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CONTENTS

ATTITUDES AND PRO-ENVIRONMENTAL BEHAVIOURS: DETERMINING FACTOR OF PERSONALITY AND LIFESTYLE

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Abstract

Sustainability in well-being embodies the interconnecting course of how various systems influence each other. The more strongly individuals subscribe to values beyond their immediate interests, that is, prosocial, collectivistic and biospheric values, the more likely they are to engage in environmental behaviour. *Issue*: Existing research has limited evidence on specific values of Malaysian's personality and lifestyle (PL) that have significant impact on attitude and pro-environmental behaviour (AP). *Purpose*: This paper aims to verify the statistical predictability of AP based on PL. *Approach*: Multiple Correlation and Multiple Linear Regression were carried out to assess linear associations and parameters of linear equations to predict AP components based on PL items. *Findings*: AP components were moderately predictable by some of the PL items. Specifically, '*Urging media to raise environmental awareness*' and *'being mindful about environmental destruction*' were the two strongest predictors of AP.

Keywords: attitude and pro-environmental behaviour, personality and lifestyle

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INTRODUCTION

Human interdependence with the environment (HIE) is a valuable aspect of architectural psychology as it is an extended understanding towards improving the well-being aspects of architecture. HIE is one of the main causes of subjective sustainable well-being (SSWB). Personality and lifestyle (PL) and attitude and pro-environmental behaviours (AP) are interrelated dimensions of HIE (Abu Bakar et al., 2017a, 2017b, 2017c, 2018), yet the impact of specific PL items on AP has limited proofs. This paper assesses the statistical predictability of AP based on PL items of Malaysian respondents.

LITERATURE REVIEW

Case studies based on articles from selected Asian Journals from the year 2011 onwards highlight conditional factors and potential determinants of Interaction with Nature (AP). Table 1 summarizes these findings.

Table 1 Conditional Factors and Potential Determinants for Environmental Behaviour

Conditional Factors	Potential Determinants	References
Cultural orientations – consumers with high collectivistic values and low materialistic values had higher recycling tendency	Recycling attitude and behaviours (the approach to reclaiming the purpose of used materials)	(Latif & Omar, 2012)
Policies implementation supporting environmental purchasing behaviours such as promotion of energy rating, labelling green appliances, banning hazardous items, rebate, and green procurement practices	Purchase energy-efficient, recycled packaging, and biodegradable products, and green detergents	(Harizan et al., 2013)
Concerns about environment, social influence, accessibility to environmental facilities, monetary motivation, and altruism.	Waste separation, practising buy-back centres and recycling and reusing household items	(Zena et al., 2014)
High income and education level favour the green movement and have concerns for food safety	Purchasing and consuming organic food	(Teng et al., 2011)
Concern on solid waste management and readiness to adjust to new practices	Bring reusable bag for shopping	(Zen et al., 2013)
Awareness (familiarity to energy-efficient labels), attitude (standpoint on energy-savings) and social norms (environmental lifestyles)	Purchasing energy-efficient products and appliances based on energy efficiency labels	(Zainudin et al., 2014)
Perceived consumer effectiveness (environment related past experience behaviour, environment-related intention-behaviour, willingness to pay, and regulatory support - separating household waste, being a member of environmental groups	environmentally conscious consumer behaviour (purchasing biodegradable products, energy-saving products, and products that are less harmful to the environment)	(Ramly et al., 2012)
Environmental emotions, environmental cognition (well-informed, understanding and knowledge on green practices), environmental attitude (general sense of favourableness or unfavourableness for green behaviour)	Keeping materials out of the waste stream: reduce (minimising consumption), reuse (use again or repurpose used materials) and recycle	(Nameghi & Shadi, 2013)

The case studies generated three significant components of AP: (i) Energy Saving (APa), (ii) Waste Handling (APb) and (iii) Smart Consumer (APc).

Table 2 Components and Determinants of Attitude and Pro-Environmental Behaviour

Definition of AP	Components	Indicators	Code
The positive and responsible behaviours throughout everyday decisions and actions attempted to favour and safeguard the environment	Energy Saving	turning off fans and lights when they are switched on	APa
		turning off taps when brushing teeth	
	Waste Handling	throwing rubbish according to designated recycle bins	APb
		separating rubbish at home (metals, paper, glass, etc.)	
		reusing grocery bags/ jars/ bottles/ boxes/ cans, etc.	
		using towels instead of tissues	
	Smart Consumer	using water tumbler instead of purchasing water	APc
		purchasing refillable detergents	
		purchasing energy-savings appliance	
		purchasing products that are organically produced	

Personal Lifestyle (PL) manifests in the personal outlook and approach to life in relation to environmental consciousness (Abu Bakar et al., 2017a, 2017b, 2017c, 2018). Qualities adhere to PL include (i) moral stance in collectivistic values (Laurens, 2012; Clark et al., 2014; Caesar, 2016), (ii) commitment to modest and environmental choices (Horayangkura, 2012; Laurens, 2012; Khare, 2015; Ming et al., 2015), and (iii) environmental concerns through knowledge and awareness (Horayangkura, 2012; Masud et al., 2013; Ming et al., 2015).

Table 3 Determinants of Personal Lifestyle

Definition of PL	Indicators	Code
The personal orientation that portrays collectivistic worldviews, modesty and humility towards others as well as consciousness of environmental issues	favouring relationships with others over personal success	PL1
	choosing to disappointing self over disappointing family	PL2
	taking account others' opinions in making life decisions	PL3
	taking the pleasure of working with others	PL4
	practising moderation in purchasing and using resources	PL5
	feeling unconcerned if not being able to afford things	PL6
	believing that having many assets does not lead to happiness	PL7
	being mindful about environmental destruction	PL8
	feeling affected by the environmental loss of other countries	PL9
	urging media to raise environmental awareness	PL10

According to theoretical fundamentals, the research hypothesize that AP components are predictable by PL. The following sections provide empirical evidence on the predictability of APa, APb and APc based on PL items.

METHOD

A sample of 4315 was pooled and statistically assessed. An 11-point Likert scale was given to the Malaysian respondents to reply to questionnaire items which consist of the components of AP and the ten (10) PL items. Pearson correlation analyses were carried out to determine significant linear associations between the AP components and PL items. The significant correlations warrant for multiple linear regression analyses to estimate parameters of the linear equations in order to predict values of APa, APb and APc from PL items.

RESULTS AND DISCUSSION

Table 4 Multiple Correlations between PL items and APa,APb and APc

H_0	There is no statistically significant correlation between APa and respective PL items
H_0	There is no statistically significant correlation between APb and respective PL items
H_0	There is no statistically significant correlation between APc and respective PL items

Correlation Strength Threshold (Dancey & Riley, 2004)										
0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1
zero		weak			moderate			strong		perfect

DV	Stats	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10
APa	r	.339**	.317**	.330**	.380**	.364**	.325**	.294**	.330**	.307**	.392**
	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315
APb	r	.261**	.259**	.284**	.305**	.302**	.278**	.277**	.301**	.254**	.267**
	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315
APc	r	.313**	.301**	.317**	.370**	.338**	.320**	.312**	.334**	.300**	.341**
	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315

Statistical Interpretation of Multiple Correlation Analyses	
APa	At 95% confidence level, there were statistically significant and weak correlations between APa and (i) PL1 (r =.339, p = .000); (ii) PL2 (r =.317, p = .000); (iii) PL3 (r =.330, p = .000); (iv) PL4 (r =.380, p = .000); (v) PL5 (r =.364, p = .000); (vi) PL6 (r =.325, p = .000); (vii) PL7 (r =.294, p = .000); (viii) PL8 (r =.330, p = .000); (ix) PL9 (r =.307, p = .000); and (x) PL10 (r =.392, p = .000).
APb	At 95% confidence level, there were statistically significant and weak correlations between APb and (i) PL1 (r =.261, p = .000); (ii) PL2 (r =.259, p = .000); (iii) PL3 (r =.284, p = .000); (iv) PL4 (r =.305, p = .000); (v) PL5 (r =.302, p = .000); (vi) PL6 (r =.278, p = .000); (vii) PL7 (r =.277, p = .000); (viii) PL8 (r =.301, p = .000); (ix) PL9 (r =.254, p = .000); and (x) PL10 (r =.267, p = .000).
APc	At 95% confidence level, there were statistically significant and weak correlations between APc and (i) PL1 (r =.313, p = .000); (ii) PL2 (r =.301, p = .000); (iii) PL3 (r =.317, p = .000); (iv) PL4 (r =.370, p = .000); (v) PL5 (r =.338, p = .000); (vi) PL6 (r =.320, p = .000); (vii) PL7 (r =.312, p = .000); (viii) PL8 (r =.334, p = .000); (ix) PL9 (r =.300, p = .000); and (x) PL10 (r =.341, p = .000).

At 95% confidence level, there were statistically significant positive correlations between (i) APa and each of PL items, (ii) APb and each of PL items, and (iii) APc and each of PL items. The null hypotheses claiming there are no statistically significant correlations between (i) APa and respective PL items, (ii) APb and respective PL items, and (iii) APc and respective PL items were all rejected.

Three (3) multiple regression analyses were carried out to predict the values of each of dependent variables (i) APa, (ii) APb and (iii) APc given the set of PL explanatory variables (PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9, and PL10).

Table 5 Multiple Linear Regression – PL predicting APa

H₀
There will be no significant prediction of APa by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 & PL10

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.456ᵃ	.208	.206	1.69886	1.552

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	3259.311	10	325.931	112.930	.000ᵇ
Residual	12421.954	4304	2.886		
Total	15681.265	4314			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.151	.167		18.893	.000	2.824	3.477
PL1	.105	.025	.095	4.256	.000	.057	.153
PL2	.000	.027	.000	.007	**.994**	-.052	.052
PL3	.009	.029	.008	.320	**.749**	-.047	.065
PL4	.118	.028	.102	4.230	.000	.063	.173
PL5	.085	.027	.074	3.098	.002	.031	.139
PL6	.072	.024	.066	2.985	.003	.025	.120
PL7	-.002	.025	-.002	-.091	**.927**	-.051	.046
PL8	.029	.027	.024	1.060	**.289**	-.024	.082
PL9	-.014	.023	-.013	-.596	.551	-.059	.032
PL10	.223	.022	.211	10.273	.000	.181	.266

A multiple regression was generated to predict APa based on PL items. R value of .456 indicated an adequate level of prediction (R > 0.4). The Durbin-Watson statistic was 1.552 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, $F (10, 4304) = 112.930$, $p = .000$, with an R^2 of .208; indicating that the proportion of variance in APa that can be explained by PL items was 20.8%.

At 95% confidence level, PL1 (B = .105, t = 4.256, p = .000); PL4 (B = .118, t = 4.23, p = .000); PL5 (B = .085, t = 3.098, p = .002); PL6 (B = .072, t = 2.985, p = .003) and PL10 (B = .223, t = 1.273, p = .000) were significant predictors of APa. On the contrary, it was found that PL2 (B = .000, t = .007, p = .994); PL3 (B = .009, t = .32, p = .749); PL7 (B = -.002, t = -.091, p = .927); PL8 (B = .029, t = 1.06, p = .289) and PL9 (B = -.014, t = -.596, p = .551) were not significant predictors of APa.

Personality and Lifestyle (PL) items account for 20.8% of Energy Saving (APa). Five (5) of PL items were significant predictors of APa.

Table 6 Multiple Linear Regression – PL predicting APb

H₀
There will be no significant prediction of APb by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 & PL10

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.365ᵃ	.133	.131	1.82230	1.542

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2190.153	10	219.015	65.953	.000ᵇ
Residual	14292.658	4304	3.321		
Total	16482.812	4314			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.110	.179		17.387	.000	2.759	3.461
PL1	.037	.026	.033	1.413	**.158**	-.014	.089
PL2	.008	.029	.007	.272	**.786**	-.048	.064
PL3	.065	.031	.052	2.122	.034	.005	.125
PL4	.083	.030	.070	2.780	.005	.025	.142
PL5	.065	.029	.056	2.224	.026	.008	.123
PL6	.059	.026	.053	2.292	.022	.009	.110
PL7	.050	.027	.042	1.879	**.060**	-.002	.102
PL8	.132	.029	.109	4.542	.000	.075	.189
PL9	-.002	.025	-.002	-.067	**.946**	-.050	.047
PL10	.044	.023	.041	1.890	**.059**	-.002	.090

A multiple regression was generated to predict APb based on PL items. R value of .365 indicated slightly a weak level of prediction (R < 0.4). The Durbin-Watson statistic was 1.542 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, $F(10, 4304) = 65.953$, $p = .000$, with an R^2 of .133; indicating that the proportion of variance in APb that can be explained by PL items was 13.3%.

At 95% confidence level, PL3 (B = .065, t = 2.122, p = .034); PL4 (B = .083, t = 2.78, p = .005); PL5 (B = .065, t = 2.224, p = .026); PL6 (B = .059, t = 2.292, p = .022) and PL8 (B = .132, t = 4.542, p = .000) were significant predictors of APb. On the contrary, it was found that PL1 (B = .037, t = 1.413, p = .158); PL2 (B = .008, t = .272, p = .786); PL7 (B = .050, t = 1.879, p = .060); PL9 (B = -.002, t = -.067, p = .946) and PL10 (B = .044, t = 1.89, p = .059) were not significant predictors of APb.

Personality and Lifestyle (PL) items account for 13.3% of Waste Handling (APb). Five (5) of PL items were significant predictors of APb.

Table 7 Multiple Linear Regression – PL predicting APc

H₀
There will be no significant prediction of APc by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 & PL10

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.428ᵃ	.183	.181	1.56634	1.532

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2363.151	10	236.315	96.321	.000ᵇ
Residual	10559.512	4304	2.453		
Total	12922.663	4314			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.181	.154		20.690	.000	2.880	3.482
PL1	.066	.023	.066	2.896	.004	.021	.110
PL2	.000	.025	.000	.009	**.993**	-.048	.048
PL3	.007	.026	.006	.270	**.787**	-.044	.059
PL4	.154	.026	.146	6.005	.000	.104	.205
PL5	.012	.025	.011	.463	**.643**	-.038	.061
PL6	.075	.022	.075	3.344	.001	.031	.118
PL7	.053	.023	.050	2.333	.020	.009	.098
PL8	.070	.025	.065	2.787	.005	.021	.119
PL9	.007	.021	.008	.349	**.727**	-.034	.049
PL10	.109	.020	.113	5.426	.000	.069	.148

A multiple regression was generated to predict APa based on PL items. R value of .428 indicated an adequate level of prediction (R > 0.4). The Durbin-Watson statistic was 1.532 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, $F (10, 4304) = 96.321$, p = .000, with an R^2 of .183; indicating that the proportion of variance in APc that can be explained by PL items was 18.3%.

At 95% confidence level, PL1 (B = .066, t = 2.896, p = .004); PL4 (B = .154, t = 6.005, p = .000); PL6 (B = .075, t = 3.344, p = .001); PL7 (B = .053, t = 2.333, p = .020); PL8 (B = .070, t = 2.787, p = .005) and PL10 (B = .109, t = 5.426, p = .000) were significant predictors of APc. On the contrary, it was found that PL2 (B = .000, t = .009, p = .993); PL3 (B = .007, t = .27, p = .787); PL5 (B = .012, t = .463, p = .643) and PL9 (B = .007, t = .349, p = .727) were not significant predictors of APc.

Personality and Lifestyle (PL) items account for 18.3% of Smart Consumer (APc). Six (6) of PL items were significant predictors of APc.

Table 8 Summary of Findings

		PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10
		IV (Predictor Variables) - β									
DV (Outcome Variables)	APa	**.095** ✓	.000 ✗	.008 ✗	**.102** ✓	.074 ✓	.066 ✓	-.002 ✗	.024 ✗	-.013 ✗	**.211** ✓
	APb	.033 ✗	.007 ✗	.052 ✓	**.070** ✓	**.056** ✓	.053 ✓	.042 ✗	**.109** ✓	-.002 ✗	.041 ✗
	APc	**.066** ✓	.000 ✗	.006 ✗	.146 ✓	.011 ✗	**.075** ✓	.050 ✓	.065 ✓	.008 ✗	**.113** ✓

✓ = statistically significant predictor; ✗ = not statistically significant predictor

DV	Indicators	IV	Top 3 Strongest Predictors	β
APa Energy Saving	• turning off fans and lights when they are switched on • turning off taps when brushing teeth	**PL10**	**urging media to raise environmental awareness**	**.211**
		PL4	taking the pleasure of working with others	.102
		PL1	favouring relationships with others over personal success	.095
APb Waste Handling	• throwing rubbish according to designated recycle bins • separating rubbish at home (metals, paper, glass, etc.) • reusing grocery bags/ jars/ bottles/ boxes/ cans, etc. • using towels instead of tissues	**PL8**	**being mindful about environmental destruction**	**.109**
		PL4	taking the pleasure of working with others	.070
		PL5	practising moderation in purchasing and using resources	.056
APc Smart Consumer	• using water tumbler instead of purchasing water • purchasing refillable detergents • purchasing energy-savings appliance • purchasing products that are organically produced	**PL10**	**urging media to raise environmental awareness**	**.113**
		PL1	favouring relationships with others over personal success	.075
		PL6	feeling unconcerned if not being able to afford things	.066

Findings show that PL10, designating '*urging media to raise more environmental awareness*' was the strongest predictors of APa and APc. PL8, denoting '*being mindful about environmental destruction*' was the strongest predictor for APb. Environmental concerns through mindfulness, awareness and responsiveness are influential in determining environmentally responsible behaviours. On this basis, environmental education that allows individuals to delve into environmental issues, learn to resolve environmental challenges, and take action independently and collectively to improve the environment is crucial. Exposure from the education develops the skills, commitment and eventually habits of making informed and responsible decisions for the environment.

CONCLUSION

HIE in SSWB suggests that moral concerns explain environmental behaviours. This paper evidence that AP is moderately predictable by PL. In future work, statistical modelling on the constructs elaborated in this paper, along with cultural and economic background intervention, shall prove the research's importance.

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THE AMELIORATION OF THERMAL COMFORT INSIDE TRADITIONAL HOUSING IN MENAA CITY-ALGERIA

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Abstract

The traditional housing in Algeria are designed to adapt to the surrounding condition and desert climate. The internal housing layout and thermal comfort plays a significant role in the Algerian traditional housing design and standards. The historical, cultural, religion and climate of Algeria have significant influence on the design of its houses. This study of houses in the City of Menaa in Batna, Algeria, explained the traditional design of houses of the people of Amazigh, particularly Chaoui in the building of homes and shelters. Today, the condition of traditional houses in Menaa Batna, is far from satisfactory because the city has suffered lack of economic investment by the central government which resulted in significant deterioration of its traditional housing condition that lead to discomfort in term of thermal especially during winter. This research aims to analysis the current condition of these traditional houses and to propose improvement in term of thermal comfort to the occupier of these houses. The study used mixed methods namely literature review where the researcher used comparative approach from international case study; and descriptive analyses based on the questionnaire and observations. The results of the analyses enabled the researcher to recommend improvement to the condition of the houses using integrated solutions and techniques. These recommendations were designed to achieve a modern and environmentally acceptable thermal comfort in winter season for the houses, without losing the traditional architectural features of these old houses.

Keywords: city of menaa, traditional housing, rehabilitation, thermal comfort.

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INTRODUCTION

Thermal comfort is defined as a complex sensation produced by a system of physical, physiological and psychological factors, leading to the individual comfort of well being. According to Givoni (1978), the maintenance of thermal equilibrium between the human body and its environment is one of the main requirements for health, well-being and comfort. The TLF (Treasure of the French Language) currently has two definitions of comfort: "*Set of materialistic conveniences that provide to the well-being of individual" and "Everything that ensures the well-being of individual in term of spirituality and tranquillity*." These two notions are associated with the well-being of the person, either through materialistic element or psychological subjective element (Gallissot, 2012).

Thermal comfort in houses plays an important role in the context of quality of life and building standards. There are two approaches in defining the notion of comfort related to the thermal environment of a building. First by (Fanger, 1973), where the author defined comfort as an expression of the state of neutrality: Givani (1978) defined it as "*state of mind expressing the satisfaction of its environment…the subject cannot say if he wants to be colder or warmer*". The researcher identified thermal comfort as "*a conditions for which the self-regulating mechanisms of the body are at a minimum level of activity*".

In Algeria, traditional houses make up the largest number in the housing sector in Algeria and analysis on the housing designs, its construction and its application are needed to maintain the current supply. The information or research on technical element of theses traditional houses, particularly in terms of saving energy, materials, adaptability of design and thermal comfort would ensure the adaptation of the traditional houses to the modern living environment. Adaptation to local climate and cultural element of the community would provides solution to a targeted sample and not adaptable as a universal answer. (Viaro and Ziegler, 1983).

Mozer (1998), in his book "The Adaptive House" proposed an adaptive approach to home comfort. According to his work, adaptation is the means of measuring the preferences of the inhabitants. He stated that when the inhabitants manually adjust room instructions, this is is an indication that their needs have not been met. According to Van hoof (2008), thermal comfort is often considered as the main source of discomfort and its determination to the physical mechanisms is a complex dependent relationship. Indeed, thermal comfort is considered under two underlying assumption, namely: the first assumption is the relationship of thermal exchanges between the user and the internal environment, as well as between the internal and the external environment. The second assumption is the perception related to the occupant, on the sole thermal criterion, possesses as human regulation mechanisms, whether physiological or psychological (Gallissot, 2012).

Among the research done on the traditional habitat, Amoudruz (2018) stated that the current proposed solutions to traditional resign of houses tend do not meet the expectations of consumers and traditional architecture must evolve for that. According to the author, the most important aspect of today the preservation work is that the traditional image imposes on each region. Most renovation work need to be respected the traditional design and the restoration work need to be done at a smaller scale. The profound socio-economic changes experienced by the Algerian historic cities during the colonial period and the post-colonial period are on the traditional housing where:

i. "Marginalization Process" where the traditional housing was devalued by modern architect or government officer.

ii. The "let it go" process where traditional homes are totally degraded and abandoned by their owners and later being demolished by the government or owner. (National seminar on traditional housing, 2009)

Consequently, the return to the characteristics of the traditional architectural model adapted to Algerian social and climatic criteria in the field of construction is increasingly recommended by experts in the field. The return to these characteristics promotes energy saving, improvement in the durability of the structure and preserving the Algerian and Maghreb values and traditions.

Laurens (2012), reported that: *"It is possible to design modern homes, while preserving the traditional Algerian cachet instead of copying models that do not reflect the local culture".* ARUP, an international architecture firms based in Amsterdam, recommended that the development of traditional architectural house model in Algeria, need to be presented in universities and design offices before any renovation or conservation work carried out to the actual building (Extract from the Algerian Portal of Renewable Energies, 2012). In addition, traditional house designs are known for its adaptability to local climates based on centuries of results and experiences. However, it is also known that thermal comfort in winter is a constant problem in traditional housing.

The Chaoui habitat is a mountainous community living in semi-buried troglodyte habitat that integrated their houses into the topography. The traditional houses in the Menaa city is one of the richest in Aurès, located strategically between two rivers that suitable for human habitation. Menaa in the wilaya of Batna in Aures, Algeria is a region that contains these traditional housings where it symbolist the relationship between human and nature with all its diversity and originality (Adjali, 1986). Today the condition and design of these traditional houses in Menaa has no longer meet the needs of the inhabitants especially during winter. The inhabits tend to leave their traditional houses during winter which lead to this study. Some of the questions arises were

i. Why do the majority of the occupants of the traditional houses abandoned their houses during winter?

    ii.   What are the potential design that can be proposed and integrated to improve the condition of these housing?

    iii.   How can the proposal be adapted to these houses and what are the impacts to the local landscape?

RESEARCH OBJECTIVES

The study proposes the following objectives which are

    i.   To identify the main factors that contribute to the abandonment of traditional houses during winter in Menaa city;

    ii.   To analyze the traditional design and its impact to the living condition and the thermal comfort of the occupiers;

    iii.   To proposed suitable design to address the issue of thermal discomfort during winter that are suitable to the traditional architecture of these houses and the identify within the region.

Based on the study visits and inventories conducted to these houses, most of these traditional houses were used as second or holiday homes. The winter condition in Meena which is quite extreme has led to occupier abandoned the houses and moved to their other houses which have modern facilities and heating element.

METHODOLOGY

The study used mixed method where site inventories and questionnaire survey were conducted to collect the data. A descriptive analysis based on the questionnaires and site inventories and observation were used to validate the anlysis. A questionnaire survey was developed and face to face interview were conducted to the occupier of these houses in order to identify the issues and problem faced by the occupier living in these traditional houses. Within the Menaa city there were 195 traditional housing and 50 were abandoned or unoccupied. 70 samples of respondents were selected for the questionnaire survey.

In term of inventories or observation method, several houses were selected as case study to identified the physical and condition issues. Multiple visits were conducted for inventories purposes and interview were also conducted with the occupiers. Issues related to the thermal discomfort and various other issues were asked to the occupier. The literature review identified that various rehabilitation technique can be used to overcome the themal comfort issues without affecting the traditional design of these houses. These techniques can provide solution to the adaptation of these traditional houses to the need of the occupiers.

Case Study

10 houses were selected as the case study and various technical and physical issues were identified during the inventories. Physical recommendations were proposed with the consent of the occupier, and these improvements were proposed without harming the traditional architecture, aesthetics value and the authenticity of these traditional houses.

Figure 1 Location of the house (case study) in Menaa city (no scale)
Source: drawn from an aerial view I.N.C And an inventory on the ground (Benbouaziz Akila, 2011)

Presentation of the Current Condition of Housing Sample
The house consists of two floors with surface of 198 m² in "Figure 2". Its spatial organization follows the same layout of the traditional housings in this region. The ground floor is reserved for storage and for animals such as sheeps and goats while the first floor accessible using a staircase, includes a common room, a room, a storage and a courtyard. In short, this house includes a space for animals, space of storage and a space for living which only consists of a room and a communal space. This limited space represents the main place for social and living area where the daily activities take place (all the daily activity of meeting, cooking and weaving are conducted in this space). The house structures are from stone with a width of 45 to 50cm. The floors are made of timber reinforced with a mixture of clay and straw. The following figures demonstrate the conditions of the houses

Figure 2 The floor condition at the yard (left) and exterior wall (right)
Source: Author

Figure 3 Cracks on the interior wall
Source: Author

Figure 4 Poor condition of the common room walls (left) and stairs (right)
Source: Author

Figure 5 Deterioration of interior floors and partial structure collapse
Source: Author
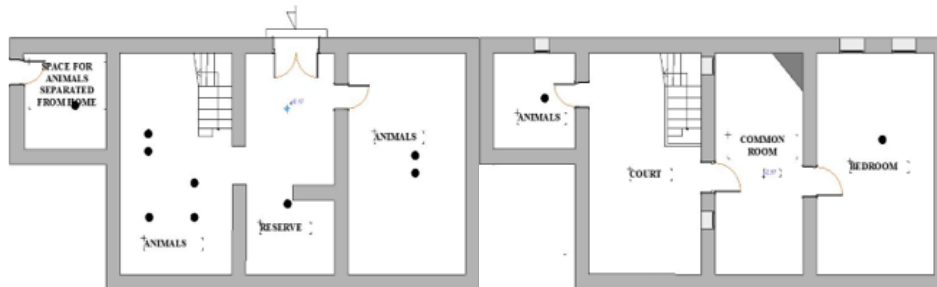
Figure 6 Ground Floor Plan (left) and First Floor Plan (right) prior to Rehabilitation
Source: Author

Based on the site inventories, several problems were identified which are:

a) The floor of the houses was made of timber reinforced with clay and straw. The condition of the flooring was in very advanced state of degradation where partial of the foor were collapsing in some part.
b) The condition of the interior and exterior plaster was deteriotated with holes and the stone walls were at high risk of collapsed.
c) The lack of waterproofing of the walls and flooring in the common room and bedroom.
d) The deterioration condition of the timber doors and windows.
e) Lack of lighting in the common room and living areas and the occupiers tend to open the door and window for the purpose of lighting. This has led to cold wind coming into the living area.

RESULT AND INTERPRETATION

This section discussed the anlysis from the questionnaire form from 70 respondents. In Menaa city there were 195 traditional housing and 50 houses were abandoned. The researcher surveyed 70 respondents for the purpose of the study.

Table 1 Results for Questionnaire

Questions	Variables	%
Personal information	Without level	10%
	Primary	25%
	Average	30%
	Secondary	30%
Profession / status	Liberal	20%
	Employee	40%
	No profession	40%
Statut de la maison	Owner	90%
	Tenant	10%
The occupation of the house	All year	50%

	Summer period	50%
If you do not occupy the house during the winter period, why?	Adverse conditions in the interior	85%
	Unfavorable conditions outside	15%
	Away from the city	0%
Do you have the following? Gas *(Yes or No Question)*	Yes	60%
Electricity *(Yes or No Question)*	Yes	80%
Water *(Yes or No Question)*	Yes	80%
Sanitation *(Yes or No Question)*	Yes	60%
What type of heating do you use during the winter?	Gas	60%
	Electric	0%
	A wood	25%
	Butane gas (bottles)	15%
	A fuel	0%
Number of floors:	1 floor	35%
	2 floors	55%
	3 floors	10%
The ground floor is a space of:	Life	30%
	Sheepfold	20%
	Storage	20%
	Life and sheepfold	30%
The exterior façade	Completed	35%
	Not completed	65%
Coating of interior walls	Completed	30%
	Not completed	60%
	Partially	10%
Flooring inside the house	Completed	15%
	Not completed	70%
	Partially	15%
Unfavorable conditions inside the house	Cold unbearable	70%
	Poorly equipped house	20%
	Does not meet modern comfort	10%
Poor Air flow? *(Yes or No Question)*	Yes	70%
Humidity problem? *(Yes or No Question)*	Yes	25%
The factors that contribute to the thermal discomfort inside the house in winter:	Degradation of interior walls	30%
	Soil degradation	30%
	Opening presence without glazing	0%
	Roof degradation	30%
	Carpentry degradation (doors and windows)	10%
Room organization is inappropriate to ensure adequate thermal comfort during winter	Yes	70%
Rehabilitation work *(Yes or No Question)*	Yes	30%
Transformation work *(Yes or No Question)*	Yes	30%

Based on the anlysis, 50% of the inhabitants of the traditional housing occupied their homes only during the summer and not during winter, due to the

coldness and harsh condition of winter. When asked the reasons of moving out from the house during winter, 85% of the resopondents stated that the cold conditions in the houses led them to abandoned the houses during this period. 70% of the respondents stated that as the courtyard is an opening in the house, most rooms in the houses were cold and not suitable for habitation due to the design of these rooms that tend to overlook the courtyard. The lack of electricity supply lead to the houses unable to used electric power to provide heating and lighting in these houses. In addition, 90% respondents believed that deterioration of the interior walls, the ground and the leaking roof were the main factors that led to the thermal discomfort of these houses during winter as these houses have many openings and not fully insulated.

The improvement work proposed to the occupants were to rearrange and redesigned the opening and improve the physical condition of the houses using modern brick and material. It is noted that majority of occupants preferred these old houses because it is their traditional houses and owned by their family in generations and the design or layout of the houses tend to promote family relationship and intimacy among the occupiers.

The Proposed Solutions and Techniques
The rehabilitation and enhancement proposal for the traditional houses in Menaa city took consideration all architectural aspects and function related to the buildings. The rehabilitation proposed to use passive design technique which involve immediate works to improve the thermal comfort within the building such as the wall trombe (show details of wall trombe in figure3) separation by BA13mm, insulation of the roofing by ecological materials, double glazing to reinforce the thermal comfort and to minimize the heat losses, floor coverings, transform internal layout the house while keeping authentic traditional in order to reduce degradation process. It is necessary to propose modern, economical and ecological techniques and solutions without harming the architecture and authenticity of the region. The lack of rehabilitation and maintenance works on these houses is the root cause of its degradation.
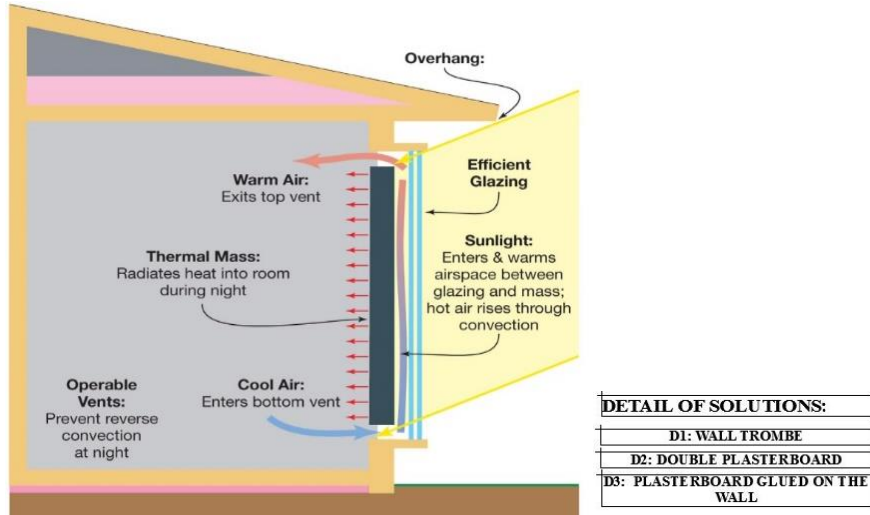
Source: Author
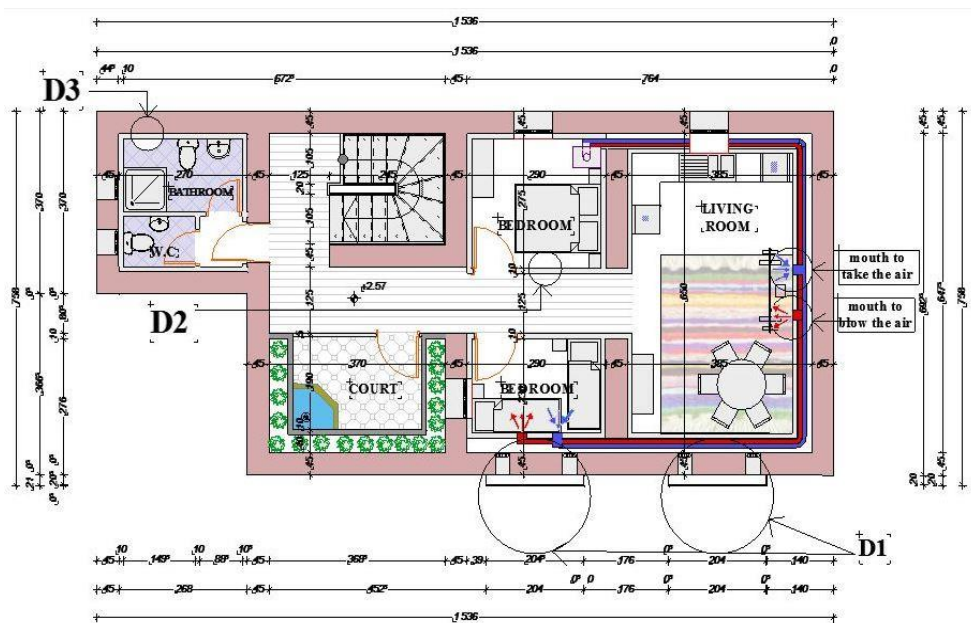
Figure 7 Plan of the housing sample after rehabilitation
Source: Author

The following figures show the proposals for the interior of the houses.

Figure 8 View of the courtyard (left) and the common room (right)
Source: Author

Figure 9 View towards the kitchen (left) and trombe wall in the common room (right).
Source: Author

Figure 10 Interior view of the proposed living room
Source: Author

Figure 10 Interior view of the proposed bedroom where the hot air boiler is located
Source: Author

Figure 11 Interior view of the proposed second bedroom
Source: Author

RECOMMENDATION

In order to ensure acceptable thermal comfort inside the traditional houses in desert climate and to help create a suitable environment for the occupiers of traditional housings in Menaa city, the following recommendations are proposed:

    i.   The authorities concerned should consult the residents and encourage them to maintain the condition of the houses. Financial assisted can be given to the renovation of these houses as this will ensure the preservation of these houses in future.

    ii.   Architects and design offices should involve in the conservation of traditional houses in order to safeguard the heritage of the area. The introduction of passive energy solutions and used of modern solutions that promote economic and ecological solution should be encouraged as this will minimize energy consumption. The used of local and environmental material on the restoration and renovation would would ensure local product and local economic are promoted in the contruction industry within Algeria.

CONCLUSION

The research has highlighted the amelioration of thermal comfort inside traditional housings in Menaa city. The aim of this research was to propose improvement on thermal comfort of the traditional housings in Menaa during the winter period. The proposals through rehabilitation and renovations of these houses will restore its value by offering modern renovation techniques without harming the identity and traditional architectural landscape of the region. To ensure comfortable thermal comfort in a traditional house, integration of ecological concept using local resources and the use of renewable energy material are essential in order to maintain economic and local tradition.

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AN ASSESSMENT OF HOUSING AFFORDABILITY INDEX AT DISTRICTS LEVEL IN KELANTAN

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Abstract

The purpose of this paper is to assess the housing affordability level in every district in Kelantan. The goal of this study is to determine the affordability level and the affordable housing price in every district in Kelantan. In order to determine the housing affordability level, the Price-to–Income Ratio approach or known as median multiple is used in this study. The study found that the overall affordable leve in Kelantan from 2012, 2014 to 2016 has increased from 4.5 to 4.8 to 5.4 which clearly showed the level worsen over the years. In term of afforadablee housing price, the Kelantan median house price for 2016 was RM199,900 but using median multiple calculation using the income data, the maximum affordable house price should be within RM 110,844, which clearly showed that the current housing prices is severely unafforable for Kelantan State.

Keyword: housing affordability index, median house price, median income, affordable housing price, median multiple

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INTRODUCTION

Shelter is an essential need according to the hierarchy Abraham Maslow (1943). According to the Australian Council of Social Service (ACOSS), access to housing that is affordable is essential for individual, family and community wellbeing (ACOSS 2008). According to Khazanah Research Institute, KRI (2017) and Bank Negara Malaysia (2019), a house is considered affordable when the median price of housing market is three times the gross annual household income (Star Online, 2019). The National Housing Policy 2018- 2025 highlighted that the main issue faced by Malaysian, is the unaffordable housing market where the many Malaysian are unable to purchase a house offered in the market due to its high prices (News Straits Times, 2018). In Malaysia, the affordable house price is within the range of RM165,000 to RM242,000 based on the annual median income of RM55,0020 (Bank Negara Malaysia, 2017). The median multiple calculation shows that Malaysia housing price currently is at 4.4 which is highly unaffordable.

OBJECTIVES OF THE STUDY

According to KRI Report (2015), all states in Malaysia indicates higher percentage of home ownership in rural area as compared to the urban area. This is due to land price in the rural are chaper compare to urban area and land value in urban area tend to be expensive due to economic activity centred in this area. Additionally, Mohamed Osman et al. (2017) stated that the shortage of affordable housing was critical and the level of income worsen over 2012, 2014, and 2016. Thus, this study intends to assess housing affordability index using data produced by the Department of Statistic (2012, 2014 & 2016) and NAPIC (2012, 2014 & 2016). The objectives of this paper are to:

    i.   To examine the housing affordability index for every district in Kelantan for the year 2012, 2014 and 2016

    ii.   To propose the maximum affordable housing price for each district using the price to income ratio approach

    iii.   To provide recommendations on the affordable housing price at districts level in Kelantan

LITERATURE REVIEW

Housing affordability is an important agenda in Malaysia based on the National Housing Policy 2018-2025, nationally. The term housing affordability became popular in the past two decades, replacing 'housing need' which is at the center of the debate in the year 2000 in providing adequate housing for all. According to AHURI (2004) "the affordability of housing" refers to the ability of households to meet housing costs, while maintaining the ability to cover other basic living

costs. Shuid (2016) mentions that the affordable housing is also defined as what is appropriate in terms of quality and location other than price. In Malaysia, the percentage of home ownership is 69.1% in the urban area and 81.2% in the rural area. KRI report in 2015 and 2017 identified that housing affordability level in Malaysia has worsen over the years and the purchasing power among Malaysian has also reduced further.

Affordability can be measured through price-to-income ratio, more commonly known as the 'median-multiple' developed in 1988 by the United Nations Centre for Human Settlement (UNCHS) and the World Bank under the Housing Indicators Program. The median multiple is based on the assumption that as housing prices become higher relative to incomes, a smaller proportion of households can afford to buy houses, other factors held constant.

Metric Measurement for Housing Affordability

Price- to Income Ratio
This study uses the approach of Price to Income Ratio (PIR) to measure housing affordability. PIR is the method that shows the ratio based on the median housing prices over the annual household income. This approach was developed in 1988 by the United Nations Centre for Human Settlement (UNCHS) and the World Bank under the Housing Indicators Program (KRI Report, 2015). The advantage of this approach is to know the households' greater ability to pay for housing and also to compare measures of prices and incomes (Fox & Finlay, 2012). A formula of PIR as illustrates in Figure 1:

$$PIR = \frac{\text{Median house price}}{\text{Annual Median Income}}$$

Figure 1 Formula PIR Approach
Source: Norazmawati (2015)

Demographia International Housing Affordability Survey (2004) also had introduced the housing affordability rating. Table 1 represents the affordability categories.

Table 1 Housing Affordability Categories

Rating	Median Multiple
Severely Unaffordable	5.1 and above
Seriously Unaffordable	4.1- 5.0
Moderately Unaffordable	3.1- 4.0
Affordable	3.0 and below

Source: Khazanah Research Institute Report (2015)

Median multiple Three
The three times median multiple is considered as an appropriate threshold to calculate housing affordability cited by Housing Buyers' Association and in the 11th Malaysia Plan (KRI, 2015). Thus, to forecast the affordable maximum price is by the calculation of annual median income multiple by three.

The factors influencing housing affordability of residents are housing price, household income, housing demand and types of housing. The relationship between house price and income level reflect the consequences on the housing affordability of the people in purchasing a house. Research suggest that housing prices reduces the housing affordability.

