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Program Details

**Tuesday, 4 December 2012**

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Welcoming Message

On behalf of the Organising Committee of the 6th ASEAN Post Graduate Seminar (APGS 2012), it is my greatest pleasure to extend our warmest welcome and invitation to all academicians and practitioners around the world to the APGS 2012 that will be held in Kuala Lumpur, Malaysia, in December 2012. This seminar, organized by the Faculty of Built Environment, University of Malaya, Malaysia will cover a wide range of built environment issues.

Sustainability is a common and important theme in the field of built environment. It is important from the planning and design stage of construction projects to post-construction stage. In order to assist you cope with the increased complexity and needs of comprehensive construction developments, APGS 2012 will bring together national and international frontline thinkers, academics, executives, government and business officials, practitioners and leaders to present and discuss the pivotal role of the key professions in the achievement of comprehensive and sustainable built environment.

Thus, we look forward to welcome you to Kuala Lumpur, a beautiful city with multicultural and ethnic groups, as a participant in APGS 2012.

Au Yong Cheong Peng
Organising Chairman
Faculty of Built Environment, University of Malaya
Malaysia
Organizing Committee

Seminar Advisor
Associate Professor Dr. Sr Azlan Shah Ali

Administrative Advisor
Mr. Mohd Zaaky Nor Rani

Chairman
Au Yong Cheong Peng

Secretary
Kho Mei Ye

Treasurer
Nurshuhada Zainon

Committee Members
Ardalan Aflaki
Esmaeil Negarestan
Nur Farhana Azmi
Shirley Chua Jin Lin
Reviewers

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2) Distinguished Professor Allen J. Scott, University of California, Los Angeles, US
3) Professor Dr. Ismail Rahmat, Universiti Teknologi MARA, Malaysia
4) Professor Dr. Michael Pitt, University College London, UK
5) Professor Low Sui Pheng, National University of Singapore, Singapore
6) Professor Michael L. Riley, Liverpool John Moores University, UK
7) Associate Professor Dr. Sr Adi Irfan Bin Che Ani, National University of Malaysia, Malaysia
8) Associate Professor Dr. Sr Azlan Shah Ali, University of Malaya, Malaysia
9) Associate Professor Dr. Sr Syahrul Nizam Kamaruzzaman, University of Malaya, Malaysia
10) Associate Professor Dr. Anuar Alias, University of Malaya, Malaysia
11) Associate Professor S. P. Rao, University of Malaya, Malaysia
12) Dr. Sr Rodiah Zawawi, University of Malaya, Malaysia
13) Dr. Faizah Ahmad, University of Malaya, Malaysia
14) Dr. Faizul Ali Mohd Rahim, University of Malaya, Malaysia
15) Dr. Norhayati Mahyuddin, University of Malaya, Malaysia
16) Dr. Zakaria Alcheikh Mahmoud Awad, University of Malaya, Malaysia
17) Ms. Raha Sulaiman, University of Malaya, Malaysia
Keynote Speakers

Keynote 1: Moving Away from 'Design-by-Disaster' in Fire Safety towards a Sustainable Built Environment
Dr. Farid Wajdi Bin Akashah

Keynote 2: Planning to Make a (Sustainable) Difference: a Question of Ethical Values
Professor Heather Campbell

Keynote 3: Emerging Cities of the Third Wave
Distinguished Professor Allen J. Scott
### Papers by Sessions

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3) Urban Futures for Brasilia and Kuala Lumpur: A Literature Review about some Creative Experiences in Coping with a Modern Urban Landscape  
4) Model Review and New Residential Land Development Model Construction in Orchard Planting Villages  
5) A Review on Place Attachment Indicators and Characteristic of Places  
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2) Study on Efficiency of Passive Cooling Strategies on Thermal Comfort Attainment within Tropical Climate  
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4) Evaluation of Environmental Sustainable Design Principle in Iranian Primary School  
5) Accordance with Nature, the Secret of Sustainability in Historical Villages of Iran  
6) Green and Sustainable Buildings: Preliminary Research on the Benefits and Barriers |
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2) Factors Affecting Sitting Intention in Open Spaces Based on the Theory of Reasoned Action  
3) The Impacts of Visibility and Accessibility of Workplace Layout on Organizational Productivity as Conducted through Face-to-Face Interactions  
4) Investigate Traditional Models and Elements in the Contemporary Architecture of Iran  
5) Dos Perception of Water Lead Landscape Designers to New Physical Forms? |
| 2B      | 1400–1600 | Construction Technology & Facilities Management | 1) Strength Characteristics of Steel Fibre Reinforced Geopolymer Concrete Composites  
2) Analytical Models for FRP Confined Circular Concrete Columns  
3) Selection of Procurement Method For Building Maintenance Management: A Decision Making Model  
4) A Review of Public Housing Maintenance Issues and Its Impact on Building Quality and Tenants’ Satisfaction  
5) Identifying Key Risks in Building Performance  
6) Facilities Management Strategies: A Preliminary Review |
| 2C      | 1400–1600 | Environmental & Sustainable Design 2 | 1) Household Energy Consumption and Carbon Foot Print in Ibadan City, Nigeria  
2) Making the Switch: Factors Affecting Consumer Preferences for Home Eco-Design Features  
3) The Effect of Project Sustainability Management in Construction Industry Development  
4) Challenges and Conflicts in Post-Disaster Reconstruction in Historic City of Bam, Iran  
5) Reconstruction of Post War Cities through Tourism Development Case Study Khorram-Shahr |
List of Papers in Session 1A

1) Applying the what if? Planning Support System in Determining Future Residential Land Use Allocation
   Abdulrahman Abdulaziz M Majrashi, Dato’ Prof. Dr. Alias Abdullah

2) Social Interaction in Football Stadiums as Urban Public Places
   Farzaneh Asadi Malekjahan, S. Rahman Eghbali

3) Urban Futures for Brasilia and Kuala Lumpur: A Literature Review about some Creative Experiences in Coping with a Modern Urban Landscape
   Luiza Farnese L. Sarayed-Din

4) Model Review and New Residential Land Development Model Construction in Orchard Planting Villages
   Wang Qianyi, Qin Fei

5) A Review on Place Attachment Indicators and Characteristic of Places
   Nur Farhana Azmi

   Azizi Bahauddin
APPLYING THE WHAT IF? PLANNING SUPPORT SYSTEM IN DETERMINING FUTURE RESIDENTIAL LAND USE ALLOCATION

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Abstract
Innovative geographic information systems applications continue enjoy increasing popularity, especially in area of development planning and monitoring. This study aims at exploring in particular the GIS application which serves as a planning support system for determining residential land use allocation. It further explores the application’s use in ensuring safe and convenient locations of residential areas as it produces improved outputs according to the priorities given to parameters during the planning process. GIS applications constitute a valuable improvement in modern planning systems as they simplify the production of plans and shorten the process as compared to the conventional methods. Based on the research objective which is “What if?” 2.0 Planning Support System software is applied to generate several residential land use scenarios. The finding of this research (Planning Support System) PSS “What if?” 2.0 constitute a very useful tool in the effective planning of proper residential land use allocation and determining the suitability of the placement of a land use.

Keywords: planning support system (PSS), what if, GIS, residential land use

1. INTRODUCTION
The significance of Geographical Information Systems (GIS) as the main component of the Planning Support System lies on the fact that spatial information planning and development need to be frequently updated and organized. Han and Kim (1989), argue that the Planning Support System (PSS) and Decision Support System (DSS) combine both urban and regional planning traditional tools with other technologies such as an expert system, Decision Support System, hyper media systems and group Decision Support Systems. Yet, Geographical Information Systems (GIS) are still the core of these systems. Thus, GIS has been applied in planning which vitally include the formulation of plans and development control.

