of living with increased access to higher order facilities and services such as better education, medical services, recreational and the like. The National Urbanization Policy (NUP) and National Physical Plan (NPP) while fully cognizant of the potentially divisive globalization effect on national development, stress the enhancement of overall living qualities for sustainability. This paper seeks to explore the differences between the importance and satisfaction in living qualities between the urban and rural dwellers in 14 quality of life domains with the aim to highlight the role of planning in reducing the perceived gap.

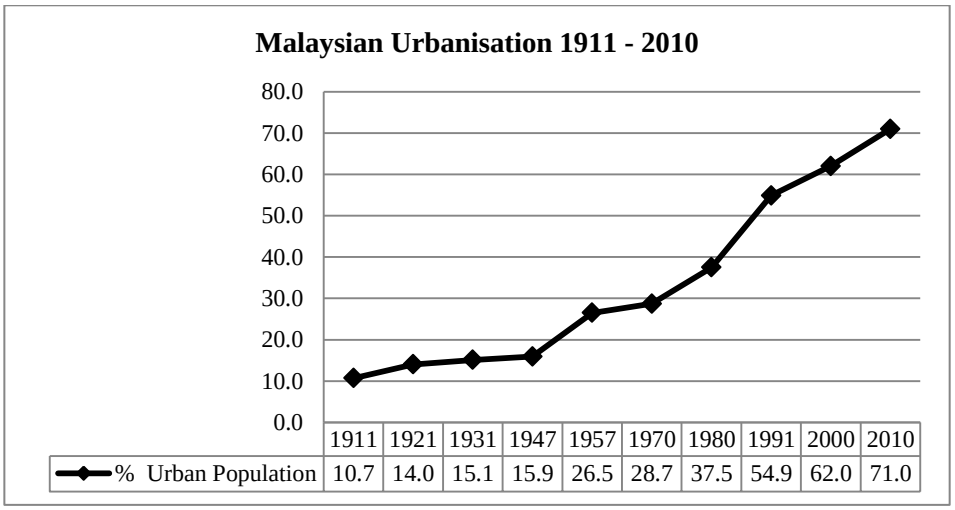
URBANIZATION IN MALAYSIA

Based on the definition of urban areas by the Department of Statistics[i], Figure 1 shows the urbanization rate in Malaysia since 1911. Urban growth in the country has shown a steady increase with an accelerated rate of increase in the past three decades or so. In 2010, the urbanization rate was 71.0 percent, increasing from 62.0 percent in 2000. Apart from W. P. Kuala Lumpur and W. P. Putrajaya with 100 percent level of urbanization, the other states with a high level of urbanization were Selangor and Pulau Pinang with 91.4 percent and 90.8 percent respectively. Conversely, the states with lower urbanization levels were Kelantan (42.4 percent), Pahang (50.5 percent) and Perlis (51.4 per cent) (Department of Statistics Malaysia, 2012).

The marked increase in the urbanization rate started from 1970 onwards, and continues to increase remarkably (Figure 1). The single most important explanation for the phenomenal increase in the urbanization rate since 1970 was the implementation of the New Economic Policy (NEP) which immediately followed the ethnic clash of 1969[ii]. The two-pronged aim of the policy was to eradicate poverty irrespective of race and to restructure the society so that no identification of ethnic origin with economic functions and geographical locations could be made. Urban strategies which were intertwined with the broader regional policy and programs in Malaysia have led to large scale urbanization especially among the Bumiputras and the Malays. Much of these took place in the newly created towns in the Regional Development Areas (RDAs) called the new towns, further development of existing small towns in the agricultural regions, as well as the establishment of industrial centres within small and medium sized towns in densely populated rural areas (Katiman, 1988).

From the mid-1990s onwards, popularly known as the "new period of globalization" (Jomo, 1995), a new trend characterizes urban development in Malaysia. The policy shift emphasizing economic liberalization and modernization in ensuring national success in the new k-economy saw new mega urban projects such as the Multimedia Super Corridor (MSC), the Kuala Lumpur International Airport (KLIA), Kuala Lumpur City Centre (KLCC) and Putrajaya (the new administrative centre) with "hi-tech" physical infrastructures were built as a means of "plugging into", and "making [of] an information economy and society" (Bunnell, 2002). Based on the pattern of current trends in the globalization of economic activities, urban growth and development are expected to accelerate and concentrate further in the few existing urban conurbations. These are more attractive to international investors since they

offer bigger agglomeration economies and returns to investment as well as a higher quality of life.



	1911	1921	1931	1947	1957	1970	1980	1991	2000	2010
% Urban Population	10.7	14.0	15.1	15.9	26.5	28.7	37.5	54.9	62.0	71.0

Figure 1: Urbanisation Rate in Peninsular Malaysia, 1911-2010
Source: Based on data from Ooi, 1975 and Department of Statistics, 2012

QUALITY OF LIFE REPORTS IN MALAYSIA

In response to the growing importance and practicality of quality of life as a measure of progress and harmony in a country, Malaysia has embarked on producing the first Quality of Life Report in 1999. In the Malaysian context, the quality of life is defined as encompassing personal development, healthy lifestyles, access and freedom to acquire knowledge and to enjoy living standards that exceed the basic needs and individual psychology (Malaysian Quality of Life, 2002). These endeavors are in line with the level of social welfare that is set as the national's goal. A total of 10 indicators was selected that best portray the well-being of the community in the country. These indicators are income and distribution, environment, transport and communications, health, education, housing, environment, family life, social participation and public safety.

The sequel to the 1999 report was published in 2002 in order to assess the ongoing changes that are taking place in Malaysia. Several additions have been made in this second report, which includes indicators on culture and leisure. Exclusive indicators focusing on quality of life in urban Malaysia (MUQLI) were also added. The addendum signifies the importance of urban

population in Malaysia that represents 71.0 percent of Malaysia's population in 2010 (Department of Statistics Malaysia, 2006). Unlike the first report that utilized the quantitative approach and lacked elaboration of the indicators used, the second report to some extent, attempted to reconcile this by giving further explanation of those indicators.

The Malaysian Urban Quality of Life Index (MUQLI) for the period of 1990-2000 is based on data collected from four cities; Ipoh, Johor Bahru, Kuala Lumpur and Kuching that, collectively, accounted for 30 per cent of the country's total urban population in 2000. The MUQLI is a composite index consisting of indices of income and distribution, working life, transport and communication, health, education, housing, environment, family life, social participation, public safety and culture and leisure. The report also included the findings of a survey carried out in 2000 on 2,304 respondents living in two more cities (Kuantan and Kota Kinabalu), in addition to the four cities above. The survey was carried out to solicit perception as to the urban quality of life in Malaysia and to provide a qualitative assessment of the urban quality of life which complements the quantitative analysis described earlier.

All cities studied recorded improvements in the quality of life of their population for the observation period, with Kuala Lumpur registering the highest increase of 9.0 points, followed by Ipoh, Johor Bahru and Kuching. About three-quarters of the people surveyed reported further that they were satisfied with the overall quality of life in Malaysian cities. The majority of the respondents were satisfied with aspects of urban living pertaining to indices for family life, education, infrastructure and amenities, public safety, housing, health, transport and the work place (Economic Planning Unit, 2002).

STUDY METHOD

Sampling and survey procedures

The primary source of data for this study was a perception survey designed to solicit a broad base perceptions of values that are acceptable and thus used to indicate the quality of living conditions by Malaysian society. The survey method was also used to collect information on satisfaction levels on previously agreed-upon quality of life aspects. Stratified sampling technique was used to determine the acceptable sample size whereby the total population was stratified according to states and districts. Based on this strategy, 100 districts (from the total of 136 districts listed in the Malaysian Population and

Housing Census 2000) were sampled. This more than met the 97 districts, the minimum number of districts, required (Krejcie & Morgan, 1970). To ensure sample representativeness, subjects were selected from sex, ethnic, age cohorts and location (urban and rural) categories that reflect the real stratification in Malaysia. Face-to-face interviews were conducted by a trained group of interviewers. The questionnaire survey was administered on 3,500 respondents who were selected from all over Malaysia including Sabah and Sarawak. A total of 3,494 questionnaires were completed and analyzed using SPSS 17.0 (Statistical Package for Social Sciences). All statistical procedures were also performed using the same software.

Measurement

Quality of Life Index (QOL) in this study was measured by a self-report scale consisting of 30 indicators constructed from a total of 106 items. All items used the five-point *Likert* scale (1 = not satisfied/good/frequent/important at all to 5 = very satisfied/good/frequent/important). In the interview session, respondents were asked to rate the importance of and satisfaction over a set of indicators of life qualities from the 14 quality of life domains that were identified as a benchmark for determining the quality of life for the Malaysian society. These domains were Population and Family, Participation in Education, Human Resource, Health, Income, Expenditures and Savings, Housing, Environment, Transportation, Culture and Entertainment, National Unity, Communication and Technological Change, Social Participation, Public Safety and Social Security. The 30 indicators were constructed to complement 55 indicators derived from secondary sources according to same 14 domains. These indicators are 108.0 % more than the indicators reported in the Malaysian Quality of Life Index (MQLI) (EPU, 1999) and 194.0% more than the Malaysian Urban Quality of Life Index (MUQLI) (EPU, 2002). Table 1 shows comparative indicators for MQLI, MUQLI in Malaysia and the study indicators. The significant contribution to the existing local knowledge about the quality of life made in this research is the role of National Unity consisting items measuring the society's readiness and willingness to accept diversity as well as their confidence in local and national institutions' abilities to safeguard the interests of all fairly.

Table 1: Comparative Domains and Indicators for QOL, MQLI and MUQLI in Malaysia

DOMAIN	QOL 2010	MQLI 1999 & 2002	MUQLI 2002
	POPULATION AND FAMILY	**FAMILY LIFE**	**FAMILY LIFE**
1.	Marriage	Divorce	Divorce
2.	Divorce	Household size	Household size
3.	Household size	Crude birth rate	
4.	Dependency ratio	Juvenile delinquency	
5.	Single household		
6.	Female-headed household		
7.	Family happiness		
DOMAIN	**PARTICIPATION IN EDUCATION**	**EDUCATION**	**EDUCATION**
1.	Preschool	Preschool participation rate	Teacher-student ratio secondary school
2.	Secondary school	Secondary school participation rate	Average class size primary school
3.	University students	University participation	Average class size secondary school
4.	Primary school	Teacher-student ratio secondary school	
5.	Teacher-student ratio primary school	Literacy rate	
6.	Teacher-student ratio secondary school		
7.	Literacy rate		
8.	Satisfaction on curriculum & co-curriculum		
DOMAIN	**HUMAN RESOURCE**	**WORK ENVIRONMENT**	**WORK ENVIRONMENT**
1.	Unemployment	Unemployment	Industrial accidents
2.	Workplace accidents	Industrial accidents	Industrial disputes
3.	Average monthly income	Industrial disputes	
4.	Satisfaction and work-life balance	Work days loss due to industrial actions	
5.	Labor force		
6.	Foreign labor		
DOMAIN	**HEALTH**	**HEALTH**	**HEALTH**
1.	Doctor per 10,000 population	Doctor-population ratio	Doctor-population ratio
2.	Hospital beds per 10,000 population	Life expectancy at birth bagi for male	Infant mortality
3.	Life expectancy at birth (male)	Life expectancy at birth for female	
4.	Life expectancy at birth (female)	Infant mortality	
5.	Infant mortality		
6.	Epidemic occurance		
7.	Awareness of epidemic		
8.	Immunization		
DOMAIN	**INCOME, EXPENDITURE & SAVINGS**	**INCOME AND DISTRIBUTION**	**INCOME AND DISTRIBUTION**
1.	Income per capita	Real income per capita	Income per capita
2.	Gini coefficient	Gini coefficient	Gini coefficient
3.	Poverty	Poverty	Poverty
4.	Household income		
5.	Importance of income		
6.	Satisfaction on income gaps		
7.	Social development		

	expenditures		
8.	Adequacy of income for life sustainance		
9.	Satisfaction on savings		
DOMAIN	**HOUSING**	**HOUSING**	**HOUSING**
1.	Low cost housing units built	Average medium-cost house price	Average rent- income ratio
2.	Housing affordability	Low cost housing units	Average house price-income ratio
3.	Home ownership	Houses with piped water	
4.	Houses with electricity supply	Houses with electricity supply	
DOMAIN	**ENVIRONMENT**	**ENVIRONMENT**	**ENVIRONMENT**
1.	Clean water supply	Water quality	River quality index
2.	Clean air	Air quality	Solid waste per capita
3.	Importance of environmental protection	Forested area	
DOMAIN	**TRANSPORT**	**TRANSPORT & COMMUNICATION**	**TRANSPORT & COMMUNICATION**
1.	Private transport	Private motorcycles & cars	Private motorcycles & cars
2.	Roads	Road development index	Public transport
3.	Satisfaction on public transport	Commercial vehicles	Telephone
4.		Telephone	
5.		Daily newspaper circulation	
DOMAIN	**CULTURE & ENTERTAINMENT**	**CULTURE & ENTERTAINMENT**	**CULTURE & ENTERTAINMENT**
1.	Cultural, historical & landmark buildings	Library membership	Recreational and sports clubs
2.	TV programs with local content	Television viewers	Library membership
3.	Cultural importance	Domestic hotels visitors	
4.	Television viewers		
5.	Involvement in activities & past time habits		
6.	Involvement in cultural activities		
DOMAIN	**NATIONAL UNITY**		
1.	Readiness to accept other people's opinions & willingness to discuss towards arriving at a consensus		
2.	Readiness to acknowledge & accept other people's culture, political ideology & religion		
3.	Tendency & frequency of communication with ethnically-based social institutions		
4.	Perception of having good relationships with other people at workplace, school, neighborhood and other institutions.		
5.	Use of national language for communicaation, fluency & the importance of national language for national unity		
6.	Tendency to associate oneself with similar ethnic group, decendency or original cluster		
7.	Confidence of (selected) local and national institutions'		

	abilities to safeguard the interests of all fairly		
DOMAIN	**COMMUNICATION & TECHNOLOGICAL CHANGE**		
1.	Fixed phone ownership		
2.	Daily newspaper circulation		
3.	Mobile phone ownership		
4.	Computer ownership		
5.	Internet access		
6.	Social communication		
DOMAIN	**SOCIAL PARTICIPATION**	**SOCIAL PARTICIPATION**	**COMMUNITY PARTICIPATION**
1.	Involvement in volunteer	Registered voters	Registered volunteer
2.	Involvement in community activities	Registered community associations	Registered voters
3.	Registered voters	Registered NGOs membership	Rukun Tetangga membership
4.	Direct involvement of members in decision making		
5.	Voluntary participation in selected organisations		
6.	Frequency of attendance to community-level meetings.		
7.	Number of NGOs		
DOMAIN	**PUBLIC SAFETY**	**PUBLIC SAFETY**	**PUBLIC SAFETY**
1.	Crime	Crime	Crime
2.	Road accidents	Road accidents	Road accidents
3.	Death from road accidents		
4.	Firefighter & Rescue members		
5.	RELA membership		
6.	Fear of crime		
7.	Juvenile Delinquency		
DOMAIN	**SOCIAL SECURITY**		**URBAN SERVICES**
1.	KWSP contribution		Social services expenditures
2.	Population with insurance		Expenditures for landscape
3.	Perception on social security protection scheme		
4.	PERKESO contributors		

ANALYSIS

Quality of Life Index $QOL_i^{(P)}$ in this studywhich is based on primary data collected from field survey was derived using the *Customer Satisfaction Index* technique. The same technique was used by the Australian University and Deakin University, Australia to construct the *Australian Unity Wellbeing Index* since 2001. Higher quality of life index values indicate higher living quality as perceived by the society. Similarly, higher values of the sub-index would indicate higher perceived quality of living associated with the relevant domain. The formula for index calculation using this technique is given below.

$$\text{Quality of Life Index, } QOL_i^{(P)} = \sum_{i=1}^{n} D_{i,j}^{(P)}$$

$$\text{Quality of Life Sub-Index for Domain } i\text{, } D_{i,j}^{(P)} = \frac{\sum_{i=1}^{n} y_i w_i}{5}$$

Where;

$$w_i = \frac{x_i}{\sum_{i=1}^{n} x_i} 100\%$$

x_i = average importance score for indicator i, $1 \le x_i \le 5$
1=not very important, 5=very important

y_i = average satisfaction score for indicator i, $1 \le y_i \le 5$
1=not very satisfied, 5=very satisfied

w_i = weight factor, $0\% \le w_i \le 100\%$

j = year

n = number of indicators

i =
1 = Population and Family
2 = Education
3 = Human Resource
4 = Health
5 = Income, Expenditures and Savings
6 = Housing
7 = Environment
8 = Transportation
9 = Culture and Entertainment
10 = National Unity
11 = Communication and Technological Change
12 = Social Participation
13 = Public Safety and
14 = Social Security

Paired sample t-tests were conducted to investigate any significant differences between satisfaction level and importance level of the QOL domains among respondents living in rural and urban areas. The gap between satisfaction and importance levels for the domains between rural- and urban-based respondents was tested using the established ANOVA. A total of 42 (3 x 14) hypotheses were tested, three for each domain[iii].

FINDINGS

Table 2 shows that more than half of the respondents (58%) interviewed lived in the urban areas compared to rural areas (42%). The majority (68.2%) of the respondents aged between 25-54 years old and can be defined as within the productive working age. The larger proportion of the respondents furthermore was of the Malay ethnic origin (55.4) and Muslims (62.5%). Most respondents reported monthly individual income between RM1, 000 – RM4, 000 (56.4%); household size of between 3 - 6 persons (66.3%) and self-owned housing (66.1%). Almost complete coverage of public utilities was also observed in

respondents' housing units. Table 2 summarizes the major characteristics of the sample.

Table 2: Sample Characteristics

Characteristics	**n**	**(%)**	**Characteristics**	**n**	**(%)**
Location			Types of household		
Urban	1962	58.0	Single household	58	1.7
Rural	1420	42.0	less than 3 members	219	6.4
Age			3 or no more than 6 members	2282	66.3
16-24	742	21.3	more than 6 members	885	25.7
25-54	2371	68.2	Employment Sector		
55 and above	365	10.5	Private	1003	29.2
Gender			Public	1146	33.4
Male	1750	50.4	Self-employed	710	20.7
Female	1722	49.6	Unemployed	575	16.7
Ethnicity			Individual income		
Malay	1931	55.4	Less than RM500.00	259	7.7
Chinese	859	24.6	RM500 - RM1000	634	18.9
Indian	269	7.7	RM1000 - RM4000	1895	56.4
Others	427	12.2	RM4000 and above	232	6.9
Education level			No income	337	10.0
No formal education	105	3.0	House ownership		
Primary	321	9.3	Own house	2286	66.1
Secondary	1650	47.8	Rent	760	22.0
Tertiary	1373	39.8	Squatters	29	0.8
Marital Status			Others	384	11.1
Single	1265	36.4	Main source of utility provider		
Married	2083	59.9	Official electricity provider	3469	99.3*
Widower/Divorced /Separated	128	3.7	Official water provider	3289	94.1*

Note: All percentages are based on valid percentage except for * which is calculated based on total sample of 3494.

Figures 2 and 3 show the importance and satisfaction levels by QOL domains among the rural and urban respondents. It can generally be observed that the Malaysian society was rather realistic in that they did not expect perfection in the performance of the QOL measurable domains. However, a few domains were accorded with higher importance score (percentage score exceeding 90%). These domains were Education, Human Resource, Income,

Expenditures and Savings, Housing and Social Security. National Unity, Public Safety, Social Participation, Culture and Entertainment, and Communication and Technological Change were by contrast, considered less important in determining living qualities according to the respondents.

Figures 2 and 3 also generally depict the underperformance of all domains (excepting Culture and Entertainment) measured against their corresponding importance level as felt by the respondents. The trend prevails for both urban and rural respondents. The significant disparity between satisfaction and importance levels in urban and rural locations is evident from Table 3. All paired sample tests performed were significant at 1% level with the largest observable disparity associated with Income, Expenditures and Savings in all locations. The rural respondents further perceived that there is also much to be done to reduce the wide disparity between satisfaction and importance levels in the Social Participation domain. Smaller disparity in the importance and satisfaction levels was found in the Social Security (for both locations) followed by Human Resource and Environment domains among the urban respondents.

Table 3 also reported the importance-satisfaction gap, employing the established ANOVA to test for any significant differences in the gap score between the urban and rural respondents. The importance-satisfaction gap is determined by subtracting the satisfaction score assigned to a domain from its importance score. Table 3 shows rather clearly that there were significant differences in the above-mentioned gap for most domains between rural and urban locations as perceived by the respondents. Variations in the importance-satisfaction gap score between rural and urban respondents were not significant for only Health and Transportation domains. In other words, the perceived importance and satisfaction rating of the two domains were similar for both rural and urban respondents.

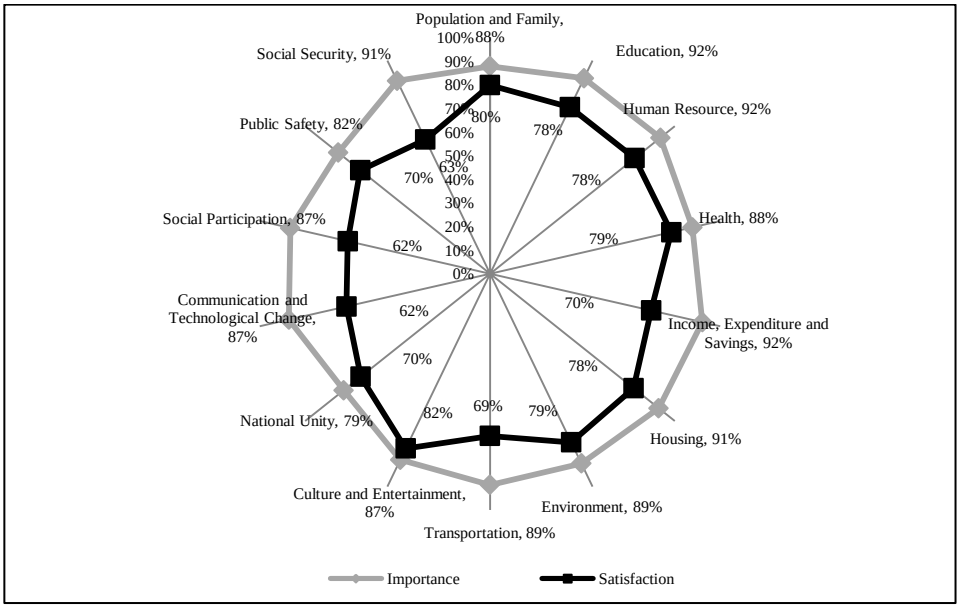


Figure 2: Importance and Satisfaction Levels among Those Living in Urban Areas by QOL Domain

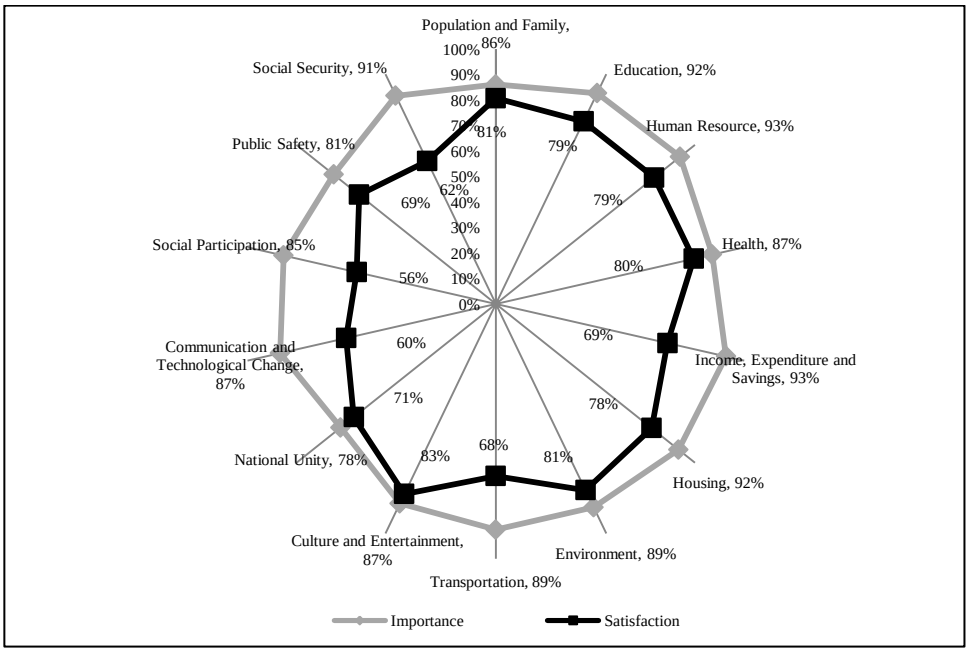


Figure 3: Importance and Satisfaction Levels among Those Living in Rural Areas by QOL Domain

Table 3: Satisfaction and Importance Levels of Each QOL Domain by Urban and Rural Locations

Domain	Rural			Urban		ANOVA F-statistics	
	Satisfaction (Mean, n)	Importance (Mean, n)	Paired sample test (t-test, df)	Satisfaction (Mean, n)	Importance (Mean, n)	Paired sample test (t-test, df)	
Population and Family	81% (1402)	86% (1394)	30.7941 (1399)	80% (1941)	88% (1944)	38.0662 (1945)	4.1374**
Education	79% (1317)	92% (1401)	34.8431 (1398)	78% (1828)	92% (1948)	44.211 (1947)	3.7515*
Human Resource	79% (1309)	93% (1403)	27.8692 (1821)	78% (1823)	92% (1950)	18.352 (1304)	9.8314***
Health	80% (1405)	87% (1397)	33.3795 (1393)	79% (1952)	88% (1948)	40.6681 (1948)	1.6455
Income, Expenditure and Savings	69% (1362)	93% (1398)	58.0132 (1935)	70% (1886)	92% (1949)	50.3995 (1381)	5.0742**
Housing	78% (1407)	92% (1401)	35.5687 (1942)	78% (1940)	91% (1951)	26.0565 (1393)	4.2985**
Environment	81% (1410)	89% (1401)	29.7271 (1946)	79% (1946)	89% (1951)	17.3408 (1394)	24.826***
Transportation	68% (1404)	89% (1397)	40.4687 (1929)	69% (1926)	89% (1949)	35.5679 (1388)	1.1060
Culture and Entertainment	83% (1293)	87% (1397)	-7.7172	82% (1821)	87% (1948)	-13.2228	23.4238***

			(1820)			(1291)	
National Unity	71% (1386)	78% (1400)	35.8882 (1945)	70% (1936)	79% (1948)	23.8388 (1395)	24.191***
Communication and Technological Change	60% (1347)	87% (1398)	14.7157 (1938)	62% (1849)	87% (1946)	21.5672 (1390)	50.6382***
Social Participation	56% (1389)	85% (1398)	60.3866 (1933)	62% (1935)	87% (1945)	47.4761 (1375)	5.2262**
Public Safety	69% (1412)	81% (1397)	34.2456 (1940)	70% (1946)	82% (1948)	32.5559 (1396)	11.8988***
Social Security	62% (1391)	91% (1399)	9.9145 (1941)	63% (1937)	91% (1947)	12.1729 (1385)	8.6616***

Note: * P < 0.01, ** P < 0.05, ***P < 0.001; All paired sample tests have significant values of P < 0.001

PLANNING IMPLICATIONS

Myers (2007) advocated the critical use of QOL knowledge by planners since they are inherently concerned with development and the dynamism of change. He used the golden goose metaphor to illustrate the relationship between QOL and development planning – firstly, quality of life encourages economic development; however, the resulting urban growth alters quality of life (potentially killing the golden goose). Secondly, planning can help mitigate the damaging effects of growth, an important complement to its other role in promoting economic development.

Indeed, the role of urban planning in Malaysian national development, seen from the above perspective, is indisputable and has in fact, strengthened currently. It was in the Third Malaysia Plan 1976-1980 (Malaysia, 1976) that the strategy for urban and regional development was clearly spelt out for the first time. The fundamental idea was designing the urban hierarchy so as to generate a denser pattern of urban-regional development throughout the country. This urban focus of the regional development strategy, while explicit

and consistent with the objectives of the National Economic Policy (1970-1990), was carried through to the current National Vision Policy (2001-2010). The 9th and 10th Malaysia Plans (five-year development plans) which embody the length of the policies' time span, set the strategy for urban development to improved and thereby higher quality of urban services and more livable urban areas.

Within the Integrated Resource Planning and Management Framework, development planning in Malaysia integrates spatial planning with other sectoral planning in its implementation incorporating plans and policies already available at the national level. These include the master plans for agriculture, industry, tourism, water management and transport. The National Physical Plans (NPP) in particular, which complements the Five-Year Economic Development Plans starting from the 9th Malaysia Plan embodies the strategy for national spatial development up till 2020 and provides the spatial dimension to the sectoral distribution of national resources (Department of Town and Country Planning Malaysia, 2005).

In line with Vision 2020, National Vision Policy and Malaysia's Five-Year Plans, the role of planning in national development is as follows (Department of Town and Country Planning, 2001):

- Translating the socioeconomic objectives in spatial and physical forms
- Translating development policies into physical planning
- Considering the importance of environmental quality in planning
- Planning for urban facilities
- Contributing and managing scientific and technological advancement.

Taking into recognition further, the processes impacting national growth and development namely globalization and the emergence of the k-economy, land use/spatial planning in Malaysia currently aims to (1) rationalize national spatial planning for economic efficiency and global competitiveness, (2) promote balanced regional development for national unity (3) optimize utilization of land and natural resources for sustainable development and (4) secure spatial and environmental quality and diversity for a high quality of life.