Table 3: Factors determine housing affordability

Factors	Literature review
Housing prices	The dynamic behavior of housing price can influence cyclic patterns in the housing market3 Previous studies investigate the escalating housing affordability problem resulting from the bubble-like behavior of house prices,4
Household Income	Purchase affordability considers the ability of a household to borrow enough funds to purchase a house, while repayment affordability considers the ability of a household to repay the mortgage 5 that households encounter a housing affordability problem when they pay more than a certain proportion of their income to obtain suitable housing.6

RESEARCH METHODOLOGY

Study Area
The study area is in the state of Kelantan where the state is located in the north-eastern part of Peninsular Malaysia with total area of 5, 713 square miles or 11.2% of the total area of Peninsular Malaysia. Kelantan is bounded to Thailand in the north, South China Sea in the northeast, Terengganu in the east, Pahang in the south and Perak in the west. Kelantan consists of 10 districts namely Bachok, Kota Bharu, Machang, Pasir Mas, Pasir Puteh, Tanah Merah, Tumpat, Gua Musang, Kuala Krai and Jeli.

According to Department of Statistic Malaysia (2017) the main economic activities in Kelantan are services (66.4%) and agriculture (24.6%). The Gross Domestic Product (GDP) per capita in 2016- 2017 shows that Kelantan is at the lowest rank among other states in Malaysia. However, in terms of economic growth in services, manufacturing as well as agriculture sector, data

from Department of Statistic (2018) showed an improvement or better economic growth from 2016 to 2018.

Despite the encouraging activities, Kelantan ranked last amongst other states in terms of urbanisation in Malaysia and report form Khazanah Research Institute (2016) stated that Kelantan only portrayed 42.4% of urbanisation level. Additionally, in 2016 Kelantan was the third highest state with poverty recorded at 0.4%. In terms of annual median income, residents in Kelantan received the lowest compared to other states in Malaysia which amounted RM 36,948 in 2016 (NAPIC, 2017). This is the reason why the state of Kelantan was chosen as a case study.

Data Collection and Analysis Method
This study only analyses the secondary data from National Property Information Centre (NAPIC) and Department of Statistic (DOS) as well as trusted sources for instance journal article, published reports, websites and books. The study will used descriptive analysis with combination of (i) graphical description such as graphs, (ii) tabulated description and (iii) statistical commentary which will be part of the discussion in this paper.

ANALYSIS AND FINDINGS

Comparison of Housing Affordability Index in Districts Level in Kelantan

Table 2 Comparison of Annual Median Income and Median House Price in 2012, 2014 And 2016 in Districts Level of Kelantan

Districts	2012		2014		2016	
	Annual Median Income (RM)	Median House Prices (RM)	Annual Median Income (RM)	Median House Prices (RM)	Annual Median Income (RM)	Median House Prices (RM)
Bachok	25,920	110,000	30,276	210,000	35,196	250,000
Kota Bharu	31,068	210,000	38,820	211,250	44,124	240,000
Machang	30,372	116,500	32,592	178,500	35,472	150,000
Pasir Mas	23,136	133,760	26,328	165,000	30,516	205,000
Pasir Puteh	25,116	122,500	29,052	55,000	34,740	187,000
Tanah Merah	26,160	93,000	32,964	105,000	36,252	150,000
Tumpat	27,168	193,500	33,288	180,000	37,260	280,000
Gua Musang	29,952	94,000	31,884	115,000	33,816	148,690
Kuala Krai	20,928	91,500	28,920	127,500	30,492	183,350
Jeli	21,636	108,000	26,412	111,000	28,524	268,000
Kelantan	**27,312**	**122,500**	**32,592**	**157,740**	**36,948**	**199,900**

Source: NAPIC (2016)

Table 3 Percentage Increase and Decrease in Median Income and Median House Price

Districts	2014		2016	
	Median Income %	Median House Price %	Median Income %	Median House Price %
Bachok	16.81	90.91	16.25	19.05
Kota Bharu	24.95	0.60	13.66	13.61
Machang	7.31	53.22	8.84	-15.97
Pasir Mas	13.80	23.36	15.91	24.24
Pasir Puteh	15.67	-55.10	19.58	240.00
Tanah Merah	26.01	12.90	9.97	42.86
Tumpat	22.53	-6.98	11.93	55.56
Gua Musang	6.45	22.34	6.06	29.30
Kuala Krai	38.19	39.34	5.44	43.80
Jeli	22.07	2.78	8.00	141.44
Kelantan	**19.33**	**28.77**	**13.37**	**26.73**

Source: NAPIC (2016)

Table 2 shows the annual median income and median house price for the year 2012, 2014 and 2016 in every district in Kelantan. Based on table 2, the annual median household income in every district increased over the year 2012, 2014 and 2016. In term of housing prices, the increase of median house price can be seen in majority of the districts except in Pasir Puteh and Tumpat between 2012 and 2014.

Table 3 indicates the changes in the percentage of annual median income and median house price in the year 2014 and 2016. In 2014, the largest percentage increase in annual median income was in Kuala Krai with 38.19% increase which is similar with increased in housing price (39.34%). That is why the level of affordability remains the same (figure 2). For the median house price (2014), the largest percentage increase (90.19%) was in Bachok while the median income only increased by 16.81%. In 2016, the biggest percentage increase in median income and median house price was in the district of Pasir Puteh but this did not guarantee that the houses remained at 'affordable' range. This is because the percentage increase in median income was 19.58% but the increased on the median house price was nearly 240%.
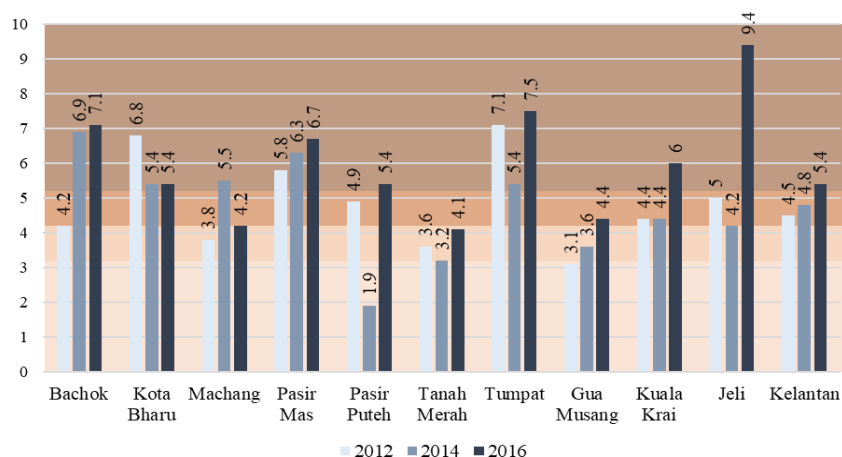
Figure 2 Housing Affordability Index in Every Districts in Kelantan for Year
2012, 2014 And 2016
Source: Author's Calculation based on NAPIC (2016)

Figure 2 illustrates the housing affordability index in every district in Kelantan. In general, the median house price in Kelantan exceeds the three times median annual household income threshold which showed that houses in all districts in Kelantan were not affordable. The index in Kelantan worsen from 2012 to 2016. In 2012, the index was at 4.5 and worsen to 4.8 in 2014 whereby the index for both years were at 'seriously unaffordable'. In 2016, the affordability index for Kelantan state continued to worsen to 5.4 which is extremely unaffordable. The reason is due to the house price rise much faster than income/wages (Tejvan Pettinger, 2019), thus making housing become more unaffordable (Mohamed Osman, et al. 2017).

The district of Jeli having the worse affordability level for the year 2016 where the index increases from 4.3 (2014) to 9.4 in 2016. Based on DOS data, the household income increased by 8% but the increased of median housing price were 141.44%. The rapid increased of housing prices made the affordable level to be 'extremely unaffordable' with index 9.4. However, in 2016, the districts of Machang and Kota Bahru affordability index was better than 2014 where the index reduced from 5.5 to 4.2 while the later district index remained at 5.4. This is because the median income increased at higher rate as compare to the median housing prices. The overall affroability index for Kelantan state worsens over the year (2012, 2014 and 2016) where the indexed worsen from 4.4 – seriously unaffordable (2012) to 4.8 – seriously unaffordable (2014) and further worsen to 5.4 - severely unaffordable (2016). This clearly showed that the income of the local household is low and unable to cover the housing prices within the state.
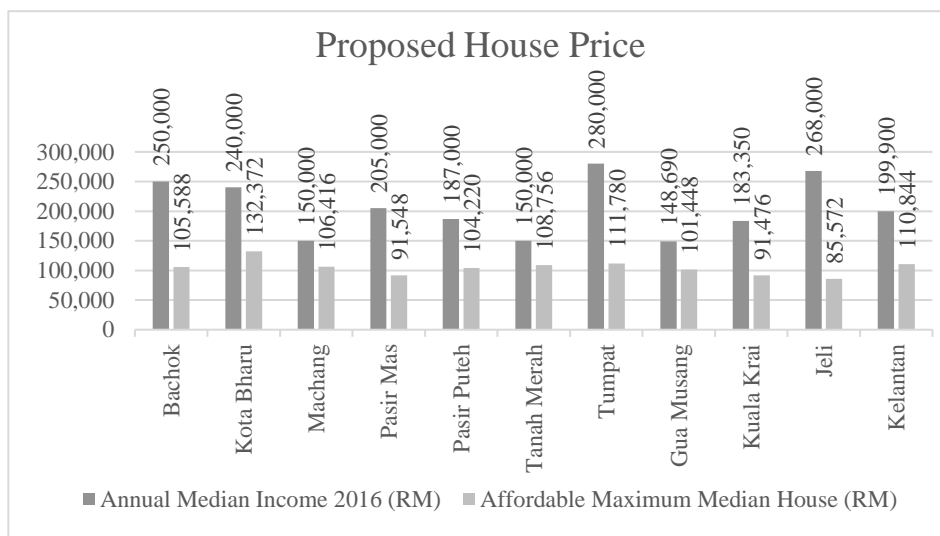
Figure 3 Maximum Affordable House Price in Every Districts
Source: Author's Calculation based on NAPIC (2016)

Figure 3 portrays the affordable housing prices within the districts in Kelantan maximum median house price based on housing affordability index ratio 3.0. For the whole Kelantan, the median house price for 2016 was RM 199,900 but based on the median multiple three, the affordable house price was RM 110,844 with the difference of 44.6%. Among all the districts, the largest gap is in Jeli with median house price for 2016 was RM 268,000 and the affordable house price was at RM 85,572. Thus, the price gap was RM 182, 428 (68%). This is followed by Tumpat and Bachok with the price gap of RM 168, 220 (60.1%) and RM 144, 412 (57.8%) respectively. Whilst, the lowest house price gap is in Tanah Merah which was RM 41,244 (27.5%). The prevailing market prices in key urban employment district were beyond the means of households, with varying degrees of severity across locations and districts.

Table 4 shows the estimation of the range of afordable house price based on income range prepared by the Department of Statistic and Bank Negara Malaysia in 2016. The table used both the Housing Cost Burden approach for the lower house price range and Residual Income approach for the upper price range. The lower house price in the range is calculated based on the Housing Cost Burden approach, in which a house is deemed affordable if the monthly housing loan installment does not exceed 30% of household net monthly income (after statutory deductions). Estimates are based on interest rate of 4.5% and 35-year loan tenure. The upper house price in the range is calculated based on the Residual Income approach, which takes into account statutory deductions, basic expenditures and other debt obligations, and with the assumptions of loan-to-

value ratio of 90%, interest rate of 4.5% and 35-year loan tenure. (Bank Negara, 2016)

Table 4 Maximum Affordable House Price in Every Districts

Household Income Range (RM)	Maximum Affordable House Price (RM)
≤ 1, 999	112, 200- 124, 700
2, 000- 3, 999	222, 150- 247, 200
4, 000- 5, 999	318, 600- 354, 100
6, 000- 7, 999	408, 300- 453, 600
8, 000- 9, 999	493, 500- 556, 100
10, 000- 14, 999	699, 560- 777, 600

Source: Department of Statistics Malaysia (2016) and Bank Negara Malaysia (2016)

However, in this study, the researcher used the price to income ratio approach and to calculate the maximum affordable house price, the annual median income household is multiple by 3.0. Table 5 indicates the proposed house price for every district. The result portrays that the affordable house price using house price to income ratio approach estimated lower housing prices compared to the approach of Housing Cost Burden and Residual Income Approach. For example the capability of the residents in Jeli with median income of RM 2,377 per month is to purchase a house price below RM 85,572 and compares to the estimation in Table 4, where the household with income between RM 2,000- RM 3,999 per month are expected to afford buying houses ranged between RM 222,150- RM 247,200 which is far higher that the calculation based on median house price to income ratio formula.

Table 5 Affordable House Price Using Approach PIR

Districts	Median Income 2016 (RM)	Affordable Maximum Median House (RM)
Bachok	2,933 per month x 12 months x 3	105,588
Kota Bharu	3, 677 per month x 12 months x 3	132,372
Machang	2, 956 per month x 12 months x 3	106,416
Pasir Mas	2, 543 per month x 12 months x 3	91,548
Pasir Puteh	2, 895 per month x 12 months x 3	104,220
Tanah Merah	3, 021 per month x 12 months x 3	108,756
Tumpat	3, 105 per month x 12 months x 3	111,780
Gua Musang	2, 818 per month x 12 months x 3	101,448
Kuala Krai	2, 541 per month x 12 months x 3	91,476
Jeli	2, 377 per month x 12 months x 3	85,572
Kelantan	**3, 079 per month x 12 months x 3**	**110,844**

Source: Author's Calculation based on NAPIC (2016)

CONCLUSION AND RECOMMENDATION
It is recommendation that the median house to income ratio to be used to calculatie housing affordability as the price range for affordable homes under the Residual Income and House Cost Burden approach clearly skews to the higher

housing price when compared to the actual median house price for 2016. Given the simplicity of the 30-percent standard, the house price to income ratio remains a reliable indicator of affordability both over time and across markets. In term of housing affordability in Kelantan, the study concluded that the affordability level among districts varied due to different household income level and housing prices. In term of affordable housing prices, table 5 showed that the 10 districts have different affordable housing prices with Kota Bahru as the main urban centre having higher affordable housing price compare to the other districts.The calculated affordable house price should be use by the Kelantan state government when the state government planned for their housing stock in future.

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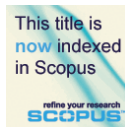
THE IMPACT OF PERSONALITY AND LIFESTYLE ON INTERACTION WITH NATURE

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Abstract

Awareness on the complex interdepending systems between individuals and their contexts is a fundamental understanding of sustainable well-being. Collectivist beliefs and biospheric values translate the normative behaviours when environmental decisions are being made. Issue: Existing research has limited empirical evidence on the impact of personality and lifestyle (PL) on interaction with nature (IN) for Malaysia. Purpose: This paper aims to verify the statistical predictability of IN based on PL. Approach: Multiple Correlation and Multiple Linear Regression were carried out to assess linear associations and parameters of linear equations to predict IN components based on PL items. Findings: IN components were predictable by the majority of the PL items and 'feeling affected by the environmental loss of other countries' was the strongest predictor of IN.

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INTRODUCTION

Human interdependence with the environment (HIE) is one of the strong sources of subjective sustainable well-being (SSWB). Personality and lifestyle (PL) and interaction with nature (IN) are dimensions of HIE that mutually stimulate one another (Abu Bakar et al., 2017a, 2017b, 2017c, 2018). Human beings willingly influence their surroundings directly and indirectly. The direct influence is often demonstrated in the willingness to assist each other in pursuing worthy life goals by helping and nurturing others and being good role models. The indirect influence is revealed in contagious emotions, empathic resonance and imitation of empathy towards the surrounding environment. This paper assesses the statistical predictability of IN based on PL.

LITERATURE REVIEW

Case studies based on articles from selected Asian Journals from the year 2011 onwards highlight conditional factors and potential determinants of Interaction with Nature (IN). Table 1 summarizes these findings.

Table 1 Conditional Factors and Potential Determinants for Interaction with Nature

Conditional Factors	Potential Determinants	References
Unmaintained outdoor space: murky water that provides a place for mosquito breeding, too dense vegetation, and tall and bushy that blocked views.	Emotions and feelings (safety and security) induced in natural elements	(Maruthaveeran, 2012)
Motivation (to experience nature, to unwind) activities (appreciating nature, trekking and hill climbing, observing sunrise, observing hilltop scenery,).	The urge to be in nature, knowledge and ability to cope with outdoors.	(Zainol et al., 2012)
Housing value depended on a variety of park elements, conceptual or design of the park, distance to the park, views towards the park, and active areas in the park facing the house.	The inclination to be close to natural or outdoor areas, the urge to spend time in the outdoor environment	(Shukur et al., 2011)
Health condition and availability of natural environmental, views and accessibility to outdoors	The need to be in natural environment	(Ghazali & Abbas, 2011)
Physical well-being (active living); cognitive well-being (comfort, relaxed, and calmness, sense of privacy); and social well-being (interaction)	Having pleasant experience in natural setting: relaxed, energetic and healthy	(Mansor et al., 2012)
Accessibility to natural environment correspond with health and behaviour	Health condition depends on outdoor environment	(Khotdee et al., 2012)
Stimulation of natural elements to encourage motivation (sense of connectedness to greeneries and flexibility of spaces and diversity of natural elements)	Sense of curiosity and feeling engaged, creative and active in natural setting	(Faizi et al., 2013)
Age, gender, health-related conditions (stamina, health issues) and facilities in outdoor areas	Physical health and capability in outdoor areas	(Inani et al., 2013)
The physical setting of outdoor space: characteristics of groundcovers, open spaces, and tree foliage.	Ability to adapt and adjust to natural surrounding	(Ngesan et al., 2013)
Uniqueness of natural features and distinct character of landscape elements	Curiosity of natural features (ability notice details)	(Mahidin & Maulan, 2012)

The findings from the case studies generate three significant components of IN: (i) Nature Attachment (INa), (ii) Knowledge and Capability (INb) and (iii) Inclination towards Nature (INc).

Table 2 Components and Determinants of Interaction with Nature

Definition of IN	Components	Indicators	Code
The internal and external emotions and aptitudes towards the natural environment expressed in the contact between human and the ecological nature	Nature Attachment	outdoor environment determining own health and wellness	INa
		being able to recall experiences in the natural environment	
	Knowledge and Capability	being able to adapt to various outdoor surroundings	INb
		being able to see and hear what others usually miss in nature	
		being able to notice scientific details of nature	
		being able to cope with the outdoor environment	
	Inclination towards Nature	feeling the urge to spend time in the natural environment	INc
		tending to lose concentration without contact with nature	
		tending to have objects from the outdoors in personal space	
		spending time planting at home	

Personal Lifestyle (PL) manifests in the personal outlook and approach to life in relation to environmental consciousness (Abu Bakar et al., 2017a, 2017b, 2017c, 2018). Qualities adhere to PL include (i) moral stance in collectivistic values (Laurens, 2012; Clark et al., 2014; Caesar, 2016), (ii) commitment to modest and environmental choices (Horayangkura, 2012; Laurens, 2012; Khare, 2015; Ming et al., 2015), and (iii) environmental concerns through knowledge and awareness (Horayangkura, 2012; Ming et al., 2015).

Table 3 Determinants of Personal Lifestyle

Definition of PL	Indicators	Code
The personal orientation that portrays collectivistic worldviews, modesty and humility towards others as well as consciousness of environmental issues	favouring relationships with others over personal success	PL1
	choosing to disappointing self over disappointing family	PL2
	taking account others' opinions in making life decisions	PL3
	taking the pleasure of working with others	PL4
	practising moderation in purchasing and using resources	PL5
	feeling unconcerned if not being able to afford things	PL6
	believing that having many assets does not lead to happiness	PL7
	being mindful about environmental destruction	PL8
	feeling affected by the environmental loss of other countries	PL9
	urging media to raise more environmental awareness	PL10

According to theoretical fundamentals, the research hypothesizes that IN components are predictable by PL. The following sections provide empirical evidence on the predictability of INa, INb and INc based on PL items.

METHOD

A sample of 4315 was pooled and analyzed. An 11-point Likert scale was given to the Malaysian respondents to reply to questionnaire items which include the components of IN and the ten (10) PL items. Pearson correlation analyses were carried out to determine significant linear associations between the IN components and PL items. After the correlation analyses, multiple linear regression analyses were executed to estimate parameters of the linear equations in order to predict values of INa, INb and INc from PL items.

RESULTS AND DISCUSSION

Table 4 Multiple Correlations between PL items and INa,INb and INc

H$_0$	There is no statistically significant correlation between INa and respective PL items										
H$_0$	There is no statistically significant correlation between INb and respective PL items										
H$_0$	There is no statistically significant correlation between INc and respective PL items										

Correlation Strength Threshold (Dancey & Riley, 2004)										
0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1
zero	weak			moderate			strong			perfect

DV	Stats	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10
	r	.360**	.345**	.356**	.401**	.350**	.292**	.293**	.347**	.365**	.394**
INa	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315
	r	.321**	.325**	.343**	.366**	.349**	.314**	.323**	.372**	.357**	.337**
INb	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315
	r	.273**	.268**	.298**	.323**	.321**	.297**	.312**	.342**	.326**	.318**
INc	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315

	Statistical Interpretation of Multiple Correlation Analyses
INa	At 95% confidence level, there were statistically significant and moderate correlations between INa and (i) PL4 (r =.401, p = .000). Additionally, there were statistically significant and weak correlations between INa and (ii) PL1 (r =.360, p = .000); (iii) PL2 (r =.345, p = .000); (iv) PL3 (r =.356, p = .000); (v) PL5 (r =.350, p = .000); (vi) PL6 (r =.292, p = .000); (vii) PL7 (r =.293, p = .000); (viii) PL8 (r =.347, p = .000); (ix) PL9 (r =.365, p = .000); and (x) PL10 (r =.394, p = .000).
INb	At 95% confidence level, there were statistically significant and weak correlations between INb and (i) PL1 (r =.321, p = .000); (ii) PL2 (r =.325, p = .000); (iii) PL3 (r =.343, p = .000); (iv) PL4 (r =.366, p = .000); (v) PL5 (r =.349, p = .000); (vi) PL6 (r =.314, p = .000); (vii) PL7 (r =.323, p = .000); (viii) PL8 (r =.372, p = .000); (ix) PL9 (r =.357, p = .000); and (x) PL10 (r =.337, p = .000).
INc	At 95% confidence level, there were statistically significant and weak correlations between INc and (i) PL1 (r =.273, p = .000); (ii) PL2 (r =.268, p = .000); (iii) PL3 (r =.298, p = .000); (iv) PL4 (r =.323, p = .000); (v) PL5 (r =.321, p = .000); (vi) PL6 (r =.297, p = .000); (vii) PL7 (r =.312, p = .000); (viii) PL8 (r =.342, p = .000); (ix) PL9 (r =.326, p = .000); and (x) PL10 (r =.318, p = .000).

At 95% confidence level, there were statistically significant positive correlations between (i) INa and each of PL items, (ii) INb and each of PL items, and (iii) INc and each of PL items. The null hypotheses claiming there are no statistically significant correlations between (i) INa and respective PL items, (ii) INb and respective PL items, and (iii) INc and respective PL items were all rejected.

Three (3) multiple regression analyses were carried out to predict the values of each of dependent variables (i) INa, (ii) INb and (iii) INc given the set of PL explanatory variables (PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9, and PL10).

Table 5 Multiple Linear Regression – PL predicting INa

H₀
There will be no significant prediction of INa by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10

Model Summary					
Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.471ᵃ	.222	.220	1.54620	1.648

ANOVA					
Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2934.876	10	293.488	122.761	.000ᵇ
Residual	10289.671	4304	2.391		
Total	13224.547	4314			

Coefficients							
Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.253	.152		21.433	.000	2.955	3.550
PL1	.098	.022	.096	4.360	.000	.054	.142
PL2	.029	.024	.028	1.211	.226	-.018	.077
PL3	.020	.026	.018	.787	.431	-.030	.071
PL4	.153	.025	.143	6.027	.000	.103	.203
PL5	.043	.025	.041	1.717	.086	-.006	.092
PL6	-.009	.022	-.009	-.406	.685	-.052	.034
PL7	.014	.023	.013	.623	.533	-.030	.058
PL8	-.012	.025	-.011	-.481	.631	-.060	.036
PL9	.115	.021	.118	5.425	.000	.073	.156
PL10	.145	.020	.149	7.313	.000	.106	.183

A multiple regression was generated to predict INa based on PL items. R value of .471 indicated adequate level of prediction (R > 0.4). The Durbin-Watson statistic was 1.648 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, $F(10, 4304) = 122.761$, $p = .000$, with an R^2 of .222; indicating that the proportion of variance in INa that can be explained by PL items was 22.2%.

At 95% confidence level, PL1 (B = .098, t = 4.36, p = .000); PL4 (B = .153, t = 6.027, p = .000); PL9 (B = .115, t = 5.425, p = .000); and PL10 (B = .145, t = 7.313, p = .000) were significant predictors of INa. On the contrary, it was found that PL2 (B = .029, t = 1.211, p = .226); PL3 (B = .020, t = .787, p = .431); PL5 (B = .043, t = 1.717, p = .086); PL6 (B = -.009, t = -.406, p = .685); PL7 (B = .014, t = .623, p = .533) and PL8 (B = -.012, t = -.481, p = .631) were not significant predictors of INa.

Personality and Lifestyle (PL) items account for 22.2% of Nature Attachment (INa). Four (4) of PL items were significant predictors of INa.

Table 6 Multiple Linear Regression – PL predicting INb

	H_0				
There will be no significant prediction of INb by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10					

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.445[a]	.198	.196	1.44301	1.671

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2210.859	10	221.086	106.176	.000[b]
Residual	8962.079	4304	2.082		
Total	11172.937	4314			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.188	.142		22.505	.000	2.910	3.465
PL1	.036	.021	.039	1.721	**.085**	-.005	.077
PL2	.037	.023	.039	1.652	**.099**	-.007	.082
PL3	.050	.024	.049	2.054	.040	.002	.097
PL4	.083	.024	.085	3.518	.000	.037	.130
PL5	.044	.023	.046	1.895	**.058**	-.002	.090
PL6	.032	.021	.034	1.542	**.123**	-.009	.072
PL7	.038	.021	.038	1.785	**.074**	-.004	.079
PL8	.093	.023	.094	4.037	.000	.048	.138
PL9	.097	.020	.109	4.916	.000	.058	.136
PL10	.033	.018	.037	1.796	**.073**	-.003	.069

A multiple regression was generated to predict INb based on PL items. R value of .445 indicated an adequate level of prediction (R > 0.4). The Durbin-Watson statistic was 1.671 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, $F_{(10, 4304)}$ = 106.176, p = .000, with an R^2 of .198; indicating that the proportion of variance in INb that can be explained by PL items was 19.8%.

At 95% confidence level, PL3 (B = .050, t = 2.054, p = .040); PL4 (B = .083, t = 3.518, p = .000); PL8 (B = .093, t = 4.037, p = .000) and PL9 (B = .097, t = 4.916, p = .000) were significant predictors of INb. On the contrary, it was found that PL1 (B = .036, t = 1.721, p = .085); PL2 (B = .037, t = 1.652, p = .099); PL5 (B = .044, t = 1.895, p = .058); PL6 (B = .032, t = 1.542, p = .123); PL7 (B = .038, t = 1.785, p = .074) and PL10 (B = .033, t = 1.796, p = .073) were not significant predictors of INb.

Personality and Lifestyle (PL) items account for 19.8% of Knowledge and Capability (INb). Four (4) of PL items were significant predictors of INb.

Table 7 Multiple Linear Regression – PL predicting INc

H_0
There will be no significant prediction of INc by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.405[a]	.164	.162	1.67223	1.604

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	2367.393	10	236.739	84.660	.000[b]
Residual	12035.522	4304	2.796		
Total	14402.915	4314			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.081	.164		18.769	.000	2.759	3.403
PL1	.030	.024	.028	1.218	**.223**	-.018	.077
PL2	-.010	.026	-.009	-.382	**.702**	-.062	.041
PL3	.054	.028	.047	1.925	**.054**	-.001	.109
PL4	.074	.027	.067	2.709	.007	.021	.128
PL5	.044	.027	.041	1.646	**.100**	-.009	.097
PL6	.042	.024	.040	1.778	**.076**	-.004	.089
PL7	.079	.024	.070	3.225	.001	.031	.127
PL8	.094	.027	.083	3.518	.000	.042	.146
PL9	.086	.023	.085	3.747	.000	.041	.130
PL10	.067	.021	.066	3.125	.002	.025	.109

A multiple regression was generated to predict INa based on PL items. R value of .405 indicated an adequate level of prediction (R > 0.4). The Durbin-Watson statistic was 1.604 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, F (10, 4304) = 84.660, p = .000, with an R^2 of .164; indicating that the proportion of variance in INc that can be explained by PL items was 16.4%.

At 95% confidence level, PL4 (B = .074, t = 2.709, p = .007); PL7 (B = .079, t = 3.225, p = .001); PL8 (B = .094, t = 3.518, p = .000); PL9 (B = .086, t = 3.747, p = .000) and PL10 (B = .067, t = 3.125, p = .002) were significant predictors of INc. On the contrary, it was found that PL1 (B = .030, t = 1.218, p = .223); PL2 (B = -.010, t = -.382, p = .702); PL3 (B = .054, t = 1.925, p = .054); PL5 (B = .044, t = 1.646, p = .100) and PL6 (B = .042, t = 1.778, p = .076) were not significant predictors of INc.

Personality and Lifestyle (PL) items account for 16.4% of Collaborative Engagement (INc). Five (5) of PL items were significant predictors of INc.

Table 8 Summary of Findings

		PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10
		IV (Predictor Variables) - β									
DV (Outcome Variables)	INa	.096 ✓	.028 ✗	.018 ✗	**.143 ✓**	.041 ✗	-.009 ✗	.013 ✗	-.011 ✗	**.118 ✓**	**.149 ✓**
	INb	.039 ✗	.039 ✗	.049 ✓	**.085 ✓**	.046 ✗	.034 ✗	.038 ✗	**.094 ✓**	**.109 ✓**	.037 ✗
	INc	.028 ✗	-.009 ✗	.047 ✗	.067 ✓	.041 ✗	.04 ✗	**.070 ✓**	**.083 ✓**	**.085 ✓**	.066 ✓

✓ = statistically significant predictor; ✗ = not statistically significant predictor

DV	Indicators	IV	Top 3 Strongest Predictors	β
INa Nature Attachment	• outdoor environment determining own health and wellness • being able to recall experiences in the natural environment	PL10	urging media to raise more environmental awareness	.149
		PL4	taking the pleasure of working with others	.143
		PL9	**feeling affected by the environmental loss of other countries**	**.118**
INb Knowledge and Capability	• being able to adapt to various outdoor surroundings • being able to see and hear what others usually miss in nature • being able to notice scientific details of nature • being able to cope with the outdoor environment	**PL9**	**feeling affected by the environmental loss of other countries**	**.109**
		PL8	being mindful about environmental destruction	.094
		PL4	taking the pleasure of working with others	.085
INc Inclination towards Nature	• feeling the urge to spend time in the natural environment • tending to lose concentration without contact with nature • tending to have objects from the outdoors in personal space • spending time planting at home	**PL9**	**feeling affected by the environmental loss of other countries**	**.085**
		PL8	being mindful about environmental destruction	.083
		PL7	believing that having many assets does not lead to happiness	.070

The findings revealed that some of the PL items significantly account for INa, INb and INc. PL9, designating '*feeling affected by the environmental loss of other countries*' was in the top three strongest predictors across IN components. The sense of moral responsibilities and concerns on global environmental problems implicitly and profoundly translate into emotions towards and aptitudes in the natural environment. Reaching out to people in different countries to inform on environmental issues are difficult due to language barriers, illiteracy and cultural differences. Local outreach, media outlets and classroom education can ease the communication barriers, spread messages and foster sense of proactive citizenships hence deepen shared empathy towards the natural surroundings.

CONCLUSION

HIE in SSWB promotes the idea the ways humans interact with nature originates from their collectivist backgrounds and biospheric values. This paper evidence that IN is predictable through PL. Statistical modelling on the constructs elaborated in this paper is warranted for future research.

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WALKABILITY FACTORS FOR A CAMPUS STREET

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Abstract

It has been reported that translating walkability is complicated, particularly the execution of its theory in planning practices. This study untangled the queries by presenting factors that makes campus interesting, walkable, and more importantly to be characterised as 'pedestrian friendly campus'. For this purpose, campus street walkability factors were analysed using factor analysis to find out the most significant measures of street walkability in the campus and its underlying items. All data has been run through SPSS beforehand and have met the assumption required for factor analysis that were formulated with the sample size of 500 respondents. The result from the study reveals that walkability factors of the campus were gratified from four significant factors that are classified as comfort, connectivity, safety and accessibility. The study reveals that proper streetscape design uncovers various potentials of the streets in forming part of a successful campus open space in the future. Moreover, the empirical findings in this research have provided a new understanding of the street function. Aside from functioning as space connectors, the streets offer broader opportunities for various pedestrian activities, which consists of passive and active activities that would contribute to the students' social and physical enhancement.

Keywords: walkability, campus design, streetscape, street

INTRODUCTION

According to Speck (2012), there are four key factors of 'General Theory of Walkability'. The book elaborates on the elements that makes a city interesting, walkable to pedestrian, and more importantly it explains the characteristics of a 'pedestrian friendly' street. It stated that there are four main conditions that gratify walking needs; i) safety, ii) useful, iii) comfortable, and iv) interesting. Each of these qualities needs to be in line with one another, and none alone is satisfactory.

Meanwhile, Jacob (1993) outlined six characteristics of walkable streets. These characters include; i) pleasurable environment for a leisure walk, ii) prioritisation on pedestrian comfort, iii) streets with meanings, iv) qualities that engage the eyes, v) transparency, and vi) complementary streetscape elements. Indeed, Litman (2014) and other authors expresses the same thought as Jacob (1993) on the characters of pedestrian-friendly streets. In other studies that were conducted by Rahman, Shamsuddin and Ghani (2014), and Yap et al. (2010), proximity (distance), lack of congestion, familiarity, greenery, public amenities, maintenance and freedom of action are factors that attract pedestrian to get attached to the street's environment.

In similar studies, Lee and Moudon (2003) measured walkability by the number of travel lane and presence of crosswalk, density (Owen et al., 2004; Brian & Susan, 2008), high density area, street directness, high connectivity (Handy, Xinyu, & Mokhtarian, 2002), distance to non-residential spaces, land use mix (Sallis et al., 2004), street connectivity, personal safety, parks and open space. This paper therefore, suggested that walkability studies involve various measures depending on the site context itself and how the concept is understood. Walkability can also be linked with qualitative attributes such as visual quality, attractiveness, safety and comfort. Walkability represents indefinable items; it is intangible and cannot be seen physically or represented through solid elements. It depends on the context and how it is being understood (Bahari, Arhsad & Yahya, 2013).

RESEARCH BACKGROUND

The notion of campus walkability is aimed for the students to easily reach hostels, faculties, green space and other facilities by foot. The implementation of the walkability concept is very crucial, particularly in Malaysian campus. The reason being that majority of the Malaysian universities were planned and developed in a scattered pattern (Shamsuddin, Sulaiman, & Ja'afar, 2007). The academic building, facilities and students' hostels were distanced away and disconnected by empty spaces in between. Hence, resulting in difficulties for pedestrians' access within the campus area. Gehl and Gemzre (1996) stated that three essential principles for walkable places are i) protection, ii) comfort and iii) enjoyment.

Protection is measured through the safety assurance against the traffic, crime and unpleasant experiences. In a walkable environment, walking is considered as a safe mode of mobility for pedestrian without being affected by the surrounding traffics. The work of Moayedi et al. (2013) identifies that walkability is measured by the quality of streetscape design, that needs to promote comfort, efficient access, permeability and pleasant experiences.

According to Miyakoda (2004), in Kansas City Departments of Planning identify walkability through five indicators of directness, continuity, street crossing, visual attractiveness and security. These qualities are reached through proper planning of streetscape. Indeed, Park (2008), and Nor Zalina and Amanina (2016) also pointed out that streetscape elements are the essential factors influencing the qualities of walkable streets. The work of Shuhana (2004), defines walkability as comfort and safety of pedestrians are achieved; with well-defined pedestrian-vehicle space and well-connected street sidewalks. Since the pedestrian perception and behaviour are highly influenced by street physical attributes (Park, 2008; Almoush et al, 2018), this validates that exploring the streetscape design is relevant to this study. Table 1 highlights various walkability studies and its concern.

Table 1 Studies Related to Walkability by Various Authors

Authors	Walkability Concept	Concern
Gehl & Gemzre (1996)	Three essential principles for walkable place are safety (traffic and calamity, crime and violence), comfort (positive climate, aesthetic quality and experiences) and enjoyment (ability to perform various activities without any obstruction).	safety , comfort , enjoyment
Litman (2012)	Walkability component are based on safety (traffic), security (crime), comfort (sidewalk LOS and continuity, buffer), conveniences (ease of access and crossing activities), visual interest (attractiveness)	Safety, security, comfort, conveniences and visual interest
Miyakoda (2004)	Measures walkability through five indicators of accessibility (directness and continuity), conveniences (street amenities and security), visual attractiveness, road and personal safety (street crossing)	accessibility, safety , conveniences, attractiveness
Galanis & Nikolaos (2011)	Walkability is measured through attributes of streets distance, climate condition, topography, street network and social factors	distance, climate condition, topography, street network and social
Ja'afar, Sulaiman, & Shamsuddin (2012)	The qualities and criteria of a walkable streets are comfort, attractiveness, clear direction in terms of accessibility, human scale, space and symbol.	comfort, attractiveness, accessibility, human scale, space & symbol
Speck (2012)	Gratify four main conditions; it needs to be safe, useful, comfortable and interesting. Each of these qualities needs to move towards together and none alone is satisfactory.	safe, useful, comfortable & interesting
Rahimiashtiani & Ujang (2013)	Pleasurability and attractiveness are factors that affected streets walkability.	pleasurability & attractiveness

Table 1: Studies Related to Walkability by Various Authors (cont'd)

Authors	Walkability Concept	Concern
Appleyard (2003); Clark, Scott, & Yiannakoulias, (2013)	Walkability as an indicator to how satisfactory the transportation system meets the needs of pedestrian. It is a measure towards how friendly the environment is.	pedestrian needs & satisfaction
Moayedi et.al (2013)	Measure walkability through the quality of streetscape design, land use pattern, building accessibility and social safety.	streetscape design, land use pattern, building accessibility and social safety
Litman (2014); Mohd Syazwan et al. (2018)	Walkability as the quality of waking state, comprises of safety, comfort and convenience attributes	safety, comfort & convenience
Afsar, Mohd Yazid & Mohd Johari (2015)	Walkability focus on liveability, accessibility, safety, street connectivity by streetscape elements and pedestrian activity.	liveability, accessibility, safety, connectivity, streetscape elements and pedestrian activity

Table 1 highlights the majority of walkability studies and their concerns on the four major attributes of safety, connectivity, accessibility, comfort and attractiveness to obtain a walkable street. However, each attribute was measured differently due to the different understanding and background of the researcher. For instance, the quality of conveniences and accessibility refers to the same meaning whereas the operational definition may vary. Hence, this study focuses on how streetscape elements influence walkability attributes of the four indicators.

METHODOLOGY
The statistical method used for this study is a simplified factor analysis with Principal Component Analysis (PCA). The consistency of internal items as determinant of the reliability instruments was measured through Cronbach's alpha ranged from 0.6 - 0.9. For this study, campus street walkability factors were analysed using factor analysis to find out the most significant measures of street walkability in the campus and its underlying items. All of the data was processed through SPSS beforehand and met the assumption required for factor analysis were formulated with minimum sample size of 150 respondents. Adequate correlations between variables are confirmed as to ensure that all variables are appropriate for data reduction. Originally, the factorability of 42 items of four influential street walkability factors were examined. Several well-recognised criteria for the factorability of the correlation were applied.

STUDY AREA
The IIUM Gombak campus was chosen as the study area, encompassing its major and secondary road networks. The major network is the circular road; meanwhile

the secondary road comprises the pedestrian routes connecting the mahallahs (hostels) and the kulliyyahs (faculties) as well as the students' centre (the centralised facilities provided for the students and staff such as ATM, cafeteria, convenience store and post office). The traffic direction for the vehicles on the main circular road is a one-way route. The street network involved in this study consists of routes that connects the mahallahs and the students' centre. The selected routes where questionnaires were distributed are three streets of Imam Malik Street (Street 1), Imam Abu Hanifah Street (Street 2), and Al Jamiah Street (Street 3) (Figure 1). These streets were chosen due to their level of utilisation by students of different majors for various purposes on daily basis. The street networks are also equipped with sufficient softscape and hardscape elements which support students' walking activities for various weather conditions.
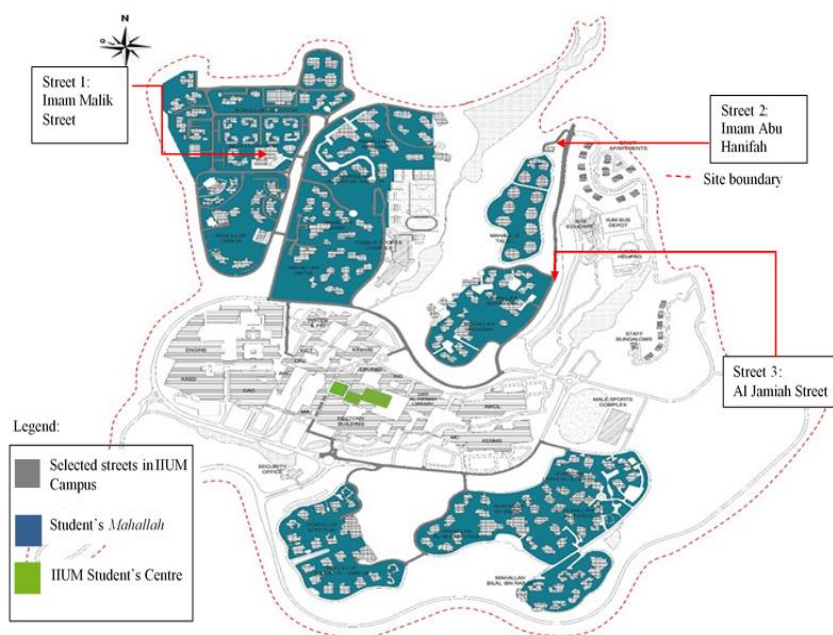
Figure 1 Selected Streets Studied

FACTORS ON WALKABILITY

A principle component analysis was computed using Promax rotation to discern the factors that influence campus street walkability based on student's satisfaction level. A series of statistical assumptions were assessed to ensure the suitability of the data for Exploratory Factor Analysis (EFA). Barlett's test of sphericity (p = 0.000) and the Kasier-Meyer-Olkin measure of sampling adequacy (KMO = 0.747) all indicated that the data satisfy the threshold for Principle Component

Analysis (PCA). The PCA (with Promax rotation) generated four factors based on Kasier criterion (Eigenvalue = 1.0). The factors were named as connectivity, safety comfort and accessibility.