“What if?” as its name indicates does not only precisely intend to predict the future conditions. It is actually an explicit policy-oriented planning tool used to determine what would happen if the policy changes are made and the future assumptions proved to be correct. Klosterman (1999, 2001) described the policy choices considered in the model to include the stages of infrastructure expansion, the zoning ordinance and the implementation of land use plans and the open space program established. He described assumption for the future considered in the model as including future population, trends of employment and predicted development densities.
“What if?” provides future land use patterns projection by balancing the supply of land and the demand for land and its suitability for different uses at different locations. It enables planners to explore alternative visions of future areas by defining alternative land suitability, growth and allocations.

Planning Support System (PSS) has shifted from a conventional method to a modern system. This involves the use of some advancement in technology. This study will focus more on PSS application in order to determining residential land use allocation using “what if?” application. This can assist the planners in understanding suitable area for residential allocation and avoid hazard area.

2. LITERATURE REVIEW

PSS are a type of spatial decision support system specially created to help planners and decision makers in making better decisions about present and future land uses. They focus in offering an evidence-based approach for including socioeconomic and biophysical data to create land use change scenarios. Moreover the role of PSS also include helping in land use and land cover change, comprehensive projections, three-dimensional visualisation, and impact assessment (Klosterman and Pettit 2005). In addition, many PSS are available (Brail and Klosterman 2001; Geertman and Stillwell 2004), which could be categorized as modelling categories such as cellular automata, large-scale urban, rule-based and state-change (Klosterman and Pettit 2005). On the other hand, although there has been a number of PSS developed in the 1990s and 2000s there are still issues in how to bridge the gap between GIS and PSS (Geertman and Stillwell 2004) and a recognized problem in the adoption of PSS tools by planners. The main obstacle in the widespread adoption of PSS in planning is the lack of awareness (Vonk et al. 2005). To distribute knowledge of the planning support systems, real-world example projects of PSS application in planning practice will be crucial’ Vonk et al. (2005, p. 909). Geneletti, D. (2008) argued that the biodiversity issues offen have a highly limited support because of the lack of appropriate or usefull data and suitable planning support system (PSS). He organized the information gathered during the analysis into a PSS represented by a (GIS) with a customised query allowing users to access to layers in the Environmental Impact Assessement (EIA) screening stage.

2.1 Planning Support Systems (PSS)

GIS was created as a research tool and was developed in the 1980s as a significant computer planning support tool (Budic 1994). Despite the fact that GIS are recognised as an powerful planning tool, do not meet the planners needs (Klosterman 1999). Thus, planning support systems (PSS) was introduced to provide a more modified tool, particularly designed for planning purposes. Moreover, ArcGIS’ (Pettit and Pullar 2001) provides planners with an essential knowledge of GIS and the necessary skills to apply GIS and PSS in practice.

Planning Decision Support Systems aiming at projection to some point in the future or estimation of the impacts from some form of developments. Planning Support System (PSS) are geo-information instruments used by planners to provide the needed support to the different aspects of the planning
process such as collecting and organizing the data, diagnosing the planning problems, consulting the stakeholders, generalizing and visualizing the scenarios (Brail and Klosterman, 2001).

The models were categorized by two scopes: technique (modelling approach used to develop the PSS), and task (analytic task). The table lists the four modelling techniques by the order in which they were applied for the first time to the planning process. These are: Large scale urban models, Rule-based models, State-change models and Cellular automata models.

Table 1: Categorization of selected Planning Support systems:

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<td>land-use/land-cover change</td>
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<td>Large scale urban models</td>
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<td>Rule-based models</td>
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<td>State-change models</td>
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<td>Cellular automata models</td>
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Source: Klosterman, R. (2005)

2.2 “What If?” Planning Support System

“What If?” is defined as “a collaborative GIS-based Planning Support System developed by Klosterman (1999), which is supported by What If?”. Petit, C. et al. (2008), stated that what if? PSS have been applied to help the planners to understand more land suitability and the probable impacts of population growth projection. The PSS is a commercial off-the-shelf (COTS) software package not an academically supported planning tool. What If? is a stand-alone software package, developed using ESRI’s MapObjects embeddable mapping and GIS components. Recently, there are a number of applications of What If? (version 1.0) in the United States (Kim 2004; Klosterman et al. 2002, 2006; Li 2003; McClintock and Cutforth 2003; Pettit 2005; Webb 2003). In Australia, What If? (version 1.0) has been applied to help the Shire of Hervey in Queensland to know the effect of projected population growth that contributed to the ‘sea-change’ phenomena intensified by tourism and an aging retiring population (Pettit 2005). The PSS consists mainly of two programs — Setup and What If?. What If? Version 2.0 is an enhanced version of version 1.0. These comprise:

- the ability to project land use as well as population and employment figures
- the ability to handle more number of land use classes and suitability factors that the PSS, and to capture planning ratings and weightings.
- Disaggregated reporting on the projections for sub-areas and the total study area alike.
enhanced cartographic and mapping capability.

What If? needs pre-processing (buffering, union, clean..) of input data layers in order to create a Unified Analysis Zone (UAZ) file, which will be stored in ESRI’s shapefile (*.shp) format. What If? is a PSS developed based on the principle to keep the models simple. It identifies developments that occurred in urban planning. It is a GIS-based PSS created to support collaborative planning and public participation. What If? is also a scenario-based and policy oriented PSS using GIS data to carry out land suitability analysis, land use demands for future projects and then allocate these projected demands to the best suitable locations. It enables planners to create urban growth scenarios for the future and decide the impacts of alternative policy choices on future land use patterns.

3. METHODOLOGY
The Planning decision method has greatly been affected by the evolution of sciences and technology. Two tools namely, Planning Support System (PSS) and Decision Support System (DSS) represent some of the tools used to achieve planning quality in best possible development. In order to conducting the research, a proper methodology needs to adapt. There are four stages which are the initial stage, secondary stage, third stage and the final stage.

The last stage has two steps to identify which are allocation scenario and land use allocation demand. This stage is suitable for the implementation at District Local Plan due to context of micro level of planning. Figure 1 below explain the “What if?” frame work and its stages.

3.1 Land Suitability Analysis
Land suitability analysis been done in order to run the program. In is necessary to conduct this analysis since the program could not been operating without the output of the suitability analysis. Suitability analysis will help in the determine suitability of different location for accommodating future residential land use demand. In conducting the suitability analysis, there are four steps that need to be done accordingly. Specifying importance weights, specifying suitability ratings, specifying land use conversions, and also computing the suitability scores are the four steps in conducting the suitability analysis.

3.2 Growth Pattern Analysis
Growth pattern analysis been done in order to acquire the report for the future residential land use demand. In conducting the analysis, there are sixth different major steps that need to be done accordingly from one step to another step. Selecting a demand scenario, specifying residential demand assumption, specifying employment-related demand assumptions, specifying preservation demand assumptions, specifying local demand assumptions, and finally computing the projected land use demands are the steps need to be done through conducting the demand analysis.
Figure 1: What if? Framework
Source: Yaakup, A. et al. (2007)
3.3 Allocation Analysis
In allocation analysis, the scenario been chosen according to the analysis to conduct. Allocation analysis based on suitability analysis, Growth pattern analysis which is combining with growth control. Growth pattern is concentric and radial form also plays a role in controlling the development that been planned earlier.

4. STUDY AREA
Kajang is a city in the eastern part of Selangor in Malaysia (2.98° N, 101.77° E). Kajang is also the district capital of Hulu Langat with the area of 9,298 hectares. It is located approximately 21 kilometers (13mil) south of Malaysia's capital, Kuala Lumpur. As of 2007, the total number of population in the Mukim of Kajang is 300,775 persons whereby according to the annual growth rate of 2.2%, the population is expected to grow to 404,772 persons in the year of 2020.