The revised NPP (NPP-2) approved on August 2010, outlined the objective as "to create an efficient, equitable and sustainable national spatial framework to guide the overall development of the country towards achieving a high-income and developed nation status by 2020". Additional policies and measures formulated in NPP-2 include matters regarding climate change, protection of biodiversity, green and new technology, as well as sustainable tourism (Federal Department of Town and Country Planning, Malaysia, 2010).

The above clearly spells out the increasing importance of urban planning in Malaysia, to support the national agenda.

In another planning application, quality of life research such as reported herein provides as a tool for regular monitoring and reporting of place-based and community-based living qualities. The relationships between the characteristics of these places and the perceived QOL of the residents are most certainly important as they underpin many approaches to planning and design to enhance the quality of people's lives. This is also in line with the livability and sustainability objectives for development within the planning framework in urban Malaysia as indicated over and over, in most planning policies and documents. The subjective indicators employed in this study which attempted to obtain a value for goods, services and amenities from which quality of life is supposed to derive, could be valuable input for planning. Again, this should encompass the whole process of, provision of, delivery of and access to improved living environments.

Although QOL indicators may reflect a rich coverage of living aspects, it should be apparent that not all goods, services and amenities which are location specific are under the control of local governments. Some are more effectively provided by higher level governments i.e. state and federal levels. Cleanliness, beautification, localized public nuisances, local level pollution and quality of public services can certainly be acted on by local decision makers. Furthermore, the aggregated individual living qualities in this study, which indicate community consensus, seem to suggest that promoting the social cohesion of communities would improve the quality of life in places. This includes aspects of Social Participation and National Unity, for example, involvement in community activities, perception of having a good relationship with other people at workplace, school, and neighborhood. Clearly, quality of life concept presents an important opportunity for planners to capture the attention of wider stakeholders in development. More important, protecting the quality of life is a goal that citizens' groups, business leaders share, and hence it affords a potential basis for negotiating consensus over specific planning goals (Myers, 2007). It almost invariably includes political aspiration too.

ACKNOWLEDGEMENT

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[i]According to the Department of Statistics, urban areas in the latest 2000 census were defined to include gazetted areas with their adjoining built-up areas which had a combined population of 10,000 or more. In addition, urban areas should have at least 60% of their population (aged 10 years and over) engaged in non-agricultural activities as well as having modern toilet facilities in their housing units. Urbanization, on the other hand, refers to the proportion of the total population living in its urban areas.

[ii]For more satisfactory explanations on factors influencing early urbanization in Malaysia, please refer to Lim, 1973; Cooper, 1951; Ooi, 1975).

[iii] The hypotheses are:

Hypothesis 1: paired-sample test

H_0: There is no significance difference in satisfaction and importance score for domain$_i$ among respondents who live in the rural area.

H_1: There is significance difference in satisfaction and importance score for domain$_i$ among respondents who live in the rural area.

Hypothesis 2: paired-sample test

H_0: There is no significance difference in satisfaction and importance score for domain$_i$ among respondents who live in the urban area.

H_1: There is significance difference in satisfaction and importance score for domain$_i$ among respondents who live in the urban area.

Hypothesis 3: ANOVA

H_0: There is no significance difference in gap score for domain$_i$ among respondents who live in the urban and rural areas.

H_1: There is significance difference in gap score for domain$_i$ among respondents who live in the urban and rural areas.

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AWARENESS BY KUALA LUMPUR CITY HALL STAFFS FOR SUCCESSFUL IMPLEMENTATION OF CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED)

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Abstract

A city that is free from all forms of crime and criminal threats will able to create a community that has quality human capital. Both crimes and the fear of crime have a significant impact on the quality of life. A safe city is a key to the success of community development, urban development and nation building. Rising of crime index for past six years in Kuala Lumpur is questionable whether CPTED has been successfully carried out by the KLCH in creating a safe urban environment for people to live in. Urban development Plans should make safety primary criteria in making the city successful and livable. This research aims to investigate the awareness level of Kuala Lumpur City Hall (KLCH) implementer in implementing the Crime Prevention through Environmental Design (CPTED) which was introduced in 2004 by the Malaysian Government. A mixed method research approach was adopted employing a questionnaire survey and in depth interview with a sample of officers and technician of KLCH whose scope of work includes the implementation of CPTED. The findings suggest that the existing level of awareness is still low with the lack of awareness on CPTED due to the limited knowledge and poor understanding of CPTED concept and implementation. However, it was also found that the implementers of KLCH are beginning to develop an awareness of the importance of safety urban environment and are beginning to consider the capability of the built environment in reducing both, the fear of crime and the actual crime from happening. Successful CPTED implementation will be a meaningful contribution towards the creation of a safe

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city that is livable for the urban community in Kuala Lumpur therefore helping to improve their quality of life.

Keywords: CPTED

INTRODUCTION

Awareness of Kuala Lumpur City Hall's implementers is the most important factor for any policy implementation. It has not been explained so much in other previous study and research on successful policy implementation. Without KLCH implementer's awareness on current policies and trend, it is impossible for them to gain the knowledge of the policy, understanding how to implement it and a commitment for the implementation and develop a skill in implementing the policy is required. Crime Prevention through Environmental Design (CPTED) is partially one of the Safe City crime prevention strategies that have been adopted since 2004 by the Malaysian Government. Rising of crime index for past six years in Kuala Lumpur is questionable whether CPTED has been successfully carried out by the KLCH in creating a safe urban environment for people to live in. Thus this study takes initiatives to investigate the level of CPTED awareness by the KLCH implementers. The study was conducted among the professionals and technical staffs from selected technical departments that involved in the Kuala Lumpur development process.

The crime rates in Malaysia getting worsen since the year of 1991 when it increased more than 300%. The seriousness of this problem can be concluded up in the year 2007, where the sum of crime rate statistics is about 588 murder cases and 3,177 rape cases which equivalence to more than one person was murdered (1.6 per day) and more than eight women were raped every day (8.7 per day) (Amar Singh Sidhu, 2005). Increase of the crime rate never stops at any point especially the violent crime that increased by 85% from year 2003 to 2006. For the first five months of the year 2007 the crime rate in Malaysia increased by 8.7% and that year become the worst year due to the increasing crime index of 156, 315 cases in 2003 up to 224,298 cases in 2007 which the rise is 45% over past four years (Amar Singh Sidhu, 2005). CPTED implementation that started in 2004 did not yield a proper result. In 2004, the crime rate in Kuala Lumpur especially snatches thefts increased and contributed to 18 % of the crime index (Chor Chee Heung, 2010). The increasing crime rates continue from year to year and the decline of the crime rates in 2010 was due to the initiative taken by the government by making the crime prevention as a NKRA in Government Transformation Program (GTP) 2010. Increasing of

the crime rate for the past six years in Kuala Lumpur has been questioned, whether the CPTED implementation by the KLCH was successfully implemented in KL. This research assumes that by increasing the implementer's awareness, CPTED implementation will be more successful in Kuala Lumpur. Further sections of the paper then, examine the level of awareness of implementers in KLCH and the level of CPTED implemented by them. The paper concludes that to achieve a successful of CPTED implementation, awareness is one of the factors that need to be looked into.

CRIME IN MALAYSIA

Crime and fear of crime are a major urban stress and crime problems are social issues that affect thousands of people's lives each year (Massoomeh Hedayati Marzbali et al, 2012). Malaysia is one of the most rapidly developing countries in Southeast Asia (Wong, T.C et al., 2006) and one of the challenges faced by the nation is the increase in crime rate. The social aspect is one of the key elements that contribute to the sustainable development of other aspects of the environment and the economy (Halimaton Saadiah Hashim, 2011). Figure 1 would give a better and clear picture of the rising crime rate in Malaysia. This has caused real fear amongst the public at large, most prominently amongst women and children whose lives are most directly affected.

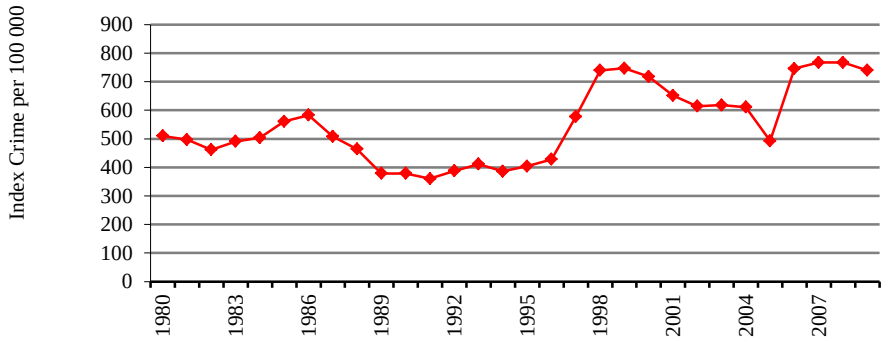

Figure 1: Crime Index In Malaysia from 1980 – 2010
Sources : Royal Malaysia Police 2011

The seriousness in the increasing crime rate has caused a drastic action by the government by focusing on the crime prevention. Crime prevention has become as a National Key Result Area (NKRA) major goal of Malaysia Government in providing a better and safe environment for people to live.

Malaysia government is not exempted from this matter where over RM37 billion for the year 2010 and RM35 billion for the year of 2011 were spent for the crime problem (Annual Report Government Transformation Programme Roadmap, 2011). An immediate effort was taken to combat this problem through supervision by police in the selected hot spot area which was also known as a Target Hardening strategy. Currently less than 8% of the Royal Malaysian Police force is directly fighting crime (Annual Report Government Transformation Programme Roadmap, 2011). The police alone cannot provide all the solutions for crime prevention, householders and communities must learn to help themselves and regain control over their neighbourhoods through forming groups such as Neighbourhood Watch. The physical built environment also helps in preventing crime from happening. This has been practiced by many other countries around the world. A quality design of the urban built environment is needed to prevent crime and a good community cooperation is needed to create a better living environment become a strategic strategy in order to making the cities in Malaysia a safe city.

CRIME PREVENTION THROUGH ENVIRONMENTAL DESIGN (CPTED) AND ITS IMPLEMENTATION IN MALAYSIA

Crime and environment and the spatial patterning of crime has become a hot debate and the big discussion started way back in 1920s (Shaw and McKay). The concept of CPTED is an idea of how the design of physical of built environment plays an important role in the prevention of criminal acts by their behavior and can lead to a reduction in the fear of crime and the incident of crime which can improve the quality of life. The Opportunity Theory of Crime Prevention was developed during the 1970s and was initiated and expanded by researchers from UK Home Office Research Unit (Massoomeh Hedayati Marzbali et al., 2011). The goal is to reduce the opportunities for crime to occur by creating a defensive environment with approaches from both the physical and the psychological aspects as the same time. This reduction is achieved by employing physical design features that discourage crime, while at the same time encouraging the legitimate use the environment. National Crime Prevention Institute explained that a CPTED program is based on the premise that the proper design and effective use of the built environment which can lead to a reduction in the fear and incidence of crime, as well as an improvement in the quality of life (Rebecca Lynn Wenzelm. 2007) for both the psychological aspects of human nature and the role of the external physical environment on human behaviour. On the external physical environment aspect, he suggested that the urban design, including the design of streets, parks, terminals and

super highways, could prevent crimes from occurring by reducing the "opportunities" to the criminals. CPTED is an idea using the physical environment as protection against attack (Robert A. Gardner, 1981). The essence of CPTED in creating a defensive environment is approached from both the physical and the psychological aspects. To ensure the effectiveness of CPTED, it should be applied both to external and internal physical environments, and to the environments of the place and the offender, respectively (Matthew B. Robinson, 1996).

The concept of the CPTED program are a manipulation of the physical environment in producing behavioural effects that will reduce the incidence and fear of crime which will help in improving the quality of life (Crowe, Tim. (2000), Ronald V. Clarke (1998) & Robert A. Gardner, 1981). Robinson Taylor and Harrell (1996) describe CPTED as "focuses on the settings in which crimes occur and on techniques for reducing vulnerability of the settings" because its central premise is that crime can be facilitated or inhibited by features of the physical environment. Agreed by Crowe (2000), where CPTED as a proper design and effective use of the built environment can lead to a reduction in the fear of crime and the incidence of crime, and to the improvement in the quality of life. A proactive design approach used by urban planners is to manage settings for incidences of crime and the fear of crime in building environments which are buildings, street, open space and parks. CPTED approach is perceived to have a stronger effect in influencing fear towards crime. This is due to the fact that the CPTED approach involves constant elements that may be modified through planning and design. This has been proven through several researches that discovered the physical environment can open up opportunities for crimes to be committed. CPTED as including physical layout, housing typologies as well as neighbourhood outlook and appearance are the main criteria that become the focus for the occurrence of crime. This aspect is believed to have a correlation with certain physical configurations which may generate more comfortable surroundings in which people can communicate and act in a better and easier way.

The first program of crime prevention in Malaysia was the Safe City launched in 2004 which consist of 23 steps for the first action and 15 steps on the second movement. The earlier Safe City action was using CPTED strategies as crime prevention. However, the crime rate obtained from the RMP by the researcher did not show positive results compared with the years of CPTED implementation. It is important to ensure the success of CPTED implementation in providing a better quality of life to the people in Kuala Lumpur.

Several methods have been introduced to achieve the effective physical environment in the implementation of the Safe City. A safe city can be achieved

by a designing the environment with the safety as a major focus and providing a quality of planning layout. Environmental Design Initiatives is a strategy that was implemented by the JPBD to create a physical design environment that helps in preventing and combating criminal activities from occurring. In Malaysia, the national budget for 2010 was presented by the Prime Minister YAB Dato' Sri Mohammad Najib Tun Razak, which an amount of RM3.7 billion was allocated for the crime prevention program. However, the amount allocated is only focused on the provision to enhance the efficiency of security personnel, including providing modern and sophisticated equipment. It aims to achieve the crime reduction target of 5 per cent at the end of 2010. The CPTED Implementation Guide was introduced in March 2011. It is a reference document for all relevant decision makers, planners, managers and designers. This document contains a summary of concepts, general guidelines and user-friendly checklists. It outlines the basic requirements for the design and management of the built environment of the community, city, and town for a safer and more secured environment. Implementation of CPTED is not only used for new development but also implemented in the existing development to create safer cities in Malaysia. Architects, designers and town planners have been concerned with crime problems in urban centres and residential areas and their effects on the human well-being. Therefore, the role of KLCH implementers including the planners, architect and other design professionals should take into consideration the surrounding environment in order to reduce or enhance crime rates. In this research, the implementation of CPTED by the KLCH is reviewed by accessing the implementers' awareness on "what is CPTED" and "when" they started to implement the policy. The importance of the CPTED implementation by KLCH implementers will contribute to a better and safe built environment which will lead towards the reduction of crime happen in the urban area.

Policy Implementation and Successful Implementation

Implementation is both an outcome and a process. Implementation is connected to specific policies as particular to specific problems in the society and it is a process involved individuals with different background, organizations, procedures and techniques working together to ensure the policies effect the program goals. According to Van Meter and Van Horn, the process includes one time and continuing efforts to achieve the mandated by policy decision. Policy implementation is what develops between the establishments of an apparent intention on the part of government doing something or stop doing something and the ultimate impact of world of actions.

Successful implementation, defined by Matland, requires compliance with statues' directives and goals; achievement of specific success indicators; improvement of political climate that surround the program. A successful policy implementation occurs when a policy is carried out in full and external circumstances are not favourable and the policy produces the intended results or outcomes. Implementation failure, like implementation success, is therefore a highly contested concept. Its description depends on the intentions, expectations and values of those involved in policy implementation. Meanwhile in, Elmore defined failures of implementation is lapses of planning, specification and control. Wildavsky explained that policy failure is resulted from non-implementation or from unsuccessful implementations which occur when there is a division between formulating a policy and implementing it. Persistent implementation failure is often the result of applying a mistaken theory of change. Failure of implementation has largely been treated as a minor flaw, a treatable and transitory mistake. The criteria for successful or failed implementation are then not focused on the degree of match or mismatch between formal intentions of the policy and actions of the implementers, or on the deviant behaviour of implementers. Instead, they measure the programme in terms of the positive gains. These gains might be due to intended or unintended outcomes. It is mostly done by researchers to explain the existence of "implementation gap". The existence of this gap can thwart the implementation of the policy. This has been a concern to the social scientist, but not to the policy makers. It is important to understand the nature of policy implementation because international experience shows that policies, once adopted, are not always implemented as envisioned and do not necessarily achieve intended results.

According to Pressman and Wildavsky (1984) implementation is complicated by the fact it involves multiple actors in multiple organizations, and within an organization and different staff from different departments is also involved. It can be concluded as a process with stages performs with the implements for a specific target group with an output is either intended or unintended. Agreed with Franklin and Ripley, they explained that the actors holding, diffuse, completing goals and work within a context of a complex mix of government programs that require participation from numerous layers, units and who are affected with the policy. Either people or action both are related in the implementation process and have an impact on the specific task given. Ball describes that policy, by its nature, is not value neutral but it is "a matter of authoritative allocation of values" and he argues that policies cannot be separated from the interests, conflict and domination or justice. He considered the human as a major factor because it emphasizes the powerful authority in the problem solving ability of the people. This theory analyses various

implementation games which hinder policy implementation and propose a specific ways to overcome those obstacles. Implementation involved so many factors and the implementers are very important to be discussed to ensure the successful implementation of a policy.

The "people issues" may be endemic to any policy implementation and it's an issue to be discussed and it is crucial to realize as a condition for successful CPTED implementation by KLCH. The issue with the implementing agency has been focused for decades. The accurate characteristic of implementing agency needs to be considered in developing the program for the implementation. Organization and implementers are the core factor in transforming the policy into action and its importance cannot be disputed. Meter and Horn described the three elements of the implementers' response may affect their ability and willingness to carry out the policy are (1) their recognition which consisted of comprehension and understanding of the policy, (2) direction of their response,(3) and intensity of that response. All elements mentioned will lead to the successful implementation and are linked to each other in accord to their model. The characteristics of implementing agencies and the implementers may have an effect on the effective implementation. Policymakers and program implementers also often have limited understanding of how broader policies might help overcome service delivery obstacles.

RESEARCH METHODOLOGY

The research employed a case study method using a mixed method approach in investigating the level of awareness of the CPTED program among the policy implementers in the local authority. This study was conducted in Kuala Lumpur City Hall (KLCH) which is the largest local authority in Malaysia. There are three types of data collection techniques administrated. First, a questionnaire survey method that is followed by In Depth Interview. Another method used in this study is the content analysis of the relevant official documents.

The questionnaire survey technique is consistent with Bell (1996) where he explained that the most obvious way to measure the level of thinking, behavior, emotions and human behavior is to ask questions about what they feel, think, do and done. It was also agreed by Shuhana (1997) in which according to her, Canter (1977) has stated that the easiest way to explore human responses and reactions in a place is to ask questions so they can explain it. In this research, the questionnaire was designed using a Likert scale and a Thurstone scale as a measurement. Meanwhile the in depth interview was used

because the information received from an individual is very valuable and highly valued. The main objective in this data collection process is to see the awareness of the top management on the implementer's awareness in implementing the CPTED. In this study, three top management officers that function as decision maker were interviewed using a semi-structured interview schedule. The in depth interview method was conducted in its natural setting where the researcher seeks to listen to participants and build a picture based on their experiences and perceptions. In other words qualitative study allows for in depth analysis of comments and perceptions of individual involved in implementing the CPTED.

A total of 11 out of 25 departments which involved in KL development were selected to be involved in the survey. The departments are; (1) Economic Planning and Development Coordination Department, (2) Master plan Department, (3) Urban Planning Department, (4) Public Works, (5) Urban Transportation Department, (6) Drainage & River Management Department, (7) Architect Department, (8) Quantity Surveying Department, (9) Mechanical Engineering Department, (10) Urban Design & Building Department and (11) Landscaping and Urban Cleaning Control Department. The choice of selecting the respondents in each department is based on their technical background and their involvement with KL developments. They are divided into two groups. The first group is Top Level Management in KLCH that comprised of three Head of Departments and function as a decision maker in the organization and involved directly with the CPTED policy and implementation. Meanwhile the second group is Professional and Implementers group. This group consists of officers and staffs whose starting grade is 48 to grade 11. All the implementers mentioned above are either the officer at top management level or the technicians that are fully involved with the development of Kuala Lumpur. Two main criteria were listed to decide on the CPTED implementers to be the surveys which are (1) department function and scope of work in development, (2) staffs' function and scope of work in development. Those KLCH staff whose duties are as a decision maker and implementers will be automatically identified as a potential respondent. A staff name list, grade designation and employment are carefully created from the total of 11 departments. The result calculated is an 867 staffs whose roles are as CPTED implementers in KLCH. The sampling technique is based on purposive sampling method. This technique is chosen based on certain criteria of selected respondents in KLCH and this sampling technique should be used when the researcher has a judgment with a specific purpose in mind and use it in selecting the initial samples. The sampling technique used is a purposive sampling method. This technique is chosen based on certain criteria of selected respondents in KLCH and this sampling technique should be used when the researcher has a judgment with a

specific purpose in mind and use it in selecting the initial samples. A sample size of 361 out of this total of 867 respondents that was identified as CPTED implementers was then obtained as respondents.

A mixed method approach was employed to analyse the data with the quantitative approach used as a predominant method due to statistical data being used as a measurement to achieve the aim of this study. The technique was selected because it is a numeric and data often associated with accuracy. A few tests were used based on the aims and types of data collected. The quantitative analysis was conducted using the statistical test such as descriptive analysis and inferential statistics. Meanwhile Pearson Chi Square, Cramer V, Spearman Correlation analysis was selected to seek for awareness level and Multi Respond test was used to determine the level of CPTED.

FINDINGS

Respondent's profile

A total of 867 respondents in this study was working in KLCH and involved in urban development of Kuala Lumpur. To support the obtained quantitative data, three staffs from the top level were interviewed in collecting the qualitative data. The background of survey respondents included their working position, status, working group, grade, gender, age, educational background, working experience and scope of work. Fig.3 shows the percentage of staff's position in KLCH organization and the importance of their roles i.e. technician 29%, Assistant Architect 20% and Technical Assistant 14% which dominated the total of implementers in KLCH. It is very important to seek their awareness in CPTED understanding and implementation because they are the main group of implementers for this policy. From the findings, the management can determine which group to focus on training of CPTED implementation.

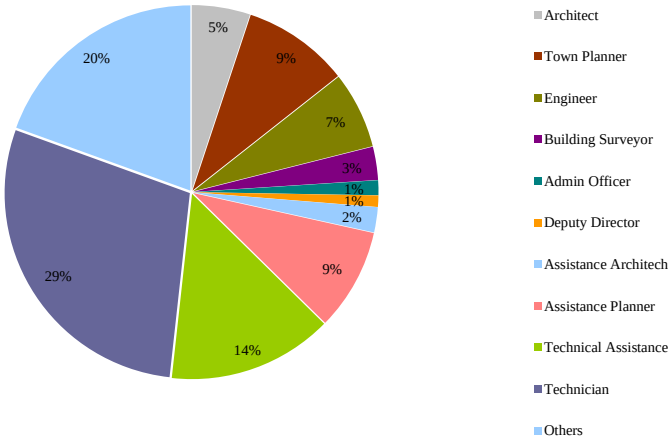

Figure 3. Implementers Position in KLCH

Source : Field Work, 2012

The second part of the demographics survey is more focusing on the education background, working experience and current scope of works. The working experience in the current scope of work it will reflect on the staff skills and ability in the CPTED implementation. This study discovers that most of the implementers are well-educated with 33.9% are degree holder which accumulates 108 people. Staffs with diploma and certificate holder were 26.6% (85 people) and 22.9% (N=73) as shown in Fig.4. Implementers with technical background play a major role in ensuring the CPTED policy implemented accordingly for urban development in Kuala Lumpur.

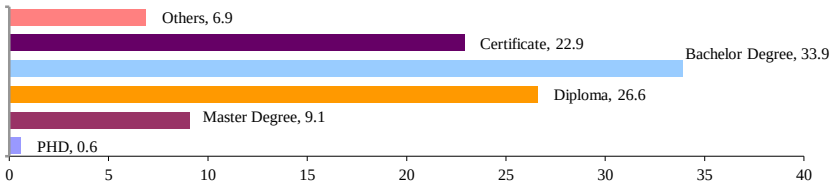

Figure 4.Implementers Educational Background in KLCH

Sources : Field Work, 2012

There are two groups of respondents, which are the technical and non-technical staff. Most of the respondents that involved in this survey have worked in KLCH more than 20 years that cover the 30% (N = 96) from the total

respondents. It is followed by those that have been working in KLCH for 1 – 5 years with 27.8% (N = 89). But yet those experience staff still dominated the function as implementers with 18.8% for 6-10 years, 11.6% for 11-15 years and 11.9% for 16-20 years working experience. The technical scope of work totally dominated by the male with 65.9% (N=211) compared with female which only 34.1% (N=109). Moving on, one of the last questions queried their scope of work. 17.8% of the respondents were involved in building inspection scope of work. The most important stage in implementing the CPTED is in the evaluation of development proposals in which 80 people. 25.4% staffs were involved in this stage. 29.7% were involved in project implementation and others were involved as a policy and decision maker. It was assumed that respondents were majority of technical and educated background with long experience working in KLCH and were the implementers of CPTED policy for urban development in Kuala Lumpur.

Level of awareness

Awareness of the actual year of the Safe City and CPTED implementation is less than 20% with only 14.1% (N= 36) from 255 staff and only 15.6% (N=29) from186 staff aware of the actual year of the Safe City Program and CPTED implementation by the government and KLCH which both program has started simultaneously in year 2004 (Fig. 5).

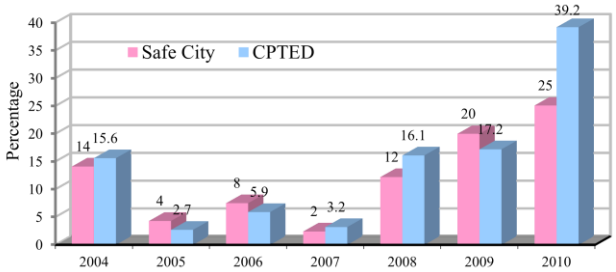

Figure 5.Implementation of Safe City and CPTED by KLCH

Sources : Field Work, 2012

A Chi-Square test was tested and discovered that both awareness of year of Safe City Implementation and year of CPTED implementation was significantly related, $\chi^2 = 77.555^a$, $p < .05$, $p = .000$. The finding shows that the value of $p < .05$, with more than half of the implementers with 79.2% answering 2010 as a year of Safe City and CPTED implementation followed by 2004 with 63% and 2009 with 44.7%. Meanwhile the Cramer V measures the degree of the relationship and found that the awareness of year of Safe City

implementation had a less significant relationship (V = 0.525) to the year of CPTED implementation.

On the second finding of awareness factor, another two questions were asked in order to seek the awareness of the CPTED implementation by the KLCH. Both questions are referring to the same answers expected by the researcher and the answer to both questions should be of no significant difference. The finding on this matter discovered that a huge gap as shown in Fig.6 for both similar questions. The differences either for "Yes" or "No" answer for both similar questions are 23.1% and 14.1% (Fig 6).

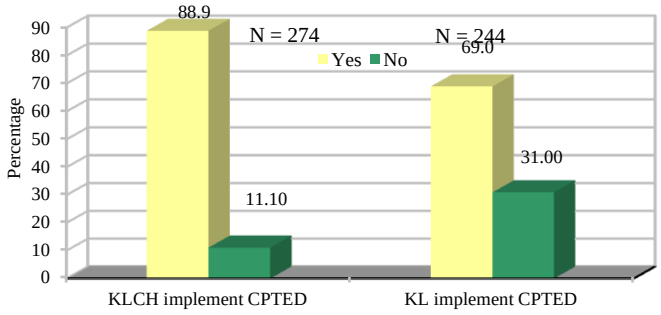

Figure 6.Awareness on CPTED implementation in Kuala Lumpur
Sources : Field Work, 2012

The relationship between both items, between the awareness of Safe City Implementation and CPTED Implementation was intended to strengthen the result and findings on the level of implementer's awareness. This is because the CPTED program is a more detailed program that outlines how the Safe City Program can be implemented. Hence, awareness of the Safe City Program will mean that the respondents will also be aware of CPTED. Both programs were implemented by the government simultaneously in the year 2004. By employing the correlation, it will increase the reliability and the validity of the findings and the result.

Data obtained show that the majority of implementers agrees that CPTED has been implemented by KLCH in Kuala Lumpur. The increment on awareness of CPTED implementation is reflected from the promotion by the JPPD since 2010 and yet in the year 2008 CPTED has become a policy in DKLCP 2020.

A significant correlation was observed between both awareness of CPTED implementation in Kuala Lumpur and CPTED implementation by

KLCH, $\chi^2 = 26.222^a$, $p < .05$, $p = .000$. The finding shows that the value of $p <. 05$, with more than half of the implementers with 157 of them respond on the positive value of "yes" for both implementations. The Cramer V readings found that the awareness of CPTED implementation in Kuala Lumpur had a less significant relationship (V = 0.335) to the CPTED implementation by the KLCH.

Most of the implementers answered that the year of both program implementations were 2009 and 2010 and these represent the highest percentage rate in total. Promotion of Safe City and CPTED implementation was carried out on a large scale that began in 2009 after the government makes the crime prevention aspect as NKRA and become the focus in the GTP. In 2008 the Draft Kuala Lumpur City Plan 2020 has made CPTED as a policy to be followed and implemented. All these factors contributed to the awareness of both programs. Their awareness on both program implementations did improve where the momentum is picking up year by year starting from 2008 to 2010. If there is a higher level of awareness among implementers, they may diligently implement whatever instructions given by the organization. In addition to costs and benefits the nature of policy affects their knowledge base and level of the participant as implementers.