The Cronbach Alpha of all extracted factors exceeded 0.6. Therefore, the scale achieved internal consistency. The communalities for all items exceeded 0.3, suggesting the 'ability' of the items to load strongly in one of the factors. CN 16 and A44 were omitted due to low factor loadings. The total variance explained was 62.706%. Table 2 shows factor loading for each item on their strongest affiliated factors.

Table 2 Rotated Component Matrix for Street Walkability Dimension

Dimension	Items	Factor Loadings
Comfort	Reducing pedestrian conflict.	0.998
	Buffer from vehicles noise.	0.997
	Space for other pedestrian activities.	0.816
	Continuous shady trees along the streets.	0.771
	Spacious pedestrian sidewalk.	0.736
	Seating/waiting area for pedestrian on streets.	0.700
	Covered sidewalk for mobility improvement.	0.690
	Bicycle lane for cyclist.	0.652
	Jogging track.	0.635
Safety	Protection from rainy weather.	0.930
	Protection from sun heat.	0.916
	Segregation between pedestrian and vehicles route.	0.907
	Underground tunnel safety.	0.887
	Prioritisation for pedestrian crossing activities for streets without crossing mark.	0.858
	Streets lightings functionality during night time.	0.827
	Buffer between pedestrian sidewalk and vehicles route.	0.815
	Streets lightings enhance mobility during night.	0.795
	Prioritisation on pedestrian crossing activities for streets with crosswalk.	0.640
	Decrease vehicles speed on crosswalk marking area.	0.597
	Streets lightings enhance vision during night time.	0.544
	Drivers reduce vehicles speed on streets without crosswalk.	0.323
Access-ibility	Nearest facilities should be reached able/access (bus stop etc).	0.946
	Presence of multiple-choice route.	0.766
	Sidewalk clearance from obstruction elements.	0.743
	Crosswalk mark need to be visible during night time.	0.741
	Increase signage legibility for night time use.	0.739
	Enhance signage legibility to ease wayfinding.	0.632
	Streets corner should be clear from trees height/obstruction.	0.607
	Trees planted along sidewalk clearly direct my way.	0.585
	Provide crosswalk mark at each main street junction.	0.580
Connect-ivity	Sidewalk should consider the nearest distance to reach destination.	0.842
	Sidewalk design should properly connect.	0.755
	Sidewalk should be provided on both sides of streets.	0.703
	Pedestrian short cut route.	0.628
	Small stop point/meeting area.	0.621

Diagram 1 presents street walkability factors gathered from survey. The suggested names for the subthemes were i) Street and Sidewalk Zoning as well as ii) Decrease pedestrian conflict. Meanwhile, three subthemes were extracted from safety (S) factor were named as i) vision at night ii) traffic safety and iii) physical safety. Three subthemes were extracted from accessibility (A) factor, namely i) permeability / directness ii) ease of movement iii) access to facilities. Two subthemes were extracted from connectivity (C) factor, which were i) sidewalk connectivity and ii) time/distance.

DISCUSSION

The result from the study suggests that walkability factors of the campus gratify four significant factors classified as comfort, connectivity, safety and accessibility. The result obtained reveals that comfort factor is more significant than safety, accessibility and connectivity factors. The significance of comfort factor is suggested to be associated with the execution of street zoning and the presence of amenities along the street. The execution of street zoning is implemented through well-defined space division and proper composition of streetscape elements on the street. Sidewalk spaces should only be utilised for walking activities. Other pedestrian activities such as sitting or waiting needs to be placed within the furnishing zone. Amenities are another essential aspect found to be significant in this study, in which they are considered to be a contributing factor that increases the level of pedestrian physical comfort. Moreover, reducing conflict among pedestrians helps to enhance pedestrian comfort as well. The result suggest that spacious sidewalk is capable of easing pedestrians' movement which would avoid them from the need to walk on the vehicle's lane. Pedestrian comfort is, therefore, increased when there is less conflict among pedestrians.

The second prominent factor of walkability in campus area is safety. The results suggest the four criteria could improve pedestrian safety in IIUM Campus include; i) segregation between pedestrian and vehicle route, ii) the presence of crosswalk marking, iii) composition of planting elements and iv) lighting luminance. The segregation between pedestrian and vehicle route provides a barrier between pedestrians and vehicles. This reduces the number of conflicts between pedestrians and vehicles on the street. A reduction in pedestrian-vehicle conflicts resulted in decreased amount of traffic collision. Crosswalk marks should be made available at the main street junctions as to ease pedestrian crossing movements. Planting elements such as shrub should function as a barrier to control pedestrian crossing movements within the street area. Lighting luminosity, location and types of lighting on the streets are important as to improve pedestrian safety during especially in night time.
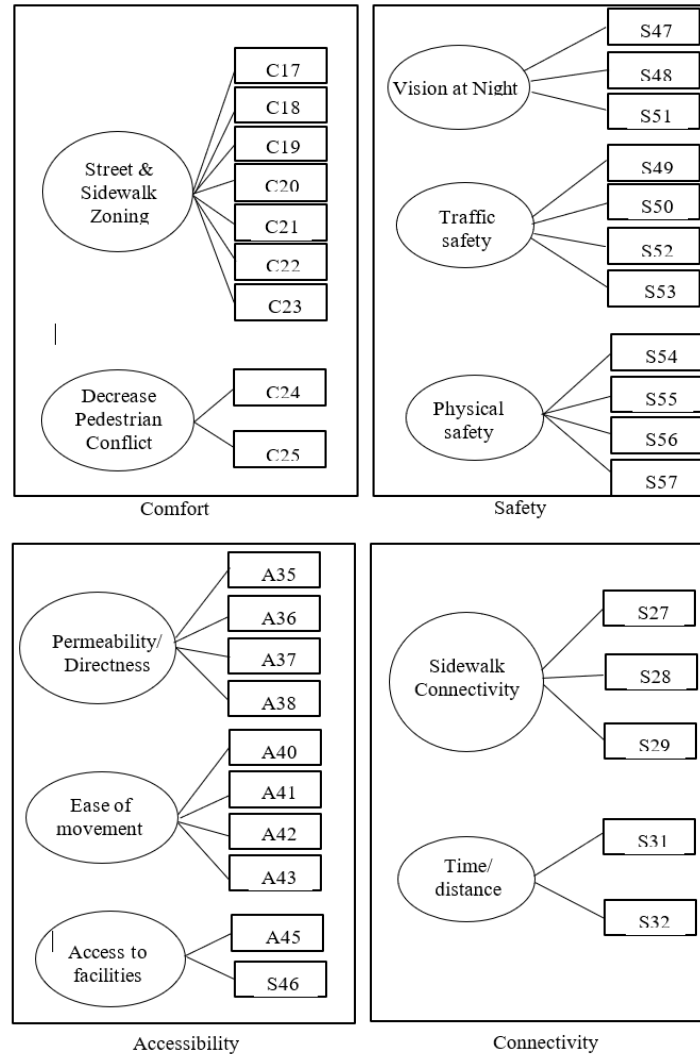
Figure 1 Suggested Name for Latent Variables - Component of Street Walkability

The third walkability factor is accessibility. In this study, accessibility was found to be influenced by three aspects; i) permeability/directness, ii) ease of movement and iii) access to facilities. Street permeability and directness are enhanced through planting locations, types and arrangements. For instance, tree canopies and trunks function as walls and 'roof' to create more defined street spaces. This creates an increase in pedestrian accessibility, frames the pedestrians' vision while walking, and eases their movements and activities. Signage execution and sidewalk links to the nearest facilities help to enhance

street accessibility on the campus. Land use such as hostels, faculties and bus stops need to be connected appropriately and should be easily accessed by pedestrians within the campus area to increase the level of street accessibility.

Connectivity is the fourth street walkability factor, which is improved through a well-connected sidewalk, implementation of an adequately paved desired pathways and an even sidewalk surface. A well-connected sidewalk is a sidewalk that links to each other without any separation elements or sudden stops. Sidewalk design should consider the shortest path possible for pedestrians to move from one place to another. Each desired path found within the campus should be appropriately paved. In sum, even though comfort appears to be the most significant factors of a walkable street, this does not indicate that other walkability factors are less significant. It is crucial that these factors co-exist and complement each other for a street to be considered as walkable.

CONCLUSION

The findings of this study produce significant implications for future practices on walkable street design. This study also reveals various potentials of streetways in becoming a part of a successful open space through a well-designed campus streetscape in the future. Moreover, the empirical findings in this research have provided a new understanding of the street function. Aside from its fundamental function as space connectors, streets offer broader opportunities for various pedestrian activities, which consist of passive and active activities. This would contribute to students' social and physical development. The research has also proven that pedestrian walking activities are influenced by streets' physical environment, particularly the composition and the selection of streetscape elements. Recognising the fact that a walkable street provides numerous benefits and more sustainable ways for students to access the campus's grounds, the injection of four walkability factors identified from this study might offer a new paradigm to the campus street environment.

This study concludes that street walkability can only be achieved through the assessment of streetscape elements in the campus by taking into consideration the pedestrian or user's preferences and needs. Greater efforts and attention are needed to be invested towards understanding pedestrian's preferences and to encourage them to walk within the campus as such improvements would make pedestrians become more attached and connected to the street environment.

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PERSONALITY AND LIFESTYLE INTERPRETS EXTERNAL CONDITION TO ENVIRONMENTAL BEHAVIOURS

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Abstract

Personality and lifestyles frame individuals' interpretation of situational information; as such, the encouragement, convenience and reinforcement to behave more environmentally. Issue: Existing research lack empirical evidence on the influence of personality and lifestyle (PL) on external condition (EC) to environmental behaviours. Purpose: This paper aims to verify the statistical predictability of EC based on PL. Approach: Multiple Correlation and Multiple Linear Regression were carried out to assess linear associations and parameters of linear equations to predict EC components based on PL items. Findings: EC components were predictable by some of the PL items. In particular, 'urging media to raise environmental awareness' was the strongest predictor of EC.

Keyword: external condition, personality and lifestyle

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INTRODUCTION

Human interdependence with the environment (HIE) entails (i) the ability to contribute, and (ii) the willingness to be responsive, and (iii) the enthusiasm to be more engaged with one's context for meaningful and sustainable well-being. Personality and lifestyle (PL) and external condition (EC) are two interrelated HIE dimensions that significantly contribute to subjective sustainable well-being (SSWB) (Abu Bakar et al., 2017a, 2017b, 2017c, 2018). Personal environmental values stem from collectivist beliefs and biospheric ideals that forms PL serve as guidelines in individuals' life and influence the way individuals evaluate the EC of environmental behaviours. Few studies to date have empirically examined how personal values relate to situation perception. This paper assesses the statistical predictability of EC based on PL.

LITERATURE REVIEW

Case studies based on articles from selected Asian Journals from the year 2011 onwards highlight conditional factors and potential determinants of Interaction with Nature (EC). Table 1 summarizes these findings.

Table 1 Conditional Factors and Potential Determinants for External Condition

Conditional Factors	Potential Determinants	References
Sense of urgency pressure, concern, awareness and behavioural change on solid waste management.	Regulation enforcement, and limited resources	(Lim, 2011)
Environmental, ethical commitment (dedication to moral principles in relation to the environment).	Regulation aspects, financial aspects,	(Delima & Zaman, 2012)
Re-arrangements of furniture, environmental appreciation, adjustment to living conditions.	Favourable living area and stress-free environment	(Sahari et al., 2012)
Hazardous exposure from construction and development (fumes and dust as well unregulated building materials such as asbestos, lead and solvents)	proper construction regulation process and procedures, and legal enforcement	(Isnin et al., 2012)
Increase of income per capita and increase of population density (population per unit area).	Pollution, conducive outdoors, health and quality of life	(Borhan et al., 2013)
Adaptation and adjustment of the citizens to the local tropical weather.	Outdoor condition (climate, temperature and humidity)	(Nasir et al., 2013)
Safety, public services, safe surroundings, greenery and quietness, social interaction and proximity.	Access, proximity and neighbourhood quality	(Lamit et al., 2013)
Influences by environmental concern and environmental campaign programmes.	Support from family, neighbours, and colleague	(Rezai et al., 2015)
Public satisfaction and improvements of the public transportation, network and facilities.	facilities, services, comfort and vehicle design	(Hafezi et al., 2013)
Location of living spaces and monthly income or allowance influenced energy-conservative attitudes.	Convenience to facilities and products	(Singhirunnusorn et al., 2011)
Prompts, commitment, normative influence, goal setting, barriers, rewards, and feedback	Situational factor (perception of difficulty to performance)	(Latif et al., 2013)

The findings from the case studies generate three significant components of EC: (i) Surrounding Encouragement (ECa), (ii) Convenience (ECb) and (iii) Favourable Enforcement (ECc).

Table 2 Components and Determinants of External Condition

Definition of EC	Components	Indicators	Code
The contextual circumstances and situational factors that influence and hinder individuals to think and act responsibly towards the environment	Surrounding Encouragement	having family members who support eco-friendly behaviours	ECa
		having a supportive, ethical climate at work	
		having reachable conducive outdoors	
		having a neighbourhood that supports green politics	
	Convenience	recognising accessibility to environmental products	ECb
		recognising affordability of environmental products	
	Favorable Reinforcement	recognising favourable waste handling management	ECc
		recognising conducive surrounding and amenities	
		recognising the efficiency of public transport infrastructure	
		recognising legal enforcement on environmental destruction	

Personal Lifestyle (PL) manifests in the personal outlook and approach to life in relation to environmental consciousness (Abu Bakar et al., 2017a, 2017b, 2017c, 2018). Qualities adhere to PL include (i) moral stance in collectivistic values (Clark et al., 2014; Caesar, 2016), (ii) commitment to modest and environmental choices (Horayangkura, 2012; Khare, 2015; Ming et al., 2015), and (iii) environmental concerns through knowledge and awareness (Horayangkura, 2012; Masud et al., 2013; Ming et al., 2015).

Table 3 Determinants of Personal Lifestyle

Definition of PL	Indicators	Code
The personal orientation that portrays collectivistic worldviews, modesty and humility towards others as well as consciousness of environmental issues	favouring relationships with others over personal success	PL1
	choosing to disappointing self over disappointing family	PL2
	taking account others' opinions in making life decisions	PL3
	taking the pleasure of working with others	PL4
	practising moderation in purchasing and using resources	PL5
	feeling unconcerned if not being able to afford things	PL6
	believing that having many assets does not lead to happiness	PL7
	being mindful about environmental destruction	PL8
	feeling affected by the environmental loss of other countries	PL9
	urging media to raise environmental awareness	PL10

Based on theoretical underpinnings, the research hypothesize that EC components are predictable by PL. The following sections provide empirical evidence on the predictability of ECa, ECb and ECc based on PL items.

METHOD
A sample of 4315 was pooled after the data screening process. The Malaysian respondents were given an 11-point Likert scale to respond to questionnaire items which consist of the components of EC and the ten (10) PL items. Pearson correlation analyses were conducted to observe if there were linear associations between the EC components and PL items. Ensuing correlation analyses, multiple linear regression analyses were conducted to estimate parameters of the linear equations used to predict values of ECa, ECb and ECc from PL items.

RESULTS AND DISCUSSION

Table 4 Multiple Correlations between PL items and ECa,ECb and ECc

H_0	There is no statistically significant correlation between ECa and respective PL items										
H_0	There is no statistically significant correlation between ECb and respective PL items										
H_0	There is no statistically significant correlation between ECc and respective PL items										

Correlation Strength Threshold (Dancey & Riley, 2004)										
0	.1	.2	.3	.4	.5	.6	.7	.8	.9	1
zero	weak			moderate			strong			perfect

DV	Stats	PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10
ECa	r	.277**	.267**	.286**	.319**	.280**	.240**	.234**	.280**	.257**	.291**
	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315
ECb	r	.237**	.235**	.260**	.274**	.263**	.248**	.249**	.283**	.256**	.261**
	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315
ECc	r	.274**	.264**	.279**	.300**	.284**	.246**	.232**	.267**	.231**	.271**
	p	.000	.000	.000	.000	.000	.000	.000	.000	.000	.000
	N	4315	4315	4315	4315	4315	4315	4315	4315	4315	4315

	Statistical Interpretation of Multiple Correlation Analyses
ECa	At 95% confidence level, there were statistically significant and weak correlations between ECa and (i) PL1 (r =.277, p = .000); (ii) PL2 (r =.267, p = .000); (iii) PL3 (r =.286, p = .000); (iv) PL4 (r =.319, p = .000); (v) PL5 (r =.280, p = .000); (vi) PL6 (r =.240, p = .000); (vii) PL7 (r =.234, p = .000); (viii) PL8 (r =.280, p = .000); (ix) PL9 (r =.257, p = .000); and (x) PL10 (r =.291, p = .000).
ECb	At 95% confidence level, there were statistically significant and weak correlations between ECb and (i) PL1 (r =.237, p = .000); (ii) PL2 (r =.235, p = .000); (iii) PL3 (r =.260, p = .000); (iv) PL4 (r =.274, p = .000); (v) PL5 (r =.263, p = .000); (vi) PL6 (r =.248, p = .000); (vii) PL7 (r =.249, p = .000); (viii) PL8 (r =.283, p = .000); (ix) PL9 (r =.256, p = .000); and (x) PL10 (r =.261, p = .000).
ECc	At 95% confidence level, there were statistically significant and weak correlations between ECc and (i) PL1 (r =.274, p = .000); (ii) PL2 (r =.264, p = .000); (iii) PL3 (r =.279, p = .000); (iv) PL4 (r =.300, p = .000); (v) PL5 (r =.284, p = .000); (vi) PL6 (r =.246, p = .000); (vii) PL7 (r =.232, p = .000); (viii) PL8 (r =.267, p = .000); (ix) PL9 (r =.231, p = .000); and (x) PL10 (r =.271, p = .000).

At 95% confidence level, there were statistically significant positive correlations between (i) ECa and each of PL items, (ii) ECb and each of PL items, and (iii) ECc and each of PL items. The null hypotheses claiming there are no statistically significant correlations between (i) ECa and respective PL items, (ii) ECb and respective PL items, and (iii) ECc and respective PL items were all rejected.

Three (3) multiple regression analyses were carried out to predict the values of each of dependent variables (i) ECa, (ii) ECb and (iii) ECc given the set of PL explanatory variables (PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9, and PL10).

Table 5 Multiple Linear Regression – PL predicting ECa

H_0

There will be no significant prediction of ECa by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.362[a]	.131	.129	1.67677	1.426

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1821.833	10	182.183	64.798	.000[b]
Residual	12100.958	4304	2.812		
Total	13922.791	4314			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.689	.165		22.415	.000	3.366	4.012
PL1	.062	.024	.060	2.568	.010	.015	.110
PL2	.013	.026	.013	.505	**.614**	-.038	.065
PL3	.042	.028	.036	1.478	**.140**	-.014	.097
PL4	.130	.028	.119	4.718	.000	.076	.184
PL5	.036	.027	.034	1.336	**.182**	-.017	.089
PL6	.016	.024	.015	.658	**.511**	-.031	.063
PL7	.002	.025	.002	.069	**.945**	-.046	.050
PL8	.064	.027	.058	2.387	.017	.011	.116
PL9	.020	.023	.020	.862	**.389**	-.025	.065
PL10	.096	.021	.096	4.477	.000	.054	.138

A multiple regression was generated to predict ECa based on PL items. R value of .362 indicated slightly a weak level of prediction (R < 0.4). The Durbin-Watson statistic was 1.426 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, F (10, 4304) = 64.798, p = .000, with an R^2 of .131; indicating that the proportion of variance in ECa that can be explained by PL items was 13.1%.

At 95% confidence level, PL1 (B = .062, t = 2.568, p = .010); PL4 (B = .130, t = 4.718, p = .000); PL8 (B = .064, t = 2.387, p = .017) and PL10 (B = .096, t = 4.477, p = .000) were significant predictors of ECa. On the contrary, it was found that PL2 (B = .013, t = .505, p = .614); PL3 (B = .042, t = 1.478, p = .140); PL5 (B = .036, t = 1.336, p = .182); PL6 (B = .016, t = .658, p = .511); PL7 (B = .002, t = .069, p = .945) and PL9 (B = .020, t = .862, p = .389) were not significant predictors of ECa.

Personality and Lifestyle (PL) items account for 13.1% of Surrounding Encouragement (ECa). Four (4) of PL items were significant predictors of ECa.

Table 6 Multiple Linear Regression – PL predicting ECb

H_0
There will be no significant prediction of ECb by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.335[a]	.112	.110	1.73798	1.549

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1647.291	10	164.729	54.536	.000[b]
Residual	13000.532	4304	3.021		
Total	14647.824	4314			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.561	.171		20.877	.000	3.227	3.896
PL1	.028	.025	.026	1.101	**.271**	-.022	.077
PL2	.004	.027	.004	.157	**.875**	-.049	.058
PL3	.067	.029	.058	2.310	.021	.010	.125
PL4	.063	.029	.056	2.215	.027	.007	.119
PL5	.021	.028	.019	.757	**.449**	-.034	.076
PL6	.053	.025	.050	2.139	.032	.004	.101
PL7	.040	.025	.035	1.569	**.117**	-.010	.090
PL8	.100	.028	.087	3.590	.000	.045	.154
PL9	.039	.024	.038	1.646	**.100**	-.007	.086
PL10	.056	.022	.055	2.522	.012	.012	.100

A multiple regression was generated to predict ECb based on PL items. R value of .335 indicated slightly a weak level of prediction (R < 0.4). The Durbin-Watson statistic was 1.549 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, $F(10, 4304) = 54.536$, p = .000, with an R^2 of .112; indicating that the proportion of variance in ECb that can be explained by PL items was 11.2%.

At 95% confidence level, PL3 (B = .067, t = 2.31, p = .021); PL4 (B = .063, t = 2.215, p = .027); PL6 (B = .053, t = 2.139, p = .032); PL8 (B = .100, t = 3.59, p = .000) and PL10 (B = .056, t = 2.522, p = .012) were significant predictors of ECb. On the contrary, it was found that PL1 (B = .028, t = 1.101, p = .271); PL2 (B = .004, t = .157, p = .875); PL5 (B = .021, t = .757, p = .449); PL7 (B = .040, t = 1.569, p = .117) and PL9 (B = .039, t = 1.646, p = .100) were not significant predictors of ECb.

Personality and Lifestyle (PL) items account for 11.2% of Convenience (ECb). Five (5) of PL items were significant predictors of ECb.

Table 7 Multiple Linear Regression – PL predicting ECc

H_0
There will be no significant prediction of ECc by PL1, PL2, PL3, PL4, PL5, PL6, PL7, PL8, PL9 and PL10

Model Summary

Model	R	R Square	Adjusted R Square	Std. Error of the Estimate	Durbin-Watson
1	.349[a]	.121	.119	1.65688	1.448

ANOVA

Model	Sum of Squares	df	Mean Square	F	Sig.
Regression	1633.719	10	163.372	59.511	.000[b]
Residual	11815.579	4304	2.745		
Total	13449.298	4314			

Coefficients

Model	Unstandardized Coefficients		Standardized Coefficients	t	Sig.	95.0% Confidence Interval for B	
	B	Std Error	β			Lower Bound	Upper Bound
(Constant)	3.833	.163		23.569	.000	3.514	4.152
PL1	.072	.024	.071	3.003	.003	.025	.119
PL2	.019	.026	.018	.730	**.465**	-.032	.070
PL3	.049	.028	.044	1.763	**.078**	-.005	.104
PL4	.076	.027	.070	2.779	.005	.022	.129
PL5	.070	.027	.066	2.602	.009	.017	.122
PL6	.033	.024	.032	1.384	**.166**	-.014	.079
PL7	-.003	.024	-.120	-.120	**.904**	-.050	.045
PL8	.075	.026	.069	2.845	.004	.023	.127
PL9	-.016	.023	-.017	-.714	**.475**	-.061	.028
PL10	.085	.021	.087	4.013	.000	.044	.127

A multiple regression was generated to predict ECa based on PL items. R value of .349 indicated slightly a weak level of prediction (R < 0.4). The Durbin-Watson statistic was 1.448 which is greater than 1.0 and therefore the data was not autocorrelated. A significant regression equation was found, F (10, 4304) = 59.511, p = .000, with an R^2 of .121; indicating that the proportion of variance in ECc that can be explained by PL items was 12.1%.

At 95% confidence level, PL1 (B = .072, t = 3.003, p = .003); PL4 (B = .076, t = 2.779, p = .005); PL5 (B = .070, t = 2.602, p = .009); PL8 (B = .075, t = 2.845, p = .004) and PL10 (B = .085, t = 4.013, p = .000) were significant predictors of ECc. On the contrary, it was found that PL2 (B = .019, t = .730, p = .465); PL3 (B = .049, t = 1.763, p = .078); PL6 (B = .033, t = 1.384, p = .166); PL7 (B = -.003, t = -.120, p = .904) and PL9 (B = -.016, t = -.714, p = .475) were not significant predictors of ECc.

Personality and Lifestyle (PL) items account for 12.1% of Favorable Reinforcement (ECc). Five (7) of PL items were significant predictors of ECc.

Table 8 Summary of Findings

		PL1	PL2	PL3	PL4	PL5	PL6	PL7	PL8	PL9	PL10
					IV (Predictor Variables) - β						
DV (Outcome Variables)	ECa	**.060** ✓	.013 ✗	.036 ✗	**.119** ✓	.034 ✗	.015 ✗	.002 ✗	.058 ✓	.020 ✗	**.096** ✓
	ECb	.026 ✗	.004 ✗	**.058** ✓	.056 ✓	.019 ✗	.050 ✓	.035 ✗	**.087** ✓	.038 ✗	**.055** ✓
	ECc	**.071** ✓	.018 ✗	.044 ✗	**.070** ✓	.066 ✓	.032 ✗	-.003 ✗	.069 ✓	-.017 ✗	**.087** ✓

✓ = statistically significant predictor; ✗ = not statistically significant predictor

DV	Indicators	IV	Top 3 Strongest Predictors	β
ECa Surrounding Encourage-ment	• having family members who support eco-friendly behaviours • having a supportive, ethical climate at work • having reachable conducive outdoors • having a neighbourhood that supports green politics	PL4	taking the pleasure of working with others	.119
		PL10	**urging media to raise environmental awareness**	**.096**
		PL1	favouring relationships with others over personal success	.060
ECb Convenience	• recognising accessibility to environmental products • recognising affordability of environmental products	PL8	being mindful about environmental destruction	.087
		PL3	taking account others' opinions in making life decisions	.058
		PL10	**urging media to raise environmental awareness**	**.055**
ECc Favorable Reinforce-ment	• recognising favourable waste handling management • recognising conducive surrounding and amenities • recognising the efficiency of public transport infrastructure • recognising legal enforcement on environmental destruction	**PL10**	**urging media to raise environmental awareness**	**.087**
		PL1	favouring relationships with others over personal success	.071
		PL4	taking the pleasure of working with others	.070

Findings show that some of PL items significantly account for ECa, ECb and ECc, particularly PL4, PL8 and PL10. PL10, denoting 'urging media to raise environmental awareness' was in the top three strongest predictors across EC components. Urging greater media awareness implies the confidence in environmental education as the driver to better EC of environmental behaviours. Environmental concerns through knowledge and awareness positively impact the way individuals perceive their contextual factors such as physical infrastructure, technical facilities, products availability as well as social encouragement.

CONCLUSION
HIE in SSWB proposes the idea that when personal values are compatible with the contextual situation, personal values strengthen the contextual situation. This paper evidence that EC is predictable through PL. Future studies could fruitfully explore the constructs elaborated in this paper further via structural causal modelling and expand the findings through

control, moderation and mediation effects of other socio-demography and socio-psychology variables.

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EFFECTS OF SUSTAINABLE CONSTRUCTION SITE PRACTICES ON ENVIRONMENTAL PERFORMANCE OF CONSTRUCTION PROJECTS IN NIGERIA

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Abstract

There are growing calls for construction site activities to be carried out in a sustainable manner. The reason for these calls is not far-fetched in view of the enormous impact such construction activities have on the natural environment. The objective of this study is to examine the effects of green construction site practices on environmental performance of construction projects in Nigeria. The effects of three green construction site practices namely waste management, materials management and energy management on environmental performance were analysed. 168 questionnaires were administered to site managers and project managers from "class A" contractors. The data were analysed using partial least squares-structural equation modelling. The results indicate that waste management has an insignificant impact on environmental performance, while materials management and energy management have positive effects on environmental performance. The results imply that not all sustainable construction site practices lead towards the attainment of environmental performance. The study has both theoretical and practical implication that helps policy makers and contractors to better understand the relationships that exists between these variables of sustainable construction site practices as well as environmental performance. This is essential in order to come out with a better plan for their projects and formulation of appropriate policies.

Keywords: Waste management, Materials management, Energy management, Environmental performance, Construction site practices.

INTRODUCTION

Green construction site practices is an avenue for constructing buildings and civil structures using approaches of construction that guarantees a reduction in the negative effects construction activities have on the environment (Ali & Al Nsairat, 2009). Activities carried out at various stages of the construction process consume considerable amount of resources which results in resource depletion and also produce substances and greenhouse gases which are injurious to the environment and humans (Zhang, Sandanayake, Setunge, Li, & Fang, 2017). The quest for economic advancement and the continuous upward surge in human population has increased the demand for housing and other infrastructure which has worsen problems of environmental pollution, climate change, and resource depletion (Xiao, Dong, Geng, & Brander, 2018). Environmental problems such as flooding, soil erosion and emission of poisonous gasses have been on the increase in Nigeria in recent years. These have been attributed to construction activities.

There are tendencies to emphasis on the need for construction site activities to be carried out in a more environmentally sustainable manner recently. This is connected with the tremendous negative impact construction site activities have on the life of humans and the stability of the natural environment. Extensive utilization of construction materials and other resource, massive generation of construction wastes, and enormous utilization of energy in the construction process have hindered the attainment of sustainability in the construction industry. Entrenching sustainability in the construction of buildings and other infrastructures contributes immensely with regards to the impact humans on the environment, and on the quality of life (Lu & Zhang, 2016).

The adoption of green site practices may be related with the quest to ensure that, construction site practices meet with the minimum requirement regarding environmental performance. Lu and Zhang (2016) reviewed different green rating systems around the world and concluded that the sustainability in the construction industry is highly focused on the green projects, such as the quantities, sizes, and values of final products of environmentally friendly projects, instead of on sustainable management in the process of executing the projects. There is also a seeming lack of education among contractors on the relationships between green construction site practices and the various aspects of project performance in Nigeria (Allu & Ebohon, 2015).Therefore, the aim of this research is to investigate the effects of waste management, construction materials management, and energy management practices on environmental performance of construction projects. This study will be beneficial to contractors, and other stakeholders within the construction industry in Nigeria, since it will elaborate on the relationships between various site practices and their individual effects on environmental performance.

Chen, Ong, and Hsu (2016) reports that various researches have concluded that there is a variance with regards to environmental performance when green construction practices are been adopted on site. They reported that some projects recorded a positive, negative or a neutral performance as a result of engaging in environmentally friendly site practices. In a study conducted by Adriana and Ioana-Maria (2013), they observed some discrepancies when trying to ascertain the relationship between adoption of sustainability practices and projects environmental performance. It was observed that in some successful construction projects, their success could not necessarily be attributed to sustainable practices, and also there were some instances where adoption of sustainability practice didn't lead to project environmental performance.

Effective waste management as well as the other green construction site practices are expected to impact positively on the environmental performance of construction projects (Silvius & Schipper, 2016). Based on the various arguments and opinions in the review of literatures, the following hypotheses are developed;

Hypothesis 1   Waste management has a positive effect on environmental performance of construction projects

Hypothesis 2   Construction materials management has a positive effect on environmental performance of construction projects.

Hypothesis 3   Energy management has a positive effect on environmental performance of construction projects.

These hypotheses are illustrated in figure 1.
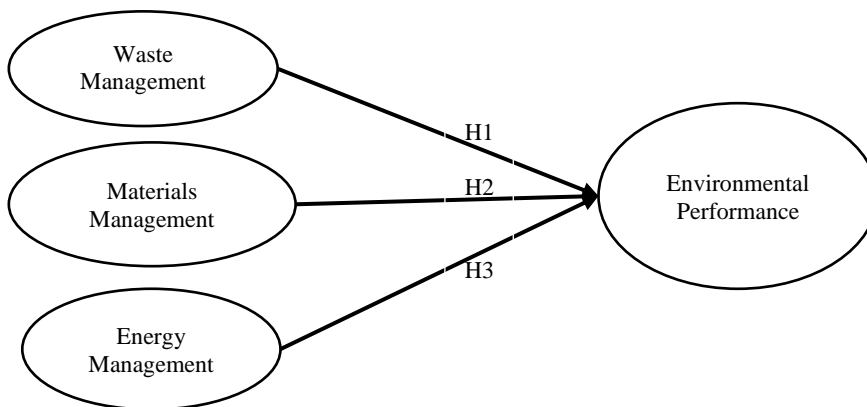
Figure 1 Conceptual Framework

RESEARCH METHOD

Instrument Development
This study was designed in a quantitative manner and a structured questionnaire was used for data collection. The items or questions contained in the questionnaire where adapted from the data collection instruments used in previously conducted studies related to this study. The items used in measuring waste management (5 items) where adapted from (Ajayi et al., 2016; Bhardwaj, 2016), materials management (4 items) which where adapted from (Sandanayake, Zhang, Setunge, Li, & Fang, 2016; Sinha, Gupta, & Kutnar, 2013), items for energy management (4 items) where adapted from (Collins, Parrish, & Gibson Jr, 2017) ,while the items for environmental performance (4 items) where adopted from (Yusof, Awang, & Iranmanesh, 2017). The questions posed in the research where answered with options on a 5-point Likert scale for the independent variables (waste management, materials management and Energy management) with 1 referring to very low extent and 5 referring to very high extent, while the dependent variable (environmental performance) was measured on a 7-point Likert scale with 1 referring to strongly disagree and 7 referring to strongly agree. It is also worthy to note that an extra single item (a global item) was collected for each of the latent variable for the redundancy analysis. This is a requirement since the constructs are all formatively measured. The choice of different scale of measurement between the dependent and independent variables was to reduce the incidence of single source bias since both sets of data will be collected from same respondents (Jakobsen & Jensen, 2015).

A pilot survey was conducted before data collection to ascertain whether the items adapted as contained in the questionnaire where valid and reliable. Interviewed for this purpose where experts in the Nigerian construction industry and those in the academia. They were asked to review and comment on the appropriateness or otherwise of the questionnaire items. In addition to the reviews and comments by the various experts, 43 completed questionnaires were collected from the to-be respondents (construction site and project managers of Class A contractors in Nigeria), the composite reliability where calculated for each of the indicators. From the results obtained from the interviews with experts, and the analysis of data gathered during the pilot survey, a few items were removed, some wordings in parts of the questions where reworded and some sentences where reversed in the final draft of the questionnaire. The constructs examined in this research are all formative. The questionnaire was prepared in English, which is the official language in Nigeria.

Method of Data Collection
Data collection for this study was done between October 2018 and February 2019. The data was collected from contractors that fall under "class A"

contractors with projects spread across the six geopolitical zones of Nigeria. Data was collected from 63 contractors who undertook 168 construction projects spread across the length and breadth of the country. The questionnaires were self-administered so as to have a high response rate. A total of 206 questionnaires were administered out of which 173 were returned. Of the 173 returned, only 168 where filled properly and considered for this study. The sample size for the study was determined based on the recommendations by Kock and Hadaya (2018). They recommended two approaches for determining the minimum samples size when using PLS-SEM as a response to the inaccuracies observed in the "10-times rule". These two methods are the "inverse square root" method and the "gamma exponential" method. The inverse square root method advocates for a minimum sample size of 160 samples while the gamma exponential method has 146 since the value of the path coefficients where not known prior to conducting the study. Therefore, the 168 valid reponses collected for this study is adequate.

Data Analysis Approach
The partial least squares structural equation modelling (PLS-SEM) was used to test the various relationships in this study. In the analysis of data for this study, WarpPLS version 6.0 was used. In specific terms, the reasoning behind the choice of WarpPLS software as against other Structural Equation Modelling (SEM) softwares is predicated on the fact that it possesses a wide variety of attributes, most of which are absent in other SEM softwares (Kock, 2017). For instance, the WarpPLS software is the first of its kind, and the only SEM software to comprehensively take into account non-linear functions linking pairs of latent variables in SEM models and calculate multivariate coefficients of interactions accordingly (Kock, 2017).

The "factor based PLS algorithm" was used for the measurement model estimation and the "stable 3" method for the calculation of the P-values as recommended by Kock (2017). Kock (2015) opined that the factor-based PLS algorithm produces estimates of both true composites and factors, and completely takes cognizance of measurement error. This addresses the criticism of PLS-SEM by some researchers, prominent among them is Rönkkö and Evermann (2013) who criticized PLS-SEM for utilizing composite algorithms, such as mode A and mode B for the calculation of latent variable scores. The warp 3 algorithm contained on the WarpPLS 6.0 inner model testing was used to analyse the structural model. This estimates parameters like the path coefficient and associated p-values by way of identifying and taking into account relationships than are not linear in the model (Kock, 2011).

DATA ANALYSIS, RESULTS AND DISCUSSION

Respondents Profile
In this study, 18% of the respondents had Ordinary National Diploma (OND) as their highest academic qualification, 27% where Higher National Diploma (HND) holders, 44% had bachelor's degree, 21% had postgraduate diploma (PGD), 49% had Masters degree (MSc) and 9% possessed a doctorate degree (Ph.D.). This indicates that the respondents are well educated and possessed the requisite knowledge to respond to the questions as contained in the questionnaire. Also, in terms of working experience, 19% had 0-5years working experience, 31%(6-10years), 48% (11-15), 42%(16-20years), 28% (over 20years). Most of the respondents where site managers who were 48.2% of the total study population, followed by project managers who constituted 47% of the respondents, senior managers and general managers where 3rd and 4th respectively in the number of respondents in this study with percentages of 14.9% and 8.9% in that other. Most of the contracting organizations considered for this study had over 200 employees which is 31% of the entire respondents, followed by 100-200 employees (29.2%), 10-99 employees (26.8%) and 0-9 employees (6%).

Assessment of the Measurement Model
Three formative constructs where studied in this research namely waste management, materials management, and energy management denoted by WM, MM and EM respectively. Also, the dependent variable (environmental performance) denoted by EP was also measured as formative. To evaluate the quality of the formative model, convergent validity, indicator collinearity, and statistical significance and relevance of the indicator weights will be evaluated. Convergent validity for formative models is determined using redundancy analysis as propounded by Chin (1998). From table 2, the formative construct for waste management produced a path coefficient of 0.721, material management had a path coefficient of 0.812, energy management yielded a path confident of 0.801, while environmental performance had a path coefficient of 0.765. all the values obtained for path coefficients where above the 0.70 threshold recommended by Klassen and Whybark (1999). This implies that the convergent validity of various latent variables is sufficient.

Apart from the redundancy assessment, the model needs to be assessed for collinearity between the various indicators. This can be done by assessing the VIF values. It is recommended that the VIF values should not exceed 3.3 in PLS-SEM analysis of formative latent variables measurements (Kock, 2014). It can be concluded based on the results in Table 2 that none of the indicators has a VIF above the 3.3 threshold. This means that collinearity among the constructs does not reach critical levels and it is not a problem in this model.

Finally, the significance and relevance of the outer weights would be analysed. From the results obtained, all the weights for the various indicators are significant except for MM1, EM1 and EP4. Since these three indicator weights are not significant, we check its outer loading as recommended by Hair, Hult, Ringle, and Sarstedt (2017). They recommended that the outer loading must be greater than 0.5 if the weights are not significant for the indicator to be retained. In this model, the outer loadings for MM1, EM1 and EP4 are 0.532, 0.973 and 0.731 respectively. Therefore, the indicators are retained.

Table 2 Assessment of Results of the Measurement Model

Construct	Items	Convergent Validity	Weights	VIF	P-value
Waste Management (WM)	WM1	0.721	0.357	1.499	<0.001
	WM2		0.269	1.511	<0.001
	WM3		0.220	2.597	<0.001
	WM4		0.219	1.464	0.047
	WM5		0.066	1.490	<0.001
Material Management (MM)	MM1	0.812	0179	1.145	0.057
	MM2		0.271	1.225	<0.001
	MM3		0.052	1.463	<0.001
	MM4		0.383	1.766	<0.001
Energy Management (EM)	EM1	0.801	0.197	1.294	0.437
	EM2		0.170	1.745	0.007
	EM3		0.054	1.280	0.003
	EM4		0.310	1.199	0.010
Environmental Performance (EP)	EP1	0.765	0.243	1.109	<0.001
	EP2		0.083	1.058	<0.001
	PP3		0.146	1.156	<0.001
	EP4		0.302	1.207	0.063

Assessment of the Structural Model

In assessing the structural model in PLS-SEM, six steps need to be taken (Ramayah, Cheah, Chuah, Ting, & Memon, 2018). These six steps according to Hair et al. (2017) are assessment of structural model for collinearity issues, assessment of the significance and relevance of the structural model relationships, assessment of the level of R^2, assessment of the effect size (f^2),and assessment of predictive relevance Q^2. Each of the formulated hypothesis represents a relationship link between one of the independent variables and the dependent variable in the structural model. Also, each of the links between the variables (dependent and independent) has a path coefficient and an associated p-value (level of significance) calculated.