In association with the development of Selangor state, it could be seen that Mukim of Kajang is developing rapidly. This could be seen in the new township that had been developed such as Taman Prima Saujana (straight from Jalan Cheras), Sungai Chua, Taman Kajang Perdana (Kajang Highlands). Apart from this, many high-end developments have mushroomed in Kajang such as Twin Palms, Sri Banyan, Country Heights, Jade Hills and Prima Paramount.

By looking towards this new residential development is occuring in Mukim of Kajang, it could be said that there are a lot of other development such as industrial, commercial and also institutional developments that are taking place in Mukim of Kajang which bring a higher number of population towards the area. Therefore, a proper method to determine future residential land use is needed. The map below indicates the current land use of Mukim of Kajang.

5. ANALYSIS AND FINDINGS
This paper contacted with three types of analysis which is suitability analysis growth pattern analysis and also allocation analysis. However, this paper focus on discuss on allocation analysis. Allocation analysis is important since it provides the projected residential land use allocation for the research. The reports or in other word the output identify the projected land uses, residential population, dwelling units and employment in each projection year for the Mukim of Kajang. Based on the research conducted, the result of the analysis shows that there are several factors which affect the allocation analysis such as residential, industry, commercial and services. The allocation analysis was focusing on development trend which is concentric and.

The growth pattern is used in order to control the way in which projected land use demands are allocated to suitable location. Concentric growth pattern which allocates future growth to concentric rings cantered on a neighbouring central city. In relate with the research that been conduct, in the concentric growth pattern there are five different radius categories been defined. Each radius had
been defined from the major settlement centre. 0km, 1km, 2km, 3km, 4km, and also 5km of radius been used which is in line with the Draft of Kajang Local Plan 2020.

Figure 2: Current land use map in study area
Growth pattern is important to specify the general spatial pattern. Without growth pattern, new development will occur in a totally random pattern, other things being equal or in other words no control in terms of development. The suitability map being acquired through the projections which is shown below.

5.1 Allocation Finding
This result might be view as strange since changes in the suitability do not affecting the allocation result. However, when looking back to the nature of the application operates, there is no changes in the allocation result if the demand that been used is the same which is (high growth). Different allocation result could be acquired if different demand was used. In general, the concept of the software was that suitability scenarios plus with the demand assumption will produce the allocation results.

6. RECOMMENDATIONS
A quantitative measure of applying “what if?” in the Mukim of Kajang has not yet been determined. Future work should continue to testing different demand scenarios to see how it is affecting residential land use allocation. More research in the field is also needed to bridge the gap between practitioners and model makers, thus, the recommendations been made in three different categories which are in terms of education, professional and also government.

Time and precise decision is a crucial factor when a person tends to practice planning profession professionally. Therefore, by using the current technology such as the planning support system it will assist the professional in making and producing a better plan. Time will be reducing as well as the output is more precise compare to the manual methods. Indeed, this help in better planning for the country. Therefore, the ability to conduct and understanding the software should become mandatory skills for those whom intend to become a professional planner.

Government is the main bodies who going to determine the direction of the development of a country. Planning Support System should be used by government to control, measure and also to evaluate the development. Currently, when a plan been made it is made on a five year basis with a certain set of projection been made. However, currently changes will need to be made after the plan been gazetted since the changes that happen.

By using Planning Support System, government will be able to prepare more choices of future projection and scenario which will help in preparing a better plan. Indeed, with more choices it is hope that a little change or no changes need to be made after the plan been gazetted. Planning Support System is definitely a good tool in helping planning a better future for all.

7. CONCLUSION
As a brief conclusion, it is true that Planning Support System helps to the proper decision making an allocated usage of land. In a nutshell, application of Planning Support System in determines the future residential land use allocation should be implying since more advantages shall be gain despite
disadvantages. What if?2.0 has a lot of advantages based on the ability of composing multiple analysis such as the suitability, demand and also the allocation analysis which are used to build a scenario to project the future development. This is where the usage of Planning Decision Support System (PDSS) will assist the planning development in making a future forecast. Future prediction will help the development in making the right choice in order to obtain the precise and accurate outcome.

Figure 3: Future Residential Land Use Allocation Map 2020
8. REFERENCES
SOCIAL INTERACTION IN FOOTBALL STADIUMS AS URBAN PUBLIC PLACES

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Abstract
One of the negative aspects of today's life is gradual reduction of social interaction among society's people and their inactive presence in public cultural-social fields. At this time, attention to design of sports environments especially stadiums as urban spaces regarding high tendency to sports places can be appropriate means to survive social interactions as one of sustainable development's main features in order to return diversity to citizen's public life and give other meaning to society's social life. Today sport and entertainment are not divided items and world leisure industries invest increasingly on last generation of stadiums as urban green spaces "second nature" and also place for social interaction. The aim of this generation's design is creation of exciting spaces in order to enrich excitement caused by stadium's internal events. This feature and being multifunction change stadiums to urban dynamic spaces. Therefore more attention to this place's values is as a watching place where can attract people again and again due to diverse functions with hosting different events, so that sport events are the most important event but are not their whole picture. By this approach, stadiums are changed to center for social encounters of society's people that in which people separate from their routine life for some minutes and experience another world. In this paper is explained the importance of stadium's design based on facilitating social-cultural relations and physical specifications that stadium because of them can affect enrichment and increasing of social interactions and establish new social relations.

Keywords: social interactions, stadium, sustainable development, urban space

1. INTRODUCTION
The modern city forced citizens to create a social life on personal territory instead of engaging in communal existence in urban space. As result, people use urban space individually, with the loss of a collective sense of the meaning of public space; people have also lost the sense that there are rules for connecting parts through the design of outdoor space (Trancik, 1986). Therefore considering the social values and translating it in design process leads to create social spaces and in contrast, ignoring human aspects causes to lose these spaces. Ignoring social – cultural attitudes in design of public space causes to weaken social interactions. Stadium as an urban space shows high potentials as an interaction space. Fast development of sport and their deep influence on nations leaded to sport act as a symbol of economy and echo of a growing culture. No doubt stadium architecture acts in accordance with sport's social concept, especially in recent decades sports emotions are not under controlled and architecture encourage it instead of controlling. Modern stadium design is based on promoting human's physical and mental dimensions and facilitating social – cultural relations in communal structure. Architecture includes urban space, green space, culture, policy, recreation and commerce. It creates a sense of real being together by making limitless world and amazing images,
because designers have concluded that appropriate stadium related to both event's quality and spectators' successful experience. Therefore, this research explained the role of stadium as public place by using qualitative approach and then it described physical specifications of stadium that can provide occasions for people to communicate and meet each other in order to enrich social interactions by using analytical approach. Also this paper analyzed a multi-purpose stadium in Anzali port in Iran as a case study in order to provide more perception.

2. FOOTBALL STADIUM AS PUBLIC PLACE

History of stadiums shows that they have always been public spaces. In the past time, stadiums have been places where the masses are directed and controlled, and they have an experience of themselves. Ancient Greek stadiums are the venue of cult activities with weapons, and later the scene of athletic contests, which served patriotic interests and above all as a means of assuring the ruling oligarchy of its superiority. Arenas of this kind could accommodate the entire population of a city. These mass celebrations were a tool of centralist rule, a means of controlling the people (Schittich, 2005). New generation stadiums like their ancestors become interlinked with other attractions in order to become self-sustaining venues in their own right. Integrating with complementary facilities causes to attract consistently large crowds, for example five people attending on the same day can have five different experiences. Therefore, Objective is to reach a critical mass where the facility draws people at times beyond the hosting of specific major events, so that the complex becomes a center for community involvement for many interest groups, where sports is the main event but not the whole picture (Pickard, 2002).