The implementer's post has a relationship on awareness as have been discovered in this study. The finding shows that the value of $p <.05$, with majority of them comes from the subordinate's level with 67.8%. As shown in Table 6.5, implementers post was significantly related to awareness on the CPTED implementation in Kuala Lumpur, $\chi^2 = 19.260^a$, $p <.05$, $p = .037$. Implementer's post had a less significant relationship (V = 0.282) as a factor of successful implementation of CPTED.

Table I shows the percentage of officers who are aware of the actual implementation of CPTED by DBKL. Lack of promotion of the needs and interests in the implementation of CPTED affects the level of awareness of officers in KLCH. From the Fig. 5, it can be seen that the level of awareness began to rise after 2009 in which the government has embarked on the implementation of the Safe City program and massive CPTED implementation. The instruction on CPTED implementation in 2009 also comes with comprehensive CPTED guidelines in order to ensure that the implementers are conversant with the right method of CPTED implementation.

Table 1: Percentage of awareness on CPTED implementation by KLCH

Post	N	KLCH Officer
Architect	13	0%
Planner	27	11%
Engineer	17	17.6%
Building Surveyor	7	28%
Admin Officer	2	100%
Deputy Head of Department	2	0%

The survey from qualitative data discovers that all officers are not aware of CPTED implementation but they are aware of the Safe City program. They assume that the Safe City program just started a few years back. A survey using an informal interview with other implements also found that all of them not aware and even never heard the CPTED term. The process of the successful implementation by the KLCH implements is disrupted when there is a loophole on awareness of CPTED. Without an awareness or knowledge of an issue, policy champions may find it difficult to further their cause as mention by [26] . As stated by [25] in his study of the attitudes of the implementing organization and staff, he discovered that the implementation of Citizen Charter in Upazila Land Office was unsuccessful due to the implementers not having sufficient knowledge about their Citizen Charter. It is important to put awareness of CPTED concept, knowledge and implementation of the implementers including top level management as a main factor in assuring a successful of CPTED. Followed by good communication, coordination and cooperation with all levels and having capable and skilled implementers with enough of resources and monitored regularly.

CONCLUSION

In conclusion, the data suggested that the level of awareness of KLCH implementers of CPTED implementation is low, less than 40% in the year 2004. Their awareness started to rise up starting from the year 2008 as CPTED has become one of the policies in the Draft Kuala Lumpur City Plan 2020 and the percentage soared in 2010 due to the massive promotion of the Safe City program and CPTED. Despite the increase in the awareness of CPTED, the percentage on the level of awareness is still low at only 39%. The lack of awareness on CPTED is due to the limited knowledge and poor understanding of CPTED concept and implementation, lack of promotion of the needs and interests in the implementation of CPTED. The level of awareness began to rise after 2009 in which the government has embarked on the implementation of the

Safe City program that comes with comprehensive CPTED guidelines. A significant correlation was observed between both awareness of CPTED implementation in Kuala Lumpur and CPTED implementation by KLCH. Although the implements post was significantly related to the awareness of the CPTED implementation it had a less significant relationship as a factor of successful implementation of CPTED. The awareness of year of Safe City Implementation and year of CPTED implementation was significantly related although the relationship is not significantly strong

A conclusion made by the researchers is that the level of awareness of CPTED by KLCH implementers is still low. However the existence of unawareness and less successful implementation cannot be regarded as a failure of the implementers group only. As stated by [23] and [25] in which the organization and staffs are a key factor in the successful implementation award of a policy. The successfulness of CPTED implementation in Kuala Lumpur, a good collaboration between the administrative organizations and the implementers group in the KLCH are one of the main key factors in achieving a World Class City on the safety aspects. Evidence suggested that the impact and extent of CPTED is recently seen in terms of synergies between urban sustainability and CPTED [4]. It is claimed that the CPTED and other approaches may lead to the appearance of a 'sustainable urban environment' and a safer urban landscape that will create more liveable and healthy communities. As mentioned earlier, the CPTED strategies that are employed at the early stage of development would make it cheaper on the operational costs rather than be employed at later stages. It is the most costs effective for the tackling of crime in urban environment.

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SUSTAINABLE FOREST MANAGEMENT IN LOWER KINABATANGAN, SABAH: ISSUES AND CURRENT PRACTICES

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Abstract

Since 1992, when the first United Nations' Earth Summit was held in Rio de Janeiro, sustainable forest management (SFM) has been increasingly used to maintain a balance between social, economic and environmental development. In line with this, the successful implementation of SFM depends in large measure on the involvement of all the stakeholders. However, in the Lower Kinabatangan area, not all the stakeholders, especially the local community, are involved in the decision making process when it comes to forest management. The primary objective of this research is to explore the views of the three major stakeholders (Government, Private Sector and Local Community) with regard to issues concerning the environment, the current methods of forest management and the factors that are having an impact on SFM in Lower Kinabatangan. The quantitative method was used in this research and the data was obtained through questionnaires which were distributed to a stratified sample of the target population of stakeholders. Of the 160 questionnaires that were distributed, 115 or 56% of them were returned. The data analysis revealed some similarities and differences in the viewpoints of the stakeholders. It was found from this research that the majority of the respondents were in favour of improving forest management as a way to solve the environmental issues that have arisen in Lower Kinabatangan.

Keywords: sustainable forest management, environmental conservation, sustainable agriculture

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INTRODUCTION

The forest is rich in natural resources and many people living in the rural areas in developing countries depend heavily on these resources for their economic and social development (Kohm & Franklin, 1997). An estimated 60 million natives rely on the forests. This means that 350 million people subsist on and derive their earnings from forest resources, while 1.2 billion people are involved in agroforestry farming (World Bank, 2006). For this reason, it is acknowledged that forests can be the answer to the eradication of poverty. However, the FAO (2001) reported that forests in the tropical regions of the world have been decreasing at an alarming rate of 9.2 million hectares (0.52%) annually from 1990 to 2000. This on-going decline of tropical forests worldwide has become an important topic of discussion among both developed and developing countries. As such, it is the general consensus that if the brakes are to be put on the current destruction of tropical forests, then it is essential that the concept of sustainable forest management (SFM) be sanctioned (Cissel *et al.*, 1994). In line with the policy debates that have been held globally, such as the Rio Declaration and Forest Principles in 1992, many countries have gradually changed their definition of SFM from one that concentrates on maintaining timber production to one that includes the economic, environmental and social dimensions of forest management (Cissel *et al.*, 1994). Beside, according to Halimaton Saadiah et al (2011), SFM can be achieving by integrated land use planning, conservation and development through the Geopark concept. Geopark concept, developed by the Global Geopark Network (GGN), and endorsed by the United Nations Economic and Cultural Organisation (UNESCO), is a concept which conserves natural and cultural heritage while enhancing socio-economic development for the sustainable wellbeing of the local population. Conservation through tourism also becomes important element for achieving the SFM. According to Ong Puay Liu and Sharina (2011), tourism is a commercial enterprise, it has an important role in ensuring the natural environment well-protected, and local communities' cultural traditions safeguarded.

This research presents the results of an analysis that was carried out on the incentives for achieving sustainable forest management and an assessment of several challenges and contentious issues concerning the main stages of sustainable forest management in a case study of Lower Kinabatangan, Sabah, Malaysia.

PROBLEM STATEMENT

Sabah has the largest acreage of oil palm plantations in Malaysia and has been a major contributor to the economic development of the country (Hoh & Ishak, 2001). The total area under oil palm in Sabah has risen to 1.4 million hectares and 5.3 million tons of crude palm oil came from this state in 2010. The palm oil industry is a major sector in the state's economy and it plays an influential role in the international edible oils market. At present, palm oil is the largest contributor to the economy of Sabah. In view of this, the growing concern among policy makers and the public that the biofuel policies in Malaysia may eventually lead to the rainforests in Sabah being replaced by oil palm plantations is logical. Such a result would damage the promotion of the environmental benefits of biofuels and destroy the ecology, with subsequent impacts on the economy and society. Over the past few years the focus has mainly been on the effects of replacing the forests with oil palm, but little is known about the increasing depletion of forests due to biofuel production (Hoh & Ishak, 2001).

In a recent report authorized by the government of the United Kingdom, it was revealed that the shift in demand from agricultural produce to biofuels is causing rapid changes in the usage of land, and if this persists the biodiversity will be reduced and it may even result in increased GHG emissions instead of a reduction (Gallagher and Patrick-Riley, 1989). From 1990 to 2005, more than 50% of the expansion of oil palm plantations in Sabah occurred through the clearance of forests (Koh & Wilcove, 2007). However, several changes were implemented in 1997. It was apparent from the on-going destruction of the forests in Sabah that the amendments to the Forest Enactment in 1984 had failed to preserve the forests and to provide better forest management. The state government changed its policy and instead of short-term licences, long-term licences were issued, such as the Sustainable Forest Management License Agreement (SFMLA), so as to foster more efficient forest management (Sabah Forestry Department, 1998). The aim is to preserve what remains of the forests and to maintain them in a sustainable manner so as to efficiently manage the production of timber for the long term and to protect the environment. The conditions imposed for the issuance of the licences are based on a model forest project in the Deramakot Forest Reserve, which is run by the SFD within the FMU. The Forest Stewardship Council (FSC) has certified that this project has met its principles and criteria for a well-managed project (Sabah Forestry Department, 2007a). Mannan and Yahya (1997) have identified several factors that have caused the widespread destruction of forests in Sabah, such as harvesting faster than the forest is able to regenerate; premature "entry" or "re-logging" which do not give forests a chance to recover after logging activities;

bad logging methods that cause damage to residual stands; neglect of silviculture and forest rehabilitation; monetary gain prevailing over environmental restrictions; political changes and instability, and the inability of forestry experts to put pressure on powerful groups. From 1975 to 1995, the area of primary forest cover shrank from an estimated 2.8 million hectares to approximately 300,000 hectares (Mannan & Yahya, 1997) and during that same period, the area of disturbed forests almost doubled. Mannan and Yahya (1997) observed that the most drastic change occurred in the primary forests under the Class II Production Forest category, where the cover was reduced from 98% in 1970 to a mere 15% in 1996. At the same time, the first major change in forest laws took place when the Forest Enactment of 1968 was revised in 1984. This revision resulted in the division of forest reserves into seven classes, the re-gazetting of all existing forest reserves to include these new classes, and the gazetting of new reserves. For example, the Deramakot Forest Reserve has been classified as the Deramakot Forest Reserve, and this change indicated that forest reserves, especially those in the Class II Commercial Forest category, could no longer be reclassified within the Sabah Forest Department but that the reclassification had to be approved by the State Cabinet and the Governor of Sabah (Sabah Forestry Department, 2007a). According to Payne (1997), the advancing disappearance and destruction of tropical rainforests in Lower Kinabatangan, Sabah, Malaysia is a major threat to the environment. Lower Kinabatangan, which is the largest and most important wetland in Sabah, Malaysia, is made up of various types of forests such as freshwater swamp forests, secondary dry land forest, limestone outcrops and lakes (WWF Malaysia, 2004). A century ago the Lower Kinabatangan was practically covered by forests but today these forests have had to make way for agriculture and the few remaining forests have been badly damaged (WWF Malaysia, 2005). On the whole, these problems have brought to the surface the weaknesses that existed in the previous concepts, planning and implementation of forest management in Sabah, such as inadequate cooperation and coordination among the various government extension agencies; lack of prioritization, commitment and support for forest management projects from stakeholders; absence of community participation, meaning that the various communities were left out of the planning and decision making process for forest management, and were not given enough information regarding the aims and objectives of forest management; poor communication due to cultural differences between extension personnel and communities; disunity and internal problems within resettled villages, for example, land and border conflicts and complete reliance on financial aid from the government (Mannan & Yahya, 1997). In addition, some environmentalists claim that unless serious measures are taken to implement sustainable forest management, 98% of the rainforests in Indonesia and Malaysia will have disappeared in 15 years' time.

RESEARCH OBJECTIVES

This research investigates the management of forests particularly with regard to the conversion of forests for agricultural use, the current forest management system and the sustainable forest management process in Lower Kinabatangan based on the views of the three major stakeholders (Government, Private Sector and Local Community).

The objectives of this research are as follows:

i. To explore the views of the three major stakeholders (Government, Private Sector and Local Community) concerning the environmental issues affecting the Lower Kinabatangan area.
ii. To examine the views of the three major stakeholders (Government, Private Sector and Local Community) concerning the current forest management practices in the Lower Kinabatangan area.

METHODOLOGY

The data for this research was collected through quantitative methods during a field survey in Lower Kinabatangan, Sabah. The primary data was obtained through the distribution of questionnaires and interviews of stakeholders, while the secondary data was obtained from the appropriate documents concerning the case study such as reports, plans and brochures. During trips to the case study area, observations were made at several important meetings, gatherings and workshops and notes were taken to be used as additional or secondary data. Various types of data were obtained from previous researches, government departments, universities and NGO offices such as maps (showing Kinabatangan, Sabah; the forest distribution in Malaysia; the land use in Lower Kinabatangan; and changes in forest cover in the world) and statistical data (on types of forests in Sabah and Lower Kinabatangan; on changes in forest cover in Sabah, Malaysia; and on fragmented land in Lower Kinabatangan due to the development of oil palm plantations). The data was obtained mainly from newspapers, dissertations, annual reports, journal articles, policies, legal documents and statistics. Data was also gathered from the Sabah Forestry Department (SFD), Sabah Wildlife Department (SWD), Kinabatangan District Office, HUTAN-French WWF, PACOS TRUST, Partners for Wetlands (Malaysia WWF), Sabah Town and Regional Planning Department, Sabah State Library HQ and branches, Environmental Conservation Department, University of Malaysia Sabah, and the Sabah Branch of the WWF.

This research made use of the Probability Sampling method, specifically the Stratified Random Sampling method, due to the homogeneity of the population. Furthermore, in this method each member of the population (subdivision) has an equal chance of being selected and thus the final result is truly representative of the whole population. Stratified random sampling is a sampling method in which a population is divided into ***L*** (strata) mutually exclusive and exhaustive strata, and a simple random sample of ***n*** elements is taken within each stratum n_h. The sampling is then performed independently within each stratum (Yamane, 1967). According to Yamane (1967), a stratified random sample is obtained the same way as a simple random sample, but the sampling is done separately and independently within each stratum. If $N_1, N_2,...,N_L$ represent the number of sampling units within each stratum, and $n_1,n_2,...,n_L$ represent the number of randomly selected elements within each stratum, then the total number of possible stratified random samples is (N_1/n_1) x (N_2/n_2) x...x $N_L/n_L)$ which is less than or equal to (N/n), the number of possible samples based on simple random sampling (Yamane, 1967). Yamane (1967) also stated that stratified random sampling has many advantages. It is as uncomplicated as simple random sampling and yet, in many cases, it is more reliable. It is also a convenient method for obtaining individual approximations for parameters for each subdivision in which the size of the sample is fixed and is not some arbitrary variable. Finally, this method ensures that the sample is typical of the population. The sample size was determined as follows according to the stratified random sampling method (Yamane 1967):

First, the population was divided into a set of smaller non-overlapping sub-groups (strata), and then a simple random sampling was performed independently in each sub-group (stratum). Normally, the size of the sample in each stratum is proportionate to the size of the stratum. This is known proportional allocation. There were three sub-groups or strata for this study.

Strata	**Population (Size)**
Strata 1 (Government Group)	N_1 105
Strata 2 (Private Sector Group)	N_2 80
Strata 3 (Local Community Group)	N_3 98
Total	**283**

For this study, 160 samples were obtained and divided into the above strata categories. The first step involved finding the total number of samples, ***N*** (283), and calculating the percentage in each group.

- % N1 = 105 / 283 = 37%
- % N2 = 80 / 283 = 28%
- % N3 = 98 / 283 = 35%

Thus, out of 160 samples,

- 37% should be N_1.
- 28% should be N_2.
- 35% should be N_3.

→

- 37% of 160 is 59.
- 28% of 160 is 45.
- 35% of 160 is 56.

Another simple way to do this without calculating the percentage is to multiply each group size with the sample size and divide that by the total population size (size of whole population or group):

- n_1 = 105x160/283, so n_1 = 59
- n_2 = 80x160/283, so n_2 = 45
- n_3 = 98x160/283, so n_3 = 56

The sample size was determined as follows by using the stratified random sampling approach (Yamane 1967):
n = N/[1+N (e2)]

where n = sample size, N = population size, e = error of estimation; the confidence level is at 95% and the error margin is at 5%. The sample size was calculated as:

$$n = \frac{283}{(283 \times 0.05)^2 + 1} = 160$$

Strata	Population (N)	Sample size (n)
Strata 1 (Government Group)	N_1 105	n_1 = 59
Strata 2 (Private Sector Group)	N_2 80	n_2 = 45
Strata 3 (Local Community Group)	N_3 98	n_3 = 56
Total	283	160

In this study, 283 questionnaires were distributed to the three different groups of respondents via email and "face to face" interviews. Of that number, 160 questionnaires (56%) were returned, of which 45 were rejected and only 115 (GG=48, PSG=35 and LCG=32) could be used. Therefore, on the whole, the sample size for the current study was only 40.6% or 115 respondents out of a population of 283. Generally, a researcher will not do a factor analysis on a sample size of less than 50 and ideally a sample size of 100 or more is required (Bartlett, Kotrlik, and Higgins (2001). In quantitative data analysis methods, software packages such as Microsoft Excel and SPSS 12.0 are used to prepare graphs and for statistical analysis of the data. Different statistical and economic analyses were applied to the quantitative data in order to achieve the objectives of this study. First, simple descriptive statistics (such as the mean, standard deviation, etc.,) were calculated to determine the main characteristics of

respondents and the values of some parameters of interest in relation to the SFM practices in the area under study. The data from the questionnaires were keyed into a Microsoft Excel file and the SPSS software program, which is normally used for social science studies, was used to perform a statistical analysis of the data. Descriptive statistics such as simple mean responses and F-tests were employed for the analysis. An analysis of Variance (ANOVA) test was used to generally examine the perceptions, understandings and beliefs of the various groups of respondents with regard to sustainable forest management practices in the study area. When the significance level $p \leq 0.05$, the results are said to be significant.

RESULTS AND DISCUSSION

The answer to the first and second objectives of this research will come from the results of the questionnaire. The details in this section were based on a field survey of 115 respondents in the Lower Kinabatangan. The respondents were divided into three categories, the Government (G) (n=48), the Private Sector (PS) (n=35) and the Local Community Group (LC) (n=32). These sections were concerned with the viewpoints of the main stakeholders (G, PS and LC) with regard to the impact of environmental issues on the Lower Kinabatangan and also the current forest management practices in the Lower Kinabatangan area.

Perceptions and Attitudes of Respondents towards Environmental Issues

This section is concerning the first objective of this research regarding the perception of the three main stakeholders towards the environmental issues in the research area. In terms of environmental issues, the results indicate that the main concerns of all the respondents from the Government, Private Sector and Local Community are floods (10.24%, 7.68% and 17.07%) and water pollution (16.56%, 13.70% and 4.36%) , while wildlife conservation is their fourth concern in the Lower Kinabatangan (Figure 1). On the whole, all the respondents shared similar views on these issues.

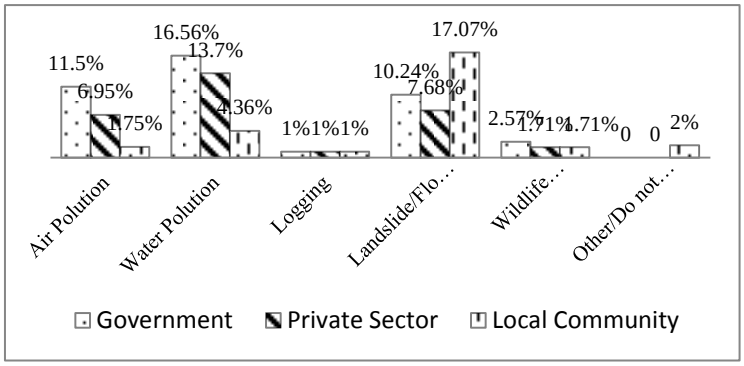

Figure 1: Ranking of environmental problems in Lower Kinabatangan (n=115)

In this section, to determine the awareness of the people with regard to environmental issues, the attitudes or perceptions of the respondents towards the protection of sustainable forest resources were examined further. A list of attitudinal statements concerning sustainable forest resources and their protection was given to the respondents and they were then asked to indicate whether they agreed or disagreed with each statement. The overall result showed that the respondents responded very positively towards the conservation of natural resources (Table 1).

Table 1: Attitudinal Statements on protection of forest resources and the percentage of respondents who agreed and disagreed with each statement (n-115)

		Strongly Agree (%)	Agree (%)	No Opinion (%)	Disagree (%)	Strongly Disagree (%)
It is our responsibility to protect the environment from development (regardless of the cost)	*Government*	11.14	21.72	1.76	4.54	2.4
	Private Sector	0.0	22.59	1.76	4.54	1.6
	Local Community	6.57	8.69	11.47	1.0	0.0
We should reduce our use of the environment now so that the next generation may benefit from it.	*Government*	24.26	17.37	0.0	0.0	0.0
	Private Sector	3.46	21.72	2.5	2.0	1.0
	Local Community	11.26	13.90	2.5	0.0	0.0
Malaysia needs to develop the forests, seas, and land to	*Government*	7.94	13.28	0.0	18.0	2.53
	Private Sector	5.29	15.05	1.0	6.58	1.69

create jobs and incomes (regardless of the environmental damage)	*Local Community*	1.76	1.77	0.0	17.14	6.76
Even though I don't use the forest resources now, I am prepared to pay to protect them in case I want to use them in the future	*Government*	0.0	19.03	0.0	22.38	0.0
	Private Sector	2.0	17.30	0.0	11.18	0.0
	Local Community	0.0	8.65	7.82	9.46	2.0
It is worth spending money to protect the forests because they help to protect the sustainable ecosystem in the area	*Government*	2.64	39.29	0.0	0.0	0.0
	Private Sector	3.53	13.29	5.0	5.83	3.0
	Local Community	8.82	9.61	5.0	4.16	0.0

Respondents' Perception on Willingness to pay (WTP) for Sustainable Forest Management

On the whole, 58 respondents (50.43%) indicated a positive willingness to pay (WTP) for the conservation of the forest resources in Lower Kinabatangan, while 57 of them (49.57%) responded negatively and refused to answer the WTP question (see Figure 2(a) and Figure 2(b).

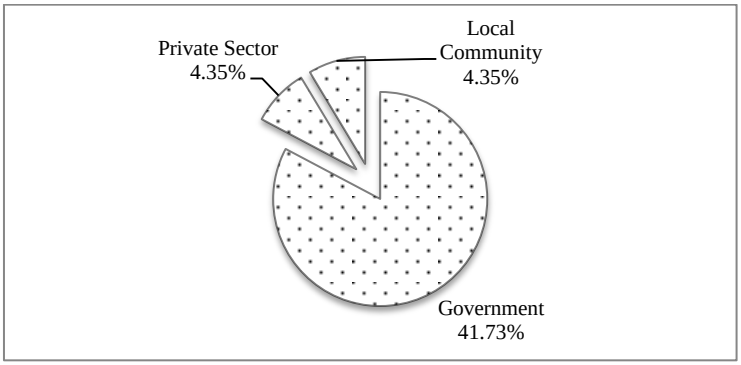

Figure 2(a). Summary of "Yes" responses to the willingness to pay question (n=58)

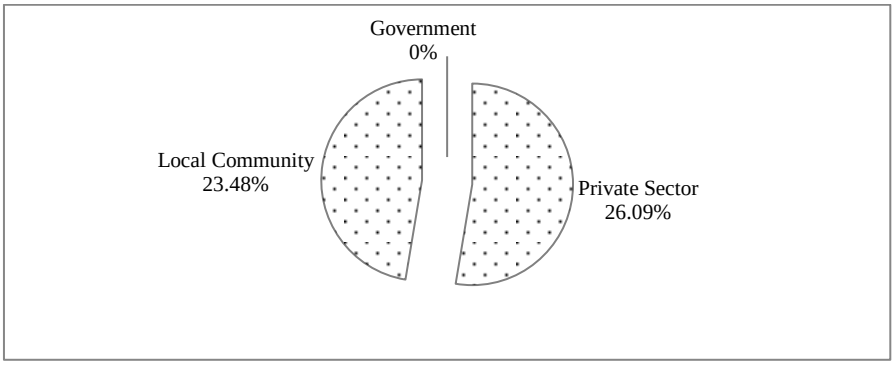

Figure 2(b). Summary of "No" responses to the willingness to pay question (n=57)

The respondents gave slightly different reasons for what motivated or encouraged them to pay more. A summary of the various motivations to pay for the conservation of forest resources and biodiversity are presented in Figure 3. A concern over the depletion of the forest and the related sustainable ecology seems to be the most common motivation.

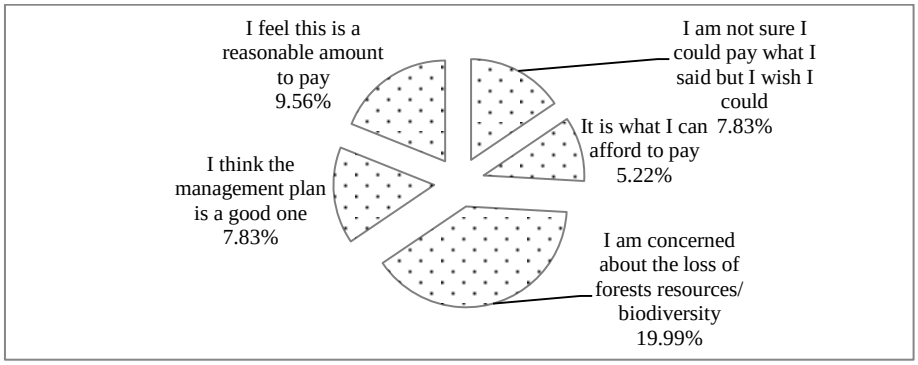

Figure 3: Reasons why respondents are willing to pay to protect the forest resources of Lower Kinabatangan (n=58)

In addition, those respondents who refused to pay more or were unwilling to pay at all were asked to state their personal reasons for refusing to contribute to the conservation of the forest resources in Lower Kinabatangan. In this section, the reasons for the reluctance to pay can be placed into seven categories. The results in Figure 5.4 show that the respondents believe that the users, i.e. the tourists who visit the Lower Kinabatangan to view the nature and the wildlife, should be made to pay more for the conservation of the forest resources. Besides that, most of the local residents were of the opinion that it is the responsibility of the government to protect the forest so as to maintain the

ecosystem of the Lower Kinabatangan. The motivations or reasons for the unwillingness to pay for the protection of the forest resources and biodiversity of Lower Kinabatangan are classified in Figure 4.

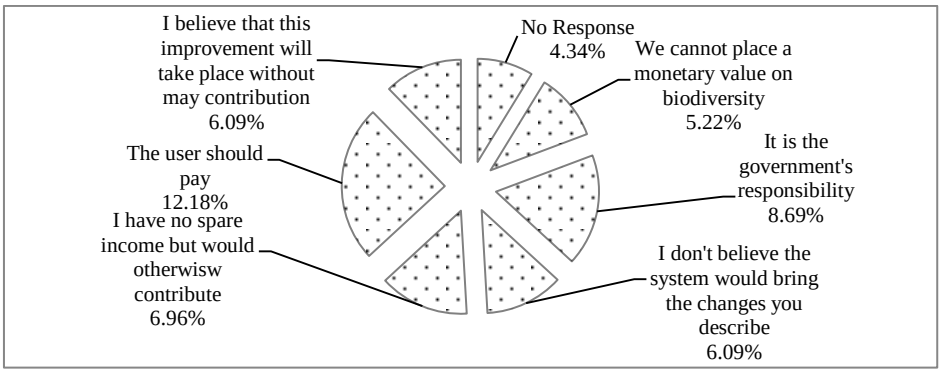

Figure 4: Reasons why respondents are not willing to pay to protect the forest resources of Lower Kinabatangan (n=57)

On being asked how much more they were willing to pay, 45.0% of the respondents said that an acceptable sum would be something between RM2 and RM5, while 41.7% said they would prefer to pay less than RM2. Nevertheless, 13.2% of them were prepared to pay more than RM5.

Respondents' Perceptions towards Current Forest Management Practices in Lower Kinabatangan

The results in this section will answer the second objective of this study. There are various views or perceptions as to whether the management of forest resources in Lower Kinabatangan satisfies the requirements for sustainability. In this regard, instead of being managed, the forest resources in Lower Kinabatangan have been exploited, and this on-going exploitation has become a major obstacle to the achievement of sustainable forest management. In order to explore the perception of respondents towards the sustainability or non-sustainability of the forest management practices in Lower Kinabatangan a series of questions with categorical and scale responses were provided. The results in Figure 5.5 indicate that 53% of the respondents, comprised of the Government (21.72%), the Private Sector (14.77%) and the Local Community (16.51%), were of the opinion that the current forest management practices were not sustainable. Nevertheless, 30% of them believed that forest management was sustainable while the remaining 17% thought that although the management of the forest was currently unsustainable, yet it could be improved if the right approach was used.