It is worthy to note that the path coefficients must be significant before the hypothesis can be accepted. In the case of the R^2, its acceptance or otherwise is dependent on the research area (Rasoolimanesh, Jaafar, Kock, & Ahmad, 2017). R^2 values of 0.19, 0.33 and 0.67 can be interpreted to be weak, moderate and substantial (Chin, 1998). An R^2 value of 0.2 is deemed adequate for

behavioural studies (Hair Jr, Sarstedt, Hopkins, & G. Kuppelwieser, 2014). Stone Geisser's Q2 values, indicative of the model's explanatory power and predictive validity, were calculated for the endogenous latent variable (Hair, Ringle, & Sarstedt, 2011). The Q2 obtained for endogenous latent variable in this study is 0.214. The validity of a construct can be established when the value of its linked Q2 coefficient is more than zero. This is the case with the endogenous variable in this study, which signifies a model wide predictive validity.

Table 3 Result of Hypothesis Testing

Hypothesis	Relationship	Path Coefficient	P-value	Effect Size	Decision
H1	WM → EP	0.005	0.472	0.002	Not supported
H2	MM → EP	0.266	< 0.001	0.102	Supported
H3	EM → EP	0.524	< 0.001	0.305	Supported

The R^2 obtained for this study was 0.41. The R^2 value obtained is relatively high and acceptable for this research area. It therefore means that the percentage variance in EP is appropriately explained by the model.
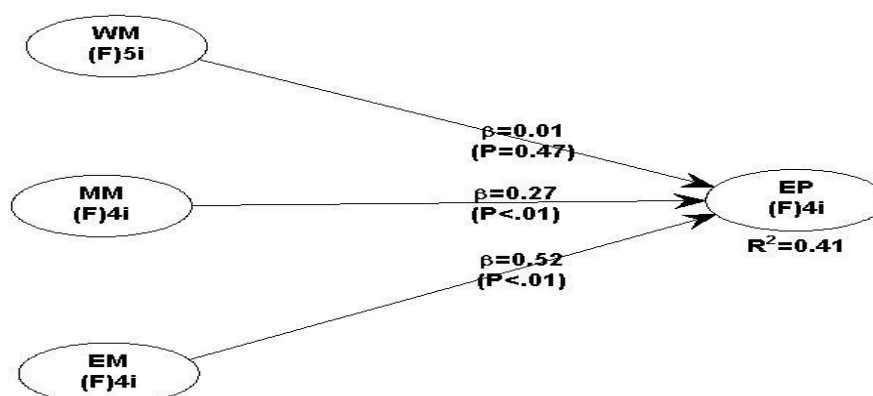
Figure 2 Results of Hypothesis Testing

Table 3 and Figure 2 presents the results obtained from the hypothesis testing and also results of the path coefficients. From the results, there is a significant effect of material management (MM) on environmental performance (EP), H2, and a significant effect of energy management (EM) on environmental performance (EP), H3. It can be observed from the results presented that waste management (WM) has a non-significant effect on environmental performance (EP), H1. In all, H2 and H3 are all supported, while H1 is rejected because the P-value is not significant. The P-value for H1 is 0.47 which is higher than the acceptable P-value of less than or equal to 0.05.

This study investigated the effects of selected green construction site practices on the environmental performance of construction projects. The results obtained indicates that energy management has significant positive effect on environmental performance. Also, construction materials management has a significant effect on the environmental performance on construction projects. However, the results show that waste management practices have no significant effect on environmental performance. It can be noticed that of the three green site practices assessed in this research, not all has significant effect on environmental performance. The findings in this study are consistent with the findings of Chen et al. (2016) where they observed some projects attained high environmental performance as a result of adopting certain green practices on site while some other projects experience negative and neutral environmental performance outcomes.

The attainment of a nonsignificant effect of waste management on environmental performance may be attributed to the likelihood that these practices have been institutionalized by the contracting firms. The contractors in this research are large contractors who handle very big projects, and also have large project turnover. As such, it could be said that was responsible for the insignificant effect of waste management. The effect of three out of so many other green practices on environmental performance where analysed in this study, the overall effect of green practices on environmental performance could be significant if the entire green practices are analysed since there is usually an overlap in these practices.

CONCLUSION

The research was conducted in Nigeria and three green site practices where analysed for their effect on environmental performance. The result indicates that energy management and material management had significant effects on environmental performance, while waste management did not. This is consistent with the findings of some studies. It can be concluded that, it is not in all scenarios that all green practices will lead to environmental performance. This can be attributed to peculiarities of different projects since all projects are of different characteristics. This can also be said to be because of the different skill sets of the workforce in the different contracting organizations. Some of the workers may be more experienced in undertaking certain green practices while others are not. It can be concluded that the environmental performance of projects executed using various sustainable site practices may be contingent on the characteristics of the projects.

The results of this study have practical and policy implications for Nigeria. For the contractors in Nigeria, it sheds more light on the possible practical effects of their construction practices on their ability to meet certain regulatory requirements on environmental performance. And for the government

and other regulatory bodies in the country, it assists them in policy formulation. It also assists them in appraising how far the various policy frameworks with regards to sustainable construction site practices have impacted on the broader goals of environmental performance.

LIMITATIONS OF THE STUDY AND RECOMMENDATION FOR FUTURE RESEARCH

This research is limited to only projects undertaken by "class A" contractors in Nigeria and did not take note of factors related to project characteristics such as project complexity, ownership structure of the project, form of contract and so on which could influence the environmental performance of construction projects when certain sustainable practices are been adopted. Also, projects undertaken by other categories of contractors where not captured in this study. Furthermore, only 3 sustainable construction practices where assessed in this research.

It is suggested that further studies should be conducted on projects executed by other categories of contractors, taking into cognizance various project characteristics. Other forms of sustainable construction site practices can also be studied in future researches and their effects on other dimensions of project performance such as: economic performance, and health and safety performance can also be examined. Similar studies should also be replicated in other countries in the developing world to compare the results with what was obtained in Nigeria.

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LATE PAYMENT ISSUES OF SUBCONTRACTORS IN MALAYSIAN CONSTRUCTION INDUSTRY

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Abstract

The practice of efficient and timely payment in construction projects is a major factor that can contribute to the success of a project. Delays in payment to subcontractor(s) by main contractor and client on construction projects in the Malaysian construction industry is considered to be a significant factor of concern. It causes severe cash flow problems to subcontractor(s) and this condition may lead to a devastating impact to the contractual payment chain. Withholding or delaying payment creates financial hardship for the construction companies and its impacts are sometimes so harsh that some companies have to close down their services. The research methodology adopted was the questionnaire survey analysis based on thirty (37) respondents from selected main contractors and sub-contractors in Gombak, Selangor. The data and information were also gathered from interviews analysis. From the research findings, among the factor of late payment from the client is payment withhold by the client. Meanwhile, the factor of late payment from the main contractor is when the term of "pay when paid" is applied. To improve the payment situation, the findings of this study suggest that there must be dedicated enforcing provisions for payment delay in contracts. This is proposed by introducing the standard form of contract clause regarding payment between the main contractor and domestic subcontractor which include levying charges on overdue payments.

Keywords: domestic contractor, construction, late payment

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INTRODUCTION

Payment is about money. Generally, money is an instrument used to achieve one's goals and desire through the transaction that involves some amount of money. Parallel in the construction industry, the money survived through the return on investment from the project management that proved the profit from the construction works as been presented by Shiner (2013). Adds on, Rahman (2012) argues that the construction industry is among the profitable ones differ to other industry. It is commonly one of the main objectives for contractors to ensure their company is keeping on survive for a long term. For instance, payment becomes more crucial as they need to cover their next project and to increase their performance to be in the top ranking in construction industry. Therefore, payment has been used as an associate indicator of their output as they are reflecting the worth of contractors. Late or delayed in payment is one of the most serious crisis, which can cause the dispute between parties, bankruptcy, abandon projects and others.

The issue of late payment becomes more critical when it involves sub-contractor who new in the construction industry and did not have strong financial stability to rotate the money. Al-Hammad (1993) states that most of the contractor that win the tender has absorbed around 70% of the construction work to the subcontractor. This situation gives advantages to the main contractors where the absorb of the work allows the main contractor to pay attention to other projects. The relationship between parties generates the ideas that payment should be secured to prevent any disputes arise in the project through good communication, good schedule planning, understand the contract agreement and etc. (Metri, 2005). This ambience further proved the essential role performed by the subcontractor in completing the construction project (Ng, 2006).

According to The Association General Contractor of America (AGCA), domestic sub-contractor can be defined as the independent contractor who performs the works, normally for a portion of the work. Domestic subcontractor in Malaysia plays a significant role in activating the construction industry as the result of sub-contracting the work by the general contractor. Normally, the provision is extremely vital in the construction project as it will stand for the fairness and justice in construction work such as the provision between the main contractor and their client. Unfortunately, in construction industry, there is poor contract binding for the domestic contractor in reacting to the main contractor. There is no specific provision that allocated specifically for the use of domestic subcontractor.

This paper reports on a study of factors on late payment faced among domestic sub contractor in Malaysia construction industry, either the client or main contractor is the main contribution to this issue. This paper scrutinises the strategy adopted by domestic sub-contractor to overcome late payment issues.

This paper is structured into five sections which including the introduction to an overview of late payment issues faced by domestic sub contractor. This is followed by a review of a factors contributing to late payment issues. In the subsequent section, an extensive of the strategies adopted by domestic sub-contractor to overcome late payment issues would be conducted. Finally, the paper provides a conclusion highlighting the key findings from the study.

RESEARCH BACKGROUND

Payment has been said lifeblood to construction industry which essential things to the process of construction and it also the reason of any problem arises. Although there are various rubrics given in numerous standard forms of contract regarding the payment from client to contractor, contractor to sub-contractor and others. The late payment still becomes the crucial issue in Malaysia construction industry (Din & Ismail, 2014). The issue becomes more complicated when there is no contractual binding between main contractor and subcontractor in standard form of contract Public Work Department (PWD) or Persatuan Arkitek Malaysia (PAM) for domestic subcontractor. There is no obligation that explains what the punishment is if late payment occurs between them. Standard form of contract is a pre-prepared contract which legally binding between two parties, the Employer and the Contractor. All the terms and conditions in the contract has been created earlier and consider as non-negotiated contract. (Zolkafli et al., 2011).

In addition, according to the Construction Industry Working Group on Payment (2007), problem related to the payment has become top of hierarchy and affects the cash flow to all chain in contract. Supardi, Adnan & Mohammad (2010), stated that the nature of dispute consists of payment (51%), delay (19%), termination (18%), variation (13%), damages (11%), performance bond (8%), default (8%), and defect (1%). Delay in payment timeliness for construction area is likely to happen most of the time that jeopardize the effectiveness of the construction work as it failed to meet the timeline schedule. Delay can be specified as time overrun in getting completion of work that already stated in a contract, or beyond the date agreed by other parties. There is provision in PWD Form 203A (1/2010) which stated within 44 days from the valuation, the government shall make the payment to contractor. Unavailability to follow the payment timeliness affects the payment to another chain, especially to subcontractor. Since the payment has been recognised as a dominant factor for the dispute, the reason of late payment issue commonly arises from poor financial management, the phenomena of pay when paid concept, negative attitude, error in submitting claim and others (Ansah, 2011 ; Azman, et al., 2014 ; Teku, 2015).

Construction industry gets high tendency to be exposed with any shortcoming and obstacles during the construction work. Among the tough hurdles deal by the contractor is the problem in payment that leads to great loss.

In Malaysia, the issue of subcontractors who do not receive the payment on time has become one of the serious causes that contributes to project delays in this country (Sambasivan & Soon (2007). According to Malaysian National Agency News (BERNAMA) (2005), there are a huge number of subcontractors in government project dismissed due to financial problem. Suhaini (2005) stated that in their finding, it is about 16, 000 of grade G1 contractors that suffered bankruptcy when other contractors failed to make payment for rural road project, although the client completed full payment to the main contractor. Therefore, it created financial hardship to the affected parties in this case. Hence, it is an obligation to main contractor to make payment for work that has been done by their subcontractor (Danuri, Munaaim, Rahman & Hanid (2006). Along these lines, one of the possibility elements to recuperate this problem is through introducing the specific management system for the payment throughout the process of the construction work.

This research will be focusing on three main parties in Malaysia's construction industry which are contractor, subcontractor, and client. Contractor and client were chosen because they conveyed the large categories on the construction industry team player. They were chosen because they are the paymaster to the subcontractor in most of the construction projects and they are the reason, contributor of late payment to subcontractor. Both parties are equally important in getting the right information in this research. They work hand in hand within any construction project and often payments problems occur between these parties. The study will also be focusing on the factor of late payment face by lower grade contractor namely G1, G2 and G3 that contributed by client and main contractor, the seriousness degree of late payment problem as well as the strategy by them to overcome this issue.

Obviously, there are various strategy has been taken to overcome this serious dilemma of late payment facing by subcontractor in construction work. However, this problem is stressfully blend in Malaysia culture as Ye & Rahman (2010) said in their finding, most of contractor considered that, a few days of delay is acceptable. However, there are several potential strategies that will be highlighted in the research such as arbitration, litigation and enhancement of communication between parties. (She, 2011).

OVERVIEW PAYMENT IN CONSTRUCTION INDUSTRY

Payment means a sum of money paid from one party to another. In term of construction, payment defined as money paid to a person or company who is hired to perform work. In other word, contractor or sub-contractor received their payment after work is successfully done (Longworth Consulting, 2009). For an illustration, payment been considered as the value of any work, materials or goods comprised in the contract. Formally known, payment needs to be paid fully and promptly except there are circumstances that delay the process. The payment is

divided by two types, which are interim payment and final payment in construction contract. Therefore, the payment requires a proper acknowledgment and certification by the Contract Administrator, Architect and Engineer. Based on Clauses Regarding Payment under PAM Contract 2 (2006), a contractor must fulfill his obligation as it confirmed early in construction contract to carry out all the works. On the other side, the client must keep his promise to pay the works done by contractors.

Since the payment is prime obligations to be fulfilled as stated in the contracts between parties, hence the failure to settle the payment can be regarded as breach of the contract. It acts as a core indicator and consideration to the performance of contractor in the construction project. Likewise, the smooth payment transaction in every procedure of work will lead to an outstanding construction project as it eases the contractor to hire the labour, buy the top brand materials and amongst others.

STAGES OF PAYMENT

i. **Advance Payment:** This type of payment is only used and available for government projects. The reason of having advance payment is to assist the contractor in term of finance to start up their projects (Palliyaguru et al., 2006). According to PWD 203A clause 69 stated that, the value of advance payment that contractor should pay is 25% from the Builder's work. However, the nominated subcontractor and supplier are not entitled to pay the advance payment. Without advance payment from client, contractor will face difficulty which is insufficient money to commence the work in the beginning of the project. Good example is the contractor experiences insufficient capital to purchase the material, transportation for labours and plants, construction of site office and any other preliminaries requirement.

ii. **Progress Payment:** Early stage of payment starts after the contractor has commences the works on site. After the work has been done, the quantity surveyor will be responsible to evaluate the progress of the construction work on the site and attain the contractor application of payment. After the valuation of works from quantity surveyor, architect must issue the interim certificate that prepared by quantity surveyor to the contractor and client. Client has to make payment to the contractor in the period of time based the standard form used to the project. To conclude, progress payment is a sum payable to the contractor on a regular basis for the progress of work done, which has been completed include material supplied on site

and any other eligible items accounted by the contract (Ismail, 2008).

iii. **Payment Upon Completion:** Minimal contractual formalities can be recognizing through payment upon completion of the work. It is normal for small-scale domestic to experience this kind of payment. It is familiar in construction industry to tolerate the total number of payments that have been settled upon completion of work. It will work based on plain letter of agreement, as there is no inclusive and formal contract agreement. The client will review the full payment receipt after the project is perfectly achieved.

iv. **Payment Upon Handing Over:** As construction industry is dynamic in reality, hence the development project especially at the outranked rural area is highly possible adapting the payment upon handing over style. It is more likely "build now pay later" program or credit financing of contract. It is because of the limitation in financial resources and small number of financial assistants by the government. However, due to attractive deal by the contractor that possibly been chosen by the indigent government to handle the project in that rural area.

v. **Final Payment:** Final payment is the final certificate that produces by the architect or the superintending officer (S.O), for the construction contract. The final payment as an appropriate amount received by the client after all the contract price adjustment is done (Ismail, 2008). It is normally issued after the defect liability period or after the contractor completes the works and any defect works. The final payment will show the amount that should be paid as the complete of the project and the contract. It also means that the architect and the engineer are satisfied and approved the contractors works based on the contract.

SUBCONTRACTOR IN MALAYSIA CONSTRUCTION INDUSTRY
According to Construction Industry Development Board (CIDB) (2013), subcontracting practices can be defined as agreement between two parties that resulting business to business relationship that commonly be found in construction industry. Subcontracting practice is most of the strategic business plan by main contractor in dealing with uncertainty in market flow and minimize the operating cost as it been transfer by subcontractor. The nature of construction project involves larger number of expertise working together (Fahada and Razak, 2013). It can be proved through the research in South African, where 70% of building project were subcontracted to other parties (Construction Industry Development Board (CIDB), 2013). Tayeh (2009) stated that, subcontract plays a vital strategy in construction to ensure the project is successful as up to 90% of

the total project values are assigned to several subcontracting firm. It is extremely essential for the general contractor to have subcontractor in their construction work as it will save the cost and time, decrease the burden of construction work and the specialty skills or advance own by the subcontractor in certain area of construction work (Badroldin et al., 2016). Unfortunately, the construction industry scenario in Malaysia proved that the catastrophe of operating subcontractor as the result of bankruptcy due to failure of the general contractor to compensate the sufficient amount spend by the subcontractor.

Among the important reason of the main contractors hire sub-subcontractor(s) as part of their work is to accelerate the projects duration. As the construction becomes more complicated, and the specialist is needed to handle some works which are not in main contractor expertise. It becomes a norm for contractor to give part of their works to others rather than handling the large workforce themselves. Enshassi, Arain & Tayeh (2012) stated that, about 80% to 90% of construction work performed by subcontractors. The presence of sub-contractor(s) gives a huge opportunity to contractor to undertake and handle more complex projects (Chiang, 2009).

i. **Cost Reduction:** Cost is one of the vital concerns by the main contractor. Thus, the subcontracting practice is one of the strategic ways in reducing the cost of construction as some general contractor did not manage to afford some amount for the cost of skillful worker in construction project.

ii. **Risk Reduction:** One of the reasons that lead to the subcontracting practices among main contractor is to reduce risk in terms of financial instability, economic fluctuations and completion risk of the project. Throughout the subcontract practices, the risk is being split to the subcontractor, as the subcontractor is play solely or full responsible towards the completion of the project.

iii. **Time consuming:** The idea of fast-tracking construction nowadays requires the smart time management in finishing the project. Henceforth, the step taken by main contractor in maximising the progress within the day given is through delegating the project to the subcontractor.

iv. **Build Relationship:** Domestic subcontractor secured the project by having good relationship with their main contractor. Commonly, the main contractor will guarantee more project to the subcontractor if only they are in a great binding relationship. Also, subcontractor needs to maintain the best connection with the main contractor to prevent any dispute arises especially during the project execution, i.e. providing specialised skills need, in which they will provide the expertise and special skills needed by main contractor in construction work. For an illustration, plumbing work that demands

an expertise from subcontractor in that area since the main contrator has a limited knowledge in the field. Therefore, this trend of subcontracting will speed up the construction work and reduced the duration for completion of project.

Further, according to condition of contract in PWD (PWD), there is specific provision that describes the payment matters in construction project between clients to main contractor, client to nominated subcontractor and general contractor to nominated subcontractor. As stated in clause 60.0 of PWD 203A (Rev. 1/2010), contractor is wholly responsible over Nominated Subcontractor (NSC), he can terminate the NSC anytime with consent from Superintendent Officer (SO) with several acceptable reasons and new NSC may be appointed without extra cost to the government.

Conversely, there is no specific allocation of provision between main contractor to domestic subcontractor in standard form of contract. The only available contract between both parties is drafted by main contractor, prior to Model Terms of Construction Contract for Subcontract Work presented by CIDB, as an alternative to the provision in September 2006. Also, there is studies from Chong (2006) who absolutely agrees that the main issue that occur between sub-contractor and main contractor is poor contract term due to zero standard form of contract for domestic subcontractor. The provision of payment timeliness in standard form of contract showed that the importance of prompt payment between client, main contractor and nominated subcontractor in order to guarantee the payment obligation for further chain is not affected (Arditi, & Chotibhongs, 2005). Disturbance of cash flow caused by late payment from the other parties will affect the performance of small business in daily operations in term of financial stability (Odeyinka & Kaka, 2005). Promptness in completing the payment is important to ensure the smooth construction operations, so that it will not interrupt the daily basis of small business operation.

FACTORS OF LATE PAYMENT

According to Amoako (2011), it is clearly mentioned that the contractors suffered financial hardship when their payment is delayed. The mistake or faulty by main contractor not just burden himself but at the same time it will be shifted to another chain which is subcontractor. Similarly, it also creates financial hardship to the subcontractor.

Fieldwork

This research was conducted by using mix qualitative and qualitative research. For the case of illustration, this research will provide the respondent with several sets of questionnaires which including numerical answer for the qualitative method while qualitative method been derived from the set of interview

questions. The rich quality data were collected, analysed, summarised and presented in Table 1 – 4, accordingly.

Table 1 Payment Due to Sub Contractor

When do subcontractors receive their payment?	Both		Main Contractor		Sub-contractor	
	f	%	f	%	f	%
Completion of work	13	35	6	30	7	41
After received payment from client	16	43	10	50	6	35
Progressive Payment every month	8	22	4	20	4	24
Total	37	100	20	100	17	100

Table 2 Late Payment Issues

Factors Contributing to Late Payment & Overcoming Late Payment Issues		Both		Main Contractor		Sub-contractor	
		M	R	M	R	M	R
Factors of Late Payment caused by Client	Client Poor Financial Management	3.4	3	3.3	4	3.5	3
	Client Withhold the Payment	4.3	1	4.2	1	4.4	1
	Failure to implement good governance in business operation	3.3	4	3.4	3	3.2	5
	Poor understanding of the contract	2.8	7	2.6	6	3.1	7
	Poor communication among parties involved	3.3	5	3.1	5	3.5	4
	Local culture and attitude	3.1	6	3.1	5	3.2	6
	Delay in Certification	4.2	2	4.0	2	4.3	2
Factors of Late Payment caused by Main Contractor	Delay and error in submitting claim	3.8	4	3.7	3	4.0	3
	Bid low price at tender stage	3.5	6	3.3	6	3.7	5
	Contractors failure to agree to the valuation of work	3.5	7	3.4	5	3.5	6
	Contractor Withhold the Payment	3.9	3	4.1	2	3.8	4
	Local culture / attitude of contractor	3.6	5	3.5	4	3.7	5
	The use of pay when paid.	4.3	1	4.4	1	4.2	1
	Poor communication among parties involved	3.2	9	3.0	8	3.4	7
	No formal contract agreement	4.1	2	4.1	2	4.1	2
	Contractor failure to understand the contract agreement	3.2	8	3.2	7	3.2	8
Overcoming Late Payment Problem by Subcontractors	Avoid accepting subcontract from financially-weak contractors	4.7	1	4.6	1	4.8	1
	Propose suitable and reasonable prices	4.1	5	4.0	3	4.1	3
	Communicate with the contractor effectively	4.2	3	4.0	4	4.4	2
	Suspend the construction process until payment is received	3.9	6	3.9	5	4.0	4
	Slow down construction work at site until payment is received	4.1	4	4.0	6	4.2	3
	Sending notice letter to client regarding contractor problem	4.4	2	4.4	2	4.4	2
	Initiate arbitration or litigation	3.7	7	3.5	7	3.9	5
	None, just ignore and continue with next month claim	1.5	8	1.7	8	1.4	6
				M = mean; R = rank			

Discussion of the Results

Based on Table 1, it is shown that most of the subcontractor got their payment after main contractor received the payment from client. The term of "pay when paid" was applied. It could be due to the late payment and non-payment issue especially to sub-contractor. This clause is applicable when the client did not pay to the main contractor that definitely led to the late payment to the subcontractor. Meanwhile, some respondents claimed that the payment was made after the work is completely done. Should there were any problem due to unavoidable

shortcoming or non-completion of work, the payment will be delayed. This indicates that late payment issue dealt by the subcontractor is the critical issues that should be tackled seriously by scrutinising the factors that induce the late payment in construction area. For an example, when those people in construction industry get used to the pay when paid concept, eventually it will cause the late payment to the subcontractor. Indirectly, this issue becomes more serious in the future.

Based on Table 2, it is shown that the factor of late payment contributed by the client. As the aim of the observation, the three highest factors selected by both parties, i.e. main contractor and subcontractor which are "client withhold the payment", "client delay in certification" and "client poor financial management" by having overall mean 4.25, 4.15 and 3.42, respectively. Based on the highest response, the client withholds the payment is the most preferred. Most of the employer intent to hold the money from giving to main contractor for several reasons such as Non-Compliance Record (NCR) by contractor not dissolve, incomplete documentation for claim and etc. Some of the main contractor faced hard time to survived to roll their money before getting the payment from client. The concept of Other People Money (OPS) mostly used by main contractors in their business sometimes failed due to client withhold the payment. Also, client has higher tendency to hold the payment in several cases namely, any defective in the construction work, or failure to fulfil the specification require stipulated in the contract and disputes arise between parties. Henceforth, this factors also contributed to the late payment crisis to the sub-contractor. The second highest selected factor was delay in certificate. According to PWD standard form of contract that has been used for the government project, the certificate of payment should be released in 14 days to the contractor. Meanwhile, in PAM standard form of contract, it is stated that the certificate of payment should be released 21 days after the application of payment by contractor. Most of the client did not take this situation seriously and indirectly will contribute to the late payment issue. The third highest factors voted by the respondent is client poor financial management is part of the reason that influences the delay in payment to the subcontractor. This tends to happen if the client is too demanding in specification manufacturing but have insufficient amount of money to pay the main contractor. This situation proves that client fails to provide the payment wisely due to their demand.

Nevertheless, based on the Table 3 the factor of late payment contributed by the main contractor is tabulated. The three highest factors selected by both side main contractor and subcontractor which are "the use of pay when paid", "no formal contract agreement" and "contractor withhold the payment" by having overall mean 4.30, 4.09 and 3.91, respectively. Based on the highest response, the use of pay when paid is the most preferred factor by main contractor to pay for the subcontractor. It is because the procedure is simpler rather than

payment based on progress as everything were done at once a time. However, this will give chance to the main contractor to drag the payment which cause the late payment to the subcontractor. The second highest factor of late payment from main contractor was no formal contract agreement. As explained previously, there is no specific allocation of provision between main contractors to domestic subcontractor in standard form of contract. The purpose of the contract is to attain fairness for both parties. Without contract, many problems will occur especially in payment process. This situation gives advantage to the main contractor to maximise their opportunity in regulatory subcontractor. The other factor from main contractor that provided by respondent was numerous project coverage by main contractor. This condition occurred when the main contractor has insufficient staff to handle various project and some of them only focus on the specific project which contribute to the higher profit. Therefore, this state of affairs will drive the main contractor to the indecorous management, wherefore the late payment issue tends to come out in the construction project.

Table 4 tabulated above shown the strategy by subcontractor to improve the situation and performance due to late payment problems. The three highest strategies were selected by both parties which are "avoid accepting subcontract from financially-weak main contractors", "sending notice letter to client regarding contractor problem" and "communicate with the contractor effectively" by having overall mean 4.71, 4.35 and 4.15, respectively. "Avoid accepting subcontract from financially weak main contractors" was the highest selected strategies from the respondents. This is an indication that, most of the respondent prefers to take early precaution before accepting any jobs. The evaluation of contractor should be done in term of financial to prevent any upcoming risk. Meanwhile, the second highest of strategy that been selected by respondents was sending notice letter to client regarding contractor problem. This is done by the subcontractor by reporting any misconduct or problem regarding the main contractor. Usually, sub-contractor will issue the notice letter to the client in order to seek for urgent response from the client side towards their main contractor. There are three respondents whom provide the other strategy to overcome the late payment problem which the answer is out of the questionnaire. Based on the factor stated above, every business must be registered by Suruhanjaya Syarikat Malaysia (SSM) that is provided by government. Furthermore, the contractor also must have certification of Pusat Khidmat Kontraktor (PKK) which is fundamental requirement to involved in any government project. These strategies have been suggested in order to ensure that the contractor is qualified in handling the project based on their capability. The second strategy provided by respondent was to propose the standard form of contract clause regarding payment between main contractor and domestic subcontractor. There must be specific allocation penalties in the clause especially in term of late payment cases such as blacklist the contractor's name, levy charge

for payment overdue and other penalties for those involve in late payment. Indeed, this clause will be referred and be the guideline if there are any dispute occurs among of them. Thirdly, the subcontractor recommends the main contractor to use their own money instead of waiting the payment from clients. To avoid any distraction in progress of works, main contractor needs to spend their money first to pay the subcontractor.

CONCLUSION

The paper reported on a study of the factor affecting late payments to domestic sub-contractor. The results show the respondents are strongly agreed that late payment issue affect the financial stability, performance, and quality of construction of subcontractor. The result concludes that, late payment culture in Malaysia construction industry is becoming a norm and habit for those in that area to deal with, whether it comes from government or private sector. This situation is getting worse and inferior when it involves the client from government. This crucial issue will be more devastating if there is no serious prevention action taken by authorities which may deteriorate the image of Malaysia.

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NEIGHBOURHOOD QUALITY ASSESSMENT: A VIEW OF TENURE OWNERSHIP AND MOBILITY DECISIONS IN PENANG, MALAYSIA

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Abstract

Most people have experienced a crucial moment of decision during their life course, that of whether to stay over or to move out of their house and neighbourhood. Residential mobility refers to mobility thoughts and intentions, as well as the actual moving behaviours among the residents, which are often triggered by feelings of dissatisfactions, state of disequilibrium or mismatch between the present housing needs and consumption, and the desired housing preferences. Residential mobility is postulated to be influenced by many factors, notably family life cycle (infant to elderly phase), tenure ownership (house owner or renter), housing profile (dwelling features) and quality of the neighbourhood. There is limited study on tenure ownership and factors of neighbourhood quality that can affect mobility decision and residential mobility behaviour. Hence, this study examines mobility decisions based on tenure ownership and neighbourhood quality including physical, social and economic attributes among residents of housing schemes in Penang Island, Malaysia. A questionnaire survey of 717 respondents living in low, medium and high cost housing in the study area revealed that dwelling features, neighbourhood facilities, environment, social interaction and attachment are the major considerations and preferences affecting residential mobility behaviours among residents. The study findings provide insights and guidance on planning for better neighbourhoods to satisfy residents' needs and enhance quality of life.

Keyword: neighbourhood quality, residential mobility, mobility decision, tenure ownership

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INTRODUCTION

Residential mobility can be regarded both as an intention to leave, as well as the actual behaviour of residents leaving their house and neighbourhood to relocate elsewhere (de Groot, Mulder, & Manting, 2011). An intention to leave is considered as residential mobility because the affected residents are involved in residential mobility decision-making, weighting out the wise and subsequently leaving to relocate in another locality (Lu, 1999a). Those neighbourhoods that residents had decided to move into are expectantly well equipped and integrated with public amenities, facilities, transportation, accessibility and safe environment that could enhance residential satisfaction and quality of life.

Neighbourhood quality is a good reflection of the residents' preferences to stay in good neighbourhoods, and vice versa. Positives vibes radiating from neighbourhood quality attributes such as safe environment, accessibility, economic livelihood and social interaction present the residents with a pleasant ambiance of housing and neighbourhood (Petzold, 2017). Residents in turn develop a strong sense of belonging and attachment to their housing and neighbourhood, most possibly with no intention of leaving their neighbourhood in future. Key neighbourhood attributes of physical environment, greenery, facilities, economic livelihood, social interaction, social attachment, dwelling features and utilities can affect mobility decisions and residential relocation choices (Woo & Morrow-Jones, 2011). Thus, this study aims to examine the linkages between tenure ownership and mobility decisions, and residents' perceptions of their housing and neighbourhood quality. The study is focused on the case of ten residential schemes located in Penang Island, Malaysia

RESEARCH BACKGROUND

Residential mobility refers to people leaving their house for purposes of relocation, either intra or intercity. Residential mobility among residents can be categorised as (i) mobility thought or intention, and (ii) actual moving (Lee, Oropesa & Kanan, 1994). Actual moving or mobility happens when there are no explicit physical, social or economic barriers to move (Mulder & Hooimeijer, 1999). On the other hand, mobility thought or intention refers to the mere act of thinking, considering, planning, willing or expecting to move elsewhere (de Groot, Mulder, Das & Manting, 2011). Actual mobility and mobility intentions are commonly used as indicators of residential mobility patterns. Studies showed that actual mobility, mobility intention and residential satisfaction are all highly correlated (Woo & Morrow-Jones, 2011; Parkes & Kearns, 2003).

Residential mobility is often associated with personal adjustments and changes of residents' housing needs as a result of households' changing composition and profile in a lifetime, from childhood to adulthood and ageing stages (Rossi, 1955).

Such profound adjustments may well trigger an action amongst residents to leave the house for residential relocation. Changes in household size and compostion over time indeed show a principle trajectory for residential mobility (Clark & Huang, 2003; de Groot, Mulder, Das, & Manting, 2011; Lu, 1999a).

Residential mobility behaviour can be determined using indicators of residential satisfaction. Residents' satisfaction is influenced by a mismatch or lack of interest with current house compared to the desired or preferred housing styles (Kim, Pagliara & Preston, 2005; Hooimeijer & Oskamp, 1996). Residents' satisfaction and perception are often driven by self-reflections and experiences that capture their housing needs and future preferences; which prompt mobility intentions and the actual moving (Ghasri & Hossein Rashidi, 2018). Residents' levels of satisfaction at the micro context of the dwelling itself as well as at the macro view of the neighbourhood perspective can lead to decisions to stay or leave the neighbourhood. Such indicator offers a key predictor of mobility behaviour (Liu, 1999). Neighbourhood quality assessment comprising of physical, social and economic perspectives is a vital measure to determine a comprehensive characteristic of prospective good neighbourhoods (Mohamed Osman et al 2017).

Scholars emphasised that family roots, community connections and resident's satisfaction with their neighbourhood positively affect their decision to stay over instead of leaving (Clark et al., 2017). Arguably, a decision to stay is classified as a non-decision as it is closely related to family life cycle and place attachment (Clark, Duque-Calvache & Palomares-Linares (2017). This is mainly due to priory on changes in family composition and the bonds they have attached to the existing house and neighbourhood. Hence, mobility decision is closely linked to the judgement of neighbourhood, community and general satisfaction. By the same token, lack of satisfaction with fluctuating housing values and lower quality schools may cause grave concerns among the residents causing them to leave the neighbourhoods (Boschman, 2018).

It is noteworthy that neighbourhood interaction and attachment can evoke and simulate different sets of values among owners and renters. The owners who possess the property would feel more at home residing in their own territory; more so than the renters who are just renting and borrowing the property for an interval. As such, the owners would have a stronger effect on neighbourhood characteristics (Boschman, 2018); while the renters might feel more insecure and uncertain about their main shelter, which may lead them to leave anyway. Life cycle may be a less significant factor on the shift from renting to owning (Sissons & Houston, 2018) because tenants prefer to relocate in relatively cheaper areas for the sake of saving to eventually own a house. Moreover, relocation timing might influence some residents to become either renters or owners after relocation (Ghasri & Hossein Rashidi, 2018).

Attributes of neighbourhood quality might differ based on the residents' future desires and aspirations. This is outstanding among residents who are quite hesitant to move or are unsure about moving out of the neighbourhood. A study by Lu (1999) identified inconsistency behaviours by residents who are indecisive about moving out, which indicates a complex situation in mobility. It is interesting to identify differences on perception and satisfaction that influence mobility decisions. A possible explanation is that those residents who intend to move out of their neighbourhood may have some levels of dissatisfactions towards their housing and overall neighbourhood; and vice versa. Tenure ownership, either owners or renters can also influence perceptions on neighbourhood quality assessment.

METHODOLOGY

Based on the research premise, this study adopted a quantitative approach to investigate linkages between tenure ownership (either owner or renter) and mobility decisions with reference to attributes of neighbourhood quality. The study embarked on a stratified sampling method to select the respondents, namely heads of households residing in ten major neighbourhood schemes in Penang Island. The housing schemes were designated in a 2009 report Profil Bandar Pulau Pinang published by Department of Town and Planning Malaysia and Ministry of Urban Wellbeing, Housing and Local Government Malaysia. The 10 housing schemes are Bayan Lepas, Bayan Baru, Sungai Ara, Balik Pulau, Tanjung Bungah, Tanjung Tokong, Georgetown, Jelutong, Air Itam, and Sungai Dua - Sungai Nibong. These locations are specified as community or town growth centres which are equipped with public facilities, infrastructure and utilities. The types of housing schemes and range of house prices were determined from reports published by Department of Valuation and Property Services Malaysia and National Property Information Centre (NAPIC).

A total of 717 heads of households living in the 10 housing schemes were selected for the study. The identification of respondents (heads of household) was based on two criteria. Criterion 1 refers to tenure ownership, either house owners or house renters. Any status that is irrelevant was disregarded. Criterion 2 refers to future mobility intention, whether respondents had had any intention to move out of their neighbourhood in future. The answer categories were 'Yes - intend to move' or 'No - intend to stay'. Some 323 respondents (45%) had mentioned about their plans to leave the neighbourhood; whilst another 394 respondents (55%) wanted to stay over. The questionnaire survey consists of questions on respondents' perception and satisfaction of the quality of their neighbourhoods with 5-Likert scale options. The option ranges from (1) strongly dissatisfied, (2) dissatisfied, (3) moderate, (4) satisfied to (5) very satisfied. The study employed a descriptive analysis of mean value to determine the level of satisfaction among respondents of different housing cost

categories. Independent samples t-test is used to compare the mean scores of different groups of people or conditions (Pallant, 2011). This is important to determine differences in perceptions and satisfactions based on tenure ownership and neighbourhood quality conditions and contexts.

RESULT

Analysis of levels of satisfaction among the 717 respondents in Table 1 showed that most respondents have moderate levels of satisfaction with regard to neighbourhood quality factors. As can be expected, respondents residing in high cost housing recorded the highest level of satisfaction with their dwelling utility at 3.90 mean value; followed by respondents living in medium cost and low cost dwellings. The lowest mean value of 2.60 was recorded by respondents in low cost housing who were dissatisfied with their neighbourhood greenery. Overall, respondents of high cost housing were comparatively more satisfied with their neighbourhood quality, with an exception of neighbourhood interaction and attachment, with the lowest mean value of 3.12.

Table 1 Level of Satisfaction of Neighbourhood Quality by Housing Costs

Factors of Neighbourhood Quality	Levels of Satisfaction (mean value)		
	Low cost	Medium cost	High cost
Dwelling Features	3.21	3.60	3.68
Dwelling Utility	3.57	3.75	**3.90**
Neighbourhood Facilities	3.39	3.36	3.50
Neighbourhood Greenery	**2.60**	3.12	3.49
Neighbourhood Public Transportation	3.25	3.55	3.29
Neighbourhood Accessibility	3.24	3.51	3.41
Neighbourhood Economic Livelihood	3.17	3.34	3.42
Neighbourhood Environment	3.20	3.42	3.70
Neighbourhood Interaction & Attachment	3.17	3.19	**3.12**

Factors of Neighbourhood Quality by Tenure Ownership

Table 2 shows the results of t-test on neighbourhood quality factors by tenure ownership. This analysis involved 525 owners (73.2%) and 163 renters (22.7%) in the housing schemes. The other 29 respondents (under 1%) were excluded from this analysis because their ownership status was considered not relevant, such as company properties and parents /sibling ownership. Study results indicate that owners and renters were significantly different in their perceptions and satisfaction levels toward dwelling features, dwelling utility, neighbourhood greenery, neighbourhood environment, neighbourhood interaction and attachment. Perceptions of owners and renters were significantly different with less than 1% confidence error for dwelling features, dwelling utility and neighbourhood interaction and attachment. For example, results for dwelling features: (owners=3.55; renters=3.20 at 4.99. df=663, p=.000).

Table 2 Owners' and Renters' Perceptions of Neighbourhood Quality

Factors of Neighbourhood Quality	Tenure						95% CI for Mean Difference	t	df
	Owners			Renters					
	M	SD	n	M	SD	n			
Dwelling Features	3.55	.713	525	3.20	.683	163	.210,.483	4.99**	663
Dwelling Utility	3.79	.633	525	3.48	.640	163	.191,.436	5.01**	663
Neighbourhood Facilities	3.45	.615	525	3.33	.598	163	-.006,.229	1.86	663
Neighbourhood Greenery	3.13	1.03	525	2.92	.911	163	.023,.388	2.21*	355
Neighbourhood Transportation	3.31	.966	525	3.44	.955	163	-.319, .053	-1.40	663
Neighbourhood Accessibility	3.35	.655	525	3.44	.769	163	-.226, .062	-1.12	301
Neighbourhood Economic	3.32	.594	525	3.24	.683	163	-.040, .218	-1.35	304
Neighbourhood Environment	3.45	.654	525	3.29	.657	163	.036, .289	2.51*	663
Neighbourhood Interaction & Attachment	3.26	.585	525	2.78	.765	163	.336, .618	6.67**	288

$*p < .05; **p = .000$

Factors of Neighbourhood Quality by Mobility Decision

Table 3 shows the results of t-test on the mean scores of neighbourhood quality factors by residents' mobility decision, either 'Yes' (intend to move) or 'No' (intend to stay). Table 3 shows a significant difference on residents' mobility decisions by all factors of neighbourhood quality, with the exception of neighbourhood accessibility. The study found that residents who had decided to stay in their neighbourhood showed a higher level of satisfaction (with less than 1% confidence error) with their neighbourhood attributes including dwelling features, dwelling utility, neighbourhood greenery, neighbourhood economic, neighbourhood environment and neighbourhood interaction and attachment. For example, the results for neighbourhood greenery: (Yes: M = 2.92; No: M = 3.23; at significance level: t = –3.78, df = 676, p = .000).