The modern stadium is not merely a venue for viewing sporting events. It’s become an integral, jaw-dropping part of the spectator experience. It’s a showcase of architectural and technological possibilities. It’s an epicenter for new community development. Stadiums themselves attract more people than the events they host. This generates not only box office revenue but also prestige and greater overall value for the sports franchise, not to mention increased tax revenues for the communities in which they’re built. For this reason, contemporary stadium design involves a thought process far beyond thinking only about sports. With countless incentives and important limitations, there are many motives that stimulate architectural imagination such as developing a relationship between a stadium, Sport, and the expectations of the audience. Aside from the framework and parts of the stadium that will remain constant, the center of the stadium must be considered as a focal point for performers, employees and the audience alike. It is impressive, creative, and alive (www.worldstadiums.com).

The game of football takes place in a successful public space. Fans packing themselves into a stadium to watch a football game participate in a structural replay of similar activities that have already taken place numerous times. Thus the performance develops a sort of ritual nature, a ritual built on vicarious participation and identification (McDonald, 2005). But football is not only event in the stadium, through hosting football match, stadiums more than other Public spaces are open to all, regardless of ethnic origin, age or gender, and as such they represent a democratic forum for citizens and society. When properly designed and cared for, they bring communities together, provide
meeting places and foster social ties of a kind that have been disappearing in many urban areas. These spaces shape the cultural identity of an area, are part of its unique character and provide a sense of place for local communities (CABE, 2002). Therefore stadiums as public spaces play a vital role in the social life of communities. They act as a self-organizing public service, a shared resource in which experiences and value are created.

On the other hand, the stadium was one of the very few public places where one could freely express oneself without fear of persecution, where contact between different individuals or social groups emerges. Also, the joy in the stadium is a lot greater than other public spaces. A goal is scored and you are in tears of joy, hugging other people, everyone is celebrating. You are hugging complete strangers and know they feel the same. Everyone is celebrating together, regardless of class. Only football matters, everything else is irrelevant.

Based on the above mentioned, the stadium is much more than just the arena in which the games are played. Experiencing life in the stadium and the passions evoked by it serves to reinforce fans' sense of belonging to their club but also further emphasizes the divide between their style of support and that of the 'passives'. Because of the long-lasting nature of the bond that ties the fan to the team, friendships created at the stadium or in a football-related environment are also long-lasting. This is helped by the fact that the team's activities are likely to be on a weekly basis, which means there is always some new development to talk about and discuss, strengthening the bond between the fans and keeping it alive (Social Issues Research Centre, 2008). Research evidence has demonstrated that post-event legacies like the Football for stadiums can help promote sport growth, social order, tourism, social interaction, income generation, place attachment, community identity, urban regeneration, 'normalization' of at-risk youth, cultural celebration, place marketing, generation of social capital, shared architectural heritage and sponsors’ public image (Shehu, 2010)

3. SOCIAL INTERACTION IN FOOTBALL STADIUMS
Social activities are all activities that depend on the presence of the others in public places. Social activities include greeting and conversation communal activities of various kinds and finally passive contacts that is simply seeing and hearing other people. Therefore a social activity takes place every time two people are together in the same space. To see and hear each other, to meet, is in itself a form of contact, a social activity. The actually meeting merely being present is furthermore the seed for other, more comprehensive forms of social activity. Space design can affect the possibilities for meeting, seeing and hearing people by providing background and starting point for meeting and other form of contact and opportunities to see and hear other people (Gehl, 1987).

Public spaces are one of the most important places that social activity can take placethere, where people of various social and cultural backgrounds come together and mingle. Here, they can encounter each other in a peaceful and civil way and personal difference is recognized and acknowledged. The awareness of sharing the same space in similar ways with people different from oneself could create a temporary bond and a sense of community. As a locus for diverse and unplanned encounters, public spaces offer the opportunity for social exchange among people who
would not otherwise experience contact in daily life. Thus public space ought to be designed and managed in such a way as to make it freely accessible and attractive to a broad range of people, so that a vital public life and possibilities for unpredictable encounters and interactions between strangers can emerge (Wiesemann, 2012).

Stadiums as public spaces provide appropriate places for social activities. In the stadium, supporting a football team creates a strong unifying social bond for fans. While fans may come from a variety of social and economic backgrounds and may range in their commitment to the team from occasional supporter to hardcore fan, football fandom remains very important for creating and maintaining bonds among community members. Being part of a group of football fans does not limit fans to that immediate community, since sometimes events and activities may span multiple communities. In this sense the football fan's life can act like a series of inter-connected social networks. With the stadium at the centre of these networks as the nexus of activities, this is where bonds are forged and emotions are first shared. But such bonds, relationships and emotions are not limited to this space. They expand outwards in multiple directions, interlinking acquaintances, friends, generations, families, communities, and societies. Many fans recognize that they had met many of their best friends through football. Even though they may initially have little else in common, they became 'best friends' every match day and have continued this friendship outside the confines of the ground. Supporting the same team on the terraces is an important way of forging and maintaining very real social bonds. While many fans stressed that they met best friends through football, others suggested that attending matches is a way of keeping in touch with old friends and other people with whom they might have otherwise lost contact. A number of fans suggested that keeping in touch with friends was one of their main reasons for returning to the stands every weekend.

Football in this sense is their principal point of social contact. Fans feel a tremendous solidarity and sense of brotherhood with the other fans. Many fans believe that football bridges barriers and that only through football are they able to interact with people they would normally have no contact with. Football provides a single common point of reference, a starting point from which friendships can blossom. While not essential for friendship, a shared interest in football can be a direct route to making new friends.

Therefore stadium as football bowl is a very effective vehicle for bringing people together and facilitating contact with others. Belonging to a fan club or even just supporting a particular team was also seen to create opportunities for meeting new people who share the same the same passion. This in turn can easily lead to the creation of a new friendship. Furthermore, because of the long-lasting nature of the bond that ties the fan to the team, friendships created at the stadium or in a football-related environment are also long-lasting. This is helped by the fact that the team's activities are likely to be on a weekly basis, which means there is always some new development to talk about and discuss, strengthening the bond between the fans and keeping it alive.

While it is expected that close friends who support the same team would meet up on a regular basis to watch matches, football often involves different degrees of friendship. Football facilitates
particular kinds of social relationships, and while fans did consider themselves to be friends with other football fans, such friendships only occupy a specific and exclusive part of their social lives. Some friendships are made possible through the fan group but extend far beyond, while others end when the play ceases and the stadium empties (Social Issues Research Centre, 2008).

In the light of above, value that spectators got most from football in the stadium was almost entirely social in nature. This included:

- Feeling part of a locality and the generation of local pride
- Deriving friendships
- Having a sense of community and communality with other people
- Being part of an informal ‘family’
- Sharing experiences with other supporters (Substance Research Team, 2010).

4. CHARACTERISTICS OF STADIUM & SOCIAL INTERACTIONS

Stadium's characteristics have effects on social contacts of the people and provide benefits in many areas including social health; social togetherness etc. stadiums offer opportunities for social interaction, relaxation, and recreation to different ethnic groups to contact, relax and enjoy outdoor life, where people of different ethnicities and interests spend their leisure time. They also affect behaviors and trends of the fans. Therefore Stadium design has an indisputable role in meeting different cultural needs and facilitating social interaction in order to contribute to social cohesion in the culturally diverse cities of the modern society. They can be great places for public life and social inclusion. People will go to stadium, participate in social life, interact with different social groups and develop social consciousness. A creative arrangement can lead people to communicate with others. They are also places with adequate diversity and potential in terms of improving social interaction and sense of community. Spatial designs to be made in such places based on providing communication without changing the characteristics will create cohesion among different social groups and remind us of consciousness of being a society and the traditional life style.