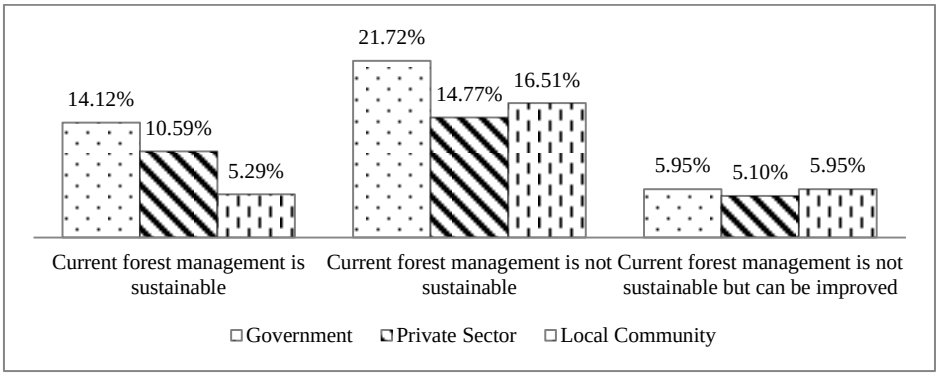

Figure 5: Response towards current forest management practices in Lower Kinabatangan

Respondents' Perceptions towards Efficiency and Success of Legislation and Forest Management in Lower Kinabatangan

This section presents the results concerning the respondents' views with regard to the efficiency of legislation and forest management in the Lower Kinabatangan area. To assess the perceptions of respondents to these matters, they were requested to indicate their level of agreement or disagreement on the success or efficiency of three key areas where success or failure has a profound impact on the forest management system in Lower Kinabatangan. The results in Figure 6 and Table 2(a) and Table 2(b) indicate that the respondents disagreed that current forest management and planning and also forest protection and strategies have been effective in sustaining forest management in Lower Kinabatangan. However, they agreed that forest legislations and policies can enhance forest sustainability in the study area.

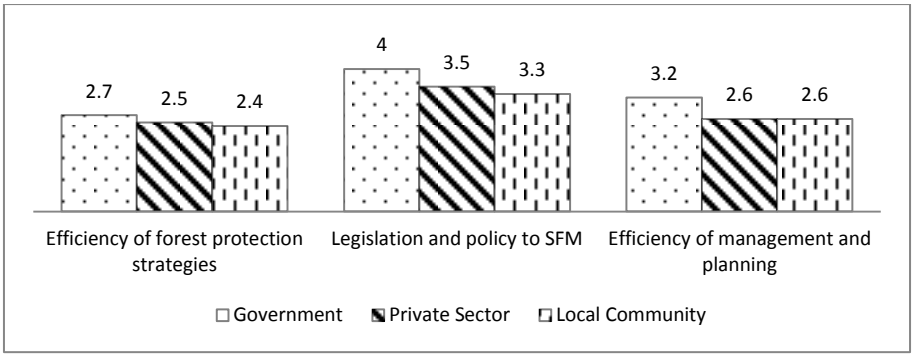

Figure 6: Response towards efficiency and success of legislation and forest management for sustainable forest management in Lower Kinabatangan (n=115)

An ANOVA test was also carried out to analyse whether there were any significant differences between the mean responses from all the respondents in the three groups. As shown in Table 2, the efficiency of current forest protection strategies in Lower Kinabatangan are not significant (p-value of 0.111) but the efficiency of forest management and planning (p-values of 0.000) and legislations and policies (p-values 0.001) for forest sustainability in Lower Kinabatangan are significant at α=0.05.

Table 2: Response towards efficiency and success of legislation and forest management for sustainable forest management in Lower Kinabatangan (n=115)

Mean response for each group						
Response on efficiency of forest legislation and management	Government (n = 48)	Private sector (n = 35)	Local community (n = 32)	Grand mean (n = 115)	F - value	p - value
Efficiency of forest management and planning	3.2	2.6	2.6	2.8	6.2	.001***
Efficiency of forest protection strategies	2.7	2.5	2.4	2.5	2.1	.111
Legislation and policy to SFM	4.0	3.5	3.3	3.6	11.2	.000***

5-Point Scale (1= strongly disagree; 3 = neither disagree nor agree; 5= strongly agree)
***Significant at 0.01

Respondents' Perceptions towards Factors Constraining the Progress of Forest Management in Lower Kinabatangan

These sections show the results concerning the perceptions of the respondents with regard to the constraints or obstacles to forest management in Lower Kinabatangan. In this context, to investigate what factors generally obstruct advancements toward forest management in Lower Kinabatangan all the respondents were asked to indicate their level of agreement or disagreement to a series of questions. Figure 7 indicates that the respondents agreed that all the issues concerning forest management, except the unsustainable use of forest resources (biodiversity), are factors that are blocking the attainment of sustainable forest management in Lower Kinabatangan. In addition, the results also indicate that all the respondents agreed that inefficient forest management, conversion of forests to other land uses and illegal land use activities were the

major blocks to sustainable forest management in Lower Kinabatangan and these issues should be given top priority.

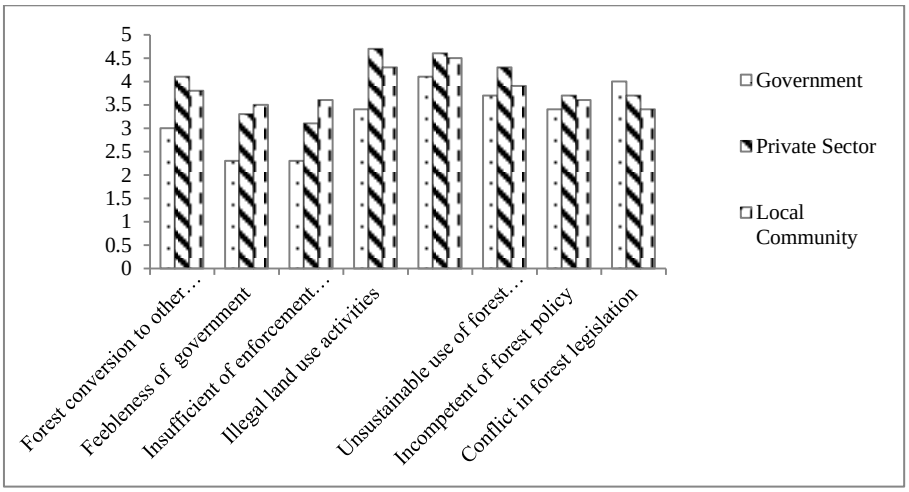

Figure 7: Response to factors constraining the forest sustainability process in Lower Kinabatangan (n=115)

Furthermore, an ANOVA test was carried out to determine whether there are any significant differences between the responses from the respondents in the three groups. As can be seen in Table 3, most of the factors were significant at α=0.05, with the exception of the unsustainable use of forest resources (biodiversity) in Lower Kinabatangan.

Table 3: Response to factors constraining the forest management process in Lower Kinabatangan (n=115)

Mean response for each group						
Response to constraints on forest management	Government (n = 48)	Private sector and NGOs (n = 35)	Local community (n = 32)	Grand mean (n = 115)	F - value	p - value
Forest conversion to other land uses	3.0	4.1	3.8	3.6	8.9	.001***
Feebleness of government	2.3	3.3	3.5	3.0	15.9	.000***

Insufficient enforcement of laws	2.3	3.1	3.6	3.0	14.2	.001***
Illegal land use activities	3.5	4.7	4.3	4.2	11.2	.001***
Incompetent forest management	4.1	4.6	4.5	4.4	3.1	.044**
Unsustainable use of forest resources	3.7	4.3	3.9	3.9	1.9	.112
Incompetent forest policy	3.4	3.7	3.6	3.6	1.4	.271
Conflict in forest legislation	4.0	3.7	3.4	3.7	11.2	.000***

***Significant at 0.01
5-Point Scale (1= strongly disagree; 3 = neither disagree nor agree; 5= strongly agree)

Respondents' Perceptions towards Sectors of Lower Kinabatangan Forestry That Require Reform

Sustainable forest management can be attained if all the sectors in the Lower Kinabatangan forestry contribute fully to the process of forest management. However, reforms must be instituted in some sectors that have been inefficient and ineffective so as to enhance the sustainability of the forest management. In order to determine which aspects of forestry in Lower Kinabatangan should be reformed so as to ensure that the sector makes the maximum contribution to sustainable forest management, the respondents were asked to indicate their level of agreement or disagreement for reforms in six areas of the forestry sector. The results in Figure 8 show that the respondents agreed that all areas in the forestry sector needed reforms but that among all these, reforms for better legislation, enforcement of laws and policies and forest management and planning strategies were the most important.

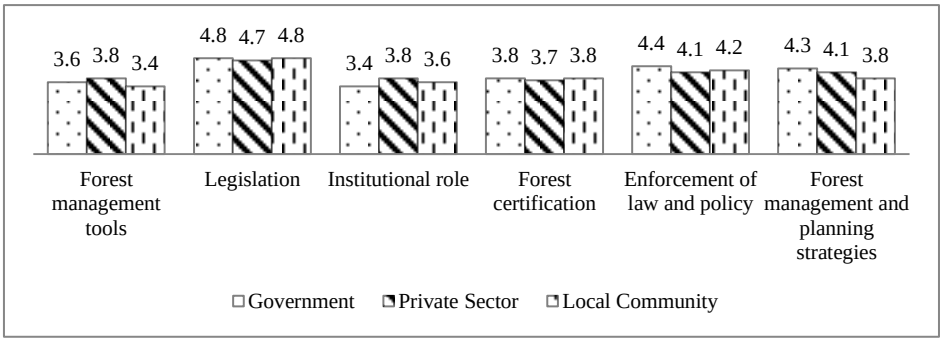

Figure 8: Response on sectors in Lower Kinabatangan forestry requiring reforms (n=115)

An ANOVA test was carried out to identify the differences in the mean responses from the respondents in the three groups. The results in Table 4 indicate that only institutional role reforms (p-value 0.041) and forest management and planning strategy reforms (p-value 0.018) were significant at α=0.05.

Table 4: Response on reforms required in the forest sector for achieving sustainable forest management in Lower Kinabatangan (n=115)

Mean response for each group						
Response to reforms in forest sector	Government (n = 48)	Private sector and NGOs (n = 35)	Local community (n = 32)	Grand mean (n = 115)	F - value	p - value
Forest management tools	3.6	3.8	3.4	3.6	2.9	.067
Legislation	4.8	4.7	4.8	4.8	.55	.588
Institutional role	3.4	3.8	3.6	3.6	3.3	.041*
Forest certification	3.8	3.7	3.8	3.8	.04	.983
Enforcement of law and policy	4.4	4.1	4.2	4.2	7.0	.490
Forest management and planning strategies	4.3	4.1	3.8	4.1	4.2	.018*

***Significant at 0.01
5-Point Scale (1= strongly disagree; 3 = neither disagree nor agree; 5= strongly agree)

On the whole, the results from the analysis conducted in this study showed that all the major stakeholders have similar views and are also fully in favour of any action to tackle environmental issues in the Lower Kinabatangan. They also argued that the Lower Kinabatangan has a weak forest management system in terms of policy and law. However, with the cooperation of all concerned the capacity for achieving sustainable forest management can be strengthened.

Forest Management in Sabah

Sabah's rich forest resources are among the most biologically diverse in the world (Koh & Wilcove, 2008). Unfortunately, over the last two decades the focus on the economic development of the state has resulted in considerable and severe changes to the landscape. As the state progressed, forest land that was once easily accessible was harvested and stripped for agriculture. According to Hoh and Ishak (2001), Sabah is now covered with oil palm plantations, as palm oil has become the main export, contributing significantly to the income of the state. With the depletion of valuable hardwoods, logging activities also decreased, but the further stripping of the forest lands did not stop there. There was a feverish race to establish oil palm plantations, particularly in the late Eighties and early Nineties (Fletcher, 1997). In this context, many of the private plantation owners were from Peninsula Malaysia, who came over to Sabah in search of cheaper and more abundant lands. The damaged forests were de-gazetted and replaced by oil palm plantations at an extremely high rate of conversion. Among the states in Malaysia, Sabah has the largest acreage of palm oil plantations and is a major contributor to the economic development of the country (Hoh and Ishak, 2001). The total acreage under oil palm in Sabah has risen to 1.4 million hectares and 3 million tons of crude palm oil came from the state in 2010 (see Figure 1). The palm oil industry is a major component of the state's economy, and is an influential player in the international edible oils market. At present, palm oil is contributing the most to the economy of the state.

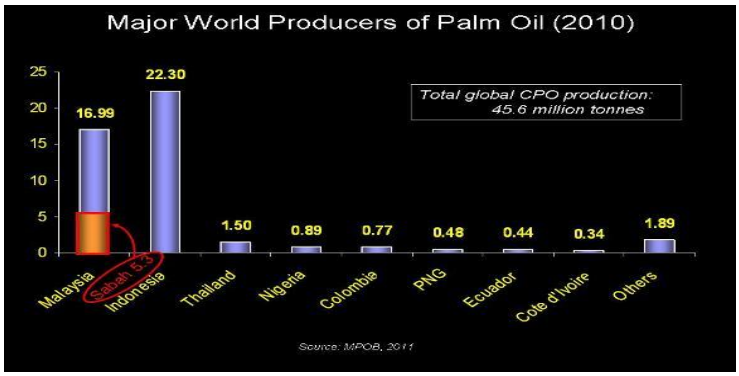

Figure 9: Major World Producers of Palm Oil (2010)
Sources: MPOB, (2011)

Under such circumstances, it is no wonder that policy makers and members of the public are expressing their concern that biofuel policies in Malaysia may result in the conversion of rainforests to palm oil plantations in Sabah. Such a consequence would erode the environmental reputation of biofuels as well as damage the ecology, with far-reaching consequences on the economy and the society. Although in recent years there has been a great focus on the impact of replacing forests with oil palm, the increasing role being played by biofuel production in deforestation is being given less attention (Gallagher *et al*., 2008). According to Gallagher et al. (1989), a recent report commissioned by the United Kingdom government revealed that the conversion of existing agricultural land due to the demand for biofuels is causing rapid changes to land use and, if this situation persists, the biodiversity will be depleted and GHG emissions may even increase instead of decrease. From 1990 to 2005, more than 50% of the expansion of oil palm plantations in Sabah happened at the expense of the forests (Koh & Wilcove, 2008).

However, several changes took place in 1997. It was apparent from the continued destruction of Sabah's forests that the 1984 amendments to the Forest Enactment were inadequate at protecting the forest resources and improving forest management. The policy of the state was changed and short-term licenses were replaced with long-term licences, such as the Sustainable Forest Management License Agreement (SFMLAs), so as to encourage better forest management (Sabah Forestry Department, 1998). The aim is to conserve whatever remains of the forest lands and to sustainably manage them in order to ensure improvements in timber productivity in the long run and protection of the environment. The conditions stipulated for the issuing of the licences are based on the model Deramakot Forest Reserve project, which is being managed by the SFD within the FMU and has been certified by the Forest Stewardship

Council (FSC) as having met their principles and criteria for a well-managed forest reserve (Sabah Forestry Department, 2007a). According to Mannan and Yahya (1997), many factors are to be blamed for the "massive depletion of forests" in Sabah, such as harvesting beyond the ability of the forest to regenerate; not giving forests enough time to recover from logging activities through early "re-entry" or "re-logging"; damage to residual stands because of poor logging practices; neglect of silviculture and forest rehabilitation; monetary gain prevailing over environmental restrictions; political changes and instability, and the inability of the forestry profession to put pressure on powerful groups.

During the period from 1975 to 1995 the primary forest cover area shrank from approximately 2.8 million hectares to roughly 300 000 hectares (Mannan & Yahya, 1997) while the area of disturbed forests almost doubled. A study by Mannan and Yahya (1997) showed that the primary forests under the Class II Production Forest category underwent the most severe loss of cover from 98% in 1970 to just 15% in 1996. Meanwhile, the Forest Enactment, 1968 was revised for the first time in 1984, marking a significant change in forest laws. This revision involved the division of forest reserves into seven classes, the re-gazetting of the remaining forest reserves so as to include the new classes of forests, and the gazetting of new reserves. For instance, the Deramakot Forest Reserve became the Deramakot Forest Reserve and this showed that forest reserves, particularly those in the Class II Commercial Forest category, could no longer be reclassified within the Sabah Forest Department without the approval of the State Cabinet and the Governor of Sabah (Sabah Forestry Department, 2007a).

On the whole, these problems have brought to the surface the weaknesses that existed in the previous concepts, planning and implementation of forest management in Sabah, such as inadequate cooperation and coordination among the various government extension agencies; lack of prioritization, commitment and support for forest management projects from stakeholders; absence of community participation, meaning that the various communities were left out of the planning and decision making process for forest management, and were not given enough information regarding the aims and objectives of forest management; poor communication due to cultural differences between extension personnel and communities; disunity and internal problems within resettled villages, for example, land and border conflicts and complete reliance on financial aid from the government (Mannan & Yahya, 1997).

Issues and challenges of forestry management in Lower Kinabatangan

The Lower Kinabatangan is made up of various types of forests such as freshwater swamp forests, secondary dry land forest, limestone outcrops and lakes (WWF Malaysia, 2004). A century ago the Lower Kinabatangan was practically covered by forests but today these forests have had to make way for agriculture and the few remaining forests have been badly damaged by selective land use, particularly for agriculture. According to a WWF (2005) report, presently the existing forests in Lower Kinabatangan are fragmented and certain areas are completely inaccessible. Even though commercial logging activities are no longer being carried out in the area, the Lower Kinabatangan forests are not being left alone. According to Pang (2003), due to the shortage of timber for sawmills, the lure of illegal logging activities is strong. Furthermore, the lowland alluvial swamps are perfect for the cultivation of oil palm if they are drained (Azmi, 1996). As such, there are still many applications coming from companies for the conversion of forested land (Pang, 2003). Locals, attracted by the financial rewards, are prepared to give up their private forest land to agriculture. Palm oil companies, bent on expanding the plantations, are offering to buy or lease the land from the local villagers. However, the local villagers are of the opinion that it is more profitable to give up their land to oil palm smallholdings. The repercussions from possible changes to private land use on the wildlife and biodiversity in the area are terrible as the forest land will be even more fragmented. At present, 85% of the Kinabatangan forest floodplain has been converted to agriculture (Pang, 2003). In 1995, roughly 190,625 hectares of land were used for the cultivation of oil palm in the Kinabatangan district, and this acreage had increased to 303,941 hectares by 2005 (Sabah Institute for Development Studies, 2008). Currently, the land in the Kinabatangan area is being used predominantly for oil palm cultivation and this has presented major problems for forest management here. In Figure 2 below it can be seen that the KWS is fragmented and stands in the midst of private land, most of which has been cultivated with oil palm (Prudente & Balamurugan, 1999).

In this context, the rich biodiversity and high conservation value of the Lower Kinabatangan area are being increasingly threatened by progressive fragmentation of the forest caused by the development of new palm oil plantations (Prudente & Balamurugan, 1999). Presently, 75 square kilometres of flood-prone land along the banks of the Kinabatangan River are being cultivated with oil palm (Pang, 2003). Many people consider this land to be unsuitable for oil palm plantations as the land is prone to annual floods. The land owners have responded to this issue in various ways. For instance, some owners have

reserved this land for reforestation, while others have preferred to find ways to control the floods every year (WWF, 2005).


Figure 10 & 11: Flooding of Young Oil Palm in a Plantation along the Sungai Kinabatangan

Source: Sabah Forestry Department

According to the Department of Irrigation and Drainage, Sabah, Malaysia (1998), although Clause 40 of the Sabah Water Resources Enactment 1998 clearly specifies that land owners must set up a riparian reserve "within 20 metres of the top of the bank of every river, including its estuary, where the river channel is not less than three metres in width" (Department of Irrigation and Drainage Sabah Malaysia, 1998, p. 171), and the Lower Kinabatangan River is more than three metres wide, yet most of the plantation companies in the Kinabatangan appear to have chosen to disregard this ruling. Some of these companies have cleared the riparian reserve to make way for agriculture, while others have done so to get rid of pests (Sabah Forestry Department, 2007a). However, Clause 40 is still a legally enforceable requirement and the establishment of these riparian reserves will help in the creation of corridors linking the forested areas, and will encourage the migration of wildlife. Poor land management can lead to environmental pollution, and in the case of Lower Kinabatangan, the inefficient management of the oil palm plantations has affected the quality of the river water and the ecosystem. From the 1960s, the quality of the water in the Lower Kinabatangan and its streams was deteriorating due to commercial logging, and this situation became worse in the 1980s when the oil palm plantations and factories commenced operations (Prudente & Balamurugan, 1999). Oil palm development makes the soil compact and this reduces the capacity of the soil to absorb water. As such, the low-water flow of the river is reduced together with the subsequent capacity of the river to dilute pollution. According to Prudente and Balamurugan (1999), the failure to set up riparian reserves along the Kinabatangan has caused river sedimentation and collapse of the river banks. An estimated six millions tonnes

of sediment are transported annually by the Kinabatangan River. When less light is able to penetrate the river, the feeding and migration of fish and prawns are affected. Furthermore, a rise in surface erosion and fertiliser run-off can lead to suspended sedimentation and increased nutrients in the river, thus choking the fish to death (Azmi, 1996), particularly in the river offshoots and oxbow lakes.

Before land clearing | after land clearing

Figure 12 & 13: Unmonitored and uncontrolled human activities and agriculture development in Lower Kinabatangan (Riparian reserves cleared for oil palm planting)
Sources: Sabah Forestry Department

Another issue is the dispute between the local communities and the foreign immigrants. The increasing employment opportunities in the oil palm industry have probably attracted more and more people to the Kinabatangan district over the past few years. However, most of those employed are foreign immigrants (Payne, 1997), with practically the whole plantation labour force comprising foreign workers such as Indonesians and Filipinos, most of whom are illegals (Azmi, 1996). The pay is low, the work is hard and it looks as though "…only people without the privilege of citizenship are willing to endure the tough work of plantation labour for money which is sufficient only for survival near (Sabah) poverty level" (Payne, 1997, p. 12). This mass entry of migrants into the area has given rise to a number of problems related to the conservation of natural resources, and stretches the natural, infrastructural and social resources to the limit (Azmi, 1996).

Besides that, the absence of cooperation among stakeholders has also created problems in forest management in Lower Kinabatangan (Payne, 1997). In this context, the local communities, relevant government agencies and the private sector should all be involved together in the development and management of forests in the Lower Kinabatangan. However, currently the

three sectors are not properly integrated (Prudente & Balamurugan, 1999). For instance, until today, tourism in the Lower Kinabatangan is heavily dependent on private tour operators who have the necessary capital, skills and the labour force to establish and manage tourism facilities. The operations are run independently, with each tour operator handling their own tourist facilities and operations. However, very few locals are involved as staff or as providers of support services such as fresh food supply, laundry services and local tour guides. For example, since the supply of fresh food is unpredictable in Kg. Sukau, it has to be brought in from Sandakan, even for some of the villagers themselves (Prudente & Balamurugan, 1999). Therefore, if the locals want to be part of the sustainable development of the area, they must be engaged and see not just the economic benefits but also the preservation of their culture and lifestyle. Success will come when there is an understanding of how conservation, social development and economic development are inter-related, and these issues are addressed correctly (Azmi, 1996).

In conclusion, the question arises as to why the problems observed in the Kinabatangan area in terms of land use and forestry status have given rise to unsustainability and why they have been allowed to continue unchecked. Several main factors have been identified from this study. Firstly, the history behind the introduction of the palm oil industry in Kinabatangan. During the mid-Seventies to early Eighties, when most forest reserves were de-reserved for timber production and the land was available for fragmentation, it was implicitly assumed that a total conversion of land use and economy from logging on State-owned land to large scale private agriculture would be to the advantage of all stakeholders (Sabah Forest Department, 2006). Not enough thought was given as to how the revenue earned would be allocated and invested, or to the costs involved and the availability of workers for the large plantations, or to the protection of the natural environment, particularly water and biodiversity. Secondly, there is no comprehensive land use plan to officially manage the allocation of land in Kinabatangan. The preparation of such a plan would involve the examination of such issues and ensure that land is allocated based on actual conditions and requirements, including environmental, social and economic considerations (Prudente & Balamurugan, 1999). In addition, there is no confidence and commitment among stakeholders with regard to plans for sustainable forest management in Lower Kinabatangan because in the top-down approach or expert-based approach, for example, the experts make the plans without consulting the stakeholders, who are only informed at the start or end of the planning process (Payne, 1989). On the whole, forest practices in Lower Kinabatangan have not succeeded in improving the environmental conditions in the forests due to a lack of involvement by all stakeholders, especially the locals. In this case, the lack of participation by the local

community indicates that the locals were not included from the start in the planning and decision-making concerning forest management, and they were not well-informed about the aims and objectives of the forest management process (Payne, 1989). Furthermore, the locals, who are used to having ample timber and land available and earning a living from these resources, are not given enough opportunities to change to other economic activities. In such circumstances, an analysis of the forest management process in Lower Kinabatangan reveals an imbalance between the economic, social and ecological aspects.

CONCLUSION

In conclusion, there is still cause for concern over forest management in Malaysia, and especially in Sabah, compared to any other developing country in the world (Mannan & Yahya, 1997). Previous studies have shown that over the years there has been a great increase in deforestation. In fact, these weaknesses are mainly with regard to forest management policies and legal aspects, the planning and control of forests, and the cooperation between the sectors involved. In addition, unsustainable land use development, for instance the cultivation of oil palm, which requires large areas of land, have resulted in several parts of the interior having to face the threat of forest extinction and the impact of increased deforestation, such as in the Lower Kinabatangan, Sabah. The result of the empirical analysis conducted in this study confirmed the theoretical setting with regard to the involvement of the participating forest management and planning stakeholders in a forest sustainability plan. In this context, all stakeholders (Government (G), Private Sector and NGOs (PS) and the Local Community (LC)) should be involved in the sustainable forest management process. They have to be equitably integrated at each step of the forest planning process, in the implementation of the outcome, and especially in the sharing of the benefits obtained from the resources and which are necessary for building or proposing a new forest management so as to successfully attain sustainable forest management in Lower Kinabatangan.

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USER'S PREFERENCE AND PERCEPTION ON THE PEDESTRIAN CROSSING IN MALAYSIA: THE CASE OF AMPANG ROAD, KUALA LUMPUR

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Abstract

The issue of road accident among pedestrian is highly emotional and raising a very strong interest within the public, and the media, mainly due to the victims are often children and elderly people. However, most of the pedestrians are lack in interest of using the pedestrian crossing. Thus, a study on the perception and preference of the pedestrian on the pedestrian crossing was being carried out in Ampang Road, Kuala Lumpur as a case study. The objectives of the study are to analyze pedestrians' preference and perception on the various types of pedestrian crossing and to conclude findings and construct strategic recommendation based on the findings. The study has been carried out on three (3) types of pedestrian crossing in Ampang Road which are overhead crossing, underpass crossing and signalised crossing. This study involved with questionnaire survey on the total of 92 respondents, and on-site observation by researcher. Statistical analysis has been carried out, i.e. the frequency, mean and percentage. There are three (3) major findings in this study. The most chosen type of pedestrian crossing is the overhead crossing. However, the underpass crossing was given the best score in term of the quality of the pedestrian crossing (based on the respondents' perception). Meanwhile, the signalised crossing is the most preferable type of crossing. The reasons and the explanation were discussed in the paper. The study is concluded with strategic recommendation for pedestrian crossing planning.

Keywords: Overhead crossing; Perception study; Signalised crossing; Underpass crossing.

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INTRODUCTION

Pedestrian crossings are the critical points in the traffic network that enable pedestrians to cross a road safely. At such intersections, motorists, cyclists, and pedestrians often have to deal with complex situations and be aware of the position, movement, and intent of other users. Mixed traffic of vehicles and pedestrians are common in urban intersections. The safety of the pedestrian depends on the type, design and location of pedestrian crossing, as well as the attitude of the road users. Abdul Aziz Chik et al. (2000) found that violation of the red signal aspect by both the motorists and pedestrians is close to 70% at midblock signalised pedestrian crossings in Malaysia. It shows the possible negative attitude of road users. Besides, from the general observation, we can also notice that there are pedestrians who always choose to cross a road without using a designated pedestrian crossing. Pedestrian tends to cross a road when it suits them, in terms of convenience and time saving rather than consideration on the potential safety implications (Martin, 2006).

Besides the factor of pedestrian attitude, the quality of the crossing facility might also affect the choice of pedestrian. Condition of crossing area is the main factor which influences people in using a crossing. Low quality of pedestrian crossing includes badly installed drop kerbs, barrier of movement, unsuitable height of crossing, and others have made people feel inconvenience to use it, then the crossing will not give benefit to a person who lives in the area (Martin, 2006). Thus, the preference and perception of pedestrian on the pedestrian crossings are necessary to be examined. Good, user friendly and preferable pedestrian walkways are always treated as an important element in improving the quality of an area including a neighbourhood area (Norainah et al., 2012).

LITERATURE REVIEW

A pedestrian crossing is a designated point on a road to assist pedestrians wishing to cross. The crossing is designed to keep pedestrians in a group where motorists can see them, and they can cross a road safely. According to Nik Ibtishamiah Ibrahim et al. (2005), provisions of adequate and safe pedestrian facilities in the urban setting would encourage more people to walk, thus increasing the pedestrian traffic. The demand for the improvement of pedestrian facilities is raised due to the reasons such as difficulties in crossing heavily trafficked intersections, conflicts between pedestrians and cyclists, physical

barriers, low visibility, improper design of handicapped accessible ramps and so on (Thambiah Muraleetharan, 2005).

Pedestrian perceptions about various crossing options show that it does influence their decisions when they are presented with these different options along their route. Marked crosswalks at signalized intersections are seen by some as unsafe because of vehicles might fail to follow the signal. Some pedestrians favor midblock crosswalks because they are more convenient and eliminate the threat posed by left turning vehicles, but others perceive them as unsafe because they feel motorists will only be looking for crossing pedestrians at intersections (Akin, 2007).

There are several factors that influence the preference of pedestrian to use a crossing, which includes the general condition of an area, generality of the crossing, and condition of the crossing area (Martin, 2006). Busy road and busy town will make people choose to use the public transport, thus increases the usage of pedestrian crossings. However, the low quality or unsafe crossings will discourage people to use it. In general, there are several key psychological principles that attract pedestrian to a place, which are security, comfort, convenience, efficiency and affordability, and welcoming feeling (Fitzpatrick et al., 2006).