Table 3 Mobility Decision by Neighbourhood Quality

Factors of Neighbourhood Quality	Mobility Decision						95% CI for Mean Difference	t	df
	Yes, Intend to Move			No, Intend to Stay					
	M	SD	n	M	SD	n			
Dwelling Features	3.18	.738	323	3.71	.617	394	-.651, -.426	-9.437**	685
Dwelling Utility	3.51	.681	323	3.88	.590	394	-.479, -.269	-7.021**	697
Neighbourhood Facilities	3.36	.699	323	3.47	.538	394	-.211, -.005	-2.064*	591
Neighbourhood Greenery	2.92	.943	323	3.23	1.03	394	-.471, -.149	-3.78**	676
Neighbourhood Transportation	3.25	.994	323	3.42	.934	394	-.327, -.012	-2.12*	715
Neighbourhood Accessibility	3.31	.712	323	3.41	.677	394	-.223, .002	-1.92	715
Neighbourhood Economic	3.19	.654	323	3.39	.576	394	-.299, -.096	-3.822**	633
Neighbourhood Environment	3.23	.684	323	3.54	.617	394	-.410, -.198	-5.639**	715
Neighbourhood Interaction & Attachment	2.90	.681	323	3.36	.591	394	-.560, -.351	-8.545**	628

$*p < .05; **p = .000$

DISCUSSION

Residents' levels of satisfaction with their neighbourhood quality can be considered as a reflection of their socio-economic status in the housing area. The study findings revealed that residents of high cost housing were comparatively most satisfied with their neighbourhood quality, recording higher mean values of satisfaction levels. This may be because residents of high cost housing typically pay much more for their housing, environmental quality, safety, security and accessibility; hence this reflects a better neighbourhood quality provision in the high cost housing (Tan, 2011). Residents of low cost housing are usually satisfied with the most basic necessities of shelter. Furthermore, residents of low cost housing cannot afford spending and investing in housing properties due to financial constraints (de Groot, Mulder, & Manting, 2011). Nonetheless, the element of neighbourhood greenery consistently scored the lowest mean value of satisfaction among residents of all housing types. This is possibly due to issues of land scarcity and high cost factor. In this study, good economic livelihood in the neighbourhood areas offered an opportunity to residents of low and medium cost housing to set up small businesses in the housing area to enhance income and job opportunities. Overall, all residents showed moderate levels of satisfaction with the neighbourhood quality; and this situation could be upgraded in the future.

In terms of tenure ownership, the study result is consistent with previous studies which showed that owners and renters differ significantly in their perceptions on housing, neighbourhood perspectives and self-esteem (Kleinhans & Elsinga, 2010). The study results showed that the owners were consistently more satisfied with five neighbourhood attributes, namely dwelling feature, utility, greenery, environment, social interaction and attachment. The renters, on the contrary were more satisfied with neighbourhood transportation and accessibility, but the findings were not significant. This finding is supported by Boschman (2018) and Sissons & Houston (2018) who also found significant differences among owners' and renters' perceptions and levels of satisfaction in prior studies. However, homeownership do have a significant positive impact on residential stability and neighbourhood environment over time (Aarland & Reid, 2018). This is because homeownership enhances the residents' satisfaction levels and presents a constant motivation for residents to upgrade and upkeep the neighbourhood (Coenen, Verhaeghe, & Van de Putte, 2018).

The study also discovered a strong significant difference in mobility decisions in the neighbourhood context. Those residents who had decided to move were dissatisfied with almost all of the neighbourhood quality factors; whereas those who had decided to stay in the neighbourhood mentioned otherwise. This study showed that neighbourhood quality provides a comprehensive approach to assess residents' housing needs and preferences that compliments their socio-cultural norms and lifestyles. The study result is

consistent with that of previous study which highlighted the behaviours of dissatisfied residents who had planned to leave the house and neighbourhood (Kearns & Parkes, 2003). Their perception of existing neighbourhood is consistent with this study, thus indicating that those who are satisfied with neighbourhood facilities would stay over, and vice versa. The study found that a positive perception of neighbourhood quality is inversely related to low residential mobility as concurred by previous studies (for example: Parkes & Kearns, 2003).

CONCLUSION
The paper investigated the intrinsic linkages between residential mobility and neighbourhood quality. It highlighted the people who had decided to move from one neighbourhood to another, their reasons for moving; and their preferences and choice in future housing and neighbourhood. Residents' mobility decisions either to move or to stay, were examined in relation to tenure ownership and perceptions of neighbourhood quality. This study aimed to establish links between mobility behaviour and neighbourhood quality among residents of low cost, medium cost and high cost housing schemes located in Penang Island, Malaysia.

A micro perspective scope derived from family life cycle, tenure ownership and housing profiles have been established in the literature as the underlying reasons influencing residential mobility and future housing preferences. This study has included a macro perspective view of neighbourhood quality in the residential mobility equation. Neighbourhood as a spatial context comprising physical, social and economic features also play a major role that can trigger residential mobility. Attributes of a neighbourhood could be a trend setter in demands for residents to move in or to move out. Residents would weigh related costs and benefits when considering mobility decisions and relocation.

In summation, residential mobility can be regarded as a consistent and pervasive trend and behaviour in cities of the developing countries; hence, it renders a major consideration in the policy development context. It is imperative to develop a policy framework to identify the structural patterns of intracity and intercity residential mobility to determine housing choice and preference. This is crucial in addressing the changing residents' needs and desires of housing characteristics during their life time, as well as in assessing the implications on changing socio-demographic spatial structure of residential areas in the city.

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THE LOW-MIDDLE INCOME HOUSING CHALLENGES IN MALAYSIA

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Abstract

Homeownership is recognised as one of human needs. However, in the 21st century, homeownership remained as one of the greatest challenges in most developing countries, and Malaysia is no exception. Housing for everyone remained an issue in Malaysia. Homeownership for the low to medium income group (LMIG) is getting difficult overtime. Questions raised on the competency of the existing housing policy in catering the uprising needs to house the LMIG. This study aims to explore the challenges within the housing policy and its implementation, and to identify ways to overcome those challenges. Opinions from four major stakeholders in the housing sector; the federal government, the state government, non-governmental organisations, and academicians were solicit using focus group interviews protocol. The results point-out three major concerns- 1) loose connection between the federal and state government, 2) mismatched of housing policy, and 3) inadequacy of financial system and poor demographic profile. Subsequently, four alternatives were proposed to address the issues raised- 1) one-stop center that operates above the differences between the governments, 2) establishes the social infrastructures before Affordable Housing in sub-urban/rural area is approved, 3) government's active interventions on affordable house pricing, and 4) public awareness on homeownership through education.

Keyword: affordable housing, housing policy, homeownership, low-medium income group.

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INTRODUCTION

Housing is fundamental to sustain a country's welfare (Shi, Chen, & Wang, 2015; Zainun, Ghazali, & Rawan, 2015). A constant development of a country's socio-economy is associated with a well performed built environment (Colesca & Alpopi, 2011). For instance, the degree of homeownership is highly correlated with the quality of social relationship (Glaeser & Sacerdote, 2000; Tech Hock Tan, 2009). Haurin, Parcel, and Haurin (2002) reveal that children of homeowners tend to portray a mature thinking and behaviour. These conclusions further strengthen the importance of homeownership towards quality social relationship and parenting. In fact, Mulder (2004) has asserted that homeownership provides greater security for individual and family members. This is certainly relevant when owning a house is meant for securing the retirement stability, and as an inheritance to pass on next generation (Cheong, 2015). However, housing industry in developing countries faces challenges in terms of its provision and affordability (Ram & Needham, 2016; Shi et al., 2015). Homeownership is the biggest debt of a household or individual expenditure which constrains the housing affordability in urban cities (Quigley & Raphael, 2004). In addition, it is worth noting that Malaysia records the highest household debt among the Southeast Asia countries in 2015 (A. L. Tan, 2016). Subsequently, provision of affordable housing (AH) has become a critical challenge in urban cities of developing countries (Ram & Needham, 2016; Shi et al., 2015; Yang & Chen, 2014) and urban Malaysia is no different (Kamal, Hassan, Osmadi, & Fatah, 2015; Shuid, 2008; Zainun et al., 2015).

In addition, provision of affordable housing remains as a great challenge in urban Malaysia, and the rapid hike of house price has deteriorated the scenario (Shuid, 2008; Zainun et al., 2015). For instance, Surach (2014) reveals that a house in the urban Malaysia (i.e. Kuala Lumpur) can easily cost up to 56 times of the household income, assuming that a household income reached RM14,580 (USD1= RM4.03). Citing a news report featuring an interview with the managing director of Khazanah Research Institute Malaysia covered by Habib (2015) reveals that new housing scheme in Kuala Lumpur were marketed at RM500,000 to RM1 million in 2014, which the affordable house price is at around RM280,000 only. In a recent annual report released by the Central Bank of Malaysia (2016) revealed that the gap between the house price and the income has expanded overtime since 2012 to 2014. In addition, a market study conducted by the Khazanah Research Institute (2015) reveals the housing market in Malaysia is considered seriously unaffordable, in which Terengganu, Kuala Lumpur, Penang and Sabah are among the worst. While the mismatched between household income of the LMIG and the housing price remain unsolved in the near future, question raised on the competency of the housing policy and its implementation in handling these challenges.

At the same time, the imbalance of supply and demand continually worsen the scenario. For instance, the Treasury secretary-general of Malaysia reveals his concern on the shortage of AH in which providing the high-end housing schemes are preferable by the developers (Tan, 2016). The mismatch between housing supply and number of households has increased to 2.5 million-unit houses in 2015, as compared with 2.1 million in 2005 (Central Bank of Malaysia, 2016, pg. 33). Central Bank of Malaysia (2016) further predicts a roughly 85,911 unit of houses shortage for each year in 2010 to 2015. Furthermore, only 21% of housing scheme launched in 2014 were marketed below RM250 thousand, and this price is relatively higher than the affordable house price for Malaysian, which is RM165, 060 only (Central Bank of Malaysia, 2016, pg. 34). These conclusions further imply the shortage of AH in Malaysia remain unsolved, particularly the urban cities.

Despite issues in housing provision remained, the federal and the state government of Malaysia are working together in strategizing policy and programmes to cater the shortage of AH. Several remedies were introduced to ease the shortage of AH such as the introduction of the 1Malaysia People's Housing scheme (PR1MA) and The People's Housing Programme (PPR).Yet, question remains unanswered on why Malaysian, especially those in urban cities are not affordable to own a house despite the country is well aware on the market and economic challenges (e.g. supply and demand, unit of houses). In fact, the Urban Well-being, Housing and Local Government Ministry of Malaysia has recently proposed that housing developers are allowed to offer housing loan, at 12% to 18% of interest rate to those who failed to secure the bank loan (Babulal, 2016; Habibu, 2016). However, this strategy received critics from the professional boards, financial institutions, and the non-governmental organisation (NGO). Such drastic decision made by the Malaysia's government further suggests the affordability remained as one of the greatest challenges in Malaysia.

A mismatch occurs between the earning ability of people and the current housing price offered in the market. The current housing price does not consider the household income, or vice versa, a fact that makes owning a house difficult. Therefore, it is reasonable to argue the competency of housing policy for AH in Malaysia. Thus, this study aims to identify the problems within the housing policy for AH and its implementation. The finding of this study will improve the internal circulation of the government in strategizing, implementing, and housing policy strengthening the existing housing policy.

HOUSING PROVISION
Housing provision for low income group in Malaysia has begun since its independence in 1957. The housing policy shifted from 'homeownership' to 'shelter for all'. A 'shelter for all' does not required the commitment of high

investment and loan repayment to the bank (United Nations Human Settlements Programme, 2008). The Malaysia's government introduced the privatisation policy in 1980s which allows the private housing developers to build and deliver houses, ranging from high-end to low-cost housing. To date, the privatisation has resulted 80% of housing provision to the country. In addition, the Guideline of the National Housing Department, Housing Article 4 demanded at least 30% of low-cost unit, based on the total unit of medium-high cost housing, must be delivered, and sales from these higher-cost housing unit should be used to subsidise the development of low-cost housing. In line with the housing policy, the National Housing Policy was then introduced to 1) deliver sufficient and quality houses for the low to medium income group (LMIG), and 2) improve the financial strength to own or rent a house through house price control (National Housing Department, 2010). However, AH in Malaysia remained questionable, and homeownership is difficult overtime.

AFFORDABILITY TOWARDS HOMEOWNERSHIP

Housing is associated with welfare facilities, it determines the household or individuals' dependency towards the country and families in acquiring their needs (Doling & Ronald, 2010). Therefore, the numbers of homeownership potentially constitute the welfare of a country. Subsequently, affordability to own a house has become an important predecessor towards the nation's welfare. Two indicators determine affordability of a household, they are expenditure and income (Aziz, Hanif, & Singaravello, 2011). Affordability is the financial capability of a household to purchase/own a house. AH should offer quality houses at reasonable price in matching the LMIG (Ram and Needham, 2016).

In the context of housing market in Malaysia, the median-multiple index or known as price-to-income ratio (PIR) was used to determine the level of affordability towards homeownership as advocated by the World Bank and the United Nations (Central Bank of Malaysia, 2016). Through this indicator, an affordable house price should not greater than 3 times annual household income of the applicant. To further interpret the median-multiple index, the Annual Demographia International Housing Affordability Survey categorised affordability into four groups-1) affordable (PIR ≤ 3.0), 2) moderately unaffordable (PIR 3.1–4.0), 3) seriously unaffordable (PIR 4.1–5.0), and 4) severely unaffordable (PIR ≥ 5.1) (Demographia International, 2016). Similar classification method was used to evaluate the housing market in Malaysia (e.g. Central Bank of Malaysia, 2016; Khazanah Research Institute Malaysia, 2015). According to these classifications, housing in urban Malaysia are considered severely unaffordable (Central Bank of Malaysia, 2016). Table 1 illustrates the comparison of PIR in urban Malaysia between 2012 and 2014. Urban cities such as Kuala Lumpur and Pulau Pinang show drastic changes of PIR in 2012 and 2014, from 4.9 to 5.4, and 4.1 to 5.2 respectively (refer to Table 1). However,

housing affordability in Malaysia (PIR=4.4) is slightly lower as compared to its neighbour such as Singapore (PIR=5.0) (Demographia International, 2016). It is worth noting that Singapore has severe land limitation as compared to Malaysia but Singapore has shown a controlled housing affordability overtime (Demographia International, 2016). These further imply the affordability towards homeownership requires immediate attention, especially in the urban cities.

Table 1 House Price-To-Income Ratio for Urban Cities in Malaysia

Cities	2012 (PIR)	2014 (PIR)
Kuala Lumpur	4.9	5.4
Pulau Pinang	4.1	5.2
Johor	3.7	4.2
Selangor	3.6	4.0
Malaysia	4.0	4.4

Source: Central Bank of Malaysia (2016, pg. 35)

The LMIG has many to concern in affording a house. The rise in house price is inconsistent with the change in income, affordability, and provision (Hashim, 2010). The forecast compound annual growth rate (CAGR) for next 3-years, 8-years, and 13-years among the urban Malaysia shows severe mismatch between the average household income and house price. For instance, the CAGR of house price index is 0.4% higher than the average household income after 13-years. Same case applies to other urban cities such as Selangor and Pulau Pinang. In fact, the CAGR of house price index increased to 7.9% while the average household income increased to 7.3% only during 2009 and 2014 (Central Bank of Malaysia, 2016). This scenario reduces the capability in securing a housing loan and mortgage repayment. In fact, such challenges were not rare to other developing countries such as China and India (Shi et al., 2016; Ram and Needham, 2016). Previous studies revealed that the involvement of private sector in providing AH is among the remedies towards AH, and Malaysia is no exception. However, the lack of AH remains as a great challenge in the country despite the involvement from both the public and private sector. Subsequently, the government plays an important role as a catalyst or driver towards AH (Atterhög, 2005; Central Bank of Malaysia, 2016; Hulchanski, 2003; Quigley & Raphael, 2004; Ram & Needham, 2016; Shuid, 2008, Mohamed Osman et al, 2017).

ROLE OF THE GOVERNMENT TOWARDS HOMEOWNERSHIP
Housing is a long-term agenda that associated with a nation's urban development, social and economic policies, either in developed or developing countries. Therefore, housing is handled or planned by its own unique policy that ensure 1) the housing quality is delivered, 2) the allocation of housing is performed in a unbiased manner, and 3) the housing provision is reasonable (Hulchanski, 2003). In addition, the objectives of housing policy are achieved through government's

role in 1) monitoring the legislation that defines the financing system such as banking, mortgage lending and tax, and 2) developing regulation that can decides/changes the building materials, professional practices, and financial aids programmes for the average households (Hulchanski, 2003). Furthermore, Atterhög (2005) found correlational relationship between homeownership and government aids where the higher rate of homeownership is associated with the greater help from the government. Similarly, Ram and Needham (2016) revealed that developers in India agreed that the government should act as a catalyst and driver to improve the housing provision. These agreements further imply the importance of government in monitoring and improving the housing affordability and provision.

The government of Malaysia is divided into 1) federal government, and 2) state government. On behalf of the federal government, the Ministry of Housing and Local Government Malaysia (MHLG) is empowered to propose and build affordable housing scheme (AHS) for the low-income group throughout the country. On the other hand, the state government is empowered to set rules and manage residential lands under its governed state (Teck Hong Tan, 2013), and to determine its implementation of housing policy (United Nations Human Settlements Programme, 2008). This housing policy includes conversion of land use, provision of low-cost houses, and levy on foreign ownership. The state government in Malaysia monitors and involved in the housing provision through its State Economic and Development Corporations (SEDCs) (Shuid, 2008). In addition, through the Town and Country Planning Act 1976, local authority is empowered to 1) guide, lead, and assign development project, 2) form collaboration with housing developers in monitoring the house price that match the LMIG, 3) set rules and development charges, and 4) control and manage the development of its respective state.

Agus (2002) stated that the most common complaints of the public sector are the delays in the processing and approval of applications for land development, conversion, subdivision and the issuance of titles. These matters are the formal responsibility of the State PTG and district land offices. The government intervenes in the housing market by urging the private sector to take the leading role in the provision of houses, including the low cost, as well as the deregulation of the approval of large massive housing projects brought about by several issues and problems related to the mismatch of housing demand and supply, housing delivery and built environment (United Nations Human Settlements Programme, 2008). House prices in Malaysia have soared to exorbitant levels in major cities, and even the middle class cannot afford to own a house or an apartment (Consumer Association of Penang, 2014). The report of the Consumer Association of Penang (2014) stated that the majority of Malaysians need affordable homes, but developers are supplying houses that are unaffordable. The report further described developers as preferring to cater

houses to investors and speculators who would buy to rent or invest in the property and would reserve the best units for clients who would purchase multiple units even before the project is officially launched. At the same time, the concept of industrialisation for the construction industry in Malaysia has been strongly supported by the federal and state governments. However, the concept is still ineffective in overcoming the housing shortage and solving the problems of increasing prices of raw materials, such as cement, steel bars, bricks and timber, all of which affect the ability of housing developers to hold down the house prices (Agus, 2002). Thus, it is reasonable to suggest that both state and federal government are facing difficult situations in handling housing issues for LMIG.

RESEARCH METHOD
This study began with an explicit review on previous empirical studies, government documents/reports, news reports, and non-governmental organisation (NGO) reports. Due to the nature of this study is to explore and discuss the challenges and implementation of housing policy in Malaysia, the social constructionism (i.e. qualitative technique) is preferable as compared with positivism. Subsequently, a focus group discussion (FGD) protocol was used to discuss the adequacy of housing policy and its implementation. Focus group was chosen as the method as enables interaction amongst the participants and researchers (Marczky, DeMatteo, & Festinger, 2005). Focus group discussion allow a deep understanding of the issue from different perspective. According to Sekaran and Bougie (2013), the sessions of a focus group aim to obtain the impression, interpretations and opinions of respondents. In this focus group discussion, the moderator plays a vital role in steering the discussions in a manner that draws out the information sought and keeps the members on track.

While the low-medium income group is the 'victim' of the housing affordability, this study decided to investigate these issues from the perspectives of the policy makers. Thus, a discussion guide was developed from the secondary data analysis. A purposive sampling technique was adopted to ensure the respondents are able to offer informative, unbiased, and explicit inputs. The selection criterions of participant are as follows- 1) experienced in monitoring and handling housing issue, 2) involved in execution of housing policy at federal or state level, 3) closely connected with the house buyers, and 4) capable to evaluate and comment on the current issues in housing provision in Malaysia. As a result, a total of 15 representatives from the state government, federal government, NGO, and independence commentator (i.e. academics in real estate) were agreed to participate in the FGD. The participation of the federal and state government in the FGD improved the validity and representativeness of the results.

The participants were grouped into two FGDs. Each FGD used a duplicated discussion guide and was chaired by two moderators. Table 2 presents

the participants' profiles. The FGD was last for about 90 minutes. The FGD followed the procedures suggested by Sekaran and Bougie (2013) and Kumar (2011). Similar techniques to conduct and manage a FGD were found in previous housing- and urbanisation-related studies such as Kamal et al. (2015); Yusof, Shafiei, Yahya, and Ridzuan (2010) and Mohamed Osman et. al (2017). The FGD was taped and transcribed for further evaluation and interpretation. Keywords were identified and grouped into relevant components.

Table 2 Respondents' Profiles

Representative	Group 1		Group 2	
	N	Position/Designation	N	Position/Designation
KPKT[a]	1	Senior Assistant Director -General	1	Principal Assistant Director -General
MBPP[b]	1	Deputy of Planning and Development	-	-
MPSP[c]	-	-	1	Senior Assistant Director of Town Planning
SUK[d]	1	Assistant Administrative Officer	1	Assistant Administrative Officer
NAPREC[e]	1	Secretariat	1	NAPREC Expertise Panel
CAP[f]	-	-	1	Research Officer
HBA[g]	1	Secretary General	-	-
Independence commentator	1	Researcher (Prof.)	1	Researcher (Dr.)
	1	Researcher (Assoc. Prof.)	1	Researcher (Dr.)
	1	Researcher (Senior lecturer)	-	-

Note: 1=Federal government, 2-4=State government, 5-7=NGO, [a] Ministry of Urban Wellbeing, Housing and Local Government, [b] City Council of Penang Island, [c] Municipal Council of Province Wellesley-Penang Mainland, [d] Penang Secretariat Housing Division, [e] National Real Estate Research Coordinator, [f] Consumer Association of Penang, [g] National House Buyers Association

RESULTS
The FGD reveals 3 major aspects that require extra attention from the federal and the state government, there are 1) a loose connection between the federal and state government, 2) mismatched of existing housing policy, and 3) inadequacy of financial system and poor demographic profile.

A Loose Connection between the Federal and State Government
An effective government role is associated with a healthy housing provision (Hulchanski, 2003; Atterhög, 2005). This further implies that the success of a housing system is in fact determined by the govern party. In the context of Malaysia, the govern parties are differentiated into two different level, the federal and the state government. However, both FGDs suggest there is a severe loose connection between these governments in response to the implementation of the housing policy. For example, the principal assistant director from KPKT (federal) in group 1 claimed there is no acknowledgement made to the federal government by the state government on the changes made to the housing policy. Same finding was discovered in FGD group 2 when both the officers from the state and the federal government failed to deny that the delay in approving the advertising permit and developers' licence (APDL) was in fact due to poor communication among the federal and the state government. APDL is a prerequisite license that

must first be approved by the federal government, then the state government. These conclusions were further supported by the independence commentator in group 1. The statement is as follows:

"The federal and state (government) relationship, in fact this is the main contributor to the house prices… because the relationship to some extend will actually push up the prices… when you (either state or federal government) try to complicate it, what is the cost involved here…"

The independence commentator (group1) explains the poor relationship will only complicate the approval process, and this delay ultimately makes AH became difficult. This statement was well supported by the rest of the panels (group 1). In addition, Kok Wah Loh (2010) has already addressed the importance to practise a two-way communication of federalism while conflicts remained within federalism in Malaysia. The unorganised communication between the state and the federal government has delayed the development process which indirectly raised the total development cost (Khoo, 2016). In fact, the slow response of government in Malaysia in not uncommon (Yusof, Abu-Jarad, & Badree, 2012), and the lengthy process is one of the constraints towards provision of AH (Ram and Needham, 2016). Delay in securing the necessary approval and permit does not in line with the nation's policy in providing AHS, and it is reasonably to argue that the current poor practice is against the housing policy.

Mismatched of Existing Housing Policy
Previous study revealed the importance of a strategic housing location towards living style and desire to own a house (Lyndall & Chris, 2012; Teck Hong Tan, 2013; Wang & Li, 2006). However, the FGDs highlight mismatch existed within the housing policy, and this inconsistency refers to the location of the AHS and the price control mechanism. For example, the officer in the Municipal Council of Province Wellesley-Penang Mainland (Group 2) claimed that most of the AHS, low cost housing in particularly was built on sub-urban or rural area. He stated that:

"…developers would locates the low cost schemes in unwelcome location, at the end of the area/site (sub-urban/rural area)…"

These sub-urban/ rural areas are lacked of social infrastructures and fundamental facilities such as public transport, retail shops, clinics, and schools. Teck Hong Tan (2013) further explains that distance between a housing scheme and its workplaces, schools, and other facilities decide the decision to buy. Subsequently, FGD in group 1 explains the importance to establish a series of

build-in infrastructures at the surrounding housing scheme located at sub-urban/ rural areas. The independence commentator in group 1 stated:

"...this is all about holistic planning… if you (the governments) want to focus on decentralisation (housing scheme located at sub-urban/rural area)… but before you do that, the government should build the infrastructures… do it before the need is coming…"

The AHS built at the sub-urban/rural areas failed to cater the fundamental needs of LMIG if the surrounding facilities and infrastructures remained overlooked. This situation will increase the financial burden of those owning and staying in these AHSs. This is in fact against the purpose of Malaysia housing policy to help the LMIG. Extra expenditure and time are spent to cater the daily activities and needs such as workplace, school, and grocery needs. The secretary general from the National House Buyers Association (HBA) (group 1) asserted that government should has provide these facilities and establish the public transport services if these AHS are to be built at sub-urban/ rural areas.

The FGDs also revealed the mismatch of the housing price control policy. This input was delivered by the secretary general from the HBA (group 1) as follows:

"...they (federal government) don't control the price, that's for the developers to declare the prices…that's only to notify them (the federal government). Initially they (federal government) have no control of housing prices..."

The secretary general further explains that the Ministry of Urban Wellbeing, Housing and Local Government (KPKT) has no authority to control the house price declared by the housing developers. In fact, the KPKT only acknowledged about the price. Similar finding was found in FGD group 2, as the Principal Assistant Director from KPKT explains that the ministry only monitors the selling price proposed by the housing developers. The officer is concerned about the large disparity of price range allowed for AH project. The statement is as follows:

"There is monitoring stage which is the minimum and maximum housing prices, but with a big gaps"

In current practice, the selling price for AHS is range between RM160, 000 to RM400, 000. However, recent study revealed that house price marketed in 2014 was ranging between RM500,000 to RM1 million in Kuala Lumpur (Habib, 2015); only less than 25% of housing scheme in Malaysia launched in 2014 were selling at less than RM250 thousand, but the selling price is only

affordable at around RM165 thousand (Central Bank of Malaysia, 2016). The secretary general (HBA, group 1) stated:

"...the disparity (minimum and maximum selling price) is too big for the developers to manipulate..."

It is questionable when the government has no right to intervene the selling price for AHS whereas prices for others such as oil and gas, and electricity in Malaysia are well-controlled by the government. At the end, the existing housing policy deviated from its main purpose to house the unaffordable group. While the housing policy remained unchanged, advantages have been taken by the developers to make greater profit instead of providing AH.

Inadequacy of Financial System and Poor Demographic Profile
The FGDs expressed their concern on the mutual relationship between the existing financial system and the buyers' demographic profile. For example, the secretary general (HBA, group 1) expressed:

"...I have checked with a lot of bankers...they were (applicants) just not qualified..."

The senior assistant director (KPKT, group 1) added:

"...it goes back to the buyers also, they should be responsible, and the government can't give each individual (a house) if they are not eligible to make a loan or own a house..."

The officer further explains the risk of bankrupt if the financial institution loosens the loan approval. This is in accordance with the fact that housing loan in Malaysia consumes large portion of a household income, and statistics showed loan repayment for homeowners are getting difficult overtime (Central Bank of Malaysia, 2010). Recent studies also suggested there is a severe imbalance between the household income and house price in Malaysia (Central Bank of Malaysia, 2016; Surach, 2014). The expertise panel from the National Real Estate Research Coordinator (group 2) expresses her concern on the consideration to provide financial aids for the affordable house buyers, she stated:

"...By providing the financial aid to people will increase the demand and raise the pressure in the housing market..."

The expertise panel (group 2) asserts that the effectiveness of financial aid is highly depends on its implementation, whether the financial aid can really

reached the LMIG. Therefore, a good policy should serve with an effective implementation. In fact, Shuid (2016) commended that financial aid from the government should not be taken as a long-term strategic towards AH in Malaysia. The aforesaid implies that financially subsidised the LMIG would never solve the challenge in homeownership or provision of AH.

DISCUSSION

The FGDs conducted outlined the aspects that required attention from different parties, ranging from house buyers, financial institution, and to the government. First, the poor connection among the federal and state government is not uncommon in Malaysia because of different political ideologies, and in fact this situation will remain unchanged in the near future. Perhaps asking the governments to work more closely and consistently can be difficult or less possible. Therefore, an independent system (i.e. no political background or agenda) or a one-stop centre should be introduced in synthesising the communication between these governments. The new system or centre should act as a catalyst to neutralise the differences and improve the implementation of the housing policy. In addition, this allows the public and developers to receive a consensus information on the housing policy, at the same time to monitor the selling price offered by the housing developers. The active involvement of NGOs (e.g. HBA, NAPREC) into this system/centre can be helpful to safeguard the quality and performance.

Second, location is an important factor in housing development. However, asking the developers or government to provide AHS in the prime zone can be challenging and difficult in term of its implementation. Therefore, the government plays important role such as establishing the social infrastructures before a housing project in sub-urban/rural areas is approved. This is to ensure those who are staying in sub-urban/rural areas can assess to these facilities, especially the public transports that travel between their workplace and home. However, the direct involvement of government in providing these facilities, in which financial injection is necessary can be difficult in the long-run (Shuid, 2016). Shuid (2016) calls upon the more involvement of private sector. Thus, a mixed-development can be a solution to ensure these housing scheme successes in sub-urban/rural areas. However, the success of this project requires the consensus between the government and housing developers.

Third, the FGDs agreed there is a need for the government to intervene and monitor the proposed selling price by the housing developers of AHS. This is in accordance to Shuid (2016) where government should be able to intercede accordingly on issues related to housing provision. However, neither the state nor the federal government possessed the right to revise the proposed selling price of AHS. Thus, it is advisable to amend the existing price range, revise the maximum and minimum price for AHS according to location and household income.

However, the following question is- what is the revised maximum and minimum price for AHS that matches current state of housing provision in Malaysia? This is to avoid the housing developers to take advantage of the wide disparity of existing price range for AHS.

Last but not least, a paradigm shift is necessary for those who are looking forward to owning a house. Ironically, while homeownership is perceived as a human right, but question raised when an individual failed to secure the minimum requirements to fulfil this human right? Thus, neither the financial institutions nor the government (i.e. financial aid) should overly bear the responsibility and offers mortgage loan to those are just not capable in committing the repayment. In fact, previous studies already hinted subsidy from government is questionable in long-run (Ram and Needham, 2016; Shuid, 2016). Alternatively, the FGDs proposed the need to educate the public towards owning a house, starts from the fundamental change in terms of attitude, financial management, and basic knowledge. This is in accordance with Shuid (2016) that it is important for those who are staying in the public housing with the low monthly rental to start paying a higher public housing rental, or to own the house, otherwise the government subsidy will be difficult in future.

CONCLUSION
The results of the focus group discussion conducted illustrate a significant need for both the federal and state governments to redefine the price of affordable housing to reflect the current market and review the concept of affordable housing in terms of location. Affordable housing should be located in an urban area that faces a serious issue of unaffordable housing prices. This study contributes to the body of knowledge by providing an in-depth overview of the housing policy and its obstacles in Malaysia and a developing country. In addition, this study delivers a clear message to the policy makers the weakness lies within the implementation itself. Shuid (2016) calls upon the revision of the housing policy, government roles, and financial assistances to further improve the effectiveness of housing market in Malaysia. While the challenges within the LMIG towards AH remained questionable, this study reveals that more can be done by other parties, especially the policy makers.

This study possessed limitations. Future FGD study may invite the participation of housing developers, real estate agency, and bankers to further explore their opinion as the stakeholders in the market on the status of AHS in Malaysia. With a qualitative technique (i.e. FGD), the findings are meant to provide in-depth explanation towards the challenges and implementation of housing policy in Malaysia rather generalisation of findings. Therefore, future study can adopt quantitative techniques and integrate a larger sample size to investigate the relationship between the aspects that are related to housing policy and the impact of the stakeholders (e.g. government, financial institution, buyers)

towards housing policy in Malaysia to provide a bigger picture of housing industry in Malaysia.

ACKNOWLEDGEMENTS

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LAND USE CHANGES IN RURAL TOWN: A CASE STUDY OF KUALA NERANG, KEDAH

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Abstract

Urbanization is the process of transforming a characteristically rural society into an urban one. The urban population is growing at an increasing rate while the rural population is declining, giving rise to imbalances in the development between urban and rural areas. The government's strategy is to distribute the development to the major settlement centres in the rural areas, which are experiencing the same effects of urbanization as the urban areas in terms of changes to the use of land, especially the reduction of agricultural land and the increase in built-up areas. This study used the method of overlay in GIS applications to investigate land use changes, the speed of urban expansion and direction of development that has taken place from the period 2001 to 2018 in the town of Kuala Nerang, Kedah. This town has undergone a change in its status from a main settlement centre to a district administrative centre. Agricultural lands, which were targeted for development in the rural areas, have been converted into built-up areas. The speed of urban expansion has been slow, although some areas have recorded a higher rate. The development is moving towards the west along the main road connecting the major towns in this part of the state. The functions of the district administrative centre have influenced land use changes.

Keywords: land use changes, rural development, GIS

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INTRODUCTION

Urbanization is the process of converting an area and its population into an urban pattern, pervaded with elements of urbanization. Urbanization transforms the character of a rural society into one that is generally urban (Embong, 2011). In Malaysia, the urbanization scenario can be divided into two stages, namely, before and after the 1970s. The first stage was the period following the Second World War until independence (1947-57), where the population was growing at an average rate of 6.2 percent annually, while the second stage of urbanization was after the implementation of the New Economic Policy in 1971, encompassing the industrial policies, agricultural development and urbanization of the country, which had a direct impact on the rate of growth of the urban population (Rostam, 2001). It can be seen that the number of people living in the urban areas has been on the rise until today. According to the Department of Statistics Malaysia (2010), the number of urban residents in the country has been increasing from 20.82 million (72%) in 2011 to 25.04 million (77%) by 2020.

This rise in the urban population has resulted in a decline in the number of people, especially youths, in the rural areas, from 8.2 million (28%) in 2011 to 7.4 million (23%) by 2020 (Department of Statistics Malaysia, 2010). This drop in the rural population in Malaysia has created an imbalance in the development between the urban and rural areas. This has led to the establishment of strategies and efforts by the government to distribute the urban development, especially in the industrial sector, to the rural areas through the existing development corridors in order to open up new growth centres that can offer employment opportunities to those living in the rural areas (Ngah, 2009).

The establishment of these new growth centres, known as small towns, can help drive rural development. In general, these small towns are to function as services, commercial and administrative centres for the districts. The existence of various activities such as commercial, services and administrative activities in the small towns can bring about land use changes, which are often related to the urbanization process in urban areas (Ngah, 2012). The urbanization process also involves the conversion of land from non-built-up to built-up areas. According to Johnson (1974), urbanization has resulted in land-use conflicts, threats to agricultural activities and speculative land markets. The establishment of small towns as a result of urbanization has brought about land use changes in rural areas (PLANMalaysia, 2016). Therefore, this paper is aimed at studying the land use changes in Kuala Nerang, which is the administrative centre for the district of Padang Terap in Kedah. The results of this study on land use changes will be used to identify the speed of urban expansion and direction of the development that is taking place in Kuala Nerang.

LAND USE CHANGES IN RURAL AREAS

Land use activities refer to the actions of humans to cultivate and modify the surface of the ground in order to meet their needs (Carvalho, 2006). Land use changes are the result of ever-increasing human development and activities (Idrus, Sian & Hadi, 2004). According to Asnawi & Choy (2016), factors such as the various government policies aimed at national development, the economic development in the industrial sector and the development of infrastructure as well as built-up areas in town centres have caused the urbanization process to spread to the rural areas and to indirectly affect the pattern of land use changes in those areas. Rural settlement centres are the areas that frequently undergo the urbanization process. This is because these settlement centres are hubs for the economic, social, services and community activities of the locals. The availability of infrastructure facilities along the main routes connecting the urban to the rural areas has attracted housing, industrial, institutional, commercial and other activities to the rural areas to achieve a balanced economic growth and to provide opportunities for employment (Antrop, 2004).

The existence of educational and training institutions has also given rise to the urbanization process as it has spurred rural development (Noor & Choy, 2018). Educational and training institutions can produce skilled youths for the development of the rural areas while providing employment opportunities to rural residents. This increase in employment opportunities will reduce the rate of rural migration to the cities. The population growth has also resulted in an increase in the demand for the conversion of agricultural land in the rural areas to built-up areas to accommodate the needs of the population. The urbanization process has had a huge impact on land use changes, especially the conversion of agricultural land for other land use activities such as housing, commerce, industries, transportation and so on to meet the growing needs of the people (Salleh, Badarulzaman, & Salleh, 2013). Land for tourism and recreation activities has also increased in the rural areas, especially in those areas with natural attractions. Tourism activities have been much more productive than agricultural activities in view of the assistance provided by the government in terms of infrastructure development to increase the income of the rural population. Indirectly, the rapid economic development in the rural areas has reduced the amount of land available for agriculture and forests due to the pressures of development, while having a negative impact on the quality of the natural environment that may give rise to the risk of natural disasters (Samat,Eltayeb, Hasni & Radad, 2010; Hussain & Ismail, 2016).

Land use changes will continue to occur in tandem with the establishment of government policies and strategies to improve the living standards of urban and rural communities. Nevertheless, it is also necessary to exercise some control over development to ensure that the rural areas do not undergo drastic changes that will alter the original activities of the population and

have a negative impact on environmentally-sensitive areas. The urbanization process can indirectly aid rural development in terms of the provision of good infrastructure facilities, the existence of institutions and the establishment of functional small towns that can increase employment opportunities and so on provided the urbanization process is well-controlled so that future generations will be able to enjoy a comfortable life (Samion et al., 2014).

STUDY AREA
The area that was selected for the study is the town of Kuala Nerang, which is located in the district of Padang Terap, Kedah, Malaysia (Figure 1). According to the Draft of the Kedah State Structure Plan 2035 (PLANMalaysia, 2017), this town is categorised as the administrative centre for the Padang Terap district, while under the Kedah State Structure Plan 2020 (PLANMalaysia, 2011), this town is a major settlement centre. The upgraded status of Kuala Nerang from a major settlement centre to a district administrative centre can potentially impact land use changes around the town. Kuala Nerang town is located in Mukim Belimbing Kanan, which covers the West Padang Terap Planning Block area.
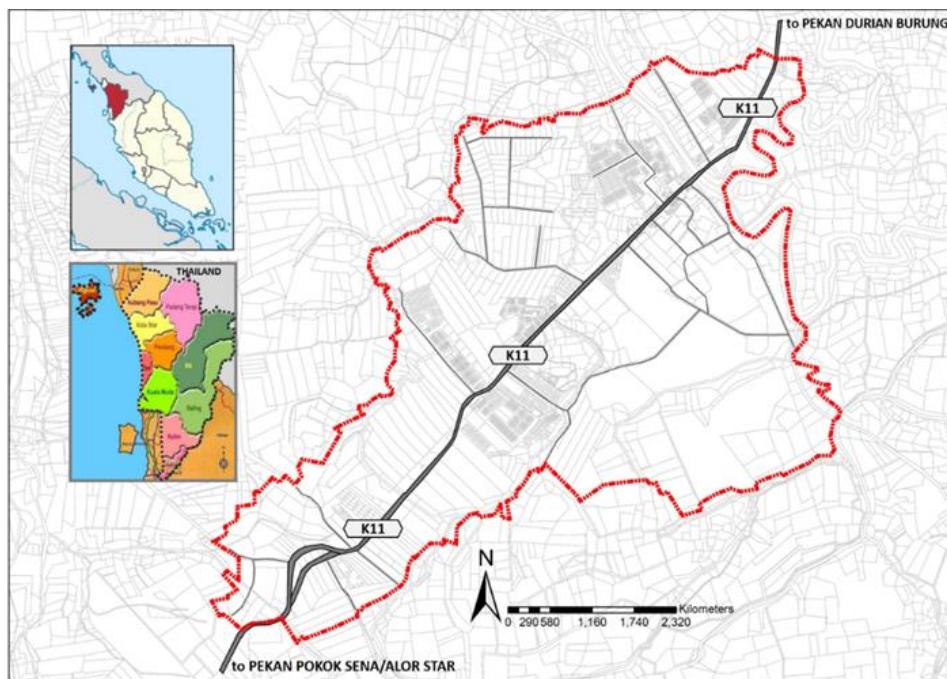
Figure 1 Location of Kuala Nerang, Kedah

The administrative boundary for Kuala Nerang, as determined by the Kedah Land Administrative Boundary's Code and Name (JTSM, 2011), covers an area of 2,146.41 acres. The town has two sections, namely, Section 1 and Section 2. Kuala Nerang is connected via the K11 State Route from Pokok Sena to the Durian Burung and to the border of Thailand. The main policies and strategies for the Padang Terap district in the Padang Terap District Local Plan 2020 (PLANMalaysia, 2018) are concentrated between Kuala Nerang and Durian Burung, characterised by the linear development corridor. This corridor is linked by major roads and is supported by the major settlement centres surrounding it, which have become the nodes to that linear development. Kuala Nerang is an existing node that has been identified as one of the major contributors to the services, commercial and administrative sectors of the Padang Terap district.