Local character, diversification of activities, sense of participation and comfort are stadium's main attributes that provide ground for social interaction and contribute to socialize people. These specifications are achieved by some design ideas include:

- Creating a sense of joy, delight and wonder
- promoting contact and communication
- providing comfort and amenity
- Stimulating creativity and imagination by drawing on legend, metaphor, and history
- being easily accessible
- conveying its message clearly
- allowing users the option of becoming attached to the place
- Providing a feeling of security and safety
- Offering relief from urban stress and enhancing the health and emotional well-being.
• Being designed with equal attention paid to place as an expression of visual art and place as social setting
• Allowing users to change and manipulate space and providing an environment that is physiologically comfortable (Cooper and Francis, 1990).

5. PROJECT DESCRIPTION
A case study based on this approach is Anzali multi-purpose stadium project that is designed on the basis of modern stadium design approach in order to improve social interaction. It is located in Anzali Port (Bandar Anzali) is a harbor town on the Caspian Sea in north province of Iran. Project characteristics are as follows:

— Local character
— Diversification of activities
— Sense of participation
— Comfort and amenity

5.1 Local Character or Identity
It is one of important features of stadium, because there is strong evidence that the presence of local character encourages community life and reactivates fan’s sense of identity with their team and its stadium as second home. design stadium as national landmark, pride and focal point for state and country in order to increases social value through reinforcing a sense of identity among fans, encouraging people to become actively involved in managing their stadium and offering choice among a wide range of distinct places and experiences.

Anzali stadium delivered to the locality as a sense of civic pride and a focus for local identification and it is still part of the fabric of places because it inspired by Anzali port's main elements such as crane, suspended cargos and carrier (fig1, fig2).these elements are main symbols of Anzali port. Suspended roof is a part of main concept in Anzali stadium design that it transfers the sense of suspension.

Figure 1: Cranes suspended cargos in dock of Anzali port (www.anzaliport.pmo.ir)
5.2 Diversification of Activities
Anzali stadiums present a diversification of activities because spectators and fans demand choice and variety; they want to visit new areas and be aware of what is happening around them. People seek an environment to meet with one another. Spectators look for quality places that take them far away from their normal life. Thus places should provide variety and be individually unique in their historical and cultural mediums. Therefore Anzali stadium can be amazing and attractive for different groups of people not only fans who like football but also people who dislike football and go there for other activities.

Some diverse activities are as follows:

- Stadium has capability to hold various events such as sporting, social and cultural events
- Venue has miscellaneous facilities such as commercial complex, exhibition space, sports museum, amphitheater and restaurant in order to attract more people and encourage them to spend more time in stadium (fig 3).
5.3 Sense of Participation
In the classical stadium, there is always a certain distance between players and spectators, but in modern stadium players and spectators are brought together in the same total and limitless space. And a new kind of interaction is thereby achieved. Spectators obtain that sense of participation which is one of the aims of the new open world. Sense of participation between fans in Stadium enriches social value through: improving fit between design and user needs, developing user ownership of positive change, enhancing sense of community, enhancing sense of wellbeing, legitimising user interests and enhancing democracy (CABE, 2005).

Anzali stadium has two layers in order to create sense of participation, first layer is spectators' seating which is solid and second layer is mild and transparent which is in appropriate distance from first layer (fig4). Having two layers make slow movements in relation to stadium's layers happen in first layer and movement related to space happen in second layer. Therefore, view to stadium's interior space is not limited because there is not any obstacle. Also second layer acts as a large screen and puts spectators in focal point, so that whole of stadium's space is integrated and spectators are part of play. On the other hand, stadium design allowed spectators and visitors to change and manipulate space and furniture in order to improve the sense of participation.

Figure 4: Space between layers of stadium (Asadi, 2006)

5.4 Comfort and amenity
Comfort facilities are effective factors to improve social interaction. A stadium is more than just the sum of its physical parts. In order for it to become more than just a functional building, but one that is attractive and comfortable, it needs to satisfy certain psychological needs. Entrance areas for large volumes of people should be spacious with high ceilings. Conversely, it is often desirable for spaces such as rest areas and bars to be more intimate in terms of their dimensions and design. The objective is to stimulate all of the human senses in order to create an overall feeling of well-being and to avoid creating spaces that alienate the user. One of the important amenities for visitors is appropriate
access routes because easy access, circulation and orientation (for example clear visual lines and signage) are crucial components of any user-friendly building. From the macro scale right down to the details, all features of the building design should be conceived with human ergonomics and comfort firmly to the fore. Spaces such as plazas and courtyards, landscaped transition areas and water features visually enhance the stadium complex and they will also help to produce a more people-friendly environment (UEFA, 2011). Anzali stadium is designed with regarding these parameters completely. It provides appropriate access routes (fig 5) and all comfort facilities such as rest rooms, lounges, club museum or visitor’s centre, children’s play area, nursery, family-friendly restaurants and shops for users(fig 6).

Figure 5: Stadium's access routes (Asadi, 2006)

Figure 6: Stadium's comfort facilities (Asadi, 2006)
These characteristics cause Anzali multi-purpose stadium to be social arena, where generates significant increased exposure and profile for the community by promotion of its events and facilities. It also delivers increased community pride because of the special nature of their structure and their events. These features enhance the quality of life of those living in the area; ensure that the stadium is integrated into the day-to-day life of its community.

6. CONCLUSION
Football stadium provides opportunities for spectators and visitors to interact with each other. It is able to bring people together and where friendships and support networks are made and maintained. Both fleeting and more meaningful encounters in stadium can provide relief from daily routines, sustenance for people’s sense of community, and they can also alleviate tensions at home. Main characteristics of stadiums included: local character, diversification of activities, sense of participation and comfort are important features that caused stadium to be act as one of the most successful public places. Therefore design of stadium as public place should be considered in order to strengthen social ties between people and encourage them to communicate.

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URBAN FUTURES FOR BRASILIA AND KUALA LUMPUR: A LITERATURE REVIEW ABOUT SOME CREATIVE EXPERIENCES IN COPING WITH A MODERN URBAN LANDSCAPE

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Abstract
Nowadays, the so-called “developing” countries are sharing not only the fast economic and city growth, but also the urban social issues related with this progress. Countries such as Malaysia and Brazil, despite their continental distance in the globe and some cultural peculiarities, are not exception. Recently, some researches – such as Postcolonial urban studies – have encouraging the dialogue between urban solutions created in these type of countries, considering them as ordinary places, regardless their status of developing, developed, etc. The aim in this paper is to point out how the recent literature in both countries has dealt with their grassroots initiatives. In particular, how the creative ways of coping with a modern urban landscape in Kuala Lumpur and Brasilia have been studied? Despite this surge in literature on postcolonial urban studies, there has been little attempt to consider the dialogue between the creative experiences of these two countries. Therefore, this paper will address the gaps for future studies relating creative experiences in these two cities in order to enhance their urban planning.

Keywords: kampong, Brasilia, post colonial urban studies, urban planning

1. INTRODUCTION
How the creative ways of coping with a modern urban landscape in Kuala Lumpur and Brasilia have being studied?