Besides the physical condition of pedestrian crossing, other major factors that affect the preference of pedestrian are their attitude and the effectiveness of enforcement. Pedestrians are always linked to the impatience to respect the signals, and use overpasses or underpasses. When the safety aspects and other related attributes were appraised, pedestrians did not favor any type of crossing in particular (Akin, 2007).

OBJECTIVES, CASE STUDY AND METHODS

A study on the perception and preference of the pedestrian on the pedestrian crossing was carried out in Ampang Road, Kuala Lumpur as the case study. The objectives of the study are (i) to analyze pedestrians' preference and perception on the various types of pedestrian crossing and (ii) to conclude findings and construct strategic recommendation.

The study has been carried out on three (3) types of pedestrian crossing in Ampang Road (Figure 1) which are overhead crossing (crossing A, namely Ampang, Figure 2), underpass crossing (crossing B, namely Ampang Park, Figure 3) and signalised crossing (crossing C, namely KLCC, Figure 4). All the

three (3) pedestrian crossings are located along the Ampang Road, and within the administration of Kuala Lumpur City Hall.

This study was carried out using the questionnaire survey on the total number of 92 respondents, and on-site observation by researcher. The size of the respondent is calculated based on the total number of users of 1,233 (column B, Table 1) with the level of error of 10%. Table 1 shows the distribution of the respondents.

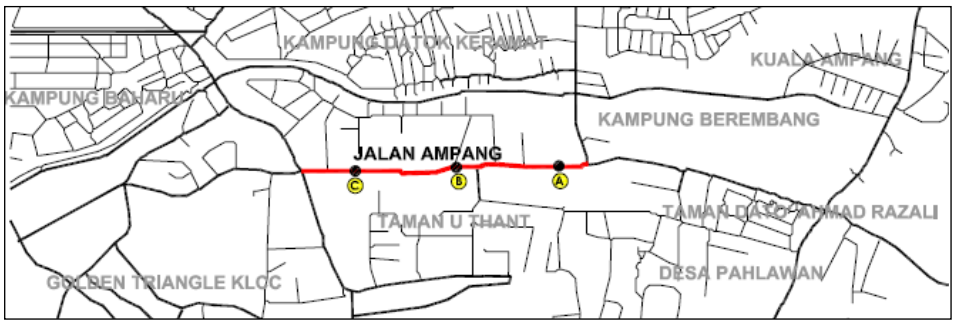

Figure 1: Location of the three (3) pedestrian crossings
Source of base map: Jabatan Kerja Raya Wilayah Persekutuan Kuala Lumpur (2013)

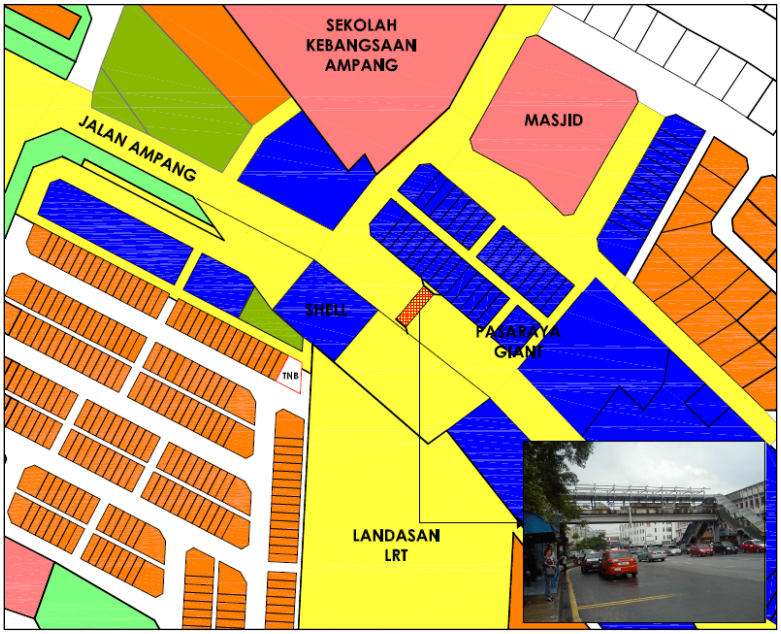

Figure 2: Location of the pedestrian crossing A (Ampang)
Source of base map: Jabatan Perancangan Bandar & Desa Semenanjung Malaysia (2013)

Figure 3: Location of the pedestrian crossing B (Ampang Park)
Source of base map: Jabatan Perancangan Bandar & Desa Semenanjung Malaysia (2013)

Figure 4: Location of the pedestrian crossing C (KLCC)

Source of base map: Jabatan Perancangan Bandar & Desa Semenanjung Malaysia (2013)

Table 1: Distribution of respondents

	A Total number of users	B Average number of users	C Percentage (%)	D Size of respondents (sample)
Crossing A - Ampang	1,248	416	33.7	31
Crossing B - Ampang Park	867	289	23.4	22
Crossing C - KLCC	1,586	528	42.9	39
Total	**3,701**	**1,233**	**100.0**	**92**

Notes:
1. Column A: The total number of users for 3 periods of time (7-8 am; 1-2pm; 6-7pm)
2. Column B: Average number of users per hour.
3. Respondents were distributed based on the percentage of actual size of users for the 3 crossings.

FINDINGS AND DISCUSSION

Use of Pedestrian Crossing

Table 2 shows the most chosen pedestrian crossing in the Ampang Road, Kuala Lumpur by respondents. It shows that the highest percentage (40.2%) of respondents mostly use the crossing A (overhead crossing – Ampang), followed by the crossing C (signalised crossing – KLCC) with 32.6%. For the crossing B (underpasses crossing – Ampang Park), there is only 25% of the respondents choose that particular point for the road crossing purpose.

As a reference to the Table 1 (column A), during the survey, the crossing C (KLCC) was identified with the largest number of user. However, according to the respondents, the crossing A (Ampang) is the most used (or chosen) pedestrian crossing. It is due to the reason of the majority of the users are living in Ampang area (Taman Kosas, Bukit Indah, Bandar Baru Ampang, etc.) who uses the crossing A (overhead) for the purpose of working trip. The crossing A is located near to LRT station and bus stop. It is the only crossing (among the three crossings) which located between a residential area and commercial area. Meanwhile, crossing B and C are connecting a commercial area with another commercial area as well as a Light Rail Transit (LRT) station, but, not the residential area.

Table 2: The most chosen pedestrian crossing by respondents

	%
Crossing A (Overhead – Ampang)	40.2
Crossing C (Signalised – KLCC)	32.6
Crossing B (Underpass – Ampang Park)	25.0
No specific crossing	2.2
Total	**100.0**

Preference on the Pedestrian Crossing

Table 3 shows that out of the 92 respondents, 47 respondents (51.1%) choose the signalised crossing as the most preferable type of crossing. The second preferable type of crossing is underpass (crossing B) with 32.6% of respondents. The rest of the respondents (16.3%) prefer the overhead crossing (crossing A). It shows that most of the respondents (pedestrians) prefer to use at-grade (signalised) pedestrian crossing as compared to the overhead and underpass. It might due to the convenience of the signalised crossing without requiring pedestrian to use the staircase. Besides, the signalised crossing is less time consuming as compared to the overhead and underpass.

In the other hand, it is found that the majority of the respondents do not prefer the overhead crossing (crossing A) even though they use it the most. If there is a choice, most of them prefer to use signalised crossing or underpass. This result might not be suitable for other area where the quality of the underpass is dark, dirty or not well maintained. The quality of the underpass especially the safety aspect in the study area (Ampang Park) is contributing to a higher preferable rate as compared to the overhead bridge.

Table 3: The most preferable type of pedestrian crossing by respondents

	%
Crossing C (Signalised – KLCC)	51.1
Crossing B (Underpass – Ampang Park)	32.6
Crossing A (Overhead – Ampang)	16.3
Total	**100.0**

Perception on the Pedestrian Crossing

Respondents were given the opportunity to evaluate the pedestrian crossings provided at the study area. There are 8-9 items have been selected for the evaluation on their perception on the pedestrian crossings. The respondents' perceptions have been scaled by: 1 = strongly agreed (SA, refer to the highest

level of quality), 2 = agreed (A), 3 = disagreed (D) and 4 = strongly disagreed (SD, refer to lowest quality level). The mean of each item is used in the discussion to show the perception of respondents on the quality of every pedestrian crossing. The evaluation covers the aspects of location, visibility, lighting, facility, connectivity, safety, condition, and design of pedestrian crossing.

For the crossing A (overhead – Ampang), the best items are on the location of the crossing (mean = 1.76) and the connectivity (mean = 1.86). However, the lighting is not really adequate with a mean value of 2.55, and facilities for visually impaired and disabled users are not adequate (mean = 3.33) (Table 4). This result can be used to explain the high usage (Table 2 and 3) of crossing A (due to the good location and connectivity), but less preferable by users (due to inadequate of lighting and facilities).

Table 4: Perception of pedestrian on Crossing A

Item	1 (SA)	2 (A)	3 (D)	4 (SD)	Mean
Strategic location of the crossing	23.9%	76.1%	-	-	**1.76**
Well connected with bus service/LRT	23.9%	76.1%	-	-	**1.76**
Ramps & pavement in good condition	-	66.3%	27.2%	6.5%	2.40
Visibility of traffic signs	3.3%	69.6%	26.1%	1.1%	2.25
Lighting is adequate	1.1%	44.6%	52.2%	2.2%	***2.55***
Height & gradient of the staircase is suitable	2.2%	72.8%	23.9%	1.1%	2.24
Adequate facility for visually impaired & disabled users	-	7.6%	52.2%	40.2%	***3.33***
Feel save	15.2%	53.3%	31.5%	-	2.16
Linked between intersections, buildings & others (parking, bus stop, LRT station)	14.5%	85.9%	-	-	**1.86**
TOTAL					2.63

Note: 1= Strongly Agreed (SA); 2= Agreed (A); 3= Disagreed (D); 4= Strongly Disagreed (SD)

For the crossing B (underpass – Ampang Park, Table 5), all the items are evaluated with mean values less than 2.0 based on the perceptions of the respondents. That means respondents are satisfied with the quality of the crossing B especially on the condition, lighting and facilities. This result can be related to the previous analysis on preference of respondents on the type of crossing, whereby, the underpass is the second preferable type of pedestrian crossing after the signalised crossing (Table 3). Even though, the respondents have the best perception on underpass (crossing B) as compared to crossing A

(Table 4) and crossing C (Table 6), most of the respondents still choose the signalised crossing (C) as the most preferable type of crossing (Table 3).

Table 5: Perception of pedestrian on Crossing B

Item	1 (SA)	2 (A)	3 (D)	4 (SD)	Mean
Strategic location of the crossing	21.7%	77.2%	1.1%	-	1.79
Well connected with bus service/LRT	21.7%	78.3%	-	-	1.78
Ramps & pavement in good condition	46.7%	52.2%	1.1%	-	1.54
Visibility of traffic signs	40.2%	57.6%	2.2%	-	1.62
Lighting is adequate	46.7%	53.3%	-	-	1.53
Adequate facility for visually impaired & disabled users	48.9%	50.0%	1.1%	-	1.52
Feel safe	42.4%	56.5%	1.1%	-	1.59
Linked between intersections, buildings & others (parking, bus stop, LRT station)	38.0%	62.0%	-	-	1.61
TOTAL					1.55

Note: 1= Strongly Agreed (SA); 2= Agreed (A); 3= Disagreed (D); 4= Strongly Disagreed (SD)

According to the perception of the respondents, crossing C (signalised – KLCC, Table 6) can be considered as moderate (overall mean value of 1.90), which is better than crossing A (overhead, overall mean value of 2.63, Table 4) but less satisfied than crossing B (underpass, overall mean value of 1.55, Table 5). For the crossing C, all the items show mean values of less than 2.0 except the items of "facilities for visually impaired and disabled", and "adequate time for crossing (with green light)" which show mean values of 2.18 and 2.13 respectively. Crossing C with the mean values of close to 2.0 or fewer (Table 6) is the most preferable type of pedestrian crossing by respondents (Table 3).

Table 6: Perception of pedestrian on Crossing C

Item	1 (SA)	2 (A)	3 (D)	4 (SD)	Mean
Strategic location of the crossing	46.7%	53.3%	-	-	1.53
Well connected with bus service/LRT	46.7%	53.3%	-	-	1.53
Kerb & crossing ramps in good condition	28.3%	69.6%	2.2%	-	1.67
Visibility of traffic signs	16.3%	78.3%	5.4%	-	1.89
Functioning of traffic light	17.4%	78.3%	4.3%	-	1.87
Adequate facility for visually impaired & disabled users	4.3%	72.8%	22.8%	-	2.18
Adequate time for crossing (with green light)	6.5%	73.9%	19.6%	-	2.13

Linked between intersections, buildings & others (parking, bus stop, LRT station)	21.7%	78.3%	-	-	1.78
Pedestrian always follows the signal	21.7%	76.1%	2.2%	-	1.80
TOTAL					1.90

Note: 1= Strongly Agreed (SA); 2= Agreed (A); 3= Disagreed (D); 4= Strongly Disagreed (SD)

CONCLUSION AND RECOMMENDATION

To conclude based on the perception of most of the respondents, the quality of crossing B (underpass at the KLCC) is the best as compared to the crossing A and C. However, most of the respondents are still prefer to use signalised (at-grade) crossing due to the convenience factor. Thus, the effort of improving the quality of facilities alone is not being able to change the public preference on the type of crossing. Most of people still prefer to use the at-grade crossing which is more convenience with less time consuming, and it is suitable for all including the disabled people.

Overhead and underpass crossings require users to climb up and down the staircase. It is discouraging people to use it. Thus, in order to encourage people to use the pedestrian crossing, more signalised pedestrian crossings should be provided instead of overhead and underpass crossings. However, the issue is whether shall we allow more intersections of pedestrian walkway and automobile carriageway (critical points) or avoid it by providing more underpass or overhead crossings, which is not preferred by the majority of pedestrians.

With the purpose of encouraging people to walk and use the pedestrian crossing, and reducing the car dependency, well-designed at-grade signalised pedestrian crossings should be provided. However, it should be applied together with other urban design principles for the convenience of pedestrians. Urban design concept such as Transit Oriented Development (TOD) or walkable design can be studied in future. Previous study in Petaling Jaya and Kuala Lumpur showed that TOD principles/features are able to encourage people to ride on public transport, to walk, and at the same time use less of their private vehicles (Ling, et al., 2010).

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COMMUTERS' PERCEPTIONS ON RAIL BASED PUBLIC TRANSPORT SERVICES: A CASE STUDY OF KTM KOMUTER IN KUALA LUMPUR CITY, MALAYSIA

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Abstract

In facing the challenges of urban traffic congestion, when people are becoming more dependent on private vehicles, public transportation services should be functioning effectively as attractive alternative modes. This research evaluates how rail public transport users perceive day to day quality of the provided services. The study investigates commuters' satisfaction levels of various trip making aspects on board KTM Komuter trains, a commuter services operated by the company Keretapi Tanah Melayu Berhad (KTMB), a heavy rail operator in Kuala Lumpur, Malaysia. A systematic probabilistic sampling questionnaire survey was conducted among the users during the month of December 2011 until March 2012. A sample of 1000 questionnaire forms returned by respondents have been gathered for purposes of ascertaining the overall satisfaction level and analysis on selected aspects of the performance indicators. The results have shown that the majority of the respondents perceived KTM Komuter services to be below the levels that the users had expected, especially the non-adherence to published schedule and travel times, frequency or headways, capacity, the physical conditions of the rail coaches and the information on delays. Most of them expected better services to increase their satisfaction levels. Hence, it is concluded that for the rail public transportation to be sustainable and continuously relevant, the operator has to increase KTM Komuter's effectiveness and efficiency or the services have to in the least remain attractive to the existing users

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Keywords: public transportation, commuter rail, KTM Komuter, Kuala Lumpur, users' perception.

INTRODUCTION

Urban dwellers in developing countries require and demand mobility and accessibility in the same rates at the growth of these urban areas. Often, this demand is accommodated by the increase number of private vehicles. However, meeting the demand through private vehicles is unsustainable for various arguments. Environmental issues are always associated with transportation, with the major contributor being the private vehicles, found travelling on many of the developing cities' roads including Kuala Lumpur, Malaysia. As the capital city of Malaysia, Kuala Lumpur continues to be flooded with newly registered motor vehicles each year. With the increase in the country's overall personal and disposable income levels, the increase in demand for private vehicle ownership is inevitable. According to the Road Transport Department of Malaysia (2011), Kuala Lumpur's percentage share of the newly registered motor vehicles has increased from 115,661 vehicles in 2000 to 208,560 in 2010 with an annual average growth rate of 4.45 per cent.

An increase in vehicle ownership and registered vehicles, while increasing mobility and accessibility, resulted in high urban traffic congestion, increase travel time, high demand for parking spaces in city centres and high rates of injury and fatality which all lead to environmental degradation. Hence, many public transport advocators in developing cities would argue for the switch from private vehicles to public transportation, to ameliorate these negative effects of transportation.

However, in developing countries too, these two aspects are declining rapidly together with the services of public transport system. More and more housing are constructed further and further away from the city centres as land prices increase, resulting in more expensive journey making and lack of choices of travel modes. It is also argued that the service qualities of public transport in the majority of developing countries are deteriorating due to overloaded capacity and the lack of maintenance (Senbil, *et al.*, 2005; Bachok, 2010).

Public transportation are shared or collective vehicles often operated with designated routes and fixed scheduled. Public transport system is a complex systems consisting of various sub-systems including various road, rail,

water and air systems, vehicles or rail coaches system, track and signalling system, route and scheduling system, fare and ticketing system, interchange and transfer system and integrated information system.

Demand for public transport is often mixed and diverse, by both captive and choice riders. Public transport faces challenges from various corners, including competition from private vehicles, dwindling patronage, generation of lower revenue to sustain its operation and decreasing financial support from the public sector, which in turn, further exacerbated the poor performance of public transport and decreased the attractiveness of public transport among private transport users. Many private vehicles users' perceived public transportation as an inferior service compared to the more comfortable and convenient private vehicles. Subsequent to these issues, the Malaysian government has formulated the Government Transformation Programmes (GTPs) in 2011, chief amongst which have been targeted especially on the improvement of urban public transport to tackle the public transportation issues, to increase the streamline capacity, to introduce an integrated ticketing platform and fare structure and to develop an Integrated Transport Terminals (ITTs) outside the city centre areas (Malaysian Government, 2011). The idea is to achieve 25 per cent modal share by the year 2015 by enhancing public transport performance in terms of reliability, travel time, comfort, accessibility and connectivity (Malaysian Government, 2011). Consequently, these initiatives would reduce the impacts of transportation on the environment and thus ensuring sustainability.

This paper discusses some of the issues concerning one particular public transport system, namely *KTM Komuter* services delivery. *KTM Komuter* service is one of the three rail services operated by *Keretapi Tanah Melayu Berhad* (KTMB), a public limited company overseeing and managing the heavy-rail systems in Kuala Lumpur, Malaysia. There exist four other rail systems namely light rail systems of *Ampang* line and *Kelana Jaya* line, monorail system, *KLIA Express* and *KLIA Transit* systems. Soon, by 2018, an additional system of mass rapid transit (MRT) system will also be operating to accommodate the demand of over 5 million urban dwellers of Kuala Lumpur region. The interest in evaluating the services performance of *KTM Komuter*, has been raised from the issues and problems identified by the literature and previous research's analyses that highlighted the needs for more efficient and reliable *KTM Komuter* services, as one of the many approaches of achieving a more sustainable transportation system in Malaysia (Bachok, 2010).

Study objectives

The study revolves around achieving the following objectives:

i. To examine the users' perception of the service quality provided by *KTM Komuter*
ii. To identify improvement elements to increase the level of services of *KTM Komuter*

PUBLIC TRANSPORTATION IN KUALA LUMPUR

There exist two main types of public transportation in Kuala Lumpur namely road- and rail-based public transportation. This research sets its realm to only elaborate on the services provided by *KTM Komuter*, a rail commuter service provided alongside four other rail systems.

KTM Komuter

KTM Komuter is a commuter train service operating in Kuala Lumpur region of Malaysia, operated by Keretapi Tanah Melayu Berhad (KTMB). KTMB also operates two other services namely intercity passenger and freight services. KTM Komuter is currently the most profitable passenger service offered, contributing to RM84.63 million to group revenue in 2006, higher than KTM InterCity's profit of RM70.94 million in the same year (KTM Komuter management, personal communication, 2012). It was introduced in 1995 to provide local rail services in Kuala Lumpur and the surrounding Klang Valley suburban areas. According to the Ministry of Transport, Malaysia's statistics (2010), the ridership of KTM Komuter was approximately 36.557 million passengers per annum, which translated to nearly 100,000 passengers daily.

KTM Komuter is a heavy-rail public transport service moving commuters from the suburban localities of Kuala Lumpur region to the city centre. It has been one of the major transport providers in the city and has great potential to be an alternative sustainable transport mode to the traffic on congested road networks. This mode of transportation also provides access and mobility to those who do not have access to a private vehicle. However, KTM Komuter has during the last few years been stigmatized by various issues and problems including, overcrowding, congested and excessive and persistent delays (Bachok, 2010).

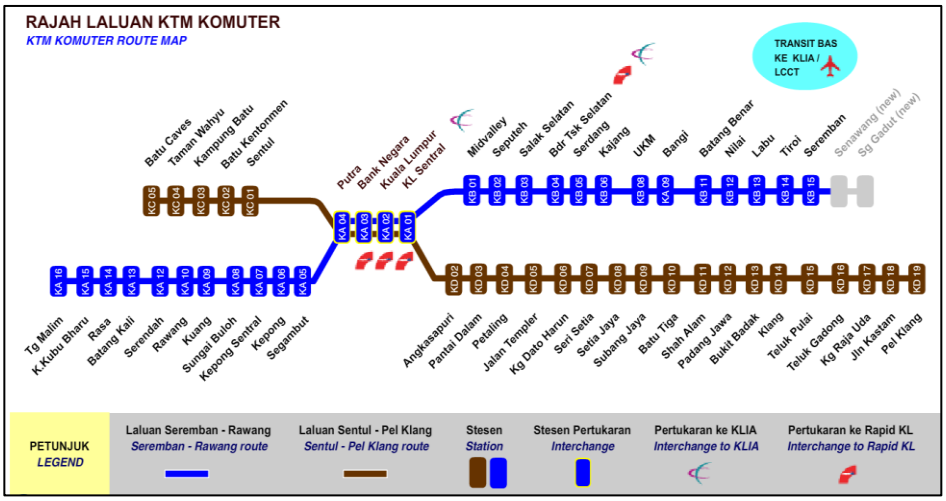

Figure 1: KTM Komuter route map

The commuter system, during the research undertaking, deploys three-car air-conditioned electrical multiple units (EMUs) with a single-car capacity of 50 to 100 passengers, totalling to about 150 to 300 passenger per EMU set. Park & Ride facilities are provided at 43 stations at a nominal charge, with only 17 stations being serviced by feeder buses (KTM Komuter management, personal communication, 2013).

KTM Komuter current networks

With a track of more than 175 km (109 miles) *KTM Komuter* network has 53 stations (*KTM Komuter* management, personal communication, 2013). The networks ply through two cross-city routes, namely the *Batu Caves-Pelabuhan Kelang* line and *Rawang-Sungai Gadut* line, plus a shuttle service from *Rawang to Tanjung Malim*, which began service in April 2007. Transfer between the two main lines can be made at *KL Sentral*, *Kuala Lumpur* and *Putra* stations. Same-platform or cross-platform interchange is available at *Kuala Lumpur* station. Passengers to and from stations between *Rawang and Tanjung Malim* must change trains at *Rawang* station. *KTM Komuter* has made shopping complexes and recreational centres more accessible. The *Mid-Valley* station, which opened in 2004 next to the *Mid Valley Megamall*, has proven to be regularly frequented. Other shopping centres located near KTM Komuter stations are Subang Parade and Carrefour Subang Jaya (near Subang Jaya station) and the MINES (near Serdang station).

Passengers for Kuala Lumpur International Airport (KLIA) may take *KTM Komuter* to *Nilai* station and change to an airport bus, or change at *KL Sentral* station onto the dedicated *KLIA Ekspres* or change at *Bandar Tasek Selatan* interchange onto the *KLIA Transit* service. Interchange with *RapidKL* (light rail transit system) is also available at *Bandar Tasek Selatan* station for *Ampang* Line and at *KL Sentral* station for the *Kelana Jaya* line. Passengers may also transfer to the Ampang Line in the city centre at Bank Negara station by means of a 200-meter walk to the Bandaraya RapidKL station and interchange with monorail system at *KL Sentral* station. *KTM Komuter* tickets are sold at counters and via vending machines, available at all stations and halts.

Overcrowding during peak hours have been observed, hence the operator has introduced a new queuing system to help users line up when the trains were due to arrive (*KTM Komuter* management, personal communication, 2012). The lines were painted on the floor with three colour codes representing each of the train set, first implemented at KL Sentral station on 17 October 2008 (*KTM Komuter* management, personal communication, 2012). The operator has introduced but temporarily halted the express services between Sungai Buloh and Kajang stations and between Kuala Lumpur and Shah Alam stations during peak hours after 2008 (*KTM Komuter* management, personal communication, 2012).

KTM Komuter issues and problems

Several issues regarding *KTM Komuter*'s performance have been identified from the contemporary literature (Bachok, 2010). The lack of integration between ticketing systems and inadequate supply of rolling stocks resulting in services being rescheduled from 15 minutes to 20 minutes have been highlighted (*KTM Komuter* management, personal communication, 2012). Other issues include low priority on maintenance, overhaul and repair programmes of the old rolling stocks resulting in a reduction of overall capacity especially during peak hours and feeder services (*KTM Komuter* management, personal communication, 2012).

This research limits itself to only focus on the following performance indicators: capacity, catchment areas, route, ticketing system, station facilities and incident and accident information dissemination. Performance evaluation is based on the users' perception and the management's prioritization of improvements to be realised during the GTPs implementation period. These measures provided the minimum level at which services are to be set against in determining the services' the success or failure. The indicators or measures

reflect various levels of impacts on efficiency and effectiveness. Impacts on mobility can be reflected by passengers' socio-demographic and trip characteristics, including the origins and destinations. Impacts on accessibility can be represented by ridership, trip amounts or frequency or regularity and person-miles/km travelled. Impacts on the users' satisfaction can be measured by the rating or ranking of services aspects, comfort, convenient, repeat use and willingness to switch from private vehicles. Overall performance evaluation can also be used to achieve specified standard and targets of the operators such ridership, revenue, return on investment, positive customer feedbacks and increased public sector subsidy.

A Guidebook for Developing a Transit (public transport) Performance-Measurement System prepared for Transit Cooperative Research Program Report 88 (2003) defines several performance measurements. These measurements and related issues are elaborated in the next sections. Selected measurements that can be conducted, suited for this research are:

i. capacity and frequency
ii. catchment areas
iii. route
iv. ticketing system
v. stations and facilities
vi. Incident/accident detection and dissemination.

LITERATURE REVIEW

Sustainable Transportation

Sustainable development is a concept explaining the environmental quality, social equity, economic vitality and the threat of climate change as used by the World Conservation Strategy (1987). The definition of "a development that meets the needs of the present without compromising the ability of the future generations to meet their own needs" has been subscribed to by the Brundtland Commission (1987). Today, the basic concept of sustainability deals with the recognition, evaluation and attempted mitigation of long-term impacts of human or developmental activity. Thus, there are "three pillars of sustainability" namely environmental preservation, economic efficiency and social equity (Tara, *et al.*, 2009).

Sustainable transportation within the context of sustainability adds the concept of transportation system effectiveness (Litman, 2005). Thus, impacts of the system on the economy, the natural (Jeon and Amekudzi, 2005) and built environments and the general social well-being. A recent study by the United States' Department of Transport indicated that a majority of the agencies related to transportation have expressed concerns over issues of the environment, the future needs and social equity (Jeon and Amekudzi, 2005). Strategies for sustainable transportation management that are related to public transportation are demand management strategies including modal substitution of private vehicles (cars, trucks, motorcycles and airplanes) by public transport, Para transit, ridesharing, walking, biking, rail and developments that promote walking and use of public transportation.

Substitution can be advocated by providing better modal options (offering services and improving public transport quality to attract travel to alternative modes) or through incentives for the use of alternative modes such as subsidies for users of preferred modes). Additionally, by improving accident/incident management methods, logistics and fleet management through advanced technologies for vehicle location and communication will improve public transport operation efficiency. Information technology-enhanced routing and scheduling can reduce the fuel needed for transport of both passengers and freight.

User Satisfaction and Perception

Satisfaction is an outcome of the experience that met the expectation (Engel, *et al.*, 1995). Satisfaction of a single element may influence the overall satisfaction of the majority attributes of the goods or services consumed (Pizam, *et al.*, 1978). Hence, it is essential to limit and discourage further dissatisfaction with one or more aspects of the train or trip making because if users felt so, they will be dissatisfied with the overall rail services of *KTM Komuter*. Moreover, satisfaction rate with each attribute of the trip making will create new perception of the services and this may influence tourists' intention to repeat their experiences travelling on the services (Swarbrooke and Horner, 2001).