METHODOLOGY

The aim of this study is to identify the land use changes that occurred in Kuala Nerang town from 2001 to 2011 and from 2011 to 2018, from which the speed of urban expansion and direction of development in the town could be determined. The secondary data for this study came from written sources such as the Draft of the Kedah State Structure Plan 2035, the Kedah State Structure Plan 2020, the Padang Terap District Local Plan 2020 and other reports related to this study.

The analysis of land use changes involved the data on land use for the years 2001, 2011 and 2018. The data on land use for 2001 was obtained in digital format (GIS format) from the Northern Zone Project Office, PLANMalaysia (Federal Department of Town and Country Planning), in Alor Setar, Kedah, while the data on land use for 2011 was obtained through the georeferencing method by using satellite images and ArcGIS (10.4) software. The data on land use for 2018 was obtained through the gathering of information in the field. The land use changes were analysed using GIS software (ArcGIS 10.4) by the overlapping method. From the results of the analysis of land use changes, the direction of development could be determined with the support of the secondary data.

To examine the speed of urban expansion in Kuala Nerang, a fishnet of the study area was generated using ArcGIS software. This fishnet produced grid cells measuring 100m x 100m as a unit of space. The rate is calculated using formula by (Hu, Du, & Guo, 2007), as given below.

$$X_{i, t+n} = \{(B_{i, t+n} - B_{i,t}) / T_i \times 100\}$$

where,
$X_{i, t+n}$ = the annual expansion intensity index of spatial unit i,
$B_{i, t+n}$ = urban area in the spatial unit i at time t + n,
$B_{i,t}$ = urban area in the spatial unit i at time t, and
T_i = the land area of spatial unit i.

Table 1 Annual expansion intensity index and its grade

Value	Grade
$X_{i,t+n} > 1.92$	High-speed expansion
$1.05 > X_{i,t+n} > 1.92$	Fast-speed expansion
$0.59 > X_{i,t+n} > 1.05$	Medium-speed expansion
$1.05 > X_{i,t+n} > 0.28$	Slow-speed expansion

Source: (Hu, Du, & Guo, 2007)

DATA ANALYSIS AND FINDINGS

This section discusses the data analysis and the findings on the pattern of land use changes, and the speed of urban expansion and direction of development in Kuala Nerang town for the period 2001 to 2018.

Pattern of Land Use Changes in Kuala Nerang

As shown in Table 2, a total of 1,364.17 acres (63.42%) of the land was used for agriculture in 2001, followed by 337.18 acres (15.77%) for housing and 165.71 acres (7.75%) for transportation. However, there was a drop in the total land use from 2001 to 2011, particularly for agriculture, which was reduced by as much as 91.87 acres (4.3%), while the use of land for infrastructure and utilities was reduced by 1.01 acres (0.04%) and for water bodies by 0.10 acre (0.01%). This decline was due to the conversion of land to meet the demand for other land uses such as for transportation, housing, institutions and social amenities, commerce as well as for open spaces and recreation. This can be explained by the development of new housing estates from Kuala Nerang to Pokok Sena and also the upgrading of the K11 State Road. In addition, there has also been the development of educational and government institutions such as the Padang Terap Community College, the Padang Terap District Office, and the Padang Terap Lower Syariah Court. Most of these have been developed on agricultural land. Meanwhile, the use of land for industrial activities has shown a decline due to the conversion of such land for transportation purposes. Vacant land began to be classified as a land use category PLANMalaysia in 2008.

Between 2011 and 2018, agricultural land continued to show a decline from 1,272.30 acres to 1,243.71 acres (1.34%), while vacant land dropped from 2.00 acres to 0.15 acres. This decline was also due to the increase in the use of land for housing, commerce, institutions and social amenities, and transportation. There were several new developments such as housing estates, commercial areas, places of worship and so on. There were no changes to the use of land for industries, vacant land and recreation as well as infrastructure and utilities during that period. This was because the proposed development of an industrial area was located outside the study area, namely at Planning Block 4 (Padang Terap/Kota Putra). The Kuala Nerang town centre has been developed as an area for services, commercial and district administration activities.

Table 2 Land Use Changes in Kuala Nerang (2001-2018)

Land Use	YEAR						CHANGES			
	2001		2011		2018		2001-2011		2011-2018	
	Area (acre)	%	Area (area)	%	Area (acre)	%	Area (acre)	%	Area (acre)	%
Housing	337.2	15.8	368.4	17.2	383.6	17.9	31.2	1.5	15.3	0.7
Commercial	14.7	0.7	23.8	1.1	27.4	1.3	9.1	0.4	3.6	0.2
Industry	5.9	0.3	2.4	0.1	2.4	0.1	-3.5	-0.2	0.0	0.0
Institution & Public Fac.	147.5	6.9	168.1	7.9	171.9	8.0	20.6	1.0	3.8	0.2
Open Space &Recreation	53.9	2.5	56.4	2.6	56.7	2.7	2.5	0.1	0.3	0.0
Vacant Land	-	-	2.0	0.1	0.2	0.0	2.0	0.1	-1.9	-0.1
Transport	165.7	7.8	196.8	9.2	204.4	9.6	31.1	1.5	7.5	0.4
Infrastructure & Utilities	2.7	0.1	1.7	0.1	1.7	0.1	-1.0	0.0	0.0	0.0
Agriculture	1364.2	63.4	1272.3	59.1	1243.7	57.8	-91.9	-4.3	-28.6	-1.3
Water Body	54.7	2.6	54.6	2.6	22.1	2.6	-0.1	0.0	0.0	0.0
Total	**2146.4**	**100.0**	**2146.4**	**100.0**	**2146.4**	**100.0**				

Based on the analysis of land use changes from 2001 to 2011, it was found that the use of land for agriculture experienced a severe decline of as much as 91.87 acres. The built-up areas benefitted from this decline in agricultural land. The three types of land use that saw the largest increase were housing, which increased by 31.18 acres (1.46%), transportation by 31.13 acres (1.46%), and institutions and social amenities by 20.61 acres (0.96%). A similar trend was detected for land use changes between 2011 and 2018, where the use of land for agriculture dropped by as much as 28.59 acres. Three types of land use that showed the biggest increase were housing, by as much as 15.27 acres (0.71%), transportation, by 7.54 acres (0.35%), and institutions and social amenities by 3.76 acres (0.18%). These land use changes are shown in Figure 2.

The details of each land use changes are illustrated on the matrix of land use changes for the period between 2001 to 2011 as shown in Table 3 (Note: The matrix for land use changes between 2011 to 2018 is not shown here due to not many changes during this period as compared to 2001 to 2011). Agriculture is the prominent land use that is experiencing decreasing land area to other land use activities. The highest change was the agricultural land use for housing to involving the construction of new housing estates (44.62 acres) to accommodate the population demand. The second highest change was from agriculture to transportation at 26.04 acres. This is particularly for the upgrading of K11 state road and construction of roads in new housing areas. The third highest change was from agricultural land use to institutions and community facilities of 16.61 acres. This is to accommodate the construction of government institutions and education to strengthen Kuala Nerang's function as district administration center. According to Samat, Ghazali, Hasni, Hadary, & Hassan (2012), the urbanization process in the rural areas has resulted in the loss of an important agricultural land as a source of income to the rural population. However, in Kuala Nerang, most of these agricultural lands are potential development areas.
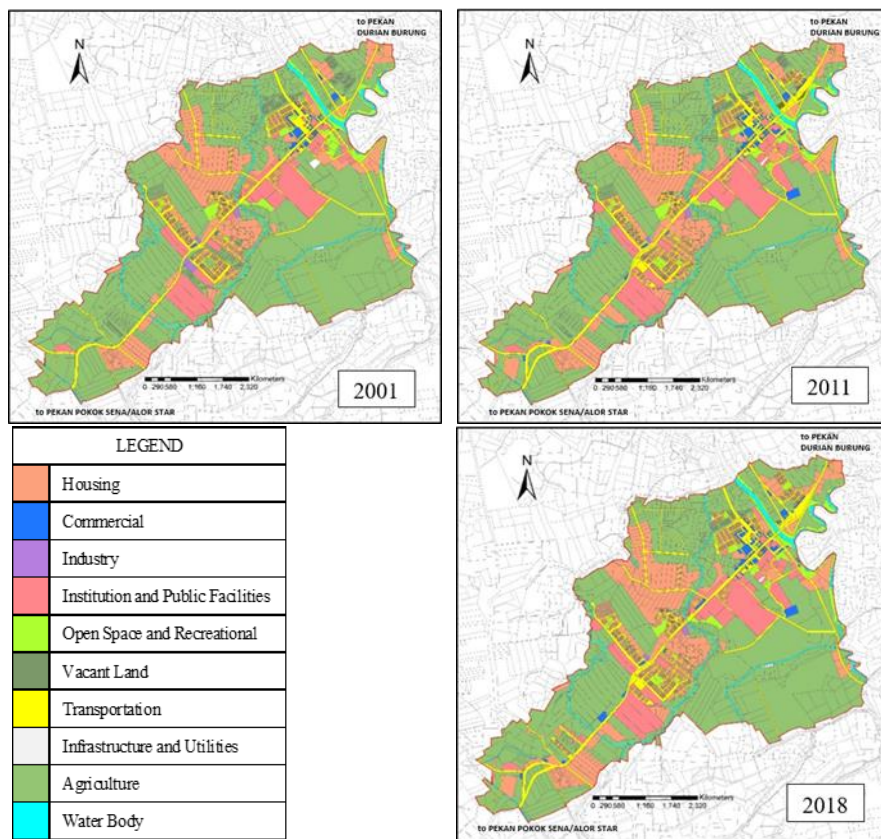
Figure 2 Land Use Changes in Kuala Nerang 2001, 2011 and 2018

Table 3 Matrix of Land Use Changes in Kuala Nerang (2001-2011)

		Landuse 2011 (acre)										
		House	Comm	Ind.	Inst.	Open space	Vac. land	Trans-port	Infra	Agri	Water body	Total
	House	323.6	0.7		0.1			2.0		10.9		337.2
LANDUSE 2001 (acre)	Comm	0.1	14.3				0.1	0.1				14.7
	Ind.			2.4				3.5				5.9
	Inst.		0.4		147.1							147.5
	Open space		2.1		3.6	48.1		0.2				53.9
	Vac. land											
	Transport		0.4			0.4		164.9				165.7
	Infra				0.8	0.5			1.4			2.7
	Agri	44.6	5.9		16.6	7.5	1.9	26.0	0.3	1261.4		1364.2
	Water	0.1									54.6	54.7
	Total	368.4	23.8	2.4	168.1	56.4	2.0	196.8	1.7	1272.3	54.6	2146.4

This clearly showed that non-built-up areas such as agricultural land and forests are often the main targets for development activities in rural areas. Their low market prices and physical features that are easy to develop encourage the growth of built-up areas such as for housing, commerce, institutions and social amenities, transportation and so on. According to Salleh, Badarulzaman, & Salleh (2013), such land use changes are one of the effects of the on-going urbanization process.

SPEED OF URBAN EXPANSION IN KUALA NERANG
The speed is determined through the annual expansion intensity index produced through an analysis of land use changes over a certain period of time. For Kuala Nerang, the analysis of land use changes revealed that there was an increase of 35 acres in the built-up area from 2001 to 2011, and it continued to increase by as much as 12.21 acres between 2011 and 2018. This change involved a reduction in agricultural land from 1,364.17 acres to 1,272.30 acres for the period 2001 to 2011, and this continued to decrease to 1,243.71 acres between 2011 and 2018.

An analysis of the speed of urban expansion using the fishnet revealed that from 2001 until 2011, 820 pixels experienced a slow expansion, while 140 pixels experienced rapid increase in the Kuala Nerang town area. This could also be seen from the results of the analysis between 2011 and 2018, where 921 pixels experienced a slow speed of urban expansion and 53 pixels experienced rapid expansion. Figure 3 below shows that the areas that experienced a rapid urban expansion were concentrated more in the northeast and southwest of the town, and it can be seen that this high rate of urban expansion occurred more between 2001 and 2011 compared to the period 2011 to 2018. The area in the northeast is the Kuala Nerang town centre, which provides a range of commercial activities and services, while the activities in the south-western area are focused more on institutions and social amenities. Both these areas are located along the main road, namely the K11 State Route that links Pokok Sena to Kuala Nerang and on to Durian Burung near the border of Thailand. The development of government and higher education institutions is concentrated more in areas that are less than a kilometre from this main road. This could be because in these areas the land is cheap; there is minimal control over development, and also to avoid a heavy concentration of urbanization activities along the main road. Rostam (2001) regarded such development as a catalyst to economic growth in rural areas. Apart from providing employment opportunities, it also increases the demand for economic, social and urbanization activities in these areas.
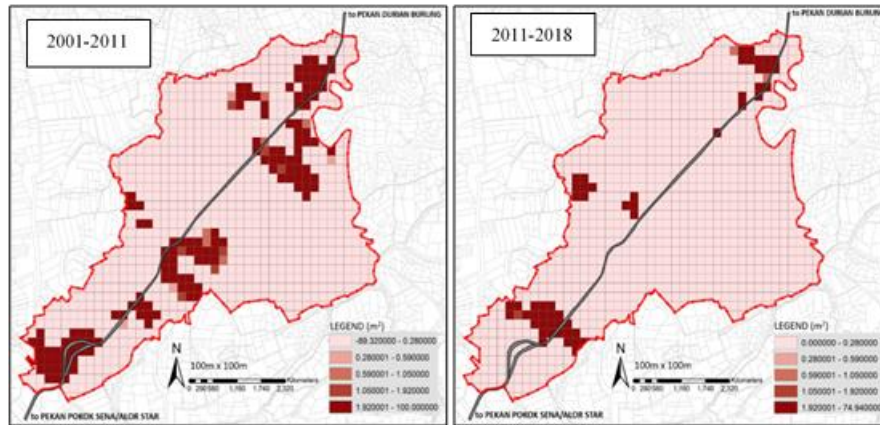
Figure 3 Speed of Urban Expansion in Kuala Nerang

Direction of Development in Kuala Nerang

The development trend in Kuala Nerang is determined by the results of the analysis on land use changes for the periods 2001 to 2011 and 2011 to 2018. Land use changes in Kuala Nerang were quite slow during both periods. The speed of urban expansion was also quite slow as the economic, social and services sectors in the town were still concentrated more in the main towns such as Alor Star, Jitra and Pokok Sena, located in the western part of the state of Kedah. The Kedah RSN Executive Inspection Report 2035 (PLANMalaysia, 2017) states that the eastern area of Kedah is receiving very little attention from investors and visitors due to poor accessibility even though it has the potential to be an eco-tourism area. In addition, there are many environmentally-sensitive areas such as permanent forest reserves and water bodies such as lakes in this section. The continued control of development in these sensitive areas will hamper land use changes as well as delay the development of Kuala Nerang town. It was found that the direction of development in Kuala Nerang is increasingly towards the west, in line with the main road (K11), which is connected to urban areas such as Pokok Sena and Alor Star (refer to Figure 4). Improved transportation and infrastructure facilities in this sprawling area will change the rural landscape in the future. In addition, the analysis of land use changes also showed that the development in this town is scattered, is close to the main road and is not concentrated in certain areas such as the town centre. Nevertheless, the eastern part of the state of Kedah, which is mainly comprised of agricultural and forest areas, should also be given attention as they have the potential to be developed for eco-tourism and agro-tourism.
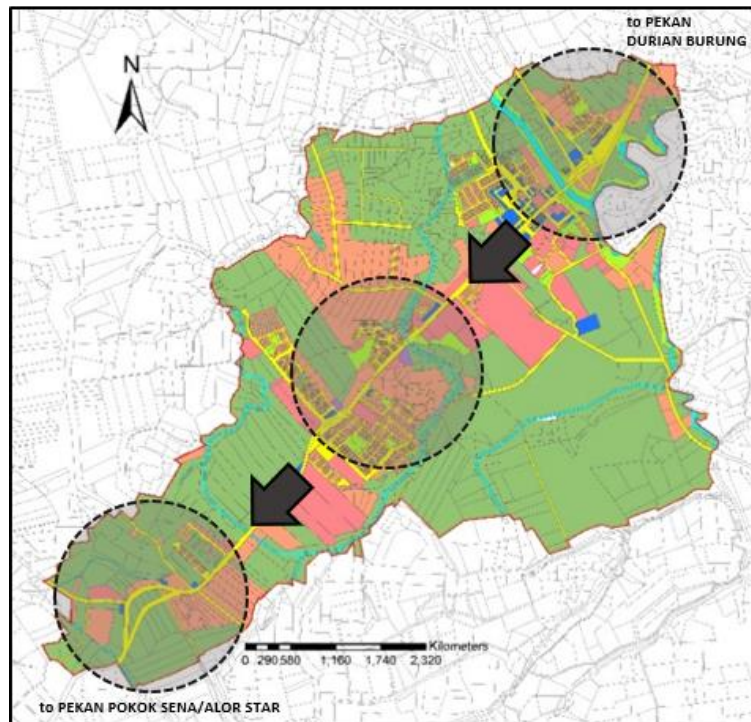
Figure 4 Direction of Development in Kuala Nerang

CONCLUSION

The results of this study showed that a small town that serves as a district administrative centre has the potential to experience changes to its land use in terms of the aspects of space and time. Agricultural land and green areas are often targeted for new development purposes as their physical features can be easily and cheaply developed. The market price for such land is usually much lower than land that is used for other purposes. The investment returns from agricultural activities are also much lower than from other land use activities such as housing, commerce, industries and so on. In terms of land administration, the process for the conversion of agricultural land to other land uses such as residential or industrial land is much easier to implement without strict conditions. This study found that three types of built-up development benefit from the decline in agricultural land, namely housing, transportation and institutions and social amenities. Although several areas have experienced rapid urban expansion, in general, the speed of urban expansion in this town is still slow. The trend and location of land use changes from 2001 to 2018 show that the direction of development in this town is towards the west and is influenced by the availability

of better transportation and infrastructure facilities in this section. The land use changes in this town can generally be said to be slow even though it is a district administrative centre. The eastern part of this state is not receiving much attention from investors and has less tourism activities because of poor accessibility and lack of viability. It is hoped that the proposed high-impact projects in the Padang Terap District such as the Kedah Rubber City and the proposed new highways, namely, the Central Spine Highway and the Trans Eastern Kedah Interland Highway (TEKIH) will further boost the economy and improve accessibility to these rural areas in the future.

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PERFORMANCE DIMENSIONS OF SRI LANKAN HOTEL INDUSTRY

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Abstract

The mixed nature of industrial and service dimension of a hotel including pure service (room service), stock management service (beverage and vendors product), and in-house processing (Food at the restaurant) crafts are a unique business setting for a hotel. In consequence, it creates a challenging task for monitoring the alignment of the strategic plan of the hotel. Hence, the performance of a hotel needs to be measured through a three-dimensional perspective which covers (i) nature of pure service, (ii) product, and (iii) service-product. The measure of the three-dimensional perspective requires empirically validated hotel-specific performance measurement system. The study reviews experts' views on performance measurement dimensions for the hotel industry in Sri Lanka based on the Analytic Hierarchy Process (AHP). Performance dimensions identified through literature review evaluated by a panel of experts consists of academics, seniors and middle-level management of hotels, government and travel advisory officials, and opinion leaders. The results of AHP on performance dimensions were re-confirmed by applying Content Validity Ratio (CVR) analysis. The AHP order of performance dimensions begins with Competitiveness followed by Finance, Quality, Innovation, Flexibility, Resource utilization, Environment, and Supplier Performance respective. The CVR on AHP order confirmed 6 dimensions on performance measurement for Sri Lankan hotel industry as final selection leaving out environmental and supplier performance from the list of performance dimensions.

Keyword: hotel industry, performance dimensions, analytic hierarchy process, expert review.

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INTRODUCTION

The effectiveness of value delivery process of an organization measured by the performance measurement system of the organization (Antony and Bhattacharyya, 2010) and conventionally performance are used to monitor and control the strategic attainment of organization's goals (Nanni, Dixon and Vollmann, 1990). Accordingly, performance measurement is common to any organization whether it is profit-oriented or non-profit oriented and depicts the success level of organizations. The measurement dimensions of performance are based on key results areas of the organization and different from organization to organization or industry to industry; universal organizational performance measurement dimensions are not popular due to the differences between industries.

The classical performance measurement system evolved with the footprint of the financial dimension and influenced by indicators like earnings per share, return on investment. Nevertheless, the emphasis on non-financial perspective dimensions such as strategic management, management accounting and operational management to measure the organizational performance and integration with financial performance have been highlighted since the early 1990s (Eccles and Pyburn, 1992; Fitzgerald et al., 1991). The argument behind the combination of financial and non-financial dimension to measure the performance of an organization is the multiplicity of stakeholder's expectation where owners and investors are keen on financial performance while customers, the public, and government focused on the non-financial performance of the organization. On account of this, scholars argued that performance measurement system must review the macro perspective that includes the roles of investors, employees, management and potential investors. Therefore, the multi-dimensional performance measurement system is essential to review the overall performance of an organization.

The hotel industry in Sri Lanka is growing continuously from 2012 to 2017 and recorded 2.05 million tourist arrivals during the year 2016 (SLTDA, 2016a) with earnings of US$ 3,518 million (CBSL, 2016) and expected is to earn US$ 7 billion by 2020 (SLTDA, 2016b). The 14 per cent growth of the industry during 2016 is well above the rate of the world tourism of 3.9 per cent and 10.7 per cent in South Asia respectively (UNWTO, 2017). This incremental growth influences the possible investment in the hotel industry and leads to gradual growth in hotel constructions, new entrance, and facelift like rebranding, renovation and upgrading to higher star grade of existing hotels.

Harris and Mongiello, (2001) stressed out hotel offering includes room services and a related support service which is in a pure service nature. Also, it has a characteristic of a retail product; selling of beverages purchased from suppliers. By the time food processing/preparation in its kitchenette and restaurant gave nature of production to hotel product. This makes the hotel

offering range between pure intangible heterogeneous services to a tangible homogeneous product (Brignall and Ballantine, 1996), and creates the difficulty on defining whether the hotel's offering is pure service or a pure product. Thus, a holistic approach is required to measure performance accommodates unique service-product nature of the hotel into its performance measurement system. Thus, the three-dimensional view for hotel performance measurement is required to describe the "Total Hotel Product". A multi-dimensional performance system is required to institutionalize the performance dimensions to incorporate industrial and institutional differences of the given territory (Wadongo et al., 2010). This absorbs the local as well as industry-specific characteristics to the organizational performance measurement system. Nevertheless, many hoteliers simply practised performance measurement based on cost and productivity that derived from narrowly defined quantifiable aspects (Fitzgerald et al., 1991) which hinder the absolute measurement of organizational performance. However, as noted, the unique service-product nature of hotel industry which has the pure service (room service), retail (beverage) and production and distribution (food at the restaurant) confirm the requirement of industry-specific mechanism for measurement of performance of hotels rather simply practising general performance measurement system. Thus, the study aims to review the literature on performance measurement dimensions of the hotel industry and analyse the experts' view on priorities of performance measurement dimensions for Sri Lankan hotel industry.

PERFORMANCE DIMENSION OF HOTEL INDUSTRY

The classical financial performance dimensions used by hotel management such as occupancy percentages, profitability and return on investment are invalid in a competitive business environment (Atkinson and Brander Brown, 2001). Even though financial indicators are leading performance measurement dimension (Harris and Mongiello, 2001), criticism on the financial dimension as a single perspective made scholars to review contemporary dimensions on performance measurement for service sector industries. The main reason behind this argument is that financial results are a reflection or lagging indicators of management actions; thus, it is a cause and effect scenario (Eccles and Pyburn, 1992) while the business performance is successful attainment of strategic goals reflecting the overall organizational effectiveness, includes financial, operational and organizational performance i.e. strategic management (Venkatraman and Ramanujam, 1986). The key drawback of financial data; an accounting period delay which explained only what happened in the past (Atkinson and Brander Brown, 2001; McKee, Varadarajan and Pride, 1989; Lynch and Cross, 1995) leads to financial dimensions to portrait short-sighted signals about the organization (Wilson and Chua, 1993). Further, it is argued that financial dimensions have a limitation on their accuracy as the irrelevancy due to the

accounting period delay as well as incongruities of financial references in a competitive business environment. This makes irregular or incompatible outcomes on performance and makes difficulty on comparisons (Harris and Mongiello, 2001). Further sole application of financial dimensions on performance measurement criticized by citing its poor market orientation, and micro in nature (Phillips, 1999). As a result, the combined use of financial and non-financial dimensions on performance measurement for hotels is recommended. This highlighted the importance of measuring the success of the organization to not purely depends on financial performance but also how overall adoption of the organization to the environment within which exist (Emmanuel, Otley and Merchant, 2013). On the other hand, designing, production and marketing functions of product or service are important areas of business success (Turney and Anderson, 1989), and priority should be given to those non-financial dimensions compared to financial dimension on performance.

FINANCIAL DIMENSION VS NON-FINANCIAL DIMENSION
According to Atkinson and Brander Brown (2001); Brander Brown and McDonnell (1995) hotel management prefer to use financial dimensions rather than non-financial dimensions. Profit, turnover (Beatham et al., 2004) growth and profitability (McKee et al., 1989) are frequently used financial indicators to measures performance in business organizations. An empirical study on performance measurement of the hotel industry of Kenya (Wadongo et al., 2010) confirmed the application of profitability, turnover, sales, and liquidity ratios as key financial indicators on performance. During the period of 1990s, Brander Brown and McDonnell (1995) introduced performance measurement dimensions based on operational indices namely; price of the room, room occupancy rate, and customer satisfaction. Further, Sink and Tuttle (1989) and Rolstadås (1998), also introduced seven performance measures with the focus on non-financial measures, namely (a) innovativeness, (b) competitiveness, (c) creativeness, (d) effectiveness, (e) productiveness, (f) efficiency and (g) profitability. In 1996, Delaney and Huselid (1996) suggest (a) Quality of product, service or programme, (b) Development of new product services or programme, (c) Ability to attract essential employees, (d) Ability to retain essential employees, (e) Satisfaction of customers or clients, (f) Relation between management and other employees and (g) Relation among employees as dimensions of perceived organizational performance. Other than the above mentioned seven dimensions, Delaney and Huselid (1996) added another four indicators as marketing, growth in sales, profitability and market share for a dimension called Market Performance. Fitzgerald et al. (1991) introduced two broad areas on performance measurement of hotel industry namely results and determinants. Six dimensions on performance for hotel industry introduced by Fitzgerald et al. (1991) under the above areas performance measurement of the hotel industry. Six dimensions

classified broadly as Results and Determinants. The Results includes (a) financial performance and (b) competitiveness while; (c) quality of service, (d) flexibility, (e) resource utilization, and (f) innovation identified as four determinants. Incorporation of employee related performance indicators or dimensions for the hotel industry also recommended since, satisfaction and the moral of the employees are prevalent to make a satisfied guest (Fitzgerald et al., 1991; fwaya, 2006). However, this addition is not widely accepted.

Fitzgerald et al. (1991) suggest financial and competitiveness are results of successful management of other four dimensions (i.e. determinants) namely; quality of service, flexibility, resource utilization, and innovation. Quality of service attends on the ability of the organization to maintain a satisfactory service to its customers. This is identified as one of the key areas on performance since the quality is pivotal to attract guests which lead to the financial performance of the hotel. The capability of the hotel on reliability, curtsey and the level of satisfying guest's requirements are indicators of the quality of service. Overall service indicators of a hotel like reliability, responsiveness, aesthetics/appearance, cleanliness/tidiness, comfort and security are identified as indicators of the quality of service (Fitzgerald et al., 1991). Flexibility as a dimension on hotel performance concentrates on process, volume and delivery which defined as the ability of the hotel to customize the chargers/rates, the job of the employees according to requirements of customers. Customer satisfaction on flexible check-in and check-out time and localized food lead to guest satisfaction and hotel performance. The resources utilization explains the ability of the organization to ensure productivity and efficiency of the organization. The innovation; final dimension focus on the individual and organizational level action or process for innovation which includes Performance of the innovation process and individual innovations (Fitzgerald et al., 1991).

Balance Score Card is another model which reviews the performance of the organization in a context of financial and non-financial perspective. According to Norton and Kaplan (2005), Balance Scorecard Approach reviews the performance of the organization on four perspectives namely; Financial, Customer, Internal Process and Learning and Growth. The review of the performance of the organization is carried out based on Objectives, Key Performance Indicators (KPIs), Targets and Actions designed by the organization relative to each dimension. The application of this general model is based on evident in Northumbria Tourist Board. The applied indicators are; total operating revenue, revenue per available room, cost relative to budget as indicators of financial dimension. The customer satisfaction review is based on the performance of the hotel taken into consideration the number of complaints, mystery guest experience, local market share and percentage of returning guest. The performance of the internal business perspective which focused on the quality and efficiency of business process measured based on service errors,

complain response, payroll percentage, employee turnover, revenue by segment. Finally, new markets, staff appraisal, staff target, courses completed, and improvements identified as indicators of Innovation and Learning perspective (Evans, 2005). It is argued that overall measures of four dimensions ensure the financial and non-financial view of hotel performance.

A case study on performance dimension of Northern Cyprus hotel industry Haktanir and Harris, (2005) established (a) Business dynamics, (b) Overall performance, (c) Employee performance, (d) Customer satisfaction, (e) financial performance and (f) Innovative activity as core themes of performance measurements. The Business Dynamic review the decision making rational and the behaviour of response mechanism for business related issues of the hotel. The overall success of the hotel was evaluated based on periodical measures of long-term overall performance or strategic attainment of hotel's objectives i.e. Overall Performance. The employee performance measured how well employees achieve set targets. The critical indicators such as comments on a guest card, feedback from the customer after checkout, and repeat business are indicators of Customer Satisfaction. The Financial Performance investigated financial success and measured by F&B costs in comparison with the budget, F&B revenue, F&B expenses, income per head and room revenue per head. Finally, Innovative Activity measured based on new additions and innovation implemented within the financial year to increase in-house sales.

In the meantime, the performance of Nigerian hospitality industry is appraised using adopted Fitzgerald model (Brignall and Ballantine, 1996), confirmed competitiveness, quality of service, innovation, community social responsibility, supplier performance resource utilization, and flexibility as the non-financial dimensions on hotel performance (Wadongo et al., 2010). This adopted model includes two new determinants namely (a) supplier performance and (b) environmental/community perspectives making a total number of dimensions into eight (Kennerley and Neely, 2002). In 2010, the study on Kenyan hospitality industry confirmed the inclusion of non-financial dimensions namely resource utilization, innovation, supplier performance and environmental indicator as determinants to the model (Wadongo et al., 2010).

In 2010, a literature review by Sainaghi (2010) summarized five internal influencers, namely Strategy, Production, Marketing, Organization and ITC as performance dimensions of the hotel industry. The intended program directing to achieve stated objectives of the hotel identified as strategy; broadly defined as competitiveness (Claver-Cortes et al., 2006), diversification (Lee and Jang, 2007), and portfolio (Lee and Jang, 2007). Further Corporate Social Responsibility and Environmental strategy are identified as contemporary inputs for strategy (Lee and Park, 2009). Other than the above strategies, capital structure, and the firm's performance was discussed in hotel performance literature. The level of efficiency and productivity of the hotel measure the

Production of the hotel (Sigala, 2004) while Marketing as the third dimension focused on (a) market orientation which explains how far the organization is concentrated on customer requirements, (b) quality which is the heterogeneity in nature due to personal contact in the hotel industry and (c) seasonality (Sin et al., 2005). The market orientation is important to the organization because the future of the hotel and its performance depend on how far the hotel is satisfied in fulfilling the requirements of its guests. Human Resource Management as a fourth dimension measures the effectiveness of knowledge management and staff satisfaction of the hotel (Sainaghi, 2010). The dimension reviews the supportive team culture, knowledge sharing to innovation performance and the relationship between employee satisfaction and the performance. Information Technology is identified as the final dimension which was not a popular dimension. Thus, later it was dropped from the list of performance dimension of the hotel industry (Sainaghi, 2010).

Macroeconomic forces like 9/11 or respiratory syndrome epidemic, the structure of tourism sector or market and destinations which are functions of tourist market also proposed as a dimension to be considered for performance and received marginal emphasis (Sainaghi, 2010). The removal of macroeconomic forces from the performance dimension list further confirmed by Chen (2007) as their poor explanatory power on hotel performance is low as 8-10 per cent. Financial performance of the hotel is indicator for financial dimension while competitiveness, quality of service, flexibility, resource utilization, innovation, supplier performance, and environmental perspective are identified as indicators for non-financial dimensions. Citation of a scholar on each dimension and the common definition for each dimension are summarized in Table 1.

The effective use of cross-cultural application of business systems not recommended without expert validation. Therefore, literature base performance dimensions shown in Table 1 are not recommended for direct application for hotel industry of Sri Lanka. As a result, the review on adaptability is recommended before the mass application in the Sri Lankan hotel industry. Thus, the study proposed an expert review on literature base performance dimensions of the hotel industry for general application to Sri Lanka industry to coup with paradox outlined. In the next section, the study explains the methodology adapted to confirm proposed financial and non-financial dimensions of hotel performance with an expert review for the final selection of suitable dimensions to Sri Lankan hotel industry.

**Table 1** Performance Dimensions Matrix for Hotel by Different Scholars

Dimensions	Definition	Scholar
Competitiveness	The ability and performance of a firm over its competitors.	Sink and Tuttle (1989); Rolstadås (1998); Fitzgerald et al. (1991); Haktanir and Harris (2005); Brignall and Ballantine (1996); Wadongo et al. (2010)
Financial Performance	The ability of the organization to use its assets and business activities to generate revenue	Atkinson and Brander Brown (2001); Brander Brown and McDonnell (1995); Beatham et al. (2004); McKee et al. (1989); Fitzgerald et al. (1991); Norton and Kaplan (2005); Haktanir and Harris (2005); Wadongo et al. (2010)
Quality of Service	The ability to maintain reliability, curtsey and availability when meeting guest requirements	Fitzgerald et al. (1991); Norton and Kaplan (2005); Brignall and Ballantine (1996); Sigala (2004); Sainaghi (2010)
Flexibility	The ability to customize the chargers/rates, job of the employees as per the customer's requirements.	Sink and Tuttle (1989); Rolstadås (1998); Fitzgerald et al. (1991); Haktanir and Harris (2005)
Resource Utilization	The ability to use of organization's human, physical and financial resources to achieve best results for the organization	Brander Brown and McDonnell (1995); Fitzgerald et al. (1991); Norton and Kaplan (2005); Wadongo et al. (2010); Sainaghi (2010)
Innovation	The ability to translating an idea or invention into a good or service	Sink and Tuttle (1989); Rolstadås (1998); Fitzgerald et al. (1991); Norton and Kaplan (2005); Haktanir and Harris (2005); Brignall and Ballantine (1996); Wadongo et al. (2010); Sainaghi (2010)
Supplier Performance	The supplier's ability to meet quality and time standards of the hotel or benchmark	Wadongo et al. (2010); Brignall and Ballantine (1996)
Environmental perspective	The ability of the organization to meet environmental standards and the social wellbeing.	Wadongo et al. (2010); Brignall and Ballantine (1996)

METHODOLOGY

Multi-Criteria Decision Analysis (MCDA) is a part of operational research which founded upon a mathematical base, ensures quantitative operational decisions upon identified decision criteria (Zavadskas, Turskis and Kildienė, 2014). The method has been applied in different disciplines including the application of strategic management (Nasab and Milani, 2012), production (Rabbani et al., 2014), tourism (Akincilar and Dagdeviren, 2014), energy and environmental management (Sambasivan and Fei, 2008). One of the tools used in MCDA is the Analytic Hierarchy Process (AHP). The AHP is a model which measures the relative importance of an element based on pairwise comparison with others and used in this study to identify priority on dimensions on performance of the hotel. The general AHP model represented as a hierarchy which has three main procedural steps including the problem structuring, evaluation, and choice (Saaty, 1977; Hummel, Bridges and Ijzerman, 2014).

The problem structuring; the first step of AHP model, explains the goal of the AHP hierarchy of the study which defines the AHP priority on dimensions of hotel performance based on five prioritization criteria namely; (a) Usefulness;

measure the ability and efficacy of the indicator at the tactical level and fit for the purpose, (b) Direct measurement; able to measure the single aspect of performance (c) Practical; able to apply within the context hotel environment, (d) Adequate; cover important aspects/dimensions of performance, and (e) Objective; clear and unambiguous about what is being explained. The single aspect of the dimension evaluated and jointly results of each analysis form a single construct. Thus, the multi-item measurement model ensures the breath of covering all aspects of a single construct by different dimensions (Diamantopoulos and Winklhofer, 2001). The lowest level of the hierarchy shows alternatives dimensions of hotel performance based on the outcome of the literature review. The AHP hierarchy model to prioritize the dimensions of hotel performance is shown in Figure 1.
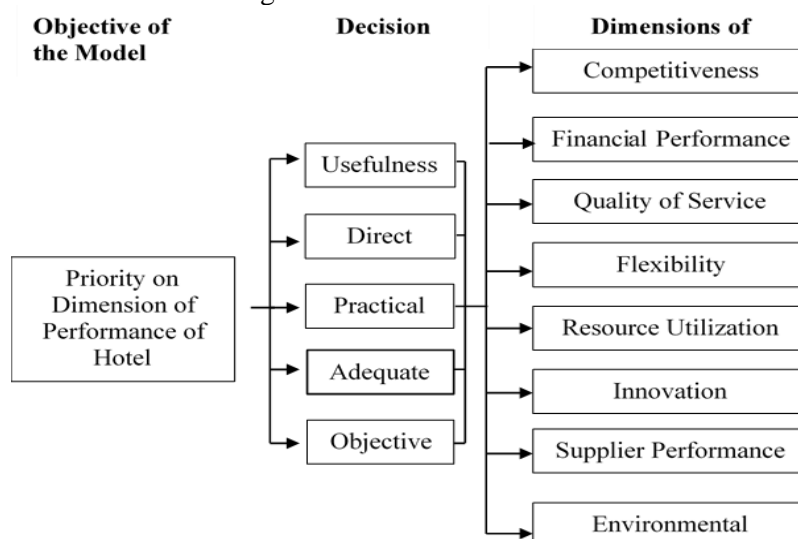
Figure 1 AHP Model on Dimension of Performance of Hotel, Sri Lanka

The second step of the AHP hierarchy which is evaluation; explains the procedure on judging the relative importance of decision criteria and alternates as well as group aggregation of judgment, consistency and sensitivity analysis. The pair-wise comparison of the relative importance of each dimension completed using a 1 to 9 scale from Equally Preferred to Extremely Preferred. Scale definition is given in Table 2.

Saaty's proposed 1-9 ratios to assess the intensity of preference of two criteria. However, the scale value 1,3,5,7 and 9 are considered as main points while the value of 2,4,6,8 is proposed as compromising values of importance between two adjacent main points. Thus, it offers advance evaluation over 5 scale model. Following the recommendation of Hummel et al. (2014), all pairwise

question statements (including criteria and alternative) are framed as positive measures of value to maintain the compatibility and relative value.

Table 2 Pairwise Comparison Original Scale for AHP Preference

Numerical scale value	Definition of the scale	Explanation
1	Equally preferred	Two activities contribute equally to the objective
3	Weak importance of one over another	Experience and judgment slightly favour one activity over another
5	Essential or strong importance	Experience and judgment strongly favour one activity over another
7	Demonstrated importance	An activity is strongly favoured and its dominance demonstrated in practice
9	Absolute importance	The evidence favouring one activity over another is of the highest possible order of affirmation
2,4,6,8	Intermediate value between the two adjacent judgments	When compromise is needed

Source: (Saaty, 1977)

The group decision approach and multiple stakeholders on the subject area used to increase the validity of the subjective decision. According to Hummel et al. (2014), stakeholder's judgment on the multi-criteria decision can be administered via an online questionnaire, electronic voting in a face to face sitting, or online voting in a dispersed group setting. In this study a total of 38 experts from disciplines related to the hotel and hospitality industry were interviewed which is well above to a minimum number of 10 experts required for expert opinion review (Cavana, Delahaye and Sekaran, 2001).

The selection of experts was done based on their knowledge priority, depth, and area of discipline and suitability in terms of perspective and affiliation. The study employee interviewer filed questionnaire in a dispersed group setting and mostly where met at their office. Details of participants are given in Table 3.

Table 3 Distribution of Experts

Expert Category	No. of Experts
Academics	03
Senior management staff of hotels	12
Middle management staff of hotels	14
Management staff of Sri Lanka Tourist Development Authority	02
Management staff of Travel Advisory Organizations	05
Opinion Leaders	02
Total	38

The Excel formula template was used to calculate global weights and priorities of criteria and the performance dimensions. The geometric mean of the individual decision was calculated to reflect the opinion of the group and considered as the final decision of each alternative irrespective of the rationale behind in each choice (Hummel et al., 2014). Here the study evaluates the weight

of criteria first and then alternative to estimate the final weight of the performance dimensions to rank them from most to least preferred. The priority order of each performance decision was considered as the preferred choice by the experts in the decision tree.