Before answering this question, it is important to highlight what this paper means by modern urban landscape and creativity. Saying that, the term modern urban landscape has been used here not focusing in the ways that “humans customize their surroundings” (Maliki, 2008, p. 14) in relation to formal architecture (brick and cement). On the contrary, it concentrates in the practices and intangible (informal) daily life experiences humans invent to cope with their multilayer modern landscape. For the purpose of this paper, ‘different ways of being modern’ refers to the Kuala Lumpur’s and Brasilia’s grassroots initiatives in dealing with its surrounded modern urban landscape.

Regarding creativity, it is important to emphasize as Landry (2008, p. xxxii) suggests, “the notion of creative city proposes that planners broaden their horizons and insights and become more imaginative in understanding the lived experience of the city”. More focusing in the grassroots initiatives, Manzini E. (2003), and Meroni (2007) also contribute on the role of creativity in the sustainable design for communities, describing it as an “on-the-field creativity, (…) triggered by the real context of needs, resources, principles and capabilities” (Meroni, 2007, p. 9). Adding a more
philosophical comprehension of the concept, Rorty (1989) defends that creativity is a required competence for imagination, which is the ability of saying things differently, of re-describing the world in a different way, creating metaphors based on your own vocabulary. For him, the imagination is the most important tool for cultural change. For this paper, the creativity concept takes into account these three meanings, namely the urban planning (Landry, 2008), the democratic (Manzini E., 2003; Meroni, 2007) and the relational (Rorty, 1989).

After these clarifications, in order to address both the above-mentioned question and the gaps for future studies related with the creative experiences in Kuala Lumpur and Brasilia, this paper will be presented in three inter-connected parts. The first one explains the post colonial urban studies and its way of looking at the city labels of developing or Third world and developed or wealthy. Secondly, the ways of being modern in Kuala Lumpur and Brasilia based on how the recent literature in both countries has been dealing with their grassroots initiatives. Finally, building on the previous parts, some research gaps for future studies in the area will be presented.

2. ‘DEVELOPING’ COUNTRIES AND POSTCOLONIAL URBAN STUDIES
Nowadays, the so-called ‘developing’ countries are sharing not only the fast economic and city growth, but also the urban social issues related with this progress. The increasing gap between rich and poor, housing issues and access to basic public services are some of them. In addition to that, the accelerated development path has other intangible consequences such as the continuous tension between the traditional city features and its modern trends connected with city growth and progress will.

The solutions, on the other hand are usually based on ‘best practices’ that have already been implemented in developed countries. For instance, policies, practices and discourse of wealthy cities have been copied and pasted all around the world under the illusion that such simple reproduction would upgrade their status and conditions of ‘developing’ countries. At the end, this catching up process just reinforces the division between what is considered modern and up to date practices from wealthy countries and what is then considered old and traditional practices from the ‘developing’ cities.

Nevertheless, recently the post colonial urban studies have promoted the dialogue between creative urban solutions invented in ‘developing’ countries, such as Malaysia and Brazil, considering them as ordinary places, regardless their status of development. Jennifer Robinson, who is one of the key researchers in this area, clarifies that “a post-colonial urban studies will assume that there is potential for learning from the experiences and accounts of urban life in even quite different cities.” (Robinson, 2006, p.41) One of the strongest effects of this perspective is the possibility of considering the traditional features of cities – usually seen as “primitive” or non-modern – as essential parts of the same construction of urban life. Having it in mind, the primary movement will be to remove the scale that carries what the common knowledge considers as ‘modern’ in one side and ‘traditional’ in the other. As highlighted in the figure 1, in removing it, the modern urban landscape starts to be understood in its diversified and rich nuances, as a space where modern and tradition are described...
and re-described in different ways throughout ordinary cities. In other words, the modern features as well as the traditional characteristics are both present in different cities around the world, and this is what really makes their identity and diversity.

Figure 1: The different nuances of a modern urban landscape

Saying that, the use of ‘developing’ countries in this paper comes more as a provocative word than as a label. Based on the postcolonial urban studies, particularly on Jennifer Robinson Robinson (2006), the stance here is to point out how the grassroots urban experiences has been studied in these two labeled ‘Third World’ cities. Therefore, the approach is radically different as it considers both places as ordinances and possible source of creative, modern and worthy urban experiences.

3. WAYS OF BEING MODERN IN KUALA LUMPUR, MALAYSIA

‘Modernity in Malaysia (...) is defined by contradictory claims, making impossible one homogeneous or coherent meaning of modernity’. (Goh, 2002, p. 12)

Kuala Lumpur, capital city of Malaysia, has been witnessing a ‘modernization’ movement in the last 20 years. The construction of Petronas Twin Towers in 1998, for example, represents “a ‘cultural landmark’, putting the city and the nation on ‘world maps’” (Bunnell, 2004, p. 299). The country’s visionary leadership transformed Kuala Lumpur into a ‘modern’ icon, attracting foreigner investments and shaped the Malaysian mindset. However, a more traditional way of life (from the kampongs) still exists within the urban environment. In Bahasa, kampong means village that, as highlighted by Maliki (2008), “originated in rural locations and the word itself signifies rurality.”(2008, p. 16)This kampong style, although sometimes not welcomed, can be considered responsible for a creative reconfiguration of Kuala Lumpur’s urban landscape.

Regarding the Malaysia discussion of modernity and traditional some authors have already contributed in this direction. From ethnographic studies such as the one undertook by Goh (2002), to a more symbolic research done by (Bunnell, 2002, 2004) the idea of a Modern Malaysia has been somehow under discussion. In addition to that, Maliki (2008) have also contribute to this area through her PhD thesis Kampong/landscape: rural-urban migrants’ interpretations of their home
landscape. The case of Alor Star and Kuala Lumpur. As one of the cases, Maliki offers a rich description of the kampong meaning in rural-urban scenario migration and has as one of the main cases the traditional/urban village of Kampong Bharu in Kuala Lumpur. This last one, is an emblematic place since it physically represents the tension between traditional and modernity in the heart of Malaysia’s capital.

Despite the existence of the aforesaid studies, most of the literature related with Kampong Bharu has focused in its history, the regulations for a Malay Agricultural Settlement – MAS and the traditional architecture features. In order to understand what has been done in this area and which are the future researches that can support the development of a more comprehensive and respectful city plan – the one that incorporates the traditional and modern features of the city the above mentioned studies will be briefly presented below.

By the use of an ethnographic study, Goh (2002) investigates the hidden forces and affected groups of the urban development and modernization process in the region of Pulau Tikus in Penang, Malaysia, particularly in the area of Kampong Serani. His effort shed light on both the complexity of developing modernization practices and the importance of understanding all the stakeholders involved. The research emphasizes that the physical and symbolic changes related with a modernization process should be a consequence of a constructive dialogue between all the groups of interest. What is more, understanding that each one of these stakeholders has their own interest and proposal, this process should be an assembled local response to global trends, and not the other way around. As the author emphasizes, “a meaningful conception of the Malaysian modern experience must take into consideration how people struggle to derive power, class, and ethnic status from their positions within the nation-state’s modernizing practices, which are, in turn, framed by a complex interaction between local and global forces of transformation.” (Goh, 2002, p. 202)

Focusing on the physical and symbolic meanings of kampong, Bunnell (2002) presents the perspectives of a range of authorities and groups engaged in the ‘contested (re)construction of appropriate urbanity and means to achieving it’ (Bunnell, 2002, p. 1697) in the urban Malaysia. In a detailed description, the author highlights the conducts, values, rules, design features and social organization of kampongs emphasizing how these concepts have been seen throughout the years of urbanization police in Malaysia. On top of that, Bunnel points out another way of understanding the kampong rules. It is argued that, instead of being understood only as an example of non-adequacy to the Malaysian urban scenario, the kampong also ‘informs emerging norms and forms of Malay, and increasingly Malaysian, modernity.’ (2002, p. 1697)

In addition, Maliki also present a detailed description of the symbolic meaning of kampong in Malaysia and particularly in the urban environment of Kuala Lumpur. However, her work goes deeply in the complex meanings of kampong landscape throughout the times in Malaysia. Based on a case study about the migrants from the rural kampong Yan Kedah to the urban Alor Setar and Kuala Lumpur (Kampong Bharu), the thesis shed light on the impact that the kampong symbolism, practices and implicit rules have on the urban landscape. In other words, ‘the process of unweaving
the meanings of kampong have illustrated that kampong ideas have the potential to inspire a landscape design language that could mitigate the harsh contrast between rural and urban Malaysia." (Maliki, 2008, p. iii).