Meanwhile, perception is a concept to express the process through which people see the goods or services (Schiffman and Kanuk, 1987). Pizam and Mansfeld (2000) further emphasized that perception is the process by which an individual receives, selects, organizes and interpret information to create a meaningful understanding or experience. Perception of an individual may differ from another, and has different meaning depending on the circumstances,

culture, values and weather of an environment from which an individual originated. Perception may not be the actual truth. While expectation can also be interchangeably understood as perception, the former can be right or wrong. Individuals may find it disappointing if they could not expect what they frequently perceive to be accordingly as expected (Pender, 1999). Hence, *KTM Komuter* users might have positive or negative perception if perceived and expected services do not perform as what they aspired. These included the following attributes.

i. capacity and frequency
ii. catchment areas
iii. route
iv. ticketing system and travel time
v. stations and facilities
vi. incident/accident detection and dissemination

Capacity and Frequency

Capacity and frequency are two essential performance indicators of public transport service levels. The variables tested in this study are the number of passengers that can be accommodated by the train cars-set throughout the services duration, in particular, during peak-hours. For the current three-car EMUs, the total capacity ranged from 50 – 100 seated and standees depending on the makes and models of the car-set. As such, for a three-car set, a capacity of 150 – 300 riders can be accommodated at any particular time.

The supply of physical rolling stocks predicted in the early 1990s has reached capacity for *KTM Komuter* services during the early years at the turn of the century. As such, from 2005 onwards, pressures to increase capacity have been experienced by *KTM Komuter*. With only 36 EMUs, servicing nearly 60,000 passengers daily, the operator could not single handedly cater the expanding demand. Additionally, more and more rolling stocks have reached their estimated lifecycle, with more than a quarter EMUs needing scheduled maintenance, repairs and overhauls. At one point in time during 2008 onwards, *KTM Komuter* services with a scheduled of 4 services per hour (15 minutes headways or intervals) were operating with only 28 EMUs, hence an overcapacity of more than 15,000 passengers. The published scheduled of services have been revisited and revamped from 15 minutes per service to 30 minutes and later 20 minutes headways or intervals. In other words, the train frequency has been reduced from 4 services per hour to only two and three respectively. The existing scenarios have indicated the need to increase the

number of capacity, the restructuring of services frequency to better reflect the available capacity, the replacement of overhauled rolling stocks and an improved and more frequent maintenance and repair culture among the operator's technical and engineering departments; simultaneously to meet the increasing demand levels.

Today, *KTM Komuter*'s annual ridership was at 36.557 million passengers (Ministry of Transport Statistics, Malaysia, 2008). This number can be translated into about 100,000 riders per average day. Demands could not be met by the current rolling stocks (at the time of writing only 26 three-car EMU sets were operational and track-worthy) and available capacity because some units are still undergoing overhaul programmes and the shortfall of old and disposed off units have yet to be replaced. Passengers have largely complained about the lack of comfort and convenience as well as overcrowding of the current units and locomotives. Most of the users claimed to have experienced low level of convenience due to the overloaded coaches and perceived low frequency especially during peak hours.

Passenger Catchment Areas

Another issue faced by *KTM Komuter* (*KTM Komuter* management, personal communication, 2012) was the low frequency and quality of feeder services provided at most of the stations. In Kuala Lumpur region, feeder services are offered by medium buses with capacity of 25 seats and 20 standees, often not in integration with the rail operations. In the case of *KTM Komuter*, it does not have its own feeder services, and the buses are often operated by independent bus companies or by RAPIDKL (a conglomerate company managing both city buses and light rail services). This is an obstacle to increase the catchment of passengers around the selected residential buffers for instances 5km, 10km or 15km around the stations. The situation was made worse for the captive riders than choice riders due to inaccessible stations by personal mode of transportation. It was not clear how the rates of catchment were calculated during planning and development of *KTM Komuter* system, because there was no systematic documentation of catchment studies (KTM Komuter management, personal communication, 2012). Other issues identified during the board meetings and interviews with *KTM Komuter* management and users surveys have also included that:

i. the catchment areas of KTM Komuter and its coverage were still inadequate, with stations being planned and developed at unstrategic locations of low population density and limited feeder services

ii. the lack of parking facilities and inadequacy and sub-standard feeder services have exacerbated the dwindling number of passengers at certain stations

iii. The inadequate catchment of passengers of certain stations has resulted in low viability and feasibility of providing sustainable feeder services and high quality accessibility.

The geographical boundaries were usually used to define catchment areas. From the centroid of stops, halts or stations, analysis of potential number of passengers can be made in accordance with the land use and population density. Using Geographical Information System (GIS) tools, the catchment falling under the determined radii which are buffers around the selected stations (centroid) or street networks (links) can be determined. GIS is able to input the layer of information regarding travel demand to the geographical catchment area. Additionally, time-based accessibility index can also be applied in monitoring the performance of *KTM Komuter* services. One hindrance to the smoothness of planning and implementation of development and construction for facilitating feeder services is the cost of acquiring extra land surrounding the stations. Currently only 38 out of the 53 stations provide park and ride facilities. Plans are under way for additional 15 stations to benefit from additional parking provision. Other improvements planned are the increasing frequency and quality of feeder services and stations' upgrades. At the time of writing, feeder services operated at a headway ranging from 30 minutes to more than an hour for selected routes and neighbourhood coverage.

Routes

The public transport riders or patrons generally have one purpose in mind, which is getting from one origin to a destination on public transport with the greatest ease and convenient possible. The customers' ease of transferring from one public transport system to another is termed as connectivity (Wen-Ji, 2003). Connectivity is basic to using or providing public transport service. Connectivity is what most personal transport modes or private vehicles can offer better, hence a selling point for a public transport operator offering this kind of alternative mode service. Therefore, it is essential for the public transport operators, public agencies and organizations involved in funding and promoting public transportation to heed connectivity from the customers' viewpoint (both new and experienced riders and non-users).

Currently, *KTM Komuter* has two main routes. Along these routes, there exist four interchange stations. Three stations provide transfer facilities to RAPIDKL services and one to *KLIA Ekspres* and *KLIA Transit* routes as well as monorail service. Four new stations along the Sentul-Batu Caves route (7.2 km) were completed in 2011. The project which cost more than RM515 million included electrification, double tracking and refitting of the old existing track, signalling, communication and construction of stations: Batu Cantonment, Kampung Batu, Taman Wahyu and Batu Caves. In the near future, Mass Rapid Transit (MRT) system proposal will provide two more interchange opportunities namely at Sungai Buloh and Kajang districts. With the opening of stations: Senawang and Sungai Gadut along the Rawang-Seremban route, the Klang Valley-Seremban region is properly accessed by heavy rail network. Long term planning would eventually lead to creation of circular lines and sub-lines of smaller-scale routes with the Greater Kuala Lumpur Region, hence completing the integrated system and network coverage of passenger rail services envisaged by many in the industry (*KTM Komuter* management, personal communication, 2012).

Ticketing System and Travel Time

Since its first operation, *KTM Komuter* has adopted the paper ticket system. It later introduced the 'Touch n Go' pre-paid stored value plastic-card-based ticket system to overcome some of the problems relating to inadequate ticket counters and high utilization of ticket vending machine during peak hours. However, the introduction of the new system has not improved much of the issue identified with the initial purposes, but rather increased the waiting time and overall journey time. Even with the new system, total travel time has since been in excess of 25 per cent due to waiting time for tickets transactions and idle time spent for rail cars to arrive at stations or platforms. In other words, to reach the destination at a designated arrival time, passengers have to begin the journey 25 per cent earlier than the normal departure time. Ticketing issue is also related to the fragmentation of the public transport system, each operator adopting a separate non-compatible system and diverse collection systems. It is envisaged that an integrated smart ticketing and contactless ticket system with features such as those of Oyster Card (London), EZ-Link (Singapore) and Octopus (Hong Kong) will be able to replace all the different ticketing system of bus and rail systems across *Klang Valley* in the near future.

Station and Station Facilities

Review of literature (Bachok, 2010) has also identified that the difficulties of transferring between and among many rail and road based public transport systems could hinder smooth and safe travels, compounded by the limited number of station termini with effective and efficient interchange facilities. This decreased the attractiveness of public transport and eventually reduced the options of users to undertake the whole or most of the journey legs by public transportation (Wen-Ji, 2003).

Servicing about 53 stations and localities, *KTM Komuter* trains now traverse over 210 km of networks. Some of these stations were planned and designated accordingly as transfer or interchange stations. KL Sentral, Bandaraya, Kuala Lumpur, Bandar Tasek Selatan and Putra stations are such as those. Along the newly extended route, passengers from the northern suburbs such as Tanjung Malim must transfer at Rawang stations to continue their journey southwards and *vice versa*. Whilst these stations may have some features for transfers, they were lacking much in seamless and smooth pedestrian interchanging experiences to both rail and road based public transportation. First, the stations connection with the other bus or rail system can be of great walking distance under extreme weather of Malaysia (heavy rain and high humidity under scorching sunrays), not weather-proofed and disabled-friendly and can also be unsafe, especially for female users travelling during late evening.

Many stations with so-called transfer facilities, lack the transit-oriented development interchange characteristics, including single integrated ticketing system. Many of these stations are located where population densities are low, retail and business functions are limited to induce walking culture and do not serve the high density residential areas, where many captive riders often dwell in. It is therefore, essential to evaluate these stations' characteristics and propose schemes to uplift the stations' features and facilities so that minimal qualities of transit-oriented development interchanges can be ensured.

Incidents/Accidents Detection and Related Information Dissemination

Incidents and accidents can be two important issues hindering the efficient, smooth and safe rail journey experience. On average, from year 2004 to 2006, approximately three incidents and/or accidents have been recorded annually within *KTM Komuter* services (Ministry of Transport, 2006). Most of them involved intercity trains that shared the same track system with the *KTM Komuter* service. The impacts were severe especially when services of

commuter trains during peak hours have already been delayed due to the backlog of existing rolling stocks. In most instances, passengers at terminals, stations and on-board the trains were not promptly informed of these occurrences and left un-attended with alternatives and possible responses.

Therefore, a study on the evaluation, prediction and emergency strategies such as diversion of routing and rescheduling is highly timely. In the least, an assessment into how passengers and commuters were supposedly reacting to such delays can be made and improved by interim dissemination of information and prescriptive responses to alternative or choices. This is an area lacking in the literature of public transportation in Malaysia, and this research specifically deals with this research realm.

METHODOLOGY

The study employed three methods of data collection. First, is the review of literature to set the scene for problem statement formulation. Second, the research team attended meetings of the board of management and held discussion session with *KTM Komuter* management team. From this method, various personal communications resulted in data gathering that was not made available in documented resources. Finally, primary data was also collected through an on-board intercept survey using pre-tested and carefully designed questionnaire forms. Observation of passengers' characteristics, stations attributes and trip making behaviour has further confirmed the responses made by the samples surveyed.

On-board intercept survey has many advantages over other methods in various aspects, after considering the values, cultures, beliefs, attitudes and weather conditions of the general Malaysian public. First, on-board intercept survey has been found to be particularly effective compared to household survey due to the avoidance of recall type of questions, especially those related to public transport trip making experiences and perception. Second, it is more effective because immediate screening of prospective public transport users can be ensured. Since, all on-board travellers are using public transport; samples can be as highly as 100 per cent representation of *KTM Komuter* users, regardless of being a first timer or otherwise. On-board intercept survey is also more effective than on-line, internet or computer-aided questionnaire survey because targeted samples would include all user types and would not exclude those without internet, computer or wired services. Finally, compared to at-station, at-terminal or at-platform survey, on-board intercept survey has been found to be very

efficient since it minimizes rates and chances of samples refusing or declining to response to questionnaire due to anxiety resulting from arriving or departing trains at the station or terminal or platform. In addition, having experienced real or actual trip making would increase the validity and reliability of samples' answers because they can easily and comfortably relate those questions with their current trip making activities.

Some 1200 questionnaire forms were distributed to passengers on-board the trains on various survey days and time period, during two phases: pilot survey and comprehensive survey. Some 1100 forms were completed and returned. Data entry and cleaning have found that some 1000 samples were useful and meaningful for data analysis purposes. The selections of respondents were based on a systematic randomized probabilistic sampling and identification of origin and destination of these passengers as screening process. Twenty enumerators were employed for each morning and afternoon survey period. A minimum of two enumerators were stationed at each door of each train car to observe and select the prospective samples. Using the 5^{th} interval, each respondent was identified at stations beginning at Batu Caves, Tanjung Malim, Rawang, Sungai Gadut Seremban, Sentul and Pelabuhan Kelang, then was selected, approached and handed the questionnaire to be completed. The 5^{th} interval was selected because it was deemed that biasness and skewness of samples can be avoided during selection, be them travelling in groups or individually. In other words, even if a large group was travelling chances of one of the members being selected can be ensured to be equal to that of an individual or a smaller group. Most of the time, if a party of five or more was travelling, the members might contemplate on the travel time and costs, since it can be more effective and less costly to travel in private vehicles such as cars compared to using public transport.

It was deemed faster and more effective for the surveys to be guided and forms to be completed by the enumerators who conducted the surveys as an information trips narration with the respondents. Using this method, target samples can respond more effectively in expressing their perception and satisfaction levels, without the distraction of reading, contemplating and writing the answers to the questions posed in the forms. Since the questions were comprehensive and the pilot survey indicated a minimum of 5 to 7 minutes were required to complete the forms, a screening activity of selecting only passengers travelling of a minimum of 7 minutes or 5 stations in the city centre or 3 stations in the outer suburb was conducted, before beginning the comprehensive intercept surveys.

The analysis and evaluation of data related to customers' satisfaction in terms of punctuality, delays, total travel time, service frequency, ticketing system, safety, convenience and facilities were carried out afterwards. Data was recorded in Statistical Package for Social Science software (SPSS), to assist in various analysis activities. Several techniques required at this stage were qualitative, quantitative, univariate and bivariate analyses. Consequently, findings were presented based on detailed and thorough descriptive and inferential analysis in the next section.

ANALYSES

Respondents' socio-demographic characteristics

Of the 1000 samples, some 41% of the respondents were males. This reflected the composition of passengers and the selection of railcars during the survey periods. The majority was local users (92%) with at least a college or university qualification (32%). The mean age of travellers was 30 years old, indicating a young, able-bodied and mobile sample grouping travelling on his or her own (more than 90% sample travelled alone). The average monthly household income reported by the respondents were RM2870 (USD 913), indicating a slightly higher income groups than the average population of Malaysia (GDP USD7,000 per annum or USD 585 monthly or RM 2100 monthly). A majority of the respondents were choice users, having owned or an access to alternative vehicles for similar types of trips undertaken during the survey periods. One in five had no access to an alternative mode for trips made, or in other words, captive users.

All the socio-demographic characteristics have bearings on the generalization of the findings and recommendations to be made in the following sections. Samples' characteristics would implicate certain patterns, skewness and tendency towards the kind of responses gathered in the sections to follow.

Respondents' trips characteristics

On average, the 1000 samples used *KTM Komuter* approximately once in a month during 2012, indicating a relatively low usage rate, not as commuters. During the surveys, 90% of respondents have been intercepted during both am and peak off peak hours due to several logistic reasons. As such, only one in ten respondents were regular or daily commuters. Routes along which they travelled were also not equally distributed with more respondents intercepted

northwards from Sungai Gadut station towards Rawang and Tanjung Malim (65%) and southwards from Batu Caves to Pelabuhan Kelang station (48%) possibly because of the longer distance and time of the journeys. Only 7% were intercepted during journeys from KL Sentral station to Batu Caves due to the short journeys involved.

A majority of the respondents were on homebound journeys (from and to home, 53% and 24% respectively). Similarly, journeys made from workplaces and education institutions were 19% and 15% respectively, while journeys to these to destinations were about 24% and 10% respectively. These three journey types and three main activities were the reasons for patronage of *KTM Komuter* by young and commuting riders.

Access modes to stations were friends' and family members' vehicles (24%), feeder buses (19%), own cars (17% used park and ride facilities) and pedal power (walking 12%). Meanwhile, egress modes to final destinations were friends' or family members' vehicles fetching the passengers (31%), pedal power (walking 26%) feeder buses (20%) and other connecting train systems. It can be seen that stations may not be highly accessible by other modes compared to private vehicles, implicating the rates and coverage of ridership. Even though catchment may be larger than or extended beyond the current ridership radii, lack of and inaccessible feeder buses might contribute to the less than optimal ridership from these stations.

Passengers' perception on the various measurement of performance can be highly influenced by the above discussed characteristics of trip and trip making.

Passengers' Perception of *KTM Komuter*'s Substitutional Mode Availability

Passengers were able to substitute *KTM Komuter* trip for other modes on almost all days of the week. For instance, they can drive their own vehicles, use other rail systems, ride the buses and motorcycles (60% to 75% of all trips can be made using these vehicles on Mondays through to Fridays). The highest substitution rate was possibility on Wednesdays with only 25% of riders being captive. Some 17% of *KTM Komuter* riders used the park and ride facilities and indicated that parking at a specific station was not as important as finding a space for parking. Majority (90% and 81% respectively) had no problems with parking fee rates and safety levels in parking areas.

Passengers' Perception of *KTM Komuter*'s Levels of Services

Capacity, routes and frequency

During peak periods, only 58% of respondents were able to board the first trains they encountered at the platform. In the morning peak period, 42% of the respondents were only able to board the second train services, while 1% had to wait for third trains to resume their journeys.

During evening peak periods, the situation got worse. Approximately 23% respondents had to board the second train while 2% had to wait for the third train to continue with journeys.

At present, trains were scheduled to service at a frequency of 3 per hour or 20 minutes headways or intervals. This meant that theoretically, a passenger has an average waiting time of between 10 to 15 minutes. Previously, the published scheduled had set the frequency at 4 per hour or 15 minutes headways or intervals, with an average waiting time of 7 to 12 minutes. However, in view of the reduced capacity due to overhauling, repair and maintenance activities, the revised frequency was established. Passengers stated that they had complained about the reduced capacity and changes in frequency. However, the situations did not get any better, and since 2008 the reduced frequency got worse, with a perceived increase in waiting time to more than 20 minutes on average. During the survey periods, the research team experienced, first hand, an average waiting time of more than 20 minutes, with an isolated excessive delay during two occasions of more than 2 hours waiting time.

The increased waiting time can be explained partially by the changes in capacity from 36 EMU sets in the 1990s to only about 28 EMUs operating at the turn of the century. Hence, perceived and actual frequency indeed has actually worsened, and headways or interval of 20 minutes could not even be met prior to the initiatives of GTPs by the government.

Around 74% respondents agreed that the current routes were adequate. Majority of the respondents (69%) also agreed that the additional routes including Seremban-Sungai Gadut and Rawang-Tanjung Malim have benefitted them in the sense of greater catchment of long distance destinations and trips being perceived to be closer than before. Only 55% of the samples agreed there was a need for route expansion to increase accessibility by population living in the outer suburbs. These respondents even suggested, among others, an extension of route to Sungai Besar, Kuala Selangor, Ulu Yam, Tampin, Gemas and Johor Bahru. Majority respondents (74%) respondents believed that the current capacity was insufficient. These users suggested the increase in capacity

will reduce many negative impacts including overcrowding during peak periods, delays and irregular schedule in adherence.

Safety and security perception on-board trains, stations and platform facilities
Safety and security were two important aspects perceived by the train users surveyed. However, there were not as important as improving the services frequency and scheduling, based on the responses of the users surveyed. At stations, three quarters of the respondents felt they could travel alone without being accompanied. This highly perceived level of safety and security was also supported by the idea that only half respondents believed that they should be cautious about the surrounding environment and be wary of their belongings. Most of the time, half of the respondents felt safe waiting at lowly-lit or enclosed areas of the stations. While waiting for the train to arrive, more than half also managed to find seats.

Overall opinions about the station and facilities were satisfactory. A high majority of users surveyed perceived the stations were clean and well-maintained. The ventilation system was also satisfactory. Only 55 respondents had experienced incidents in the last couple of years. 4% experienced or witnessed snatch theft while 1% experienced sexual harassment at the stations. Whilst 58% of the respondents saw security officers patrolling the stations, they also suggested that peak hours needed more frequent surveillance to ensure safety and security of passengers.

On-board trains, the majority of the respondents (82%) also felt safe travelling alone. Half of them believed that they should be wary of the surrounding and of their belongings. Approximately 5% of the respondents had experienced or witnessed snatch theft and 7% had experienced sexual harassment on-board the trains.

Ladies' coaches were used by 61% of the respondents surveyed. The reason for the preference was that ladies' coaches ensured safety and comfort. Most respondents were first informed of these services by their friends and families. When asked about the presence of a male user in the coaches, 58% of female users stated that they felt uncomfortable about it. Similarly, 95% of ladies coach users felt safe travelling alone. Likewise, 73% felt there was a need to be wary of the surrounding and their belongings.

Ladies coaches users surveyed felt safe even though trains were crowded, especially during peak periods. More than half female respondents stated they were able to find seats when travelling in a ladies' coach. 82% preferred to continue their journeys even though no ladies' coach was provided

within the train sets arriving at the station. 79% also stated that they would resume using *KTM Komuter*, even if the ladies' coach provided within the train sets arriving at the station were full. Some 14% of female respondents suggested that more ladies' coaches be provided in the future.

Overall, the respondents (86%) felt comfortable travelling with *KTM Komuter*. Seats have also been suggested to be reconfigured and redesigned to instil more privacy and to provide more spaces for increased number of passengers. Adding seats were suggested by some 10% while the remaining proposed regular maintenance and cleaning of the train.

Crowding was not especially a concern of some 91% of the respondents. Peak hours may be more uncomfortable (4%) and at all time, it was suggested that no crowding be allowed (3%). One in eight perceived that air-conditioning onboard train needed maintenance, because it was especially warm and uncomfortable during peak hours and crowded situations. The majority (96% to 97%) perceived the trains were comfortable, including doors, windows, movement within a coach and inter-coaches.

Information, ticketing and fares

Respondents' first encounters with *KTM Komuter* services were the results of friends or family members introducing them to the system (67%). Around 12% of the respondents reported that they were first made aware of *KTM Komuter* services by the electronic media including the television. The remaining 21% accessed the print media to become aware of *KTM Komuter* services. Majority of the respondents (73%) perceived that the information has assisted their way finding, with less than 2 minutes taken to correctly find their directions.

Before embarking on a trip, about 33% sought *KTM Komuter* services from the service guide leaflet, while 32% referred to paper timetables. Approximately 25% of the respondents accessed the internet and other 10% telephoned the call centre to find out about *KTM Komuter* services. At the station or terminal, two in three respondents (54%) accessed travel information from the platform information displays. About two in ten respondents (22%) utilized the static directions and signs to access the train services information. The remaining respondents consulted the platform and counter staff (7%) and public address system (4%).

On-board, passengers surveyed had two choices of information provision. Nine in ten respondents (92%) listened attentively to on-board announcement to orientate themselves in determining the stations of arrival. The

remaining 8% respondents studied the route maps to identify their current locations. 80% respondents perceived that the existing signage directions were adequate and 79% respondents agreed that both platform and on-board signage were adequate.

Approximately 24% to 33% of the respondents experienced some confusion when comprehending the information provided. Among the reasons were that the signage and information were not continuous in directing to station or destinations, the location being not suitable and the lack of information about the current location. Similarly, unclear announcement at platforms and onboard had led to these confusions. The respondents suggested, among others:

i. clear announcement and update information at platform, station and on-board trains to be provided
ii. more detailed information on displays to be provided
iii. information and other facilities need to be maintained
iv. maps and words need to be in larger fonts for legibility purposes
v. customers' feedback needs to be responded to promptly and staff need to be more customer-friendly
vi. electronic displays can be adopted for displays onboard train
vii. more comprehensive and prescriptive information to be provided at interchanges stations

Majority of respondents (83%) surveyed, purchased the one-way conventional paper ticket. Only 1% utilized the return and weekly ticket facilities. The remaining 14% and 1% respondents used the smart card 'Touch n Go' system and staff passes respectively. Majority of the respondents (96%) had purchased the tickets at the manual counters. Only 1% utilized the vending machine facilities. Almost all activities relating to finding ticket counters, purchasing and payment of tickets took less than 2 minutes to complete respectively. However, purchasing a ticket from the vending machines took a little bit longer i.e. 5 minutes, similar with entering the platform after purchasing the tickets. Purchasing prepaid tickets also took 3 minutes. The users surveyed recommended all activities relating to ticketing be undertaken within 2 minutes or less.

Vending machine breakdowns were rare phenomena in many stations. However, 35% of the respondents recalled having experienced this. They eventually bought the tickets manually at the counters. The stations involved were: Batu Caves, Taman Wahyu, Sentul, Bank Negara, KL Sentral, Shah

Alam, Tanjung Malim, Rawang, Segambut, Mid Valley, Serdang, Kajang, UKM, Batang Benar, Nilai dan Seremban.

Delays

Approximately three out of four of respondents have experienced delays in the last couple of years. Actual waiting time varied from generally an average of 17 minutes during week days with the exception of Fridays to 39 minutes during the weekends (read also section on capacity, routes and frequency). From the 79% who revealed that they experienced delays, some 77% recalled receiving information about the delays. From this group of respondents the majority (74%) stated that delay information was conveyed through the public announcement system, while some 22% sought the display message signs. The majority of those who experienced delay had waited for the trains to resume to its normal services.

During peak periods, users' surveyed perceived waiting time were higher than those of off peak periods. These users perceived that they waited for a range of 23 minutes to 68 minutes during these periods. On a typical week, the performances of services were also evaluated. Normal trips with train arrival and departure generally on time or within 5 minutes of published schedule were agreed by some 20% of the respondents for all day in the typical week. Some 6% of respondents stated that trains were delayed more frequently on Fridays of a typical week. Some 5% respectively indicated delays occurred more frequently during weekends of a typical week. Delays for both Tuesdays and Wednesdays of a typical week were indicated to occur more frequently by only some 3% of the respondents respectively. Only 4% perceived that delays occurred more frequently on Mondays and Thursday of a typical week. Some 1% perceived that services were frequently cancelled on all days of a typical week. Approximately 47% to 55% of respondents perceived that trains were running on a frequency of 15 minutes while less (17% to 28%) believed that trains run on a frequency of 30 minutes.

On a typical week too, only 1% of respondents perceived that trains were arriving ahead of the scheduled time on Mondays, 3% on Wednesdays and none on other days of a typical week. However, as much as 5% believed that trains were departing from stations before scheduled time on Wednesdays. On the other days of a typical week, only 1% respondents perceived that trains were departing ahead of scheduled time. The majority (54% to 62%) perceived that on a typical week trains were departing around 5 minutes after scheduled time from the stations. Variation from scheduled was more persistent on Wednesdays (62%) compared to Sundays and Tuesdays (55%) respectively. More than a

third of respondents were in the opinion that trains were departing around 10 minutes behind schedule on all days of a typical week. The variation was more persistent on Mondays, Tuesday and Wednesdays (35%) respectively compared to 27% on Sundays of a typical week. Between 5% and 12% of respondents perceived that trains were departing from stations more than 10 minutes behind schedule, especially persistent on Sundays.

Overall perception of services
It can be seen that there were variations of the perceptions and satisfactions with the services. Mixed perception of the waiting times and train delays could be due to the socio-demographic and trips characteristics of passengers, as discussed earlier. Nevertheless, it is imperative for this research to emphasise that most of the passengers can recall being delayed and can express their dissatisfaction with *KTM Komuter*. Hence, a rather overall negative perception of the commuter rail services.

In general, one in four respondents viewed *KTM Komuter* services to be delayed. Some 9% indicated crowding as a major issue of services. Approximately 3% perceived that the services needed overall improvement, while the remaining was satisfied with the services. Only 1% of the respondents believed that the services have improved since the first time they used it. On the other extreme, only 1% strongly argued that the services were horrible and could not be improved in the future.

Overall Findings

The surveys have preliminarily concluded the following findings:

i. Train services were infrequent compared to the published schedule
ii. Train services seldom adhered to schedule
iii. Train services were susceptible to delays and frequently delayed
iv. Information during delays were currently provided but inadequately, in the sense of prescribing detail reasons for delays and alternative actions to be undertaken during severe cases of delays
v. Train capacities during peak hours have reached its maximum, and waiting time of more than 30 minutes were intolerable for some commuters and users. In many cases, users had to wait for the second trains to board during peak hours
vi. Train capacity during peak hours were also insufficient in the sense of spaces provided. The current 3-car system needed extending and

suggestions have been to increase up to three more coaches per service run.

vii. Other station facilities improvements were currently not critical, although the perception about the services will be further improved in conjunction with increased capacity.

viii. In the short run, increasing capacity was the immediate action to be taken, while in the long run overall upgrading of services levels need to be ensured too.

OUTPUT OF STUDY

The findings from this research will help to create a set of alternatives in improving the performance of *KTM Komuter*. The recommendations and suggestions assisted by strong justifications will indeed assist the service providers, decision makers, stakeholders and responsible authorities to provide a better and more efficient public transportation system.

The study on the users' perception of *KTM Komuter* services prior to the improvements (additional coaches for *KTM Komuter*) made based on the National Key Results Areas (NKRAs) under GTPs have indicated several directions of improvements (Malaysian Government, 2011). From the analyses, the respondents have a general dissatisfaction with the current levels of services. Areas of their concerns included services frequency, adherence to schedule and delays. Passengers surveyed also put forward several recommendations to improve the current services. These included:

i. to increase train frequencies from the current 30 or 20 minutes headways or a frequency of two or three services per hour to 15 minutes headways or a frequency of 4 services per hour
ii. to increase train capacity from 3-coaches to 4-coaches or more system
iii. to increase rates of schedule adherence among train systems
iv. to frequently maintain the existing rolling stock to ensure each train set performs its best services in timely manner
v. to pay appropriate heed to passengers' complaints and feedbacks so that only important improvement areas be immediately addressed to in time of limited budget allocation for public transport industry.

The researchers hope that necessary, prompt and timely actions are undertaken to ensure that passengers' satisfaction and loyalty to *KTM Komuter* services are kept to their maximum level. However, the willingness rates of repeat use (11%), so far has indicated otherwise. Hence, the prioritization and implementation of the above listed recommendations can be made immediately. In the least, the choice and captive riders should perceive that *KTM Komuter* is still a relevant and an attractive alternative to other private modes and remain loyal to the services.