The sensitivity analysis on priority order estimate by changing the weight of each criterion by ±10% (Triantaphyllou and Sánchez, 1997; Mareschal, 1988) to analyse the vigour of the judgment. The results of the AHP pairwise comparison confirm the external validity of the dimension based on a clearly defined questionnaire after the literature review through the content validity study. A Consistency Ratio (CR) of Saaty (1980) also calculated to ensure or confirm individual judgments made a purely random set of comparison without any compulsion. However, perfect consistency is rarely occurring in practice, CR lower than 0.1 is considered as reasonable, between 0.1 and 0.2 is tolerable while higher than 0.2 is unacceptable with a recommendation of revision of pairwise comparison or discarded (Saaty, 1980).

The finalized indicators pointed out by the experts were then given to randomly 10 experts from the same expert list to review content validity based on decision rule of Lawshe (1975) Content Validity Ratio (CVR). The results of CVR measure between -1.0 and 1.0 and closer to 1.0 means more essential to the object and conversely, closer to -1.0 is more non-essential. This ensures the inclusion of most appropriate indicators of an exogenous variable of the study (Lawshe, 1975). The CVR allows measurement instrument to reflect the content universe to which the instrument will be generalized.

RESULTS OF AHP ANALYSIS

The individual weight of the decision criteria for evaluating performance confirms Usefulness as the most important decision criteria followed by the direct measurement, practical, adequate and finally objective. The overall priority of 45 per cent is accumulated by criterion "Usefulness" while only 6.4 per cent is given to the least important criterion "Adequate". The lambda (λ) maximum value of 5.447 and CR of 0.0988 confirm the reviewer's reasonable consistency on evaluation. This approves that experts gave higher weight on the applicability of the measurement dimension in a context of tactical level of the organization and its ability to measure the single aspect of performance when prioritizing decision criterion compared to its adequacy and practical application. Refer Table 4 for detail results of experts.

The estimation based on the global priorities on the performance dimension of hotel industry estimated and confirm that "Competitiveness" is the most important dimension, financial performance, quality of service and flexibility are identified as second, third and fourth level priorities confirmed that experts have a high concern on the hotel performance over its competitor as prime performance

dimension compared to the ability of the hotel to use its assets and business activities to generate revenue i.e. financial performance.

Table 4 Normalized Comparison Matrix and the Ranks for Decision Criterions

	Usefulness	Direct measurement	Practical	Adequate	Objective	Priority weight
Usefulness	1.000	3.317	3.193	3.099	5.267	0.450
Direct measurement	0.301	1.0000	3.361	5.065	1.299	0.234
Practical	0.313	0.298	1.000	3.212	1.331	0.133
Adequate	0.323	0.197	0.311	1.000	0.493	0.064
Objective	0.190	0.770	0.751	2.030	1.000	0.119

lambda (λ) Max: 5.447; Consistency Index (CI): 0.112;
Random-like matrix (RI): 1.120; Consistency Ratio (CR): 0.0998

Source: Expert Review Results (2017)

The level of flexibility or the hotel's ability to customize the chargers/rates, the job of the employees as per the customer's requirements is identified as the third important dimension on performance. Flexibility on room, services and hotel package ensure maximum occupancy throughout the year without making any drastic reduction during the off-season tourism in Sri Lanka. Further, the ability of the hotel on volume and delivery flexibility ensures the accommodation and management of special functions without making any guest dissatisfaction. This ensures repeat guests.

The resource utilization received 7.1 per cent priority with the attention on productivity and efficiency of the process of the hotel. The productivity and efficiency have interconnection where the efficiency concern on cost reduction of hotel activities while productivity concern on the input-output ratio of the hotel activities. However, dimensions like innovation, supplier performance, and environmental perspective receive the lower level of priority less than a five per cent importance per each dimension. Refer Table 4 for normalized comparison rank for each dimension performance of the hotel.

Table 4 Normalized Comparison Matrix and the Ranks for Dimension of Performance of Hotel, Sri Lanka

Dimension of Performance of Hotel	Decision Criterions and Relative Weight					Final Priority Weight
	Usefulness	Direct Measurement	Practical	Adequate	Objective	
	0.449	0.234	0.133	0.063	0.118	
1. Competitiveness	0.384	0.285	0.313	0.299	0.413	0.349
2. Financial Performance	0.292	0.166	0.253	0.194	0.183	0.238
3. Quality of Service	0.084	0.287	0.202	0.214	0.128	0.161
4. Flexibility	0.049	0.111	0.094	0.141	0.116	0.083
5. Resource Utilization	0.092	0.059	0.053	0.040	0.052	0.071
6. Innovation	0.038	0.039	0.038	0.053	0.044	0.040
7. Supplier Performance	0.029	0.032	0.027	0.029	0.026	0.029
8. Environmental perspective	0.029	0.019	0.017	0.025	0.033	0.025

Source: Expert Review Results (2017)

Once the AHP rank order was completed, the robustness of the rank order was studied through the sensitivity analysis. The study theatrically changed the weight of the decision criteria by ±10 per cent to evaluate the sensitivity of the results. Refer to Table 5 and 6 for result.

Table 5 The Sensitivity Analysis (+10% Change) on Decision Criterions and Ranks for Dimension of Performance of Hotel, Sri Lanka

Dimension of Performance of Hotel	Decision Criterions and Relative Weight with 10% Positive Change					Final Priority Weight
	Usefulness	Direct Measurement	Practical	Adequate	Objective	
	0.4695	0.2357	0.1291	0.0592	0.1065	
1. Competitiveness	0.3846	0.2854	0.3132	0.2999	0.4137	0.3501
2. Financial Performance	0.2924	0.1660	0.2530	0.1944	0.1839	0.2402
3. Quality of Service	0.0849	0.2877	0.2024	0.2149	0.1281	0.1602
4. Flexibility	0.0493	0.1113	0.0947	0.1414	0.1169	0.0824
5. Resource Utilization	0.0925	0.0591	0.0532	0.0407	0.0529	0.0723
6. Innovation	0.0381	0.0395	0.0380	0.0538	0.0445	0.0400
7. Supplier Performance	0.0290	0.0320	0.0279	0.0293	0.0268	0.0294
8. Environmental perspective	0.0291	0.0190	0.0176	0.0257	0.0332	0.0255

Source: Expert Review Results (2017)

Table 5 The Sensitivity Analysis (+10% Change) on Decision Criterions and Ranks for Dimension of Performance of Hotel, Sri Lanka

Dimension of Performance of Hotel	Decision Criterions and Relative Weight with 10% Negative Change					Final Priority Weight
	Usefulness	Direct Measurement	Practical	Adequate	Objective	
	0.4273	0.2324	0.1380	0.0686	0.1337	
1. Competitiveness	0.3846	0.2854	0.3132	0.2999	0.4137	0.3498
2. Financial Performance	0.2924	0.1660	0.2530	0.1944	0.1839	0.2364
3. Quality of Service	0.0849	0.2877	0.2024	0.2149	0.1281	0.1629
4. Flexibility	0.0493	0.1113	0.0947	0.1414	0.1169	0.0853
5. Resource Utilization	0.0925	0.0591	0.0532	0.0407	0.0529	0.0705
6. Innovation	0.0381	0.0395	0.0380	0.0538	0.0445	0.0403
7. Supplier Performance	0.0290	0.0320	0.0279	0.0293	0.0268	0.0293
8. Environmental perspective	0.0291	0.0190	0.0176	0.0257	0.0332	0.0255

Source: Expert Review Results (2017)

The results show that ±10 per cent change in weight of the decision criterion does not affect the original Priority Weight of Dimension of Performance of Hotel which confirms the validity of the AHP results with ±10 per cent sensitivity.

CONTENT VALIDITY RATIO
As per the results of the sensitivity analysis, it was impossible to evoke the reversal of the outcome of priority order and concluded the competitiveness is the most important dimension of hotel performance followed by financial performance. Nevertheless, considering the non-availability of a cut-off point on

priority order value in AHP model (Hummel et al., 2014), a study carried out the Lawshe Content Validity Ratio (CVR) to confirm the most suitable dimensions for performance measurement of hotels in Sri Lanka. A total of 10 experts are randomly selected from the same panel for CVR analysis (refer to Table 7) and result suggest the critical value for panel size (N) of 10 is 0.8 which suggest the cut-off value.

Table 7 Lawshe Content Validity Ratios (CVR) for Performance Dimension for Hotel industry of Sri Lanka

Dimension	CVR
Competitiveness	1.0
Financial Performance	1.0
Quality of Service	1.0
Flexibility	0.8
Resource Utilization	0.8
Innovation	0.8
Supplier Performance	0.2
Environmental perspective	0.6

Source: Expert Review Results (2017)

The results confirm that except two indicators namely "Supplier Performance" and "Environmental Perspective" all other six dimensions meet the critical value requirement. Thus, based on the results of CVR, the study concluded (a) Competitiveness, (b) Financial Performance, (c) Quality of Service, (d) Flexibility, (e) Resource Utilization, and (f) Innovation as most suitable dimensions to collectively measure the performance of hotel industry in Sri Lanka.

CONCLUSION

This paper introduced eight performance dimensions for the hotel industry in Sri Lanka. The priority order of performance dimensions of the hotel industry in Sri Lanka was reviewed based on the expert review. The study used AHP method as the tool to estimate priorities of performance dimensions and Lawshe Content Validity Ratios was used to confirm the content validity of the results. The study was able to finalize the valid list of dimensions to the hotel industry with expert validation. This country-specific analysis confirmed that competitiveness is the most important performance dimension while supplier performance and the environmental perspective were dropped from the list due to the lower content validity. Since the results confirm the competitiveness and financial performance are topmost dimensions, study suggests that hotel management need to focus on financial leverage and the stability while maintaining sustainable competitive advantage to ensure the high performance in years to come.

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DO DURATION OF STAY AND PARK VISITATION MATTER? AN EVALUATION OF PARK DISTANCE

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Abstract

Among ways to keep up with healthy lifestyle include physical activities. Recent statistics by the Ministry of Health (2016) indicated a drastic increase in the prevalence of non-communicable disease from 1990 to 2016 and the number is expected to increase or remain high. In response to the issue, the Eleventh Malaysia Plan 2016-2020 was formulated to improve Malaysians' wellbeing by providing ample open spaces to encourage an active lifestyle. This paper aims to investigate the association of proximity to neighbourhood park and its level of utilisation. 680 respondents were involved in the questionnaire survey conducted at 7 selected neighbourhood parks. The output of the Pearson Correlation evinced that proximity to neeighborhood parks was highly associated to the level of park utilisation. There was a strong and positive relationships between (i) park distance and numbers of visitations ($r = 0.841, n = 680, p = 0.000 < 0.01$), (ii) park distance and length of stay ($r = 0.803, n = 680, p = 0.000 < 0.01$), and (iii) number of visitations and length of stay ($r = 0.644, n = 680, p = 0.000 < 0.01$). The results also indicated that that the longer the distance of the park from home, the longer the time spent at the park. Whereas, the shorter the distance of the park from home, the higher the utilisation of the park.

Keyword: physical activities, quality neighbourhood park, proximity

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INTRODUCTION

Malaysia is one of the developing countries besides other Asian and European countries that experience a high number of non-communicable disease (NCDs). Apart from other determinants, physical inactivity is identified as the leading cause of NCDs and other health-related problems (Ministry of Health Malaysia, 2016). Including Malaysia, statistics have reported over 5.3 million deaths a year worldwide due to unhealthy lifestyle (Sallis and Carlson, 2015). The Malaysian government has introduced green cities and neighbourhood as its core initiatives towards achieving sustainable cities (Ministry of Housing and Local Government Malaysia, 2010). Besides enhancing people's wellbeing and increasing bodily health and muscle composition, strong evidence shows that physical activity helps in overcoming various types of cancer, depression and high blood pressure (Fong et al., 2012; Ferioli et al., 2018). This paper intends to investigate the association of National Park (NP) proximity with its utilisation for the improvement of the quality of neighbourhood park (QNP) in Malaysia. The objectives of this study are to (i) identify the relationship between park distance and number of visits, (ii) to investigate the association of park distance with length of stay and (iii) to investigate the association of number of park visitations with length of stay.

DETERMINANT FACTORS TO PARK UTILIZATION

Over the past century, there has been a dramatic interest in the subject of green open spaces (GOS). Numerous urban theorists emphasise the importance of GOS for social connectedness, recreational opportunities, enhancement of physical health and wellbeing (Samimi et al., 2009; Karuppannan et al., 2012; Brown et al., 2013). Despite the fact that GOS brings extensive value to the community, the issues of underutilisation of parks or GOS in Malaysia remain unchanged (Norsidah et al., 2015). Urban theorists agree that types of activities, safety, legibility, quality and proximity are the prominent factors that influence GOS utilisation (Ewing and Handy, 2009; Sugiyama et al., 2010; Taylor et al., 2011; Paquet, Cargo, Kestens and Danial, 2010; Akpınar, 2014). A current study conducted on the quality of GOS in Malaysia suggests that distance is one of the essential criteria for successful GOS (Nurhayati and Amanina, 2018).

Studies conducted on park utilisation related to frequency of use claim that distance has a significant influence on park utilisation (Sturm and Cohen, 2014; Ribeiro et al., 2015). The claim is supported by Agboola et al. (2011) who assert that park utilisation is highly associated with proximity to the park. One of the possible explanations is that, parks that are in close proximity to the residence of the park users are convenient to reach hence encouraging physical activities (PA) participation such as walking and cycling to the park.

Previously, several studies have reported that proximity of park to residence influences the time spent in the park and level of park utilisation. In Chicago, people who live near to parks are more likely to visit the park due to shorter travel time as compared with people who live farther from parks. Meanwhile, people who live farther away from parks would hardly visit the park yet tend to stay in the parks much longer than those who live nearby (Gobster 2002; Tinsley et al., 2002). Other studies related to satisfaction of neighbourhood park evince that distance has the strongest influences on GOS utilization compared to other factors (Hadavi et al., 2017). This suggests that the more frequently people visit the parks, the more likely that they would be involved in PA.

The frequency of park utilisation is strongly associated with a higher level of PA (Bedimo-Rung et al., 2005; Kaczynski and Henderson, 2008). Studies conducted by Kaczynski et al. (2009) reveal that proximity to parks strongly relates to age. Indeed, Sanesi and Chiarello (2006) claim that residential area, marital status and age are strong factors influencing park utilisation. Meanwhile, studies by Barbosa et al. (2007) and Schipperijn et al. (2013) discover that accessibility is an important factor that influences park usability. However, there is lack of reliable methods to measure park accessibility (Maroko et al., 2009). It is important to note that factors such as proximity to GOS are closely related to accessibility, travel time, street environment and land uses (Balfour and Allen, 2014; Pojani and Stead, 2015; So, 2016).

METHODOLOGY

Site Study

Seven neighbourhood parks under the jurisdiction of Petaling Jaya City Council (Majlis Perbandaran Petaling Jaya, MBPJ) and Shah Alam City Council (Majlis Perbandaran Shah Alam, MBSA) were selected for this study. 680 park users were involved as respondents of the questionnaires. Table 1 shows detailed information about on of the park selected for the study.

Table 1 Details on selected Neighbourhood Parks in Malaysia

Name of Parks	Location	Size	Jurisdiction
Taman Rimba Riang	Section 9, Kota Damansara	4.45ha	MBPJ
Taman Aman	Petaling Jaya	5.2 ha	MBPJ
Taman Jaya	Petaling Jaya	10.7 ha	MBPJ
Ara Damansara Park	Ara Damansara	9.9. ha	MBPJ
Taman Rekreasi Tasik Seksyen 7	Seksyen 7, Shah Alam	18 ha	MBSA
Western Park	Setia Alam	4.35 ha	MBSA
Taman Rekreasi Indah	Shah Alam	7.5 ha	MBSA

RESULT AND DISCUSSION

In line with the findings from the literature, this study believed that distance served as one of the significant factors influencing neighbourhood park (NP) utilisation particularly in Malaysia. SPSS 16 was utilized to conduct Pearson Correlation. The Pearson Correlation determined whether there was a significant correlation between, i) park distance from neighbourhood and number of visitations, and ii) park distance from neighbourhood and length of stay in the park.

The options for park distance were: 1=< 1km, 2= 1km - 2km, 3= 3km - 4km, 4= 4km - 5km, and 5= < 5km. The options for park visitiations were: 1= this is my first time, 2= everyday, 3= 2-3 times/ week, 4= every weekend and 5= 1-3 times/ month. The options for the the length of stay were: 1= 1 hour, 2 = 1 hour, 3 = 2-4 hours, 4= 4-6 hours, and 5= full day.

Table 2 shows the output of the correlation analyses. The results indicate a strong and positive correlation between (i) park distance and number of visitations. Moreover, there is a strong and positive correlation between (ii) park distance and length of stay, and (iii) number of visitations and length of stay. The results show that (i) the shorter the park distance from home, the greater the utilisation of the park, (ii) the longer the distance of the park from home, the longer the time the user spent at the park, and (iii) the lesser the number of visitations, the longer the time the user spent at the park.

Table 2: Statistical Output of Bivariate Correlations on NP distance and utilization in Malaysia

H⁰	There are no statistical correlations between (i) parks distance and numbers of visitation, (ii) parks distance and length of stay, and (iii) number of visitation and length of stay
H¹	There are statistically significant correlations between (i) parks distance and numbers of visitation, (ii) parks distance and length of stay, and (iii) number of visitation and length of stay

Measures	Statistics	Parks distance	Length of Stay	Number of visitations
Parks distance	Correlation coefficient (r)	1	.803**	.841**
	Coefficient of determination (r²)		0.646	0.707
	Sig. (2-tailed)		.000	.000
Length of Stay	Correlation coefficient (r)	.803**	1	.644**
	Coefficient of determination (r²)	0.646		0.414
	Sig. (2-tailed)	.000		.000
Number of visitation	Correlation coefficient (r)	.841**	.644**	1
	Coefficient of determination (r²)	0.707	0.414	
	Sig. (2-tailed)	.000	.000	

The followings are the results of the correlation statistics:

i. At the 99 % confidence level, there is a statistically strong and positive correlation between park distance and number of visitations ($r = 0.841$, $n = 680$, $p = 0.000 < 0.01$). The coefficient of determination ($r^2 = 0.707$, $p < 0.01$) indicates that park distance explains 70.7% variation in number of visitations. Therefore, the null hypothesis is rejected.

ii. At the 99 % confidence level, there is a statistically strong and positive correlation between park distance and length of stay ($r = 0.803$, $n = 680$, $p = 0.000 < 0.01$). The coefficient of determination ($r^2 = 0.644$, $p < 0.01$) indicates that park distance explains 64.6% variation in length of stay. Therefore, the null hypothesis is rejected.

iii. At the 99 % confidence level, there is a statistically strong and positive correlation between number of visitations and length of stay ($r = 0.644$, $n = 680$, $p = 0.000 < 0.01$). The coefficient of determination ($r^2 = 0.414$, $p < 0.01$) indicates that number of visitations explains 41.4% variation in length of stay. Therefore, the null hypothesis is rejected.

The statistical outputs suggest that park distance has a strong connection to park utilisation, that is (i) the number of visits and (ii) the length of stay at the park.

Park Distance in Relation to Time Spent at Park

In Malaysia, one of the greatest challenges is to encourage people to be involved in outdoor physical activities. Park planners need to identify the needs of people of various ages to get them involved in outdoor activities. Moreover, time spent at the park indicates higher chances of getting involved in different types of outdoor activities. Several studies have documented that the more time spent outdoors, the healthier people's well-being and the happier they will be (Thompson and Travlou, 2007; Mitchell and Popham, 2008). The claim is supported by Lestan et al. (2014) who assert that the proximity of open green spaces to home strongly affects the number of visitations and time spent at the park. The findings from this study also indicate that a park located farther from home leads to longer travel time. Whereas, park visitors who stay closer to the neighbourhood park would pay frequent visits to the park and spend lesser travel time to reach the park as compared with visitors who could only go to the park over the weekend. Current studies by Bertram et al. (2017) indicate similar findings where individuals tend to spend more time at the park during the weekend.

Interestingly, other studies indicate that distance is not the only factor influencing the time spent in green GOS. In Malaysia, health-related factors, facilities, social opportunities, accessibility, place attachment and elements of GOS are found to have significant influence on the time spent in GOS (Nor Akmar Abdul Aziz, 2012; Norsidah et al., 2015; Amir Hossein Askari, 2014;

Sreetheran, 2017). Therefore, further studies and more in-depth investigation related to NP distance and duration of time spent are needed. It is believed that frequency of park visitation and time spent are among important indicators of successful GOS design (Amir Hossein Askari, 2014). However, there is no specific justification hitherto of whether parks should be located near to, or farther from the residential areas. Different GOS-related studies measure distance differently depending on the context of the study. Moreover, some studies indicate that distance is highly related to other factors such as accessibility and streetscape design.

Park Distance in Relation to Frequency of Visitation
Based on Table 2, the results suggest that residents who live within less than 1 kilometer from the park tend to have higher frequency of visitation. Meanwhile, residents who live farther away from the park, but within less than 5 kilometers; show less visitation to the nearest NP. The results indicate that the distance of park from neighbourhood significantly influences the utilisation of neighbourhood parks. Previous studies have reported that park proximity is one of the main reasons that invite and attract frequent visits to the parks in Putrajaya. The respondents stated that their attraction to the parks reflected in their regular visits was due to the short distance of the parks from their residences (Norsidah et al., 2015). Kayczynski and Henderson (2008) state that proximity to GOS is highly connected to the increase in physical activities and the health of the communities. These findings are further supported by the studies conducted in New Delhi, India which evince that frequency of park visitation is strongly influenced by distance to the park. People who live less than 1 kilometer are more likely to pay visits to the parks as compared with those who live further than 1 kilometer away. Similarly, other studies also report the same results where the distance to GOS influences the utilization of the park (Coles and Bussey, 2000; Neilsen et al., 2013).

Previous studies claim that some park visitors particulatly the elderly, have difficulties travelling long distances. The claim is supported by recent studies stating that the older park users are unwilling to travel far due to their age and less mobility regardless of larger and attractive GOS (Lo and Jim, 2012; Paul and Nagendra, 2017; and Nurhayati Abdul Malek et al., 2018). Some studies state that NP located within walking and cycling distance would attract more users from various economic backgrounds (Cohen et al., 2012; Mohd Salleh et al., 2019). Findings of this study are supported by Walker and Crompton (2012) who mention that residents who live nearby parks, that is within .25, .5 and .75 miles, would more likely to pay frequent visits compared to those who live further away from the parks. Studies conducted by Ward Thompson and Aspinall (2011) as well as Wendel et al. (2012) state that nearby GOS located within neighbourhood

areas attract more residents to utilise them due to their sense of attachment to natural environment.

The studies further add that the nearby GIS increases people's level of satisfaction towards outdoor spaces. Recent studies by Schipperijn et al. (2017) on the comparison between eight countries in terms of park utilisation in relation to pattern of use and distance, indicate that residents who live within 1 kilometer from the park pay frequent visits to the park as compared to those who live further than 1 kilometer away from the park. It is important to highlight that these findings do support the Green Neighbourhood Plan 2010 formulated by the Ministry of Housing and Local Government Malaysia (2010) that aim to reduce carbon footprints and improve people's health and well-being through walkable neighbourhood. Moreover, parks situated within walking distance and paved with proper streetscape design would invite all people regardless of various demographic and socioeconomic backgrounds to utilise the parks. Meanwhile, parks located farther away would discourage older people and lower income groups from visiting the park. Consequently, these types of parks decrease the level of recreational opportunities among users. This is supported by other research which indicate that distance from neighbourhood to urban green spaces are highly correlated to park utilisation, particularly types and level of physical activities and frequency of use (Cohen et al., 2012; Björk et al., 2008; Toftager et al., 2011; Rasidi et al.,2012; Akpinar, 2014; Nurhayati Abdul Malek et al., 2015).

However, there is yet a specific study which discusses the maximum tolerable distance that could define either how near or far the neighbourhood is to the park. Different countries would have their own tolerable distances depending on age and transportation. Studies conducted in Shenzhen, China and Los Angeles report that 300 meters to 400 meters from neighbourhood area to open space is the acceptable distance. Distance greater than 400 meters would decrease frequency of visitations to GOS (Badland et al., 2014; Sturm and Cohen, 2014). In New York, 1 mile (1.6 km) is identified as the tolerable distance to GOS (Maroko et al., 2009). The closer the park's location to the neighbourhood, the higher the chances of recreational opportunities among residents regardless of age and socio-economic status. Unlike riding vehicles, pedestrians restricted by walkable distance (Dill, 2004; Kawada et al., 2014). Hence, parks located closer to their home are more preferable. Walking is also known as one of the sustainable alternatives advocated by various developing countries to access the GOS.

CONCLUSION

This study has proven that distance is one of the important design characteristics that have an influence on park visitation and time spent at the park. However, according to previous studies that investigated distance, other factors such as accessibility, streetscape design, safety and attractiveness need to be considered when delving into the issue of park usability. In the Malaysian context, neighbourhood parks situated close to the residential areas are more preferred instead of other influential factors such as maintenance, facilities, safety, and park qualities. Previously, the results of this study have evinced that visitors who live less than 1 kilometer from the park pay frequent visits to the park as compared to those who live further than 1 kilometer away. Hence, studies on possible factors related to distance such as accessibility, street characteristics and socio-economic background need to be investigated further to support the current study comprehensively for future GOS planning and design references.

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QUANTIFICATION OF SOLID WASTE IN SCHOOL CANTEENS – A CASE STUDY FROM A HULU SELANGOR MUNICIPALITY, SELANGOR

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Abstract

Obtaining empirical data on solid waste generation and composition is imperative to promote efficient waste management in schools. The paper aims to examine the characteristics and composition of waste generated 'during food preparation' stage and 'after consumption' stage, waste per capita and the assumption of economic valuation of solid waste for recycling. In this study, solid waste was quantified with transparency through adopting the direct weighing method to obtain reliable and accurate information of solid waste generated at the selected ten school canteens in Hulu Selangor municipality, Malaysia. Based on the result gathered, the total quantity of solid waste generated at 10 school canteens is about 162.8 kg/day with the average solid waste of 19.6 g per capita per day. The total assumption of the economic value of solid waste per day for recycling in all 10 schools' canteens is about RM 30.70, which shows that recyclable materials have high revenue potential, as well as economic benefits. The present study empirically promotes the transparency of solid waste quantification at the school level, which could help identify hotspots and strategies with the greatest potential for waste reduction.

Keyword: solid waste, quantification, schools, waste per capita, economic valuation

INTRODUCTION

Just like in other developing countries, the quantification of municipal solid waste (MSW) generated in urban and rural areas in Malaysia has becoming more complex. In this light, the Malaysian population has generated various categories of waste, including as food waste, plastics, bottles, glass, papers, metals, diapers and fabrics (Tiew et al., 2019). The rate of waste generation in Malaysia is estimated at 1.17 kg per day per person in 2018, which has significantly increased from 0.8 kg per day per person in 2005 (Chu, 2019). The recent data on MSW generation in Malaysia about 38,142 tonnes of waste per day in 2018, which skyrocketed from 19, 000 tonnes of waste a day in 2005 (Chu, 2019). Such large quantities of MSW has caused significant environmental impacts, including air pollution, groundwater pollution, depletion of soil fertility, toxic gas emissions and bad odour (Karim Ghani et al., 2013).

As a sector of major interest for intervention, the schools also are considered as one of the highest solid waste generator other than household. The high volume of waste generation in schools is partly due to the fact that students and teachers spend most of their time in school and use a variety of resources. Subsequently, they generate different types of solid waste, which may represent a significant source of solid waste. Relevant actions in reducing solid waste at the school level could help increase awareness on sustainable waste management. The present study focuses on solid waste generation in primary and secondary school canteens to gain insights about the situation of solid waste management and to promote transparency in solid waste quantification. To implement a proper solid waste management practice, it is essential to understand comprehensive quantification of waste generated and its composition before implementing any process towards reducing solid waste. In other words, accurate solid waste quantification is required to identify hotspots and strategies with the greatest potential for waste reduction.

Minimising solid waste can also help the school community and canteen operators to gain economic benefits (e.g. reducing tangible and intangible cost due to using the resource with efficiency), social benefits (e.g. improve food security) and environment benefit (e.g. reducing greenhouse gas emissions). However, most of previous studies on solid waste quantification focus more on households than the hospitality sector (Papargyropoulou et al., 2016; Saraswathy Kasavan et al, 2018, Saraswathy Kasavan et al, 2019) and even fewer in the school canteen business (Boschini et al., 2018). Despite such growing public, academic and government attention on the waste issue, there is still little research on the scales and patterns of school canteen solid waste, particularly for developing countries, such as Malaysia. Therefore, this paper is intended to fill this gap by providing new empirical data through direct weighing of solid waste quantification. This study presents a case study of schools in Hulu Selangor, Malaysia. The research explores the current status of waste characteristics and

composition during food preparation and after the consumption stage, waste per capita and the assumption of economic valuation of solid waste for recycling.

MATERIALS AND METHODS

Description of the study material
The data for this study were collected from ten public schools (7 primary schools and 3 secondary schools) located in Kuala Kubu Bharu, Batang Kali and Serendah as shown in Table 1. Due to time and budget limitations, this study only considered waste produced in the school canteen, which is normally managed by independent food service contractors. This study focuses on the quantification of solid waste generation in the 10 selected public schools. These schools are located within short geographical distance of each other. The data were collected after getting the permission from the school management and canteen managers. In Malaysia, pupils aged 7 to 12 attend primary schools, while students aged 13 to 17 attend secondary schools. Regardless of their level of study, all of these students follow a "full-time" schedule, where classes are spread over five days a week (Monday to Friday) and schools commence from 7.00 a.m. to 1.00 p.m.

Table 1 A total number of selected schools in Hulu Selangor

	Name of school	Number of students	Number of staff	Total population
Primary schools	SK Batang Kali	906	54	960
	SK Antara Gapi	622	42	664
	SK Ampang Pecah	473	47	520
	SK Kuala Kubu Bharu	244	40	284
	SK Kuala Kubu Bharu 1	324	34	358
	SK Kuala Kubu Bharu 2	268	29	297
	SK Bandar Baru Batang Kali	1532	98	1630
Secondary schools	SMK Ampang Pecah	954	73	1027
	SMK Dato' Haji Kamarudin	739	56	795
	SMK Bandar Baru Batang Kali	1659	113	1772
		7721	586	8307

In the present study, the quantification of solid waste involves direct weighing, counting, volume assessment and waste composition analysis. The quantity of the different category of solid waste generated in each school was weighed for five days to obtain the average daily rate of solid waste generation.

The students, teachers and canteen staff were requested to dispose of waste in the dustbin provided in the school canteen. Dustbin with labelled as "Group 1 Waste", which is located in the canteen's kitchen is known as the solid waste produced 'during food preparation' stage, while dustbins used by students and staff in consumption stage are classified as "Group 2 Waste". Despite the time constraints and the resource-intensive nature of this study, direct weighing of solid waste was conducted on-site after recess to ensure more accurate

quantification of the weight or volume of the waste. First, the researcher separated the waste into various categories, such as tin cans, disposable plastic food containers, paper and plastic, which were mixed with the food waste. The transparency of solid waste quantification was ensured by cooperating with the kitchen staff and the process used a weighing scale (in kilograms), large biodegradable garbage bags (to separate the waste into various categories), pen and paper (for making notes), gloves, caps and aprons. Later, all data on solid waste generation and waste composition were transferred from paper into an Excel data sheet to record the masses of waste.

Analysis Data
The first analysis determines the total quantity of solid waste generated at each school per day, specifically solid waste generated between 10.00hrs until 14.00hrs. The data was presented in the form of graph and analysis to simple descriptive statistics to understand the difference between the total waste generated in each school and obtain a better view of the waste issue at the school level. The solid waste generation in school canteen involved two stages; first, 'during food preparation' stage, and second, 'after the consumption' stage.

The second analysis explains the volume of waste generated per capita. The waste per capita quantification guidelines is highly influenced by a previous study conducted by Malefors et al., (2019), but this study made some adjustment based on the data available to make sure that the quantification of solid waste is representative of each school studied. The waste per capita can be referred to as total solid waste generation per person from each school. This calculation will lead to handle asymmetry in the data and help the school community to reduce solid waste. Thus, the waste per capita can be calculated using the equation below:

$$Waste\ per\ capita = \frac{\sum_{i=1}^{n} Xi\ (waste\ generation)}{\sum_{i=1}^{n} Yi\ (number\ of\ population)}$$

Xi refers to the total waste production in each school, while Yi is defined as the total population of each school. Thus, the total waste per capita can be measured by dividing the total waste generation and the population in each school.

The third analysis estimates the economic valuation of solid waste for recycling for per day. In this regard, every single thing used in everyday life has a value. In this study, the value of the solid waste is determined based on the market value of recycling to see the relationship between the total economic value lost from solid waste without recycling and the total solid waste produced at the school canteen. In this analysis, the value of solid waste was classified into

different classes. Then, the market value was multiplied with the mass of the solid waste based on these classes. While a small item of solid waste is regarded as having a small value, it will still cause value loss when it is directly sent to landfill without recovery of waste, particularly recycling.

RESULTS

Solid Waste Generation
Figure 1 shows the 4 main types of total solid waste (such as food waste, plastic, paper and tin) produced 'during food preparation' stage in school canteen daily. Food waste generated 'during food preparation' stage is considered as unavoidable food waste because only the edible parts of the raw materials will be used, while others are thrown away. Other than food waste, there is a high number of plastic wastes, which most of the plastics were generated 'during food preparation' stage, such as packaging materials of oils, sugar, salt and others. They also include bigger plastics used to pack all the raw food materials which were bought at the nearby market. Meanwhile, papers found in the kitchen's dustbin mainly originated from newspapers that are normally used to cover the cooking table. Tin cans found consists of the packaging materials of creamer, Milo and others canned food items.
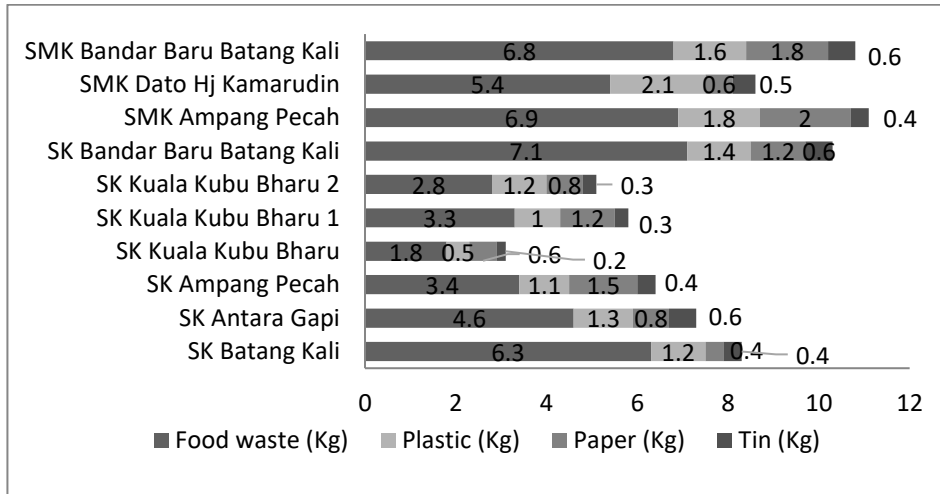
Figure 1 Total amount of solid waste produced 'during food preparation' stage at school canteen per day

Figure 2 shows the total amount of solid waste produced 'after the consumption' stage at each school canteen per day. Based on the table, the proportion of food waste is higher compared to other types of solid waste. Food waste collected 'after the consumption' stage is mostly edible, but was not

consumed by the students or teachers. It also includes unavoidable food waste, such as fish guts and chicken bones. There are 3 other main solid wastes generated at the school canteen 'after the consumption' stage which are plastic, paper and disposable plastic food containers. These three types of solid waste are used to pack the food to make it easier to serve. Normally, food is packed first either using plastic, paper or disposable plastic food containers, so that it is easier and faster for the canteen staff to serve food to a larger number of the students within the 20 minutes recess time. In this regard, a large amount of plastic, paper and disposable plastic food containers are used in the canteen. SK Kuala Kubu Bharu does not have disposable plastic food containers in its dustbin because they only served food in plates, plastics and paper wrappers. The solid waste found in the dustbin comprises of disposable plastic food containers which are more lightweight compared to other types of solid waste.
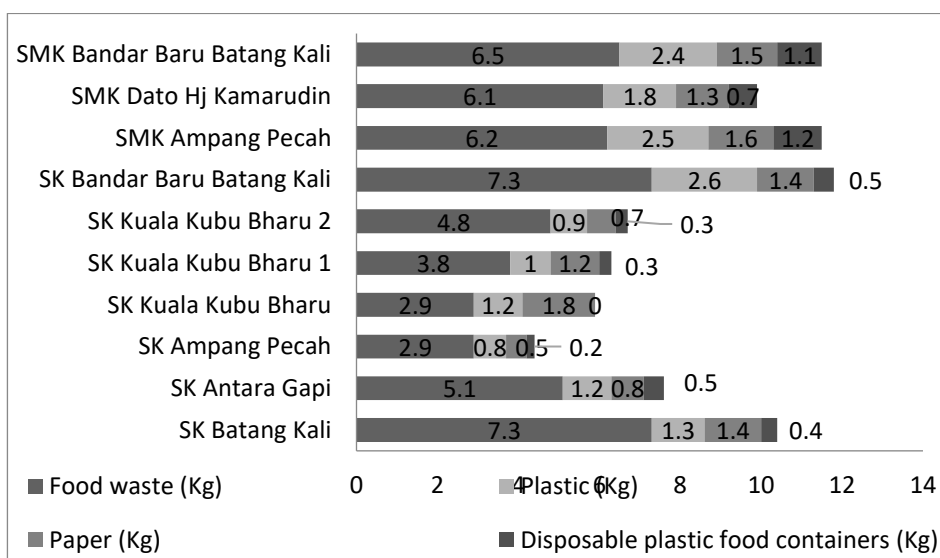
Figure 2 Total amount of solid waste produced after consumption stage at school canteen per day

Figure 3 and 4 show the total solid waste generation in each school canteen per day. There are 5 main solid wastes generated in the school canteen. Food waste, plastic, paper and disposable plastic food containers are generated 'after the consumption' stage. The waste generated 'during food preparation' stage include food waste, plastic, paper and tin cans, but there were no disposable plastic food containers. The total generation of solid waste in the school canteen for all ten schools is 162.8 kg per day. The total weight of food waste produced at all ten schools is 101.3 kg per day, which comprises of 62% of the total food weight. The weight of plastic is about 28.9kg (18%), which is higher than paper

(23.1 kg or 14%) and disposable plastic food containers (5.2 kg or 3%). The highest percentage of all school which is around 52% to 73%. Plastic waste makes up around 13% to 21% of the waste. There are some schools that use paper wrappers than plastic, such as SK Ampang Pecah, SK Kuala Kubu Bharu and SK Kuala Kubu Bharu 1. Normally, fried rice, *nasi lemak*, noodles and vermicelli are packed using paper wrappers. Some of the school canteens staff use plates to serve the food to lower the cost of packaging, however, many more manpower is needed to serve the food.
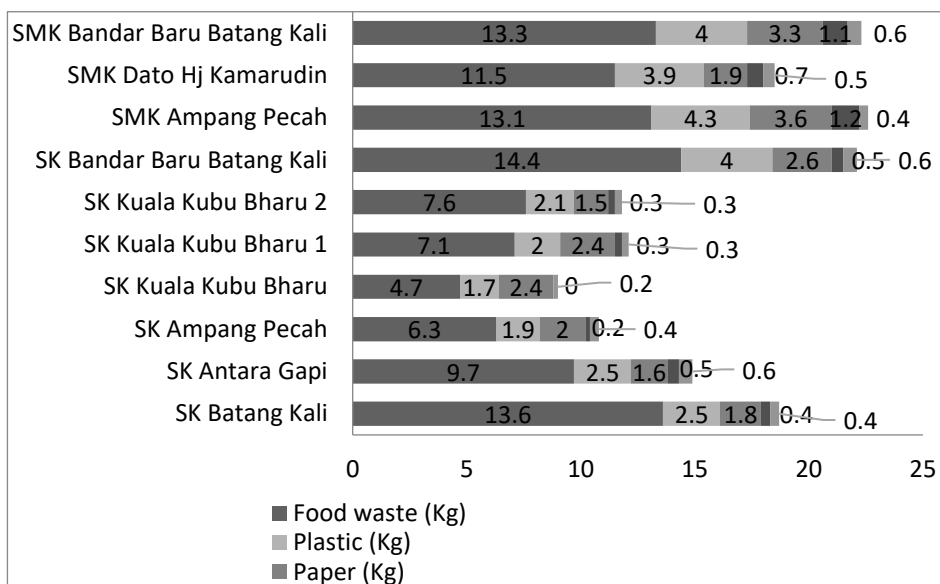
Figure 3 Total solid waste generation in each school canteen per day
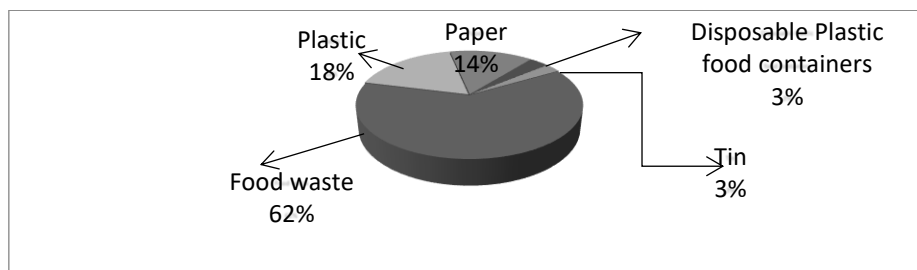
Figure 4 Percentage of solid waste generation in each school canteen per day

Waste Per Capita

The waste per capita for each school is presented in Figure 5. This finding shows a higher waste per capita in the primary schools compared to the secondary schools. Specifically, SK Kuala Kubu Bahru 2 produced the highest waste per

capita (39.7 g per capita per day) followed by SK Kuala Kubu Bahru 1 (33.8 g per capita per day). SMK Bandar Baru Batang Kali indicated the lowest waste per capita (12.6 g per person per day). In summary, waste generation at school canteens in this study is still lower as compared to school canteens from other countries. This is probably due to the limited number of sample size in our study. However, solid waste generation is skyrocketing as the number of students' increase.
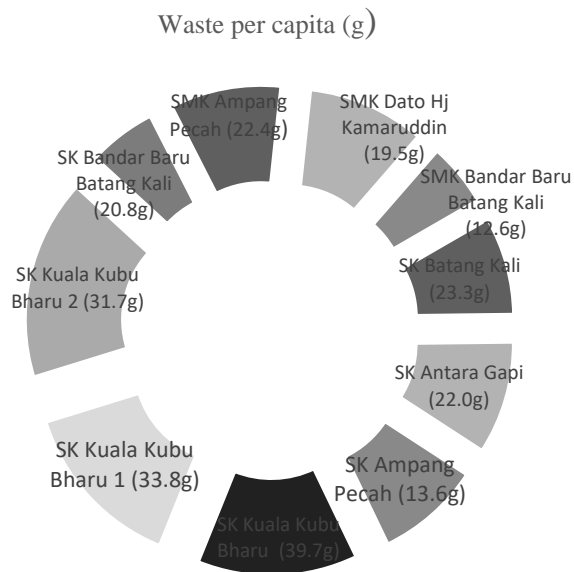

Figure 5 Waste per capita

Assumption of Economic Valuation for Recycling Solid Waste
Table 2 shows that the price of solid waste collected for recycling. The rate was obtained from the 2016 data published by Alam Flora Sdn Bhd. As the price of tin cans for recycling is about RM 3.00 per kilogram, they can generate potential revenue of RM 12.90 per day, while the recycling of mixed paper can generate up to RM4.16 per day. Moreover, the value of recycling for each kilogram of plastic and disposable plastic food containers is RM 0.40, and it could generate the potential revenue of RM13.64 per day. Sending solid waste to the nearest recycling market could generate potential revenue from solid waste recycling to provide additional income for the school community.