4. WAYS OF BEING MODERN IN BRASÍLIA, BRAZIL

Brasília, capital of Brazil, was built-in the sixties to support a governmental intent to promote a shift of power from the southeast coast of Brazil to the countryside. With the slogan “50 years in 5”, the government strategy was to develop a new and ‘modern’ city which would attract international investments and foster the development of the center region, and consequently of the whole country. In due time, the project turned out to be successful, and Brasilia became the 3rd richest city of Brazil. However, in parallel with city development, several urban issues came along, such as widened gap between rich and poor inhabitants. One of the main contrasted areas is the so-called satellite cities, which initially served as home for the candangos. These settlers came from small villages to build the planned part of the ‘modern’ capital, called pilot plan.

One of the biggest challenges regarding the literature related with this field in Brasilia is the language barrier. A lot of researches have been done about Brasilia, its recent urban story, issues and solutions, but most of them has been published in Portuguese and not in any international journals. Most recent available studies about the urban landscape of Brasilia are more related with its iconic architecture, informal housing, land ownership regulations, environmental problems and poverty issues. This last one is deeply related with Brasilia’s huge socio-economic gap manifested in the discrepancy between the well-equipped pilot plan and its poor periphery, the ‘satellite cities’, which lacks on basic public services.

Nevertheless, the academic writings related with the grassroots initiatives in Brasilia, particularly those related with the tension between modernity and traditional in its modern urban landscape, discussed the informal settlements initially funded by the candangos. When it comes to a broader discussion about the urban issues within this reality, the main author is Aldo Paviani who edits a multidisciplinary book series called Coleção Brasília. The three more relevant books related with the Brasilia urban issues are Brasilia: Habitat and exclusion (A. Paviani, 1996); Brasilia, Ideology and Reality: urban space under discussion (Aldo Paviani, 2010b); and Brasilia 50 years: from capital to metropolis (Aldo Paviani, 2010a)¹. These works discussed the habitation process in Brasilia, urban futures, informal settlements and challenges for its formalization, and the urban policies and management. However, there is no focus on the popular initiatives that could be seen both as an inspiration in fostering the Brasilia’s urban planning and as another way of being modern within the Brazil’s capital.

For the present paper, an interesting work due to its details regarding the social and cultural dimensions of a traditional/urban settlement in Brasilia is the thesis of Lacerda (2011). The design of

¹ My own translation from Portuguese, respectively: Brasília: moradia e exclusão; Brasília, ideologia e realidade :espaçourbanomquestão; and Brasília 50 anos : da capital a metrópole.
the affection perception: the case of Vila Telebrasília\textsuperscript{2}, although undertaking a more architectural approach it focuses on the symbolic dimension of how the urban settlers of Vila Telebrasília use their own creative interventions in order to cope with Brasilia’s modern urban landscape. Making use of focal groups associated with images, the author has captured the memories and feeling of the dwellers. These memories are closely related with the history of Brasilia in general as the Vila Telebrasília was the site for who were working in the construction of Brazil’s capital on 1960’s. From the thesis, it is possible to infer that the memories and practices of ‘the old times’ has now being mixed with the changing environment resulting in a new way of looking at modernity which is different from what is commonly accepted as the modernist capital.

5. CONCLUSION

When it comes to think possible urban futures for two growing economies such as Brazil and Malaysia, it is important to bring back the ideas defended by Robinson (2006). As mentioned before, the post colonial studies encourage the dialogue between urban solutions created in these type of countries, considering them as ordinary places, regardless their status of developing or developed. Despite this surge in literature on postcolonial urban studies, there has been little attempt to consider the dialogue between the creative experiences of Brasília and Kuala Lumpur. Therefore, this paper identified the gaps for future studies relating creative experiences in these two cities regarding their modern urban landscape.

For instance, potential researches could be done addressing (Goh, 2002) methodology in a different urban scenario or fostering (Bunnell, 2002, 2004) comprehensive meaning of urban modernity in Malaysia. In the first case, a more ethnographic approach toward Kampong Bharu in Kuala Lumpur, for example, will foster the understanding of the complex meaning of modernity in Malaysia and for its stakeholders. The second one, on the other hand could represents a crossroad between the kampong symbolic and physical attributes, associated with the aims of modernity from the different authorities and groups involved in the construction of a local respectful and meaningful Malaysia.

In addition to that, another potential research could be a comparison between the practices of these two traditional/urban villages. However, it important to emphasize that the comparison here should be based on the Post colonial urban premises which is ‘neither a parochial universalism nor a uniform global analytical field but a rich and fragmented array of ongoing conversations across the world of cities’ (Robinson, 2011, p. 19). The unit of comparison would not be geographical, but symbolic. In this way, the main common feature to be explored between kampong in Malaysia and the slum in Brazil would be what held them together. The Kuala Lumpur’s kampong, as well as the Brasilia’s vila are ‘not a merely unit of settlement, but more important than that it is also a coherent social entity in the sense that members are in close interaction with one another. (…)What held them together was not merely the area of settlement, but the common social, economic and political interactions’. (Syed Husin Ali, 1968, p.111. In: Maliki, p.48)

\textsuperscript{2}My own translation from the portuguese: O Desenho da PercepçãoAfetiva: o caso da Vila Telebrasília – DF

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MODEL REVIEW AND NEW RESIDENTIAL LAND DEVELOPMENT MODEL CONSTRUCTION IN ORCHARD PLANTING VILLAGES

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Abstract
New rural construction is a significant issue for the China government in the process in the construction of a well-off society. Land consolidation in rural residential areas is the first step in improving the life quality of peasants which then increase the income by commercialize the land after consolidation. However, current related research is too general in viewing this as land consolidation rather than as a systematic model for different kind of villages to follow. In this article, I will introduce a model for the orchard planting type villages that combines intensive and extensive use of land leaning from the experience from rural land development history in Japan. More specifically, the intensive model planning that the government and most Chinese scholars are encouraging fits well for those peasants who do not have planting land and are not willing in continuing to planting. For the rest of peasants, to allocate them with the residential house near or in their own orchard land is an effective way to save land, ensure production efficiency and convenience in living. Moreover, it allows the setting up of public infrastructures such as hospital, school and shopping mall in a relative concentrated area.

Keywords: orchard planting village, rural construction, residential land consolidation

1.0 INTRODUCTION
Rural area development is highly emphasized by central government and is a key issue for balanced growth of China’s economy. Roselle, Huang and Zhang (2002) pointed out that “if china is to modernize, a massive structural transformation of china’s rural sector must occur over the course of the next two to three or four decades”. Further, “China's reform being peasants' reform” was pointed out by Zhou (Zhou, 1996).