CONCLUSIONS

This research derives its basis from the viability of *KTM Komuter* as a sustainable transportation mode. Rail-based transportation has been recognised as one of the many strategies for alleviating traffic congestion in urban areas, and a means of reducing peak hour traffic. The findings from this research will help create a set of alternatives in improving the performance of *KTM Komuter*. The NKRAs' objective of modal split of 25% (of public transportation share) can be achieved if improvements can be carried out in the services levels of *KTM Komuter* including rolling stocks, scheduling and dispatching, signaling and track maintenance, public transport information systems, station facilities, seamless ticketing and improvement of users' satisfaction. The recommendations and suggestions assisted by strong justifications will indeed help the service providers, decision makers, stakeholders and responsible authorities provide a better and more efficient public transportation.

This paper attempted at presenting an overview of the users' satisfaction with *KTM Komuter* services and how *KTM Komuter* services contribute in achieving sustainable transportation in Malaysia. Satisfaction of the public transportation services can be partially represented by the users' perception of *KTM Komuter* services. Since the findings have indicated relatively infavourable perception, therefore, it has been assumed that the satisfaction levels of public transportation in Kuala Lumpur were also relatively lower. Despite the fact that the study being a work in progress, it is still expected to contribute to the understanding and potential of *KTM Komuter* in alleviating, if not solving, peak hours traffic congestion, and thus promoting more sustainable transportation in Malaysia. The contributions are reflected by the generalization of findings, recommendations and prioritization of several aspects of services as have been discussed previously.

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LAND COVER CHANGE DETECTION ANALYSIS ON URBAN GREEN AREA LOSS USING GIS AND REMOTE SENSING TECHNIQUES

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Abstract
The loss of green area has been rising all over the world particularly in big cities. For a number of decades, urban sprawl and developments have changed the natural landscapes of urban areas where areas with green areas have been converted into built up developments and other land uses. Thus this research intends to study the changes of green areas in Kuala Lumpur based on land use detection analysis approach where 3 series of remote sensing images namely SPOT2, SPOT4 and IKONOS for year 1990, 2001 and 2010 have been used to acquire the data on the green area changes aided by ERDAS IMAGINE 2011 and ARGIS 9.2. The finding of the study shows that there is a decrease in the size of green area in Kuala Lumpur from year 1990-2010 due to pressure of urban developments. Two significant factors which contribute to the changes of green area in Kuala Lumpur have been identified in the study, which are the increase in built up areas and sprawl development pattern.

Keywords: Land covers detection, green area, urban area, GIS and Remote Sensing

INTRODUCTION

The change detection is the method of identifying differences in land cover over time. Land cover change is a key driver of global change (Vitousek, 1992) and has less significant implication to alter the landscape. In particular, land cover

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change in urban areas is a major concern due to the built-up area expansion and rapid changes. Changes in green area consequently will result in the change of wildlife habitat, aesthetic, historical values, ambient air quality and other resource values, which in turn influence policy decision. Change detection is useful in many applications such as land cover and land use changes, habitat fragmentation, the rate of deforestation, coastal change, urban sprawl, and other cumulative changes through spatial and temporal analysis techniques such as GIS (Geographic Information System) and Remote Sensing along with digital image processing techniques. Mac Lead & Congation (1998) list four aspects of change detection which are important when monitoring natural resources:1) detecting the changes that have occurred; ii) identifying the nature of change; iii) measuring the extent of the change and iv) assessing the spatial of the change. The basis of using remote sensing data for change detection is that change in land use result in changes of radiances value which can be remotely sensed. Numerous techniques to perform change detection with satellite imagery have been the result of increasing versatility in manipulating digital data and increasing computer power. GIS is the systematic introduction of numerous different disciplinary spatial and statistical data that can be used in inventorying the environment, observation of change and constituent processes and prediction based on current practices and management plans. Remote Sensing helps in acquiring multi spectral spatial and temporal data through space borne remote sensors (Mohd Noor et al., 2012; Mohd Noor et al., 2011 and Ibrahim et al., 2000) while Image processing technique helps in analyzing the dynamic changes associated with the earth resources such as land and water using remote sensing data. Thus, spatial and temporal analysis technologies are very useful in generating scientifically based statistical spatial data for understanding the land ecosystem dynamics. Successful utilization of remotely sensed data for land cover and land use change detection requires careful selection of appropriate data set (Mohd Noor and Hashim 2009[a] and 2009[b]; Syriou, 2008 and Davis et al., 1991).

Green area can be defined as any green elements existed as the land cover on the ground which includes green cover, green spaces, green lungs, green belts and open space, any other elements other than are described as built-up area where it mostly comprises of with man-made hardscape, exposed bare soil, rocks and water elements (Van Boummel et al, 2006).Green area helps to reduce building heat in urban areas where it absorbs heat and maintains the cool at day and night as well as provides shades to the pedestrians and ground. Green area also has the ability to improve air quality of the surrounding environment where this ability is extremely important in today's contaminated environment. A tree can remove 26 pounds of carbon dioxide from the atmosphere per year which equals to 11,000 miles of car emissions (Relf, 2009). Lambinand Geist

(2007) mentioned that the causes of land cover changes can generally be divided into two which are proximate (direct cause) and underlying (indirect cause) where land cover can change due to natural causes such as flood, earthquake or tsunami. Green area in urban is sometimes synonymous to presence of nature in the predominantly man made environment. Urban vegetation is an important point for sustainable development, environmental conservation and urban planning process of a city. Furthermore, World Health Organization (WHO) has been specified a standard of minimum $9m^2$ of green area per person in every city in the world. The optimal amount would be $10m^2$ to $16m^2$ for every person (Vázquez, 2011). In relation to this matter, the current provision of green area for every resident of Kuala Lumpur as has been stated in Chapter 5: Greater Kuala Lumpur/Klang Valley, Economic Transformation Program is only $12m^2$ per people which is lower compared to the standard specified by the World Health Organization (WHO).

The aim of this study is to incorporate the temporal dependence of multi –temporal image data on land cover change detection techniques particularly in detecting a degradation of green area in an urban area that consequently enhance interpretation capabilities. Moreover integration of multi sensor and multi temporal satellite data effectively improves the temporal attribute and the reliability of multi data.

Urban Green Area in Malaysia

The World Environment Day 2011 in New Delhi organized by the United Nations Environment Program (UNEP) has highlighted the loss of forests and green area which happens in cities all around the world. Continued deforestation which is estimated at 5.2 million hectares worldwide per year (Shukla, 2011) is an alarming issue that must be realized by local authorities and population especially in urban areas. Kuala Lumpur experiencing dramatic changes in land use for the past few decades and there is a big possibility for depletion of green areas which have been turned into the new built up areas, towns and transportation facilities. Due to pressures from new developments in urban areas, green areas in Kuala Lumpur are seen to be rapidly declining in term of allocated space and quality. One of the major urban problems associated with the loss of green area in Kuala Lumpur is the flash flood which has been a daily occurrence in Kuala Lumpur whenever there is a heavy downpour, especially in the city centre and downstream areas (The Star, 2012).

The effort of urban greening in Malaysia has been done for the years before Independence where the greening programs have been started by British colonial in the past few decades. The issue of declining green area has become a

major issue throughout the world particularly among developed and developing countries due to the obvious negative impacts which occurred as the result of loss of green area in term of visual quality, environmental quality and health quality which leads to various establishments of organizations and voices which fight to protect the remaining green area from being disappeared (The Star, 2012).New developments and projects changes the environment in Kuala Lumpur where most green areas have been converted into built up areas. The current gazette open space to population ratio for Kuala Lumpur is in a poor state compared to London with 4ha per 1,000 people, Melbourne with 2ha per 1,000 people and Toronto with 2ha per 1,000 people while current provision of green area is only 12m^2 per people compared to World Health Organization (WHO) standard which is 16m^2 per people thus it is important for this research to identify how to assess the changes of green areas in Kuala Lumpur as the questions on what, when, where and why the changes of green areas happened in Kuala Lumpur are still unsolved.

Study area: Kuala Lumpur

The study area is located in Kuala Lumpur (3°8′51″N 101°41′36″E), Malaysia, the federal capital and most populous city in Malaysia where it covers 243 km^2 (94 sq mi) of land with an estimated population of 1.6 million in 2012 (Figure 1). Majority of the land use pattern consist of built-up areas (commercial, residential, institution, industrial recreational area, infrastructure and utilities).Once home to the executive and judicial branches of the Federal Government before it was moved to Putrajaya in 1999, Kuala Lumpur was ranked 48th among international cities by Foreign Policy's 2010 World Cities Index and was ranked 67th among international cities for economic and social innovation by the 2thinknow Innovation Cities Index in 2010. Therefore, it is crucial to sustain a green area in this region needs is crucial to ensure a prosperity and health of the urban population.

Figure 1: Location of study area – Kuala Lumpur, Malaysia

METHODOLOGY

Material and software

The data were being collected from primary and secondary data sources. The data collected from the primary sources include topographic maps of the area, land use map, road map and two types of satellite imagery for year 1990 to 2010 (Table 1). The ancillary information collected from secondary sources includes road network, cadastral map, urban map and records of green area reserve.

Table 1: Different type of data used

No	Type of Data used	Year of Acquisition/Publication	Source of data
1.	IKONOS	2010	Malaysian Remote Sensing Agency (MRSA)
2.	SPOT 2	2001	
3.	SPOT 4	1990	
4.	Topographic map	1975	JUPEM
5.	Land use map	2005	Dewan Bandaraya Kuala Lumpur (DBKL)
6.	Cadastral Map	2003	
7.	Urban map	2004	

8.	Green area development data	2011	

Methods

In order to understand the dynamic phenomenon of land use changes, the basic requirement is the availability of information on green area change, urban pattern identification and computation of landscape metric. In this study all the required information has been compiled and converted to digital forms are readily used in both data processing in Digital image Processing System and Geographic Information System. The ERDAS imagine 2011 is the main Digital Image Processing used in the study, while ArcGIS software system is the geographic system used to generate various thematic layers consisting of Kuala Lumpur Administrative boundaries, roads, and administrative boundary map using topo-sheet and other available maps. Complete methodology of the study in Figure 1.

The image pre-processing and data preparation techniques were first to be carried out; which include image rectification. The image to map procedures has been applied to all satellite imageries using sets of ground control point area appear in the same place both in the imagery and known locations in corresponding map and the urban map used as ancillary information in the rectification process. Image classification is then applied to the pre-processed image, where the land use classes map of the entire study is produced. The supervised classification techniques have been chosen for this study, using supervised classifier in ERDAS 2011, which have enabled to separate built-up and green area in accordance to the requirement in the study.

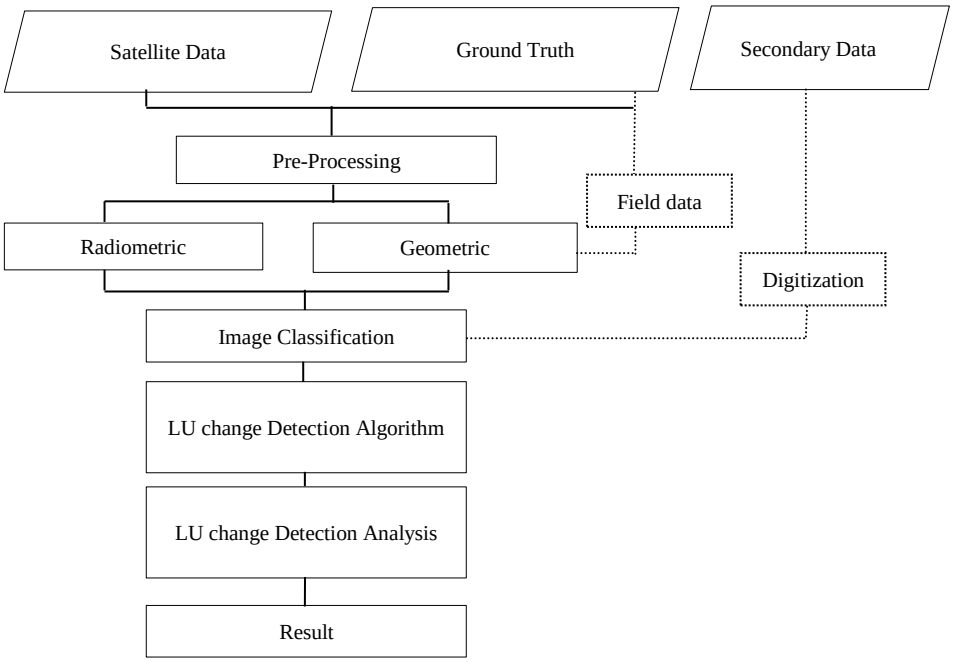

Figure 2: Flowchart of data processing adopted in the study

Once the training sites were determined, maximum likelihood classification was utilized. The Maximum Likelihood classifier is considered to give very accurate results. The classification scheme utilized only two land use classes representing green area and built-up area. The post interpretation phase included preparation of land use maps and detection of their changes. The change detection algorithm, which was employed in this study, is the post classification comparison. The overlay consisting of land use maps of 1990. 2001 and 2010 were made through ERDAS IMAGINE 2011 software. Then a transition matrix was prepared for the overlaid land use maps of 1990, 2001 and 2010 to obtain an analysis of LU changes.

RESULTS AND DISCUSSION

Image Analysis

The 3 sets of satellite data (IKONOS, SPOT2 & SPOT 4) have been successfully geometrically corrected and transformed to local mapping coordinate with RMSE ±0.5 pixel to ensure accuracy of the green area location analysed. In fact this RMSE had been widely used a good practice in ensuring good geometric output apart from ensuring sound configuration of ground

control point which is evenly distributed in the study area. Filling this imagery is also subjected to image enhancement respectively. While, the radiometric correction results show that histogram equalization is done for a better view and well distribution of pixels of the images which helps in better view and high possibility for more accurate classification. It is also shown in Figure 3 that the brightness values of each band span into optimum and uniform frequency based on image type where the brightness values of SPOT-2 XS image from year 1990 range from 64 to 256, while the brightness values of SPOT-4 1 I image from year 2001 range from 65 to 256 and the brightness values of IKONOS image from year 2009 range from 60 to 256 for each band within each image. This is because Histogram Equalization assigned all non-existent values below the minimum range and all non-existent values above the maximum range in the minimum and maximum range of each band respectively.

Three imageries obtained from year 1990 and 2009 are classified using supervised classification. The image classification carried out into main steps process to produce level classes of green area and built-up area in Kuala Lumpur. The results acquired from supervised data classifications have been reclassified into green area and built-up area and have been assigned with different colours to distinguish each class while percentage of both classes have been calculated based on the formula adopted.(Integraph 2001):

Histogram value for class / Total Histogram Value x 100……..(1)

The corresponding vector layer of land parcels was used as contextual information on the labeling level of the classified spectral class in a GIS system. The result of classification shows that two types of land use of the green area and built-up area are successfully classified. The assessment of the classification was carried out based on the classified image in each processing. Table 2 below summarizes the accuracy assessment obtained from the classification process done to every each satellite imagery. An overall classification accuracy of over 85% has been achieved during image processing. This is indeed very good classification confirmed by significant test.

Table 2: Accuracy Assessment for supervised classification processed of three types of satellite images.

Satellite Imageries	**Year Obtained**	**Accuracy (%)**	**Kappa Statistics**
SPOT 2	1990	90.0%	0.8758
SPOT 4	2001	95.0%	0.7826
IKONOS	2009	85%	0.8356

Changes in Green Area (1990-2010)

They're two results highlighted in this study consist of comparing and revealing a proportion of the green area loss. It clearly shows that the green area in Kuala Lumpur decreases significantly after 1990 until 2010. It is obvious from the table 3 that a study area had been subjected to the intensive human influence prior to the base year 1990. The average rate of change for the year 1990 – 2010 shows that we are losing a green area about 647.47 ha with 2.66% per year in 20 year period and increased increasing on the built-up usage with the same manner. The comparison of green area and built-up area changed is tabulated as follows:

Table 3: Comparison of area and rates of change of green areas and built area between year 1990 - year 2010.

Types of Land Use	**Year**						**Average rate of Change (1990-2010)**	
	1990		**2001**		**2010**			
	Area (ha)	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**	**Ha/yr**	**%/yr**
Green area	18618.66	76.62	8074.89	33.23	5669.19	23.33	-647.47	-2.66
Built-up area	5681.34	23.38	16225.11	66.71	18630.81	76.67	+647.47	+2.66

The spatial map in figure 4 below indicates the changes of green area for a year 1990, 2001 and 2010. In a span of 20 years there was the loss of more than ¾ green areas in Kuala Lumpur.

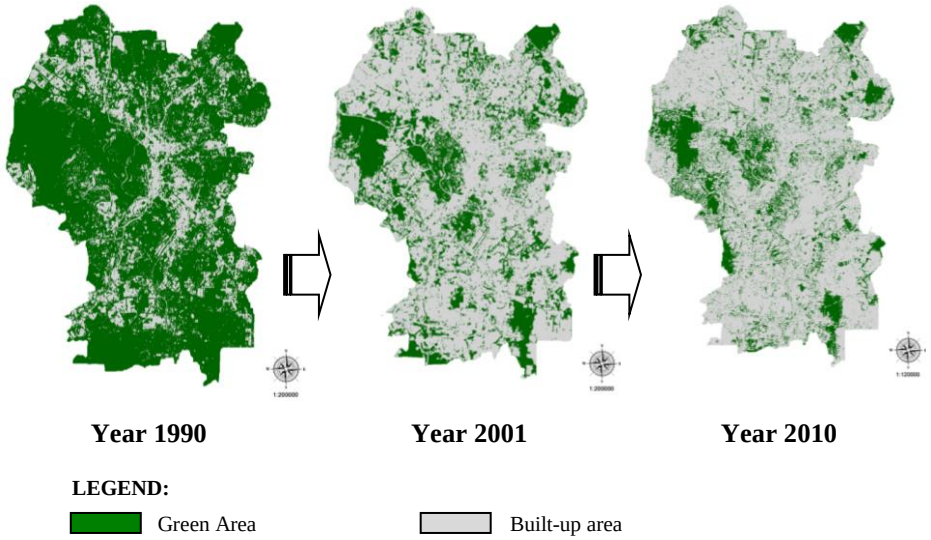

Figure 3: Results for classification

The proportion of the green area unit changed between 1990- 2010 also has been presented in table 4. Within the period, more land was brought under built-up area. In line with this, the land cover data of three years indicated the rapid changes/conversion from green area in built-up area.

Table 4: Proportion of green area units gained and/or lost between years 1990 – 2010

Types of Land Use	**Year**									
	1990		**2001**		**Difference Gained (+) @Lost (-) years 1990 - 2001**		**2010**		**Difference Gained (+) @ Lost (-) years 2001-2010**	
	Area (ha)	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**	**Area (ha)**	**%**
Green area	18618.66	76.62	8074.89	33.23	(-) 10543.77	-43.36	5669.19	-23.33	(-) 2405.7	-70.2
Built-up area	5681.34	23.38	16225.11	66.71	(+) 10543.77	+185.58	18630.81	76.67	(+) 2405.7	+114.82

Based on the table it shows that the percentage of green area from the year 1990 to 2001 decreased about 43.36% while the percentage of green area from year 2001 to year 2010 decreased about 23.3%. The built –up area shows that for 1990-2001, Kuala Lumpur has developed about 185.58% of the total development in year 1990 (5681.34ha) and 76.67% in 2001-2010 which based on year 2001 (166225.11ha). The total difference of gained and lost in the

Kuala Lumpur land cover stated that a total loss of green area for year 1990-2010 is about 70.2% and total gained of built up area for 20 year period is 114.82%. The declining trend of green area in Kuala Lumpur from year 1990 until 2010 shows that the green area will continue to decrease if no drastic action is taken towards this issue which will create a nightmare for the population of Kuala Lumpur in the future.

Factors of Green area changed in the study area

Based on the explanations on the results from the reclassification process, there are two significant factors which contribute to the changes of green area in Kuala Lumpur; a) Increase of built up areas and b) Sprawl development pattern. The developments in Kuala Lumpur result in more green area to be converted into built up areas. The following figure shows the increasing provision of land uses to be developed from year 1990 until the incoming year 2020. The provision of more land for these land uses will surely affect the percentage of green area in the future despite of more open spaces provided for each development.

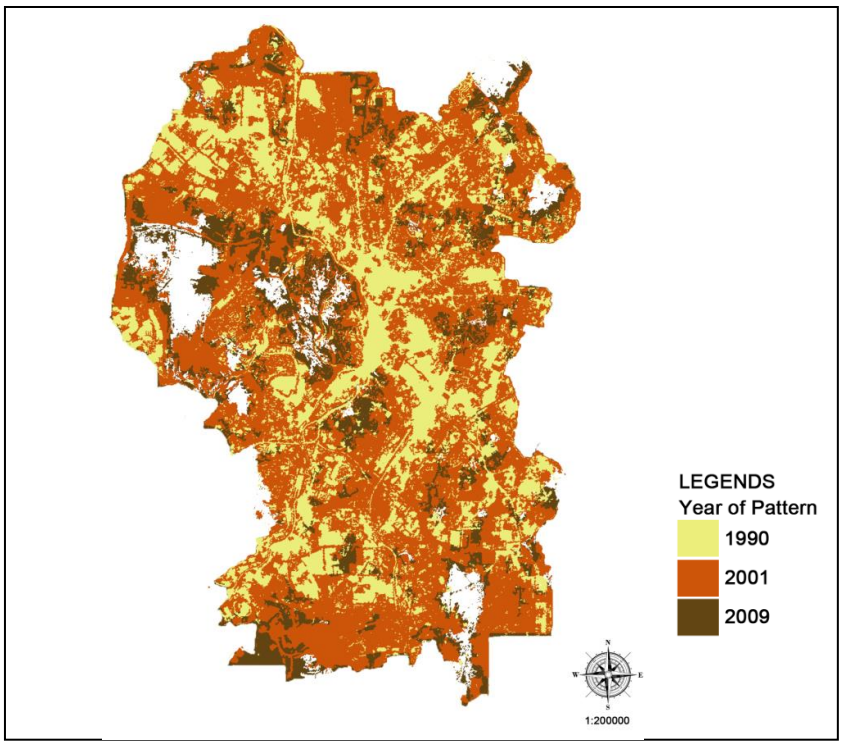

Figure 4: Pattern of green area changes in Kuala Lumpur

Sprawl development pattern in Kuala Lumpur involves horizontal development where the development continues to spread in a horizontal manner and involves more land. More green areas would be sacrificed once there is an expansion of development. Multiple layers of green area from the year 1990, 2001 and 2009 have been overlaid respectively to show the pattern of green area changes in Kuala Lumpur as shown in the figure above. This accuracy assessment shows that the results from classification stage are reliable to interpret the data of changes of green area in Kuala Lumpur and to be used for the analysis and findings of this study as Thomlinson et al. (1999) set a target for overall accuracy of 85% of a classified data to be considered reliable,

CONCLUSION

Green area is an asset of an urban area and it is an important factor to sustain life and living in any rapidly growing cities such as Kuala Lumpur. The rapid depletion of green area in recent year might result in adverse condition in urban area and its surrounding areas. The loss of green area brought many problems and harms to the area and population thus drastic action must be taken by the local authority. Initiatives should be taken to avert the area from the negative effects of urban pollution and deforestation by various government and non-government organizations, but the situation seems to overdo the expected rate of change and expansion. Green area is dynamic and spatial metrics analysis imperative for in understanding the landscape ecological conditions of urban green area. The study reveals that the green area in Kuala Lumpur is declining and will continue to decline if there is no specific measure taken by the local authority. Comprehending the results of data classification and explanations of the green area changes based on relevant information shows that the increase of built up area and sprawl development pattern are the factors which contribute to changes of green area in Kuala Lumpur. The integration of GIS and remote sensing as a powerful tool shows that a capability to provide a necessary physical input and intelligence for monitoring and detecting changes of land cover and land use in urban areas. In other hand, moving further, interfacing of urban planning with GIS and remote sensing should now receive due attention. Incorporation of land use planning model, urban sprawl analysis and related applications to evaluate different urban development alternatives in the GIS and remote sensing framework need to be explored for added knowledge in achieving a sustainable planning as well.

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ANALYSIS OF FACTORS INFLUENCING USE OF MOTORCARS IN INTERNATIONAL ISLAMIC UNIVERSITY MALAYSIA

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Abstract

Trends in transport have been changing and will continue to change over the next few years. A number of issues on the national and international transport scene have driven a need for organisations such as the Universities to further develop a sustainable transport strategy to encourage use of sustainable transport modes to achieve better environmental qualities on-campus. This research highlights the factors influencing the choice of using motorcars among student population for trips on-campus. A self-administered questionnaire was designed to collect data on "trip-makers" and "trip-making" characteristics and "preference to use motorcars as their main travel mode choice". The questionnaires were distributed to the student population who use motorcars on-campus. The total sample size selected was 100 and samples were selected from each Mahallah (hostel) by using stratified sampling method. The factors influencing use of motorcars on-campus was analysed using Pearson Chi-Square, Pearson's Product-Moment Correlation Coefficient and t-test. The preference of the respondents on the measures that should be implemented to attract students to travel by sustainable transport modes such as walking, cycling, carpooling, or using public transportation are also discussed. The factors such as "year of study", "vehicle registration status", "travel time by walking from Mahallah (hostel) to Kulliyyah (faculty)" and "experienced delay time to the Kulliyyah" were found to influence the use of motorcars on-campus. 86% of the respondents were willing to shift from using motorcars to sustainable transportation modes. Recommendations to realize the willingness to shift from motorcars to other travel modes include: formulation of policy by the University authority to reduce the over-dependence on motorcars on-campus; provision and management of efficient and effective public transportation services on-campus; provision and improvement of infrastructure

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to facilitate walking and cycling on-campus and strict enforcement on the use of illegal motorcars on-campus.

Keywords: *motorcar, travel mode, travel behaviour, sustainable transport, University campus.*

INTRODUCTION

The car is popular among commuters because it generally provides high levels of mobility and convenience. As many studies had shown, car ownership and its use have risen rapidly with increased income. The increasing affordability of cars is the most important explanation for the worldwide growth in motorisation in recent decades (Ingram and Liu, 1999, Schafer and Victor, 2000, Downs, 2004). Cars, being one of the means of transport, have significant impact and ability to affect the quality of environment in a place, as in most cases, transport is the main source of pollution (World Bank, 1996).

According to Norsyuhadah Norzalwi and Amiruddin Ismail (2011), University campuses can be defined as a small "city" because they commonly have their own communities, typical daily activities such as working, studying, businesses and own independent infrastructure facilities. However, they also experiencing the same problems as major cities are experiencing such as increase in the use of private transport, traffic congestions, noise pollutions, and also environmental problems. The motorization trends in University campuses are also similar with that of cities in terms of high use of private cars (Norsyuhadah Norzalwi and Amiruddin Ismail, 2011). Therefore, a sustainable transportation planning is in great need for University campuses to encourage the use of non-motorized travel modes, public transportation and other sustainable transportation modes in campuses.

This research discusses on the analysis of factors affecting use of motorcars as travel mode choice among on-campus University students. Because of the growing number of motorcars on-campus especially by student community, it is imperative to ascertain the likely reasons for the use of motorcars on campus. On-campus student population who own motorcars and travel to Kulliyyah (faculty) from Mahallah (hostel) by their motorcars either regularly or occasionally for attending classes was targeted. Regular users of the motorcars are the individuals who use motorcars all the time of their trips on-campus and occasional users are those who use motorcars only during some time of their trips.

LITERATURE REVIEW ON FACTORS INFLUENCING MOTORCARS AS TRAVEL MODE CHOICE

According to Hjorthol (1999) and Forward (1998b), there are several reasons why motorcars are so popular. It is mentioned that the use of motorcar provides a convenient and comfortable way to travel. The driver and passengers can travel undisturbed and feel secure, and a car journey is more time-saving. In addition, the motorcars also have cultural and symbolic values. Jensen (1997) arrives at the conclusion that the motorcar is not only a convenient mode of transport but also satisfies other needs, for example feeling that one is in control of one's journey.

Normal transport-economic models assume that people are rational beings and choose the mode of travel that gives the most benefit. Many researchers, however, had considered that people choose their mode of transport according to their feelings and habits. This manifests itself, in fact, that people do not change their behaviours just because conditions change, for example, improved public transport, since people weigh in more values on feelings and personal habits than time and cost when they choose their mode of transport (Goodwin, 1998 and Ben-Akiva et.al., 1999).

Meanwhile, Goodwin (1991) also mentioned that the motorcar is an important part of people's lives from an early age. Even when they are very young, children learn that the motorcar is a status symbol. It is also considered that taking one's driving licence as an important ritual in their early age. The motorcar is spotlighted in the films and made to symbolise freedom and strength. The car is implemented early in children's lives and becomes part of their everyday life together with feed bottles, comforters, and mom and dad. This is why methods of persuasion and other measures in the form of incentives and threats have largely proved ineffectual other than in just a few per cent of cases (Goodwin, 1991).

According to Lindström Olsson (2003), the choice of travel mode is affected by many factors, everything from transport-specific factors (describing the various components of the transport system) to individual-related factors such as a person's attitudes and habits. The choice of travel mode are influenced by the factors such as speed, journey length, comfort, convenience, cost, reliability of alternative modes, the availability of specific travel modes, town size, age, and composition; and the socio-economic status of the persons making the journeys. These factors are classified in many different ways in the literatures (Lindström Olsson, 2003). The measures of competitiveness between

different travel modes are usually derived from an analysis of three sets of factors:

a) *Characteristics of the journey to be made* (length, time of the day the journey is made, purpose of the journey, etc.)
b) *Characteristics of the persons making the journey* (car ownership, income, social standing, gender, age, etc.)
c) *Characteristics of the transportation system* (travel time involved, cost, accessibility, comfort, etc.)