Table 2 Price of solid waste for recycling collected and potential revenue per day

Type of solid waste	Average Price (RM/Kg)	Total solid waste generation (Kg)	Potential revenue per day
Tin	3.00	4.3	12.90
Mix Paper	0.18	23.1	4.16
Plastic/ disposable plastic food containers	0.40	34.1	13.64
Total			30.70

Note: Market price set by from Alam Flora Sdn Bhd. (2016)

DISCUSSION

Although solid waste seems to be a common problem in the hospitality sector, including at the schools' level in both developed and developing countries, it is challenging to find a 'quick fix' solution for the precise scale of the problem. Thus, holistic and efficient waste management at the school level requires reliable and accurate data on solid waste generation and composition. While quantifying of solid waste is a challenging task, it is crucial to gain a better understanding of the sources of solid waste generation and to identify hotspots and strategies to optimize waste reduction. In the present study, solid waste was quantified with transparency at the school level by adopting a direct weighing solid waste method to get reliable and accurate information of solid waste generated. This method was used in similar past works (Miezah, Obiri-Danso, Kádár, Fei-Baffoe, & Mensah, 2015; Taghipour, Amjad, Aslani, Armanfar, & Dehghanzadeh, 2016). In this light, to the best of our knowledge, this study is one of the first study to conduct first-hand data collection based on solid waste generation in Malaysian schools. Even though the finding of this study is not the representative of estimation for the whole domestic solid waste produced by all schools, but it is useful to adopt a precise scale to collect data throughout a short quantification period to address the solid waste problem at school level in Malaysia. On the other hand, it is important to note that just like other single case studies, there are some limitations, for instance, this study did not include the solid waste generated in the other places at the school (e.g. classrooms, administration office, laboratories, libraries and playground field) and the quantification process is limited to the canteen at the school. Nevertheless, previous studies analysing the whole solid waste generation process at the school (Rada et al., 2016).

It was observed that almost all solid waste was thrown away in the trash bins during the day and later it was sent at the landfill by the contractor. The waste generation and composition analysis have revealed that the food commodities end up being disposed in relatively larger quantities, compared to the other solid waste. In this study, food waste accounted for 62.22 per cent of the total waste. This information could benefit the school community as it provides information on the most waste being wasted to create a significant foundation for focused waste reduction strategies and efforts. Besides that, the total generation of solid waste is higher during 'after the consumption' stage compared to the total of FW generation 'food preparation' stage. Usually, the amount of solid waste generated

depends on the population of students and teacher in the schools. However, the results highlight that the generation of solid waste at the school level is not only related to the number of students and teachers but also the waste management that is carried out and intention of reduce waste among the students and teachers. For example, SMK Ampang Pecah generates the highest amount of solid waste (22.6 kg per day) compared to the SMK Bandar Baru Batang Kali (22.3 kg per day) which has a higher number of the school population (1659 students and 113 teachers).

The waste per capita analysis conducted in this study provides a benchmarking tool for waste generation quantification in the school canteen. It would be in the interest of the food service or canteen operators to conduct regular waste audits because the quantification of solid waste can help to improve waste management and subsequently, waste generation. The results of the study show that the average solid waste in schools is 19.6 g per capita per day and food waste are most commonly wasted, while other types of solid waste represent the minor waste. This discrepancy of waste per capita may arise from different food consumption pattern and waste management among the school community.

The issues related to waste will continue if wastes are still considered as non-valuable resources (Saraswathy Kasavan, 2017). This view needs to be changed, as waste has a economic value through changes in management system from land-filling to recovery of waste particularly on the recycling of solid waste. Changing the students' and teacher' perception is crucial where they should know that turning waste into valuable resources will reduce the dependency of the ecosystem as the space for waste disposal and also non-renewable natural resources. In terms of solid waste at schools, students may have the only superficial impact of waste on the environmental problem and do not clearly understand that sending waste to landfills will generate economic losses. This case study also demonstrates the assumption of economic valuation of solid waste for recycling, which rises the motivation towards reducing solid waste by applying the hierarchy of sustainable waste management, particularly on the recycling of solid waste.

CONCLUSION

This study presents a case study of schools in Hulu Selangor, Malaysia to identify of the current status of solid waste generated by the ten school's canteens Although many case studies of separation and recycling programs have involved primary and secondary school as samples (Liao, 2019; Rada et al., 2016), to the best of our knowledge, the transparency of solid waste quantification at school has not been studied in Malaysia. Based on the result gathered, the quantity of solid waste produced at the school canteen during the food preparation stage is about 76.8 kg/day, while after consumption stage is about 86 kg/day. In summary, the total quantity of solid waste generated in 10 school canteens is about 162.8

kg/day. Although the waste per capita is not significantly high, it is important to measure it to find new ways of developing management strategies for waste reduction in their food service business operation. The total assumption for the economic value of solid waste per day for recycling at all 10 school canteens is about RM 30.70, which shows that recycling materials has a high revenue potential as well as economic benefits.

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INDICATORS OF OPEN SPACE QUALITY FOR CHILDREN IN HIGH-DENSITY SETTLEMENTS

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Abstract

Open spaces are essential for city sustainability because they offer various functions. One of the benefits of open spaces is their use as outdoor space for physical activities or as learning areas for children. The purpose of this paper is to identify the indicators to measure and define open spaces appropriate for children in urban high-density settlements. This study was conducted in the peri-urban area of Tembalang, Semarang, Indonesia. In order to determine appropriate indicators, this study made use of environmental characteristics as indicators. The result showed that security, safety, comfort, and accessibility were essential factors of appropriate open spaces for children in urban high-density settlements. The contribution of this paper is to promote the importance of open space for children's activities.

Keywords: open space quality; indicators; children; high density settlements

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INTRODUCTION
Open space is an area or territory that accommodates human outdoor activities and are among the many fetures attached to neighbourhoods, cities or any other types of human settlements. Therefore, it has direct influence towards the inhabitants; physical, psychology and emotional well being (Mirsa, 2012). The elements of an open space include streets, parks and areas in between buildings which are essential in human interactions and urban sustainability (Omar, Ibrahim, & Mohammad, 2015).

It is suggested by Abbasi, Alalouch, & Bramley (2016), that the quality of open space is related to income level. Poor quality open spaces can be noticed in settlements of those with low income. People with very low income tend to live in areas that are unplanned, overcrowded and squalid. In many cases, proper open spaces are not provided in low-income areas.

Open spaces function as activity and learning areas for children. According to Joga (2013), a city must fulfil the needs of its inhabitants, which include the needs of the children. The availability of open spaces is decreasing in proportion due to other human needs supplied through shopping malls and commercial buildings. Residential needs increase as population increases. In addition, the rural to urban migration also contributes to the rising of residential needs. Thus, resulting in landuse changes from non-constructed landuse to overcrowding settlements.

One of the many issues in the densely populated settlements is the narrow open spaces. Children living in these types of settlements ended up using immediate open spaces available to them, such as streets and terraces for their activities. Prior study suggested that sidewalks and streets are used as open space for children's activities (Carr, 1992). These are however, sidewalks and streets are unplanned open spaces, hence the lack of quality and appropriateness. This paper therefore aims to recommend the indicators of quality and appropriate open spaces applicable to high-density settlements, particularly to the peri-urban areas.

INDICATORS IN DETERMINING THE QUALITY OF OPEN SPACE FOR CHILDREN
Based on previous studies, the indicators determining the quality of open space for children are summarised in Table 1. The indicators are used to assess the case study in Tembalang, Semarang, Indonesia.

**Table 1** Open Space Quality Indicators

Variables	Summary/Explanation	Indicators
Security	Security in open spaces means to secure the children from any harm such as accidents, trafficking, and other crimes. Security determinants include (i) the distance from the settlement to the open space ≤ 200 m, (ii) absence of physical limitations that limit the view of the parents to open spaces, (iii) absence of perpetrators threatening children's' safety, and (iv) distance to the environmental activity center ≤ 100 m (Moore, 1992 in Dewi, 2010; Osman etc.all ,2017). Security features should not expose children to crime-prone avenues such as drug trafficking (Veugelers, Sithole, Zhang, & Muhajarine, 2008 in Zhang & Lin, 2010; Carr, 1992; Alraouf, 2008).	• Absence of barriers limiting parents' view of the space • Absence of perpetrators threatening children's' child safety • Distance from settlement to open space ≤ 200 m • Distance to environmental activity center ≤ 100 m
Safety	Safety in open spaces means not to endanger the children. Safety determinants are (i) the distance from vehicles passing by > 5 m, (ii) absence of sharp borders, (iii) absence of steep/sloping dirt, (iv) absence of risky tools (Moore, 1992 in Dewi, 2010). Traffic safety is the most alarming issue for parents. Parents tend to restrict their children from playing in the open spaces due to lack of traffic safety (Panter, Jones, van Sluijs, & Griffin, 2010; Puglisi, Okely, Pearson, & Vialle, 2010 in Zhang & Lin, 2010; Alraouf, 2008). Parents also need to pay attention to things that might injure the children such as sharp items or broken glasss (Carr, 1992).	• Absence of sharp boarders • Absence of steep slopes of land • Absence of tools risking children's safety • Distance from passing vehivles > 5 m
Comfort	Comfort determinants include (i) absence of scattered rubbish, (ii) availability of trash can and shady trees, and (iii) absence of vehicles that take up too much of the open spaces (Moore, 1992 in Dewi, 2010). A comfortable environment should demonstrate aesthetics relating to quality home exteriors, such as a garden or greeneries free of vandalism (Saelens et al., 2003; Zhang & Lin, 2010).	• Absence of cars taking up the open spaces • Absence of scattered litter • Availability of seating areas • Availability of trash cans • Availability of shady areas
Accessibility	Open spaces should be free of high walls or barriers with a height of more than 150 cm enclosing the area. The open spaces should not be located across or along rivers/gullies/highways and in pedestrian paths next to vehicular lanes (Moore, 1992 in Goddess, 2010). A good accessibility offers opportunity to walk instead of driving. High walkability area allows children to walk, run and cycle in the open spaces. (Holt et al., 2008; Holt et al., 2009 in Zhang & Lin, 2010).	• Not located across or along the river/gullies/highways • Availability of pedestrian paths along vehicular lanes • Absence of high walls or barriers with a height of more than 150 cm enclosing the area

METHOD

The selected case study is a high-density settlement located in Tembalang, Semarang, Indonesia. The field study began with identifying open spaces in the settlement. Observations were conducted via walking through the neighbourhoods after school hours. The environmental characteristics of the neighbourhoods were gathered via observations made after school hours.

Case Study: Tembalang as a High-Density Settlement
The field study was conducted in Tembalang, Semarang. Tembalang is a peri-urban area in Semarang City, which covers four villages located in the Districts of Banyumanik and Tembalang. Based on the Central Bureau of Statistics (BPS) in Semarang, the population in Tembalang in 2015 amounted to 35,866, covering an area of 922 hectares, resulting in a population density of 36.15 persons/ha. One limitation is that, eventhough Tembalang is reported as an area of low density (Ministry of Public Works, 2004) the population density calculation showed something different. This could be done to the in and out movement of sections of the population, for education purposes.
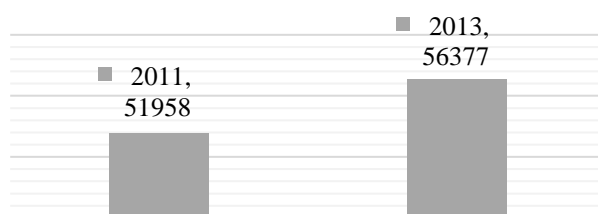
Figure 1 The number of migrants entering Tembalang area
Source: The Central Bureau of Statistic in Semarang, 2013

    i.   The number of populations recorded cannot represent the actual population as the Tembalang is an academic area, hence the migration rate is very high. Based on the Central Bureau of Statistics (2013), the number of migrants in 2013 was 56,377 consisting of students and employees of academic institutions. The number had increased from 51,958 in the year 2011 (refer to Figure 1).

    ii.   Boarding houses had increasingly dominated Tembalang. Residents of boarding houses were students and employees of academic institutions. On average, one boarding house was occupied by 10 to 25 residents.

    iii.   The calculated area did not cover the area of the settlement, instead it merely covered the administrative area.

Based on these limitations, re-calculation was done by (i) identifying the number of boarding houses, (ii) using the assumption that each boarding house was occupied by 25 residents, and (iii) using the area of the settlement instead of the administrative area as the basis for re-calculation. The re-calculation revealed that the population density in Tembalang was 209.17 persons/ha. Such density was considered as high density (refer to Figure 2) based on Standard National Indonesia (Ministry of Public Works, 2004).

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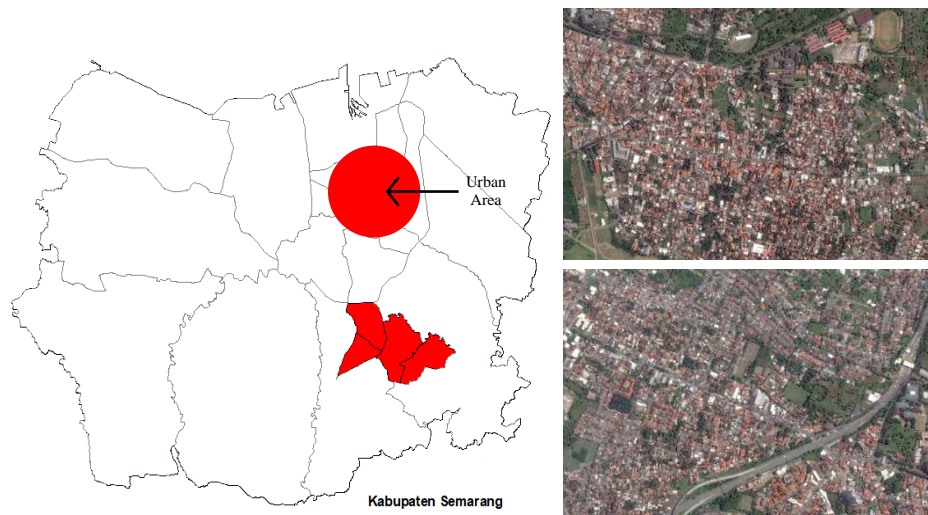
Figure 2 Tembalang Area Map and Aerial Images
Source: Bappeda (the City Development Planning Agency) Semarang, 2011 and Google Earth

Identifying Characteristics of Open Spaces in Tembalang

The characteristics of open spaces used by children in Tembalang were streets, fields and yard. Streets used by children were usually the local streets or alleys that were hardly used as roads for vehicles. Children were often seen in open spaces with proximity of 50 - 100 meters from their homes. Carr (1992) stated that the roads can be used as a place of activity for children. Previous studies also suggested that local streets and alleys are the places most often used by children (Ekawati, 2014).

Characteristics of children in the open spaces include children aged 6-12 years old. According to Santrock (2012), 6 to 12 years of age are considered the middle and late childhood. That is, they are more independent than the early childhood and are more often seen in open spaces. Childrens activities in the open spaces in Tembalang were usually physical acitivities with peers, such as sports and recreation. These activities were seen in the afternoon and after school. According to ekawati (2014), there is a difference in activities led by children in local streets and alleys. In local streets, the children usually participate in rigorous activities, while in the alleys, the children tend to have passive activities. The types of activities were attributed to the size of the streets. Local streets have a larger width than the alleys, hence encouraging more activities.

Figure 3 Activities Open Spaces: Gondang and Baskoro Streets and Facing Houses

VALIDATION OF OPEN SPACE QUALITY INDICATORS IN HIGH-DENSITY SETTLEMENTS (CASE STUDY TEMBALANG AREA)

Based on the theory and the observation, the indicators of quality open space were validated. These indicators can be used to determine ideal residential areas. This study assessed the conditions in Tembalang using the indicators. Tembalang consists of planned and unplanned settlements. Planned settlements refers to housing built by the developers. The majority of settlements in Tembalang is unplanned settlements. As mentioned earlier, Tembalang is a dense residential area due to a high migration rate. Although Tembalang has a considerably large non-built up area, it is a protected area. Additionally, the land in Tembalang is gently undulating, hence some areas could not be built on. Majority settlements in Tembalang consists of vertical residence and houses are built closely to one another. Based on the described characteristics, it is therefore possible to determine the indicators for quality open spaces.

Figure 4 The Condition of Unplanned Settlements in Tembalang: Students Boarding Houses (Two or More Storeys) and Family Houses

Table 2 indicates the list of indicators and the explanation of the quality open spaces in the high-density settlement.

Table 2 Open Space Quality Indicators in High-Density Settlements

Variables	Indicators	Appro-priate	Notes
Security	There are no physical limitations that limit the views of parents to open spaces	x	The majority of children had the activities in the streets of the neighborhood or alleys surrounded by houses with high fences, .
	There are no people who threaten child safety	v	-
	Distance from settlement to open space ≤ 200 m	v	-
	Distance to the neighborhood activity center ≤ 100 m	x	The distance between neighborhood activity centers is more than 100 meters due to the high density settlements
Safety	There are no sharp wire bars	v	-
	There are no steep slopes (of land)	v	-
	No game tool is at risk for the safety of children.	v	-
	Distance from passing vehicles > 5 m	x	The majority of children in Tembelang did their activities on the streets and across the roads used by passing vehicle.
Comfort	Not used for vehicular parking	x	Open space in the Tembalang is widely used as a vehicular parking used by residents and non-residents.
	No garbage scattered	v	-
	Seats available	v	-
	Available trash cans	V	-
	Available shade trees.	x	Not all residential areas have shady trees. There are also areas where there are no shady trees. However, it can be replaced by shadows of nearby buildings that can provide shade.
Accessibility	Not located across or along the river/gullies/ highways	x	The majority of open space for children is across the streets and on the streets.
	Pedestrian paths are separated from vehicular lanes.	x	All the streets in the area of Tembalang are passable for vehicles.
	The location is not enclosed by high walls/ barriers with a height of more than 150 cm	v	-

CONCLUSION

This study investigated the environmental characteristics specifically the characteristics of open spaces that influence children's activities. Children's activities depend on the availability of open spaces in the neighborhoods. Environmental characteristics such as street patterns, land use, and population density shape children's activities. Indicators of quality open space used in this study were based on Western literatures. For the purpose of this study, appropriate adjustments were done in order for the indicators to suit Asian living conditions. Planners should develop more indicators of quality open spaces to promote children's well being within conducive neighborhood designs in an effort to achieve better living standards.

ACKNOWLEDGEMENT

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CRITICAL STRATEGIES FOR CONSTRUCTION PLAYERS IN THE ADOPTION OF BIOPHILIC CITY CONCEPT IN MALAYSIA

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Abstract

Around 2.5 billion individuals will be living in urban areas by 2050. Two out of three individuals are going to live in urban communities or other urban focuses, featuring sustainable urban planning and public services. A biophilic city concept which is a sister term of the green city innately affiliates human being to other living organisms. Apart from adhering to human needs, the concept is the economical among other green city concepts. However, biophilic city concept is still an alien term to construction players and the public. The paper aims to propose and evaluate the critical strategies for construction players in the adoption of the biophilic city concept in Malaysia. 173 respondents consisting of government agencies, developers, consultants and contractors were involved in a questionnaire survey. 81 out of 107 strategies were accepted as the critical strategies in adopting the biophilic city concept. Among the strongest strategies are (1) effective water conservation in biophilic city project; (2) acknowledging biophilic city concept adoption publicly; and (3) adequate material resource availability for the biophilic city project. These strategies fall under three different items, namely; (1) sustainability in the biophilic city project; (2) awards and recognition for biophilic city concept adoption; and (3) organisation in the biophilic city project, respectively. Commitment of all construction players are crucial crucial towards inclusive, sustainable urban planning and public services.

Keyword: Biophilic City Concept, Construction Players, Critical Strategies, Malaysia.

INTRODUCTION

The expected total population for 2030 is 8.5 billion. The population might skyrocket to 9.7 billion in 2050 and 11.2 billion by 2100 (United Nations, 2015). Currently, Malaysia is one of the most urbanised countries in East Asia (Rasli *et al.,* 2019). The developments of townships and new cities are urgently needed to fulfil the basic need of human beings, such as shelter and protection. Unfortunately, townships developments are always associated with harming living organisms (Love *et al.,* 2016). The 11th Sustainable Goal 11, established by the United Nations (UN) focuses on sustainable cities and communities (Waage *et al.,* 2015). A significant number of researchers and government entities from federal and state government, developers and consultants have proposed the new adoption of eco-friendly construction projects. In Malaysia, these projects are in line with the 11th Malaysian Plan (11MP) and Malaysia Baru Strategic Thrust of pursuing green growth for sustainability and resilience by embracing rakyat's environmental-friendly habits and behaviour (EPU, 2015).

This paper proposes the adoption of a biophilic concept into construction projects (i) to respond to the rapid increase in urban population and (ii) to reduce the negative effects of construction projects to other living organisms. The term biophilic was originally taken from the word biophilia that is defined as the inherent of human inclination to natural systems and processes (Xue *et al.,* 2019) by urging the humans to innately affiliate with other living organisms (Wilson, 1986). There exist many contributing factors faced by government entities, developers, consultants, contractors as well as end-users to the failure in biophilic concept adoption (Arof et al., 2020). These factors need to be prevented, monitored and managed. Therefore, this paper aims to propose and evaluate the critical strategies for uptake by construction players in the adoption of a biophilic city concept in Malaysia.

LITERATURE REVIEW

Biophilia is the absolute human tendency to seek connection with nature or other form of life. Even in the advanced world, biophilia continues to be fundamental to the physical and psychological well-being (Wilson 1986: Kellert & Wilson 1993: Kellert 2012; Kellert & Calabrese, 2015). Biophilia acknowledges that human species has advanced with more than 99% of its history in adaptive response to the natural world and not due to artificial forces. The term biophilic which was originally rooted from the word biophilia emerged and later popularised by Harvard myrmecologist and sociobiologist, Edward O. Wilson (Beatley and Newman, 2013). Wilson (1986) defines biophilic as the innate emotional affiliation of human beings to other living organisms as a part of natural cycle. The adoption of biophilic into city development means humans as city inhabitants can interact spontaneously with other living organisms.

This study has conducted a systematic literature review on (i) the general strategies of adopting green construction, and (ii) the strategies in adopting biophilic city concept in construction project.

Based on the systematic review, 107 strategies were identified for uptake by construction players in the adoption of green construction projects. The general strategies for a successful adoption of green construction project are categorized under ten (10) items, namely: (1) government regulation and standards; (2) incentives and research and development (R&D) support; (3) awareness and publicity programmes; (4) education and information dissemination; (5) awards and recognition; (6) project; (7) project team; (8) organisation; (9) external environment; and (10) sustainability (Shi *et al*., 2013: Darko *et al.,* 2017: Mavi and Standing, 2018: Darko and Chan, 2018; Zhang *et al.,* 2019; Oke *et al.,* 2019; Zhang *et al.,* 2019: Li *et al.,* 2019: Darko *et al.,* 2019: Yas and Jaafer, 2020).

In reference to the 107 identified strategies, the most frequently appeared item in previous studies is the 'government regulation and standards', which consists of nine strategies: (1) mandatory policies of green construction project; (2) mandatory regulations for green construction project; (3) availability of competent promotion teams for green construction project; (4) good enforcement of green construction project policies; (5) good enforcement of green construction project policies; (6) green construction project labelling programs; (7) availability of competent local authorities in green construction project; (8) availability of proactive promotion teams for green construction project; and (9) availability of proactive local authorities in green construction project. The second most frequently appeared item is 'incentives and R&D support' which include eight strategies: (1) financial incentives for green construction project adoption; (2) further market-based incentives for green construction project adoption; (3) low-cost loans from the government for green construction project; (4) low-cost subsidies from the government for green construction project; (5) low-cost loans from financial institutions for green construction project; (6) low-cost subsidies from financial institutions for green construction project; (7) strengthened green construction project R&D; and (8) tax reduction for green construction project.

Additionally, the third most frequently appeared item is 'awareness and publicity programmes' consisting of three strategies: (1) support from executive management in green construction project; (2) public environmental awareness creation through workshops, seminars and conferences for green construction project; and (3) more publicity through media (namely print media, radio, television, and internet) for green construction project). The fourth most frequently appeared item is 'education and information dissemination' that consists of five strategies: (1) green construction project-related educational and training programmes for developers, contractors and policymakers; (2)

availability of institutional framework for effective green construction project adoption; (3) innovation technology in green construction project; (4) availability of better information on the cost of green construction project; and (5) availability of better information on the benefits of green construction project. "Awards and recognition" is the fifth most frequently appeared item, covering four strategies: (1) more green construction project adoption advocacy by the federal government agencies; (2) more green construction project adoption advocacy by the state government agencies; (3) acknowledging green construction project adopters publicly; and (4) rewarding green construction project adopters publicly.

The item "project" is the sixth most frequently appeared item that include 13 strategies, which also appears as the third item with most strategies: (1) cost-effectiveness in green construction project; (2) proper knowledge management (KM) practices in green construction project; (3) green construction project met planned quality standard; (4) long commissioning and turning period of green construction project; (5) agile processes for green construction project; (6) minimal scope change in green construction project; (7) green construction project's alignment with corporate strategy; (8) clear goals and objectives of green construction project; (9) reasonable size of green construction project; (10) reasonable complexity level of green construction project; (11)low environmental impact on green construction project; (12) urgency of green construction project; and (13) good project delivery system for green construction).

The second most item with strategies appeared in previous studies is "project team", which is also placed at the seventh rank of the most frequently appeared item. Project team consists of 17 strategies: (1) competent project manager in green construction project; (2) motivated team in green construction project; (3) a global commitment in green construction project; (4) effective consultation with key stakeholders of green construction project; (5) effective consultation with key beneficiaries of green construction project; (6) competent designers in green construction project; (7) high owner's commitment to the green construction project; (8) proper green construction project life-cycle management processes; (9) proper risk management in green construction project; (10) well-integrated team in green construction project; (11) competent team procument in green construction project; (12) good project manager's performance in green construction project; (13) high owner's involvement in green construction project; (14) proper liability management in green construction project; (15) effective green construction project planning methods; (16) effective green construction project scheduling methods; and (17) effective green construction project control).

'Organisation' is item with the most strategies and ranked as the eighth most frequently appeared item by the previous studies. Organisation covers :(1)

experienced workers in green construction project; (2) skilled level of workers in green construction project; (3) board community support for green construction project; (4) full top management support for green construction project; (5) good cooperation between stakeholders in green construction project; (6) active stakeholders involvement in green construction project; (7) adequate finance resource availability for green construction project; (8) adequate material resource availability for green construction project; (9) skilled facilities management team in green construction project; (10) good relationship with stakeholders in green construction project; (11) trust among stakeholders in green construction project; (12) good communication with stakeholders in green construction project; (13) full sponsor support for green construction project; (14) maintenance of skills over time for staff retention in green construction project; (15) high awareness workers in green construction project; (16) proper green construction project's site/workplace environment; (17) accurate time control system in green construction project; (18) accurate time feedback system in green construction project; (19) adequate labor resource availability for green construction project; (20) continuous performance measurement for green construction project; (21) thorough technical understanding of green construction project; (22) thorough technical capability of green construction project; (23) lessons learned from previous project and applied to green construction future projects; (24) proper organisational structure in green construction project; (25) dedicated department for sustainability in green construction project; and (26) organisational maturity level in green construction project.

The ninth most frequently appeared item by the previous studies is 'external environment' which include nine stratergies: (1) parties awareness in environmental issues; (2) parties awareness in environmental-related legislation; (3) stakeholder expectations in green construction project; (4) end-user imposed restrictions in green construction project; (5) sufficient market availability for green construction project; (6) adequate number subcontractors for green construction project; (7) adequate financial conditions of subcontractors for green construction project; (8) promote in achieving national profile green construction project; and (9) political stability in green construction project).

Finally, the tenth most frequently appeared item and the least cited item in the previous study is 'sustainability'. Sustainability encompasses 12 strategies: (1) effective energy consumption for green construction project; (2) effective water conservation for green construction project; (3) proper recycling management for green construction project; (4) proper waste management for green construction project; (5) usage of recycled material in green construction project; (6) low noise pollution during the green construction project; (7) optimising cost of construction in green construction project; (8) offering fair public comfort in green construction project; (9) offering fair public health and safety in green construction project; (10) usage of reusable material in green

construction project; (11) offering basic public utility in green construction project; and (12) offering fair users' security in green construction project.

The identified strategies were adopted and used to propose the critical strategies for uptake by construction players in the adoption of biophilic city concepts in Malaysia via a questionnaire survey.

METHODOLOGY
The methods used in this study were systematic literature review and questionnaire survey. A systematic literature review was the secondary data collection method that identifies, selects and critically appraises previous research (Dewey and Drahota, 2016). The method was conducted over multiple databases and grey literature on strategies for uptake by construction players in the successful adoption of (i) green construction project in general and (ii) biophilic city concept. The data from previous research were arranged based on its importance. The importance was gauged in relation to the number of mentions in the previous research.

The questionnaire survey was used to collect primary data. The survey was designed based on the systematic literature review. The minimum Cronbach's alpha value of 0.7 (specifically 0.99 with 17 subject matter experts view) as recommended by Nunnally (1967) was applied in pilot study to select questionnaire items for the actual survey. The questionnaire survey was distributed to 173 construction players involved in the design and planning of Malaysia cities. The respondents consist of government agencies (40 respondents at 23%), developers (3 respondents at 2%), consultants (78 respondents at 45%) and contractors (52 respondents at 30%). 62% of the respondents had working experiences of more than 5 years. 30% of the respondents had been involved in four (4) to ten (10) green construction projects in Malaysia. Data analysis was undertaken using the method of relative importance index (RII). Based on RII, the critical strategies were arranged based on their importance, following the study by Arof *et al*. (2018). In addition, the strategies were considered important when the RII value equal to or exceed more than 80.00 based on Rooshdi *et al.* (2018). On the contrary, the strategies were considered unimportant and irrelevant if the RII value was less than 70 (Hair *et al*., 1998).

RESULT AND DISCUSSION
The analysis examined 107 strategies, where 81 were accepted, 26 were eliminated and 3 strategies were considered critical. The eliminated strategies were: (1) optimising cost of construction in biophilic city projects; and (2) usage of recycled material in biophilic city projects under sustainability in biophilic city projects. One strategy under each of 'awards and recognition for biophilic city concept adoption' and 'biophilic city project' were eliminated, namely more

biophilic city concept adoption advocacy by federal government agencies and urgency of biophilic city project adoption, respectively.

Furthermore, under 'incentives and R&D support for biophilic city concept adoption', four strategies were identified as irrelevant and were eliminated, namely: (1) financial incentives for biophilic city concept adoption; (2) low-cost loans from the government for biophilic city concept adoption; (3) low-cost subsidies from financial institutions for biophilic city concept adoption; and (4) tax reduction for biophilic city concept adoption. Three strategies were also eliminated and considered irrelevant under government regulation and standards for biophilic city concept. The three eliminated strategies were: (1) availability of proactive local authorities in biophilic city concept adoption; (2) good enforcement practice in biophilic city concept adoption; and (3) availability of competent local authorities in biophilic city concept adoption.

In addition, eight strategies were eliminated under 'organisation in biophilic city project', which made it the item with the most eliminated strategies. The eliminated strategies were: (1) adequate finance resource availability for biophilic city project; (2) experienced workers in biophilic city project; (3) accurate time control system in biophilic city project; (4) thorough technical understanding of biophilic city project; (5) good relationship with stakeholders in biophilic city project; (6) full sponsor support in biophilic city project; (7) skilled facilities management team in biophilic city project; and (8) maintenance of skills over time for staff retention in biophilic city project. Finally, seven strategies under 'project team in biophilic city project' were eliminated. The eliminated strategies were: (1) effective biophilic city project planning methods; (2) good project manager's performance in biophilic city project; (3) global commitment in biophilic city project; (4) high owner's involvement in biophilic city project; (5) motivated team in biophilic city project; (6) proper liability management in biophilic city project; and (7) effective biophilic city project control.

Table 1 illustrates the findings of the study on critical strategies for uptake by construction players in the adoption of a biophilic city concept in Malaysia. As shown in Table 1, the most critical item was the 'external environment influence in biophilic city project adoption'. Malaysian construction players believed that the adoption of biophilic city concept can be done by (i) promoting the achievement of national profile for biophilic city projects, (ii) having an adequate number of subcontracts for biophilic city project and (iii) enhancing awareness in environmental-related legislation. Only three strategies were considered as critical with RII value exceeding 80.00, namely: (1) effective water conservation in biophilic city project; (2) acknowledging biophilic city concept adoption publicly; and (3) adequate material resource availability for biophilic city project. These strategies were under three different items namely; (1) 'sustainability in the biophilic city project', (2) 'awards and recognition for

biophilic city concept adoption', and (3) 'organisation in the biophilic city project', respectively.

Table 1 Critical strategies for construction players in the adoption of biophilic city concept in Malaysia

External environment influence in biophilic city project adoption	RII	Rank	Ave RII	Ave Rank
Promote achievement of national profile for biophilic city project	79.77	1		
Adequate number of subcontracts for biophilic city project	78.73	2		
Parties awareness in environmental-related legislation	78.27	3		
Political stability in biophilic city project	76.07	4		
Sufficient market availability for biophilic city project	75.61	5	76.10	1
Parties awareness in environmental issues	74.91	6		
Adequate financial conditions of subcontracts for biophilic city project	74.68	7		
Stakeholder expectations in biophilic city project	73.99	8		
End-user imposed restrictions in biophilic city project	72.83	9		

Awareness and publicity programmes for biophilic city concept adoption	RII	Rank	Ave RII	Ave Rank
More publicity through media (e.g. print media, radio, television, and internet) for biophilic city concept	76.07	1		
Support from executive management in biophilic city concept adoption	74.91	2	74.57	2
Public awareness creation through workshops, seminars and conferences for biophilic city concept	72.72	3		

Sustainability in biophilic city project	RII	Rank	Ave RII	Ave Rank
Effective water conservation in biophilic city project	83.70	1		
Effective energy consumption in biophilic city project	77.57	2		
Proper waste management in biophilic city project	75.84	3		
Offering basic public utility in biophilic city project	74.91	4		
Low noise pollution during the construction of biophilic city project	75.61	4	74.06	3
Proper recycling management in biophilic city project	74.91	5		
Usage of reusable material in biophilic city project	73.64	6		
Offering fair users' security in biophilic city project	72.25	7		
Offering fair public comfort in biophilic city project	71.91	8		
Offering fair public health and safety in biophilic city project	70.17	9		

Awards and recognition for biophilic city concept adoption	RII	Rank	Ave RII	Ave Rank
Acknowledging biophilic city concept adoption publicly	81.04	1		
Rewarding biophilic city concept adoption publicly	73.29	2		
More biophilic city concept adoption advocacy by state government agencies	71.79	3	73.90	4
Low-cost subsidies from the government for biophilic city concept adoption	73.06	2		
Low-cost loans from financial institutions for biophilic city concept adoption	71.79	3		
Strengthened biophilic city concept R&D	70.52	4		

***RII = relative importance index; Ave RII = average relative importance index; Ave Rank = average rank

Table 1 Critical strategies for construction players in the adoption of biophilic city concept in Malaysia (cont'd)

Biophilic city project	RII	Rank	Ave RII	Ave Rank
Low environmental impact on biophilic city project	76.65	1		
Long commissioning and turning period for biophilic city project	76.42	2		
Agile project processes for biophilic city concept adoption	75.95	3		
Clear goals and objectives of biophilic city project	75.95	3		
Proper knowledge management (KM) practices in biophilic city project	75.49	4		
Reasonable complexity level of biophilic city project	73.87	5	73.61	5
Biophilic city concept's alignment with corporate strategy	73.41	6		
Reasonable size of biophilic city project	73.18	7		
Good project delivery system for biophilic city project	72.72	8		
Cost-effectiveness in biophilic city project	71.68	9		
Minimal scope change in biophilic city project	71.33	10		
Biophilic city project met planned quality standard	71.21	11		

Education and information dissemination of biophilic city concept adoption	RII	Rank	Ave RII	Ave Rank
Innervational technology in biophilic city concept implementation	76.42	1		
Biophilic city concept-related educational and training programs for developers, contractors and policymakers	73.99	2		
Availability of institutional framework for effective biophilic city concept adoption	73.99	2	73.32	6
Availability of better information on the cost of biophilic city concept adoption	72.14	3		
Availability of better information on the benefits of biophilic city concept adoption	70.06	4		

Government regulation and standards for biophilic city concept	RII	Rank	Ave RII	Ave Rank
Biophilic city rating programmes	79.42	1		
Biophilic city labelling programmes	77.69	2		
Availability of competent promotion teams for biophilic city concept adoption	76.18	3		
Mandatory policies of biophilic city concept adoption	74.10	4	72.42	7
Availability of proactive promotion teams for biophilic city concept adoption	73.64	5		
Mandatory regulations of biophilic city concept adoption	73.53	6		

Organisation in biophilic city project	RII	Rank	Ave RII	Ave Rank
Adequate material resource availability for the biophilic city project	81.27	1		
Thorough technical capacity of biophilic city project	78.73	2		
Adequate labour resource availability for biophilic city project	75.26	3		
Proper site/workplace environment in biophilic city project	75.14	4		
Trust among stakeholders in biophilic city project	74.80	5		
High awareness workers in biophilic city project	74.45	6		
Lessons learned from other construction project and applied to future projects	74.34	7		
Accurate time feedback system in biophilic city project	73.29	8		
Good communication with stakeholders in biophilic city project	72.95	9		
Organisational maturity level in biophilic city project	72.83	10	71.82	8
Proper organisational structure in biophilic city project	72.72	11		
Good cooperation between stakeholders in biophilic city project	72.49	12		
A dedicated department for sustainability in biophilic city project	72.02	13		
Full top management support in biophilic city project	72.02	13		
Active stakeholders' involvement in biophilic city project	71.91	14		
Continuous performance measurement for biophilic city project	71.10	15		
Board community support for biophilic city project	70.87	16		
Skilled level of workers in biophilic city project	70.52	17		
Thorough technical capability of biophilic city project	70.40	18		

***RII = relative importance index; Ave RII = average relative importance index; Ave Rank = average rank

Table 1 Critical strategies for construction players in the adoption of biophilic city concept in Malaysia (cont'd)

Project team in biophilic city project	RII	Rank	Ave RII	Ave Rank
Effective consultation with key beneficiaries in biophilic city project	78.15	1		
High owner's commitment to biophilic city project	75.26	2		
Proper biophilic city project life-cycle management processes	74.80	3		
Effective biophilic city project scheduling methods	74.57	4		
Proper risk management in biophilic city project	74.57	4	71.70	9
Effective consultation with key stakeholders in biophilic city project	74.22	5		
Competent designers in biophilic city project	73.29	6		
Competent team procurement in biophilic city project	73.29	6		
Competent project manager in biophilic city project	73.17	7		
Well-integrated team in biophilic city project	71.90	8		

Incentives and R&D support for biophilic city concept adoption	RII	Rank	Ave RII	Ave Rank
Further market-based incentives for biophilic city concept adoption	74.68	1		
Low-cost subsidies from the government for biophilic city concept adoption	73.06	2	69.67	10
Low-cost loans from financial institutions for biophilic city concept adoption	71.79	3		
Strengthened biophilic city concept R&D	70.52	4		

***RII = relative importance index; Ave RII = average relative importance index; Ave Rank = average rank

CONCLUSION AND RECOMMENDATION

A total of 173 responses were collected via questionnaire survey, involving respondents of various professional backgrounds (government agencies, developers, consultants and contractors) in green construction projects in Malaysia. Out of 107 proposed strategies, 81 strategies were considered important and relevant while 26 strategies were eliminated.

Three main strategies recommended for uptake by construction players in the adoption of biophilic city concept in Malaysia were: (1) effective water conservation in biophilic city project; (2) acknowledging biophilic city concept adoption publicly; and (3) adequate material resource availability for biophilic city project. These strategies fell under three different items, namely: (1) 'sustainability in the biophilic city project', (2) 'awards and recognition for biophilic city concept adoption', and (3) 'organisation in the biophilic city project' respectively.

The findings emphasized that mutual engagement of all construction players is significantly important to ensure the successful adoption of biophilic city concept in Malaysia. Alongside the full commitment of all construction players, the government's aspiration to pursue green growth for sustainability and resilience by embracing *rakyat's* environmental-friendly habits and behaviours can be successfully achieved.

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