Many studies showed that the travel time and cost are crucial to the choice of travel mode and the decision to travel (Algers et al., 1995). Kottenhoff (1999) showed that the level of comfort and services provided by travel modes are also very important. A study in Gothenburg on motorists' choice of track-bound taxis as a hypothetical travel mode, the car drivers had indicated that the following factors were important: low fare, maximum 300m walking distance, substantial time gain, enjoyable, comfortable, clean, tidy and hygienic. Motorists want short distances to public transport, up to 3 minutes, as compared to public transport passengers who can accept up to 10 minutes walking distance (Loncar-Lucassi, 1998).

In an attempt to encourage the use of alternative mode of transport other than motorcars, the University of Bradford applies travel plan to its community in order to reduce not only the amount of traffic but also to promote a wide range of more environment friendly and healthy transport options (University of Bradford Smart Move Travel Plan, 2004-2009). Some of the initiatives that are introduced as part of travel plan at the University of Bradford include: measures to encourage flexible work practices, walking, cycling, greater use of public transport, car sharing and car parking management (University of Bradford Smart Move Travel Plan, 2004-2009).

The University of Manchester in UK has recognized the need to ensure the use of sustainable mode of transportation by the University's population. The University has developed the first Green travel plan initiatives to support its commitment on the use of sustainable transportation modes to address the growing transport and car parking issues (University of Manchester Green Travel Plan, 2006-2011). Some of the significant components in the University's Green travel plan include: additional facilities for cyclist and pedestrians; introduction of new parking charges to encourage car sharing; further development of the discounted public transport ticketing scheme; producing a student travel plan; and working with city council to integrate the

newly formed cycling routes as part of the public realm into the wider city cycle network (University of Manchester Green Travel Plan, 2006-2011).

BACKGROUND OF STUDY AREA

This study was carried out in IIUM Main Campus that is nestled in a valley in the district of Gombak in the state of Selangor. IIUM was selected because of the growing number of motorcar use among the student population. The number of registered cars on-campus has been increasing at 1.8% annually from 2007 to 2010 (Farah Diyanah Ismail et.al. 2012). Additionally, the increase in the use of motorcars by students has been inducing tremendous pressure on the limited road and related infrastructure especially parking both at the Kulliyyahs and Mahallahs The parking spaces at the Kulliyyahs were highly utilized at an average of 83.55% indicating high parking demand (Farah Diyanah Ismail et.al. 2012).

IIUM is located approximately 10 kilometres at the north-east direction from Kuala Lumpur at the foot of the Gombak Hillside.The campus is also greatly accessible via Middle Ring Road 2 (*MRR2*), Karak Highway or via Gombak Road. The University was established on 23rd May 1983. This Garden of Knowledge and Virtue campus covers approximately 700 acres of land area accommodating 17 hostels for students housing or known as Mahallah and 8 faculties or known as Kulliyyah. At present, the University accommodates 2,708 employees (IIUM Management Services Division, 2011) and 15,068 students (IIUM, Security Management Unit, 2012). The campus is also provided with 8,618 parking spaces (IIUM, Security Management Unit, 2012).

As of March 2012, there were 1,961 students registered with Security Management Unit for the legal use of motorcars on-campus. According to Security Management Unit, the number of vehicle registration applications among students in the 2011/2012 academic session has decreased by 6.41% from 2010/2011 academic session. It is obviously due to change in policy by the University management allowing only 3rd year students, 4th year students and above to apply for vehicle stickers for the use of motorcars on-campus. However, there was slight increase in the number of vehicle registration application, 0.78% from 2007/2008 to 2008/2009 academic session and 1.27% from 2008/2009 to 2009/2010 academic session.

The main buildings that include masjid, administration buildings and Kulliyyahs are placed at the central area and Mahallahs and other facilities for students are located surrounding the main buildings *(Refer to Fig. 1).* The

students of IIUM are free to choose any travel modes that they prefer to go to Kulliyyahs from their Mahallahs for attending classes. The available travel modes for the students within the campus are walking, cycling, public transportation and private vehicle. The campus also provides intra-campus bus services for the IIUM community. However, these services are limited and provided only to those students staying at the selected Mahallahs.

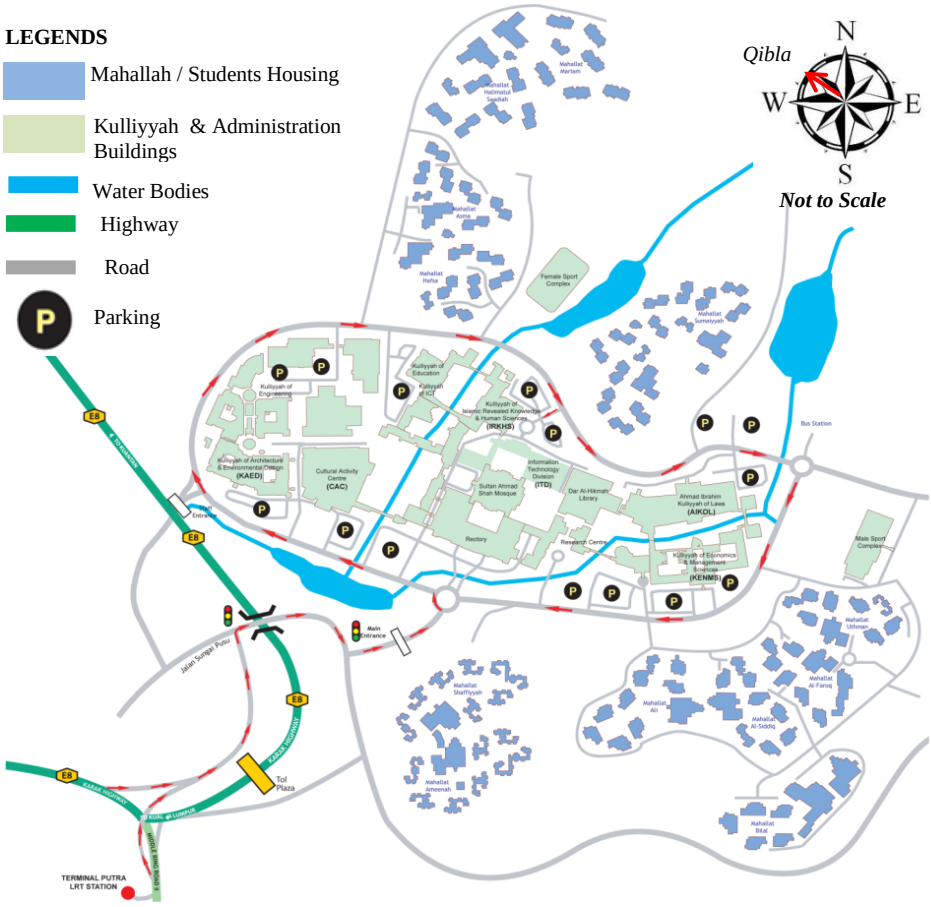

Figure 1: Main Campus of International Islamic University Malaysia
Source: www.iium.edu.my. Retrieved March 23, 2012

RESEARCH APPROACH

The data for this study was collected by using two data sources, which are primary data and secondary data. The primary data collection methods include self-administered questionnaire survey, observational survey, and structured interview. The secondary data was collected mainly from the related agencies and through other literary sources. The primary and secondary data were then analysed by using analysis methods which include univariate analysis, Relative Importance Index (RII), bivariate and *t*-test analysis.

Data collection

A self-administered questionnaire was designed to collect data on "trip-makers" and "trip-making" characteristics and "preference to use motorcars as their main travel mode choice" on-campus. Data on motorcar users' willingness to travel by sustainable transportation modes such as walking, bicycling and public transport were also collected. Both Revealed-Preference (RP) and Stated Preference (SP) approach were applied to collect data on trips which were made and trips which will be made by using sustainable transportation modes.

A self-administered questionnaire survey was conducted targeting 100 on-campus students having immediate access to their motorcars for use on-campus either regularly or occasionally. The targeted population was divided into subpopulations or strata according to Mahallahs (hostel) for the selection of samples. Upon dividing the population into subpopulation, samples were selected from each subpopulation by using stratified random sampling procedures. The sample size from each stratum was selected by using proportional allocation approach. MugoFridah W. (2002) mentioned that, in stratified sampling, a population can be divided into different groups which may be based on some characteristics or variables, and in this research, the population was subdivided according to Mahallahs before selecting samples from each Mahallah. Table 1 shows the proportional allocation of samples by Mahallah.

The questionnaire includes three main parts namely "trip-makers characteristics", "trip-making characteristics" and "preference of motorcars as travel mode choice". The frequency of using motorcars, reasons for using motorcars, willingness to shift from using motorcars to walking, cycling and public transport and preferences on the application of measures which encourages to use sustainable mode of transportation are some of the questions asked under the "preference of motorcars as travel mode choice" section.

The students were asked about their willingness to shift from using motorcars to sustainable travel modes and also their preferences on measures that should be taken to induce shift from motorcars to other transportation modes. The preferences of the students on the use of various sustainable transportation modes other than motorcars were measured by using the Likert Scale. The scale used ranges from the "most preferred" to the "least preferred" for the purpose of identifying the measures to allow shift from using motorcars to sustainable travel modes in the future. The other applications of Likert-Scale technique which were used in this study include perceptions of the students on the level of agreement on the use of motorcars on-campus (Colburn, 2003).

Table 1: Proportional Allocation of Samples by Mahallahs

Mahallah	**Number of Students**	**Proportional Sample Allocation**
Al-Faruq	732	5
Ali	933	7
Ameenah	995	7
As-Siddiq	818	6
Asiah	1087	8
Asma'	764	5
Bilal	941	7
Hafsa	763	6
Halimatus Saa'diah	707	5
Nusaibah	780	5
Ruqayyah	856	6
Safiyyah	1203	8
Salahuddin Al-Ayyubi	941	7
Sumayyah	764	5
Uthman	783	5
Zubair Awwam	1015	8
Total	**14,194**	**100**

Source: Student Affairs and Development Division of IIUM, 2012 & Primary Calculation, 2012

Data analysis

This research conducts its analysis in several phases. According to Herman Adèr (2008), data analysis is a process, within which several phases can be distinguished. The phases include data cleaning, initial data analysis and main data analysis. The structure for data analysis which was applied in this research is shown in Figure 2.

Data cleaning was carried out during the data entry stage. It is a procedure in which data were closely inspected and incorrect data were corrected. The guiding principles, as provided by Adèr (2008) are that during subsequent manipulations of the data, it should always be possible to undo any data set alterations. All information and all alterations to the data set were carefully and clearly documented. For this research, the data cleaning and data entry was carried out using SPSS.

The initial data analysis describes the collected data in an organized and summarized form. In the main analysis phase, the method of analysis was applied in aiming to answer the research questions. In this research, the methods of analysis which were applied include univariate analysis, bivariate analysis and independent *t*-test.

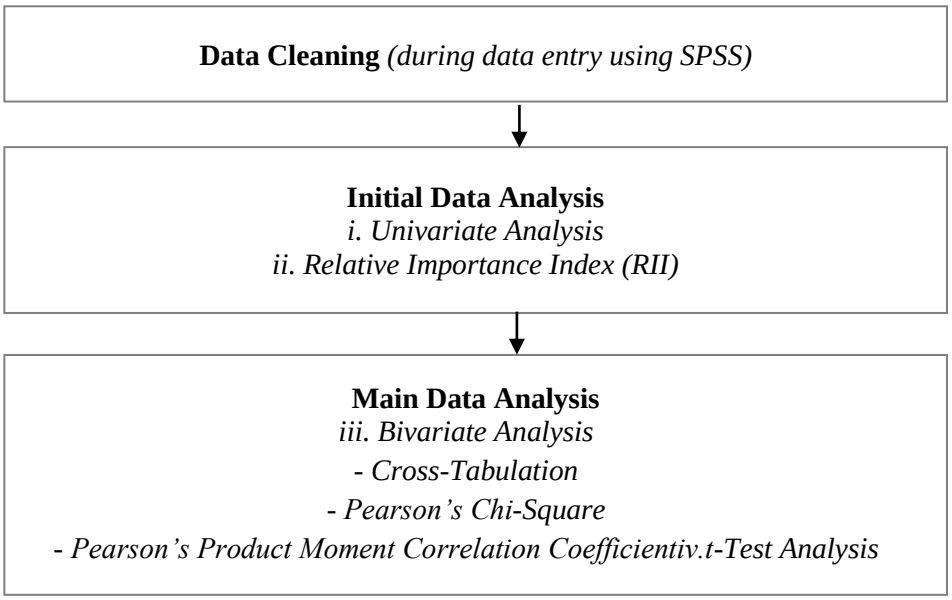

Figure 2: Structure of Data Analysis
Source: Herman Adèr, 2008 & Primary Survey, 2012

ANALYSIS AND FINDINGS

The findings of this research are mainly help to answer research questions and to achieve the goal and objectives of the research. The analyses that were applied in this research include describing single variable, relationships or associations between variables, and finding differences between two groups

within a sample. The summary of the data analysis which was applied in this research includes:

- Initial data analysis, describing single variable by using univariate analysis and identifying ranking of the variables using Relative Importance Index (RII)
- Main data analysis, describing relationships between two variables by using cross-tabulation, finding associations between variables using Pearson's Chi-Square and Product-Moment Correlation Coefficient and finding differences between two groups in a sample using Independent t-Test

Characteristics of the trip-makers

The sample consists of 55% female students and 45% male students. 27% of the students were in the 2nd year and 1st year whereas 63% were in the 3rd year and above. 96% of the total samples were studying bachelor degree programmes and only 4% were in the postgraduate programmes. The average age of the respondents is 23 years. The source of funding to support the students' degree programmes was found to be mainly from the government scholarship.

Characteristics of trip-making

About 75% of the samples have registered their vehicles with the IIUM security office. Most of the vehicles (68%) driven on-campus was single occupancy (only the driver). The average delay time being experienced during their trips by motorcars from the Mahallah to the Kulliyyah was 10 minutes (one-way). The choices of travel modes (other than motorcar) available to the students as expressed by the respondents include: 100% walking, 38% public transportation, 19% bicycles and 7% motorcycles. The frequency of using travel modes other than motorcars was generally low among the respondents.

Relationship between trip-makers and frequency of using motorcars on-campus

The analysis of data using Chi-Square and Person Product Moment Correlation Coefficient has showed that, among the characteristics of trip-makers (*gender, source of finance, and year of study*), the relationship between "year of study" and "frequency of using motorcars on-campus" was statistically significant both at 95% and 99% confidence interval [Chi-Square value = 13.868; p = 0.008]. However, the Cramer's V on this relationship only indicates a value of 0.372, a moderate strength of association between these variables. Surprisingly, it was

found that the 1st and 2nd year students were highly dependent on using motorcars for performing activities on-campus regularly. Though 1st and 2nd year students are not allowed to use motorcars on-campus, it can be noted that lack of enforcement, setting precedence by the previous batch students, lack of pedestrian, bicycle and public transport infrastructure are the likely reasons for this trend. This study includes 1st and 2nd year students as samples because of the growing number of these students using motorcars on-campus. Therefore, it can be concluded that "year of study" factor does influences use of motorcars on-campus. The students from lower level of study were highly dependent on motorcars than students from higher level of study.

Relationship between trip-making and frequency of using motorcars on-campus

This study showed that the *vehicle registration status*, *travel time by walking to Kulliyyah from Mahallah* and *delay time to Kulliyyah from Mahallah* were statistically related with frequency of using motorcars to the Kulliyyah either regularly or occasionally. The chi-square test on the relationship between "vehicle registration status" and "frequency of using motorcars to Kulliyyah" showed a Chi-Square value = 3.745; p = 0.05. Nearly 33% of the regular motorcar users and 16% of the occasional users were not registered their vehicles with the IIUM Security Unit to use their vehicles legally on-campus.

The Pearson Product-Moment Correlation on the relationship between "delay time to Kulliyyah" and "frequency of using motorcars" was found to be statistically related [$r(98) = -0.198$, $p = 0.048$]. However, the relationship between these variables showed a negative correlation, which indicates as the delay time to the Kulliyyah increases, frequency of using motorcars decreases. Nearly 45% of the respondents who were regular motorcar users to the Kulliyyah were experienced a delay time of 10 to 15 minutes. Nearly 26% of the respondents who were regular motorcar users were experienced no delay during their trips to the Kulliyyah. About 26% of the respondents were experienced a delay time of less than 10 minutes when searching for a parking space near their Kulliyyahs. Only 3.3% of the respondents who are regular motorcar users were experienced a delay time of 15 to 20 minutes.

Table 2 Results of the relationship between variables

Variables	**Sample size (n)**	**Chi-square**	**Pearson correlation coefficient**	**Significance level (p)**	**Remarks**
Vehicle registration VS Frequency of using motorcars	100	3.745	-	0.050	Statistically Significant
Delay time to Kulliyyah VS frequency of using motorcars	100	-	- 0.198	0.048	Statistically Significant
Travel time by walking VS frequency of using motorcars	100	-	0.433	0.000	Statistically Significant

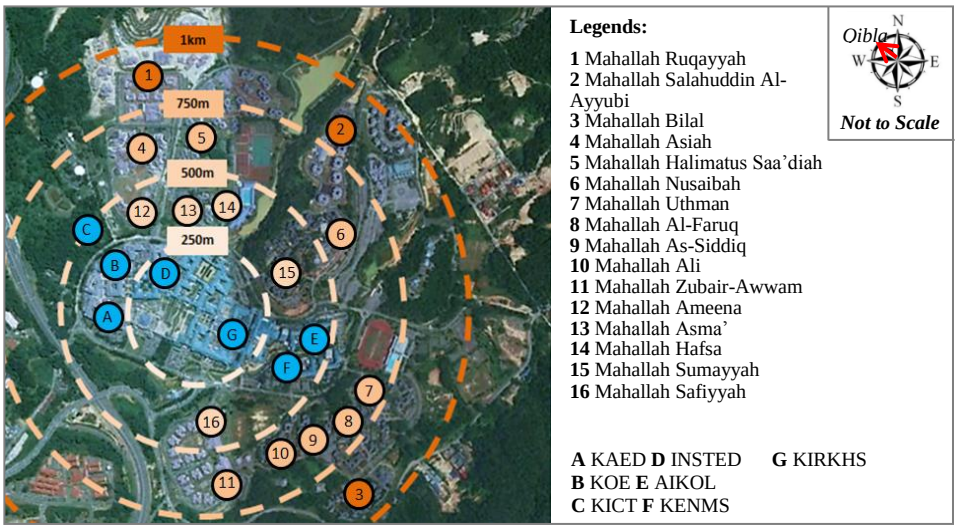

Figure 3: Distance between Origin (indicated in map by numbers) and Destination (indicated in map by alphabets)

Source: Google Earth & Primary Survey, 2012

Note: KAED – Kulliyyah of Architecture and Environmental Design; KIRKHS – Kulliyyah of Islamic Revealed Knowledge and Human Science; KOE – Kulliyyah of Engineering; AIKOL – Ahmad Ibrahim Kulliyyah of Laws; KICT – Kulliyyah of Information and Communication Technology; KENMS – Kulliyyah of Economic and Management Sciences; Kulliyyah – Faculty; Mahallah - Hostel

Not surprisingly, the relationship between "travel time to Kulliyyah by walking" and "frequency of using motorcars to Kulliyyah" showed a positive correlation [$r(98) = 0.433$, $p = 0.000$]. It showed that as travel time by walking to the Kulliyyah increases, the frequency of using motorcars to Kulliyyah also increases. Nearly 85% of the occasional motorcar users were experienced travel time by walking between 5 and 10 minutes, while, 15.4% of the respondents who use cars occasionally to Kulliyyah were experienced travel time by walking to the Kulliyah between 10 and 15 minutes. Figure 3 shows the covering distances from the Mahallahs to the Kulliyyahs. Table 2 shows the summary of the results of the relationship between trip-making characteristics and frequency of using motorcars on-campus.

Factors influencing use of motorcars on-campus

The findings showed that 61% of the respondents were relying on motorcars regularly to go to Kulliyyah from Mahallah. Only 39% of respondents were not fully dependent on motorcars to go to Kulliyyah from their Mahallahs because at times they depend on other available travel modes. Using motorcars regularly is defined as respondents being fully dependent on motorcar to go to Kulliyyah from their Mahallah at all time; and occasional use of motorcars to Kulliyyah is defined as respondents are not fully dependent on motorcars at all time and they keep their travel mode choice options open.

Of the 39 respondents who were using motorcars occasionally, about 44% of them agreed that they would use motorcars when the day is not busy and when there is plenty of available parking spaces on-campus especially near to their Kulliyyahs. The number of classes that the students need to attend in a day also influences the occasional use of motorcars. It was found that, 33.3% of the 39 respondents would use motorcars when they have more than one class in a day, and 38.5% of the 39 respondents would use motorcars when they have only one class in a day. The remaining 28.2% of them were not influenced at all on the frequency of "attending number of classes" in a day.

The level of agreement on the statement of factors influencing the use of motorcars by the respondents was analysed to determine the most likely influencing factors and the least likely influencing factors in using motorcars. The Relative Importance Index (RII) method was applied to rank the factors contributing towards the use of motorcars. Table 3 shows the ranking of each factor.

Expectedly, the "comfortable use of motorcars" to perform activities on-campus was ranked as the most important contributing factor for the use of

motorcars followed by "convenience" and "travel cost". The availability of parking spaces at the Kulliyyah, safety of motorcars parked at the Kulliyyah and Mahallah were ranked as the least important contributing factors towards the use of motorcars as expressed by the respondents.

Table 3: Factors Influencing the Use of Motorcars On-Campus (n = 100)

Statements of Factors	**Frequency of Respondents**					**RII****	**Rank**
	(1)*	**(2)***	**(3)***	**(4)***	**(5)***		
More Comfortable	0	0	0	21	79	0.958	1
More Convenient	0	0	0	30	70	0.940	2
Reasonable Travel Cost	0	1	15	45	39	0.844	3
Available Parking at Mahallah	0	9	24	34	33	0.782	4
More Time-Saving	0	11	21	38	30	0.774	5
Poor Service of Public Transportation	0	7	27	41	25	0.768	6
Safe to Travel by Car	4	12	36	26	22	0.700	7
Available Parking at Kulliyyah	14	26	36	20	4	0.548	8
Safe to Park Car in Kulliyyah	24	30	24	21	1	0.490	9
Safe to Park Car in Mahallah	22	33	28	14	3	0.486	10

Source: Primary Calculation, 2012

*(5) Extremely Agreeable, (4) Very Agreeable, (3) Fairly Agreeable, (2) Not Very Agreeable, (1) Extremely Not Agreeable

**R.I.I= Relative Importance Index

Willingness to shift from motorcars to sustainable travel modes

The results showed that 86% of the total respondents were willing to change travel mode choice from motorcars to other travel modes which are more sustainable. Only 14% of the respondents were not willing to change travel mode from motorcars to other travel modes. The measures which could be considered for the change in the travel mode choice, among those who were willing to change travel mode, was also analysed. The reasons for not willing to change travel mode choice is also included in this section.

The application of measures for a change in travel modes other than motorcars were analysed by ranking the preferences of the respondents using Relative Importance Index method. Table 4 shows the preferences of the

respondents on the measures to induce a shift from using motorcars to other sustainable travel modes.

Table 4 Preferences of the Respondents on the Measures to Shift from Motorcars to Sustainable Travel Modes (n=86)

Statement of Measures	**Frequency of Respondents**					**RII****	**Rank**
	(1)*	**(2)***	**(3)***	**(4)***	**(5)***		
Upgraded bus service	5	7	7	11	7	0.595	1
Improved pedestrian walkway and bicycle path	15	9	1	7	4	0.549	2
Limited parking space	3	9	17	15	5	0.513	3
Incentives by the University	10	7	15	11	13	0.490	4
Strict traffic regulations	6	12	10	12	18	0.488	5

Source: Primary Calculation, 2012

*(5) Extremely Preferable, (4) Very Preferable, (3) Fairly Preferable, (2) Not Very Preferable, (1) Extremely Not Preferable

**R.I.I= Relative Importance Index

The respondents had expressed that "upgrading existing bus services" was the most important and preferred measures that should be taken to allow a shift from using motorcars to other travel modes. This is followed by "improvement in the pedestrian walkway and bicycle path", "limiting the number of existing parking spaces", "incentives by the University" for using sustainable transportation modes and finally implementing "strict traffic regulations" to control the use of motorcars on-campus.

The deterrent factors for not willing to make mode choice shift from motorcars to other sustainable travel modes, as expressed by the respondents, is given in table 5. The results showed that the "clear advantages of using motorcars" was the most important deterrents for not willing to make a shift from motorcars to other sustainable travel modes. This is followed by "lack of initiatives by the authorities" to allow a shift to other travel modes, "poor public transportation services", "preference to drive alone with comfort and privacy" and "poor facilities for walking or bicycling" on-campus.

Table 5 Deterrents for not willing to Shift from Motorcars to other Sustainable Travel Modes (n=14)

Statements of Deterrents	**Frequency of Respondents**					**RII****	**Rank**
	(1)*	**(2)***	**(3)***	**(4)***	**(5)***		
Prefer advantage of using motorcars	0	0	0	3	11	0.957	1
Not used to using other travel modes	0	0	0	6	8	0.914	2
Absence of motivation from university	0	0	0	7	7	0.900	3

Poor service of public transportation	0	0	0	9	5	0.871	4
Prefer to drive alone	2	2	1	5	4	0.700	5
Uneven topography for walking and cycling	0	2	7	4	1	0.657	6
Plenty parking in campus	0	4	6	3	1	0.614	7
Poor facilities for walking and cycling	0	5	7	2	0	0.557	8
Having disability or illness	12	0	0	0	2	0.314	9

Source: Primary Survey, 2012 *(5) Most Likely, (4) Least Likely, (3) Likely, (2) Less Likely, (1) Least Likely
**R.I.I= Relative Importance Index

Differences in the level of agreement on factors influencing use of motorcars between regular and occasional users

Only "time-saving" factor was found statistically significant, (t-test value = 10.275; p = 0.000) among the factors influencing use of motorcars between regular and occasional users. The other factors were not significant statistically among the factors influencing use of motorcars between regular and occasional users. Due to limitation of space, table 6 shows t-test and significance value of only four factors.

It can be concluded that the significant factor which contributes to the use of motorcars to the Kulliyyah from Mahallah is greatly influenced by the "time-saving" factor. The mean values between groups on the "time-saving" factor, where group of respondents who use car regularly has higher means of 4.43 compared to group of respondents who use car occasionally with lower means of 3.00. Furthermore, when comparing mean value of other factors, the regular users of motorcars were normally had higher preferences on the factors such as "safety of trip makers, "available parking at Mahallah" and "safety of cars parked at the Kulliyyah" which prompted them to use motorcars on-campus regularly.

Table 6 T-Test on the Factors Influencing Use of Motorcars to Kulliyah between Regular and Occasional Users

Parameters	**Time-Saving**		**Safety of Trip Maker**		**Available Parking at Mahallah**		**Safety of Car Parked at Kulliyyah**	
	Mean	**Std. Deviation**	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**	**Mean**	**Std. Deviation**
Regular User (n=69)	4.43	0.590	3.57	1.040	4.02	1.008	3.49	1.120

Occasional User (n=31)	3.00	0.795	3.38	1.161	3.74	0.880	3.38	1.206
***t*-Test Statistics**	$t(98) = 10.275$, $p = 0.000$		$t(98) = 0.847$, $p = 0.399$		$t(98) = 1.385$, $p = 0.169$		$t(98) = 0.453$, $p = 0.651$	

Source: Primary Survey, 2012

RECOMMENDATIONS AND CONCLUSIONS

In this research, the analysis of Pearson Chi-Square, Pearson Correlation Coefficient and T-Test were applied to determine the significant factors influencing use of motorcars on-campus among students. The significant factors influencing use of motorcars on-campus among students include:

- *Year of study*
  1st and 2nd year students were found more likely to use motorcars than 3rd year and higher year students
- *Vehicle registration status*
  Those students without vehicle stickers, indicating illegal use of motorcars in campus, were more likely to use motorcars on-campus than students having vehicle stickers.
- *Travel time by walking from Mahallah to Kulliyyah*
  A significant positive correlation between travel time by walking and use of motorcars was noted. Students with higher travel time by walking from Mahallah to Kulliyyah were more likely to use motorcars to the Kulliyyah.
- *Experienced delay time to Kulliyyah*
  A significant negative correlation was found between delay time and use of motorcars to Kulliyyah. It showed that lesser the delay time to Kulliyyah, the higher the dependency on the use of motorcars to Kulliyyah and vice versa.

This research also highlights that the travel time by motorcars was a significant factor that differentiates preference in using motorcars to Kulliyyah between regular and occasional users. It means that the frequency of using motorcars to Kulliyyah either regularly or occasionally depends on how students perceive the amount of time involved when making a trip by motorcars from Mahallah to Kulliyyah.

This research also highlights that there is an opportunity, as expressed by the respondents, for shifting from motorcars to sustainable travel modes. Only 16% of the respondents were not willing to shift from motorcars to other

sustainable travel modes. The reasons being due to the theory of utility maximisation where they prefer greater benefits from their trips, for example travel time, the fare, the level of comfort and ease of accessibility offered by motorcars (DzikanKottenhoff and Lindström Olsson, 2003). The other reasons cited include: not familiar to use other travel modes and absence of motivational initatives by the authority concerned to indulge in the mode shift. On the other hand, 86% of the respondents were willing to indulge in the mode shift from motorcars to other sustainable travel modes, if measures such as upgrading bus services on-campus and improving facilities and infrastructure for walking and cycling are implemented.

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