Today land consolidation is an effective instrument in rural development, which includes improvements to agricultural production, employment, taxation policy, infrastructure, public facilities, housing and the protection of natural resources (Weissand Maliene, 2004; Maliene et al., 2005). Besides, through consolidation, the land available after consolidation can promote the prosperity of the village by facilitating the establishment of local village corporation or by other commercialization. Currently, the average land area for rural residential properties is high at around 288 m² which exceeds the state-defined standards and more than 10% of rural families have more than one residential property (Wang, Wang, Su, & Tao, 2012). So the rural residential land is in inefficient use. The consolidation potential is quite large. However; some current models in use, such as the relocation of villages in harsh areas, are area-specific and cannot be applied to the whole of...
China. Others current models lack a systemic consideration of specific economic conditions. The research in this article therefore, focuses on the sustainable rearrangement for the orchard growing villages through the land consolidation process.

Orchard planting villages in this article refer to the villages whose economy growth was dominated by planting of trees and shrubs that are maintained for food production. Here the orchards comprise the fruit and nut producing trees for commercial use. It looks at one particular village – Southeast as a case study.

2.0 LITERATURE REVIEW

The concept of land consolidation first appeared in the law of Bavaria in 1886 when the land development was aiming at improving the condition of agriculture, the cultivation areas and transportation system. With the change of the agricultural structure to meet the demand of market, ameliorating the living condition and protecting the environment were also included in the land consolidation (Xv, Yang, Xiao, & Jia, 2002). The Soviet Union dealt with land consolidation in the long-term perspective by the consideration of agricultural production, allocation of residential areas, construction of villages, greening and soil curing. In Korea, the land was consolidated in the process of “New Village Champion” which was focused on the rural land arrangement, rural environment improvement and completing the rural infrastructure (Planning Division of National Bureau of Land Management, 1998). In China, land consolidation was aiming at enhancing the cultivated areas by reclamation, improving arable soil and beautifying the environment (Zhao, 2009).

In China, numerous scholars have conducted research on land development and consolidation in rural areas. Land development aims at systemizing and optimizing land use, enlarging the cultivated land and protecting the ecology environment which makes it sustainable. I, (2007) also pointed out one of the advantages of the land development is to increase the available land resource allocation in those economically advanced areas by transferring land from extensive use to intensive use (Wang, Yu, Luo, & Qu, 2003). Land development should be based on the original layout by optimizing combinations and reallocation as well as introducing the new land use types that readjust the patterns of usage and functional areas. Aiand Pang (2006) introduced the techniques relating to the implementation of slope analysis in hilly areas. Zhang (2007) catalogued the development models based on shallow index and characteristics of land development areas.

In empirical research of land development, it has been found that land consolidation is effective way in enhance the area of cultivation, maintain the dynamic balance of farm land, promote the productivity of crops, optimize land use, protect the ecology environment and support rural reconstruction (Gao, 2005). With the experience in the farmland development, in different locations, cultivated area can be increased by 3% to 5% after the land thus freed up is developed. This means raising the space available to cultivation by 60 million hectares. The per capital area for residence of 153 square meters for the rural and urban citizens in china can be reduced to 100 square meters by redevelopment of abandoned areas (Wu, 2005). Similar research has also been conducted by Luo (2005) who postulated the landscape land development model by using the theories of ecology on the

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basis of analyzing the characteristics of degraded ecosystems. Many scholars have done the land arrangement based on the physical situation. Zhao et al. (2005) combined the real situation in the land consolidation of Zhangqiu in Shandong province and overall rural layout to come up with a standard farmland design and arrangement of water infrastructure. Zhang and Fu (2005) have established a landscape ecology planning and design system based on the situation of Maji town, Yizheng, Jiang Su province. Liu and Mo (2005) took Yaoli village, Nandan town in Guangxi as an example of land development and evaluated the benefits it may bring .Jin et al (2008) analyzed the land consolidation of fragmented land by using Geographic Information System (GIS) techniques to simulate the situation of land development and then conducted the evaluation of the project. Ma and Liu (1999) resolved the issues in the reclamation at the mine using the example of eastern mine area reclamation in China that showed that the arrangements in this kind of area should focus on the vertical, horizontal and time structure designs.

Lang et al. (2007) have synthesized the software of SPSS and analyzed the main driving force for the change in land-use of residential areas in Jiu long area of Chongqing are economic which were development ,population ,policies ,social behavior and so on .Zhang(2003) noted that the vital factors to impact the residential development in rural areas were the changes in peasants’ perceptions ,improvement of economy , capital and manpower input . Li et al. (2004) have calculated the consolidation potential by collecting data of numbers and space of residential areas, consolidation potential index and rural population .by typical sample statistics, Jia (1999) determined the abandoned rate of rural land is to be 6% and predicted the consolidation potential of Jilin province.

3.0 LAND DEVELOPMENT MODELS
Based on the characteristics of Guangxi province, Liao (2004) came out with four kinds of rural residence land development models. They are villages relocation and merger, village consolidation to save more land, village reconstruction with temporary relocation to another area and village relocation to hillside. Liu, Lin, Bin and Kong (2007) the geographic situation as the main factor to impact the residential reconstruction and noted five residential area consolidation models which were rural urbanization ,merger of small villages ,removal of whole village and construction in other place ,village reconstruction ,and removing villages to the hills. Besides that they also analyzed the models applied situations. Wang (2006) also identified models such as, removing and merging land, reconstruction, shrinking to vacate the space, urbanization. In addition, he also took the financing issue for each model into consideration. The following are the current identified models which can be use as the reference in postulating the residential land consolidation model for orchard planting village

3.1 Reconstruction within the Village
The land consolidation in this model is to retain the original village location and development is conducted inside the village through verifying and rearranging relative layout of the residence areas (Liao & Li, 2004). Demolition and reconstruction of old residential areas with the encouragement in the reuse of the existing homestead is the main aim in this model. It is to arrange the new residential area to strictly follow the principle “one household, one house” within the limitation of the national
residential standard. For those households with more than one house, the government should recover the extra houses. For those Collapsed, abandoned and ancient houses, the effective way is to demolish them. For those houses in relatively new and good condition the objective is to maintain the current situation for later consolidation with the enhancement of economic capacity. The compulsorily removed ancient houses can be commercialized as land property for enterprises or reclaimed for cultivation. In this model, the use of apartment accommodation is quite effective in shrinking the residential areas for reclamation and commercialization. However, the apartment construction requires large in financial support which is more suitable in the relative wealthy areas.

There are three kinds of emphasis for the inner village land development:

(a) Construction Emphasis:
   For the construction emphasis, the land after consolidation is mainly used for development of infrastructures and enterprises. The inner village enterprises can provide or attract capitals to finance the land consolidation and employed peasants drive economic development. It is always used in the villages around the cities to ease the pressure of population density and allow industry spread. So commercialization can not only improve living conditions of peasants but also provide the space for city extension.

(b) Reclamation Emphasis
   The land available in the villages after the reconstruction is dominated by reclamation and less in the use of commercialization. With the society development, the scale of some villages in the mountains is diminishing with the poor transport system as young generations are moving out of villages and finally disappear. This kind of villages is more likely to be consolidated by focusing on reclamation.

(c) Combination Of Construction And Reclamation
   For most villages the land after consolidation should combine the reclamation and construction for enlarging the land resource to cultivate and developing the inner village enterprises to support the growth of economy.

3.2 Village Removal and Construction in Other Areas
Through the organization and support from the government, the whole village is removed to the areas with more space and better economic conditions and reclamation undertaken for the old village (Liu, Lin & Kong, 2007). This model is applied to isolated villages in a harsh natural environment, with inconvenient transport system. This Village removal is undertaken with government support in financing. For the original villages, the antique buildings with historic value should be maintain and protected in the process of forestation.

3.3 Centralization Model
This model merges and removes fragmented and relatively small villages to a more centralized area near the town (Liu, Lin & Kong, 2007). It can be effective in enlarging the scale of the central village
and town and facilitates more efficient use of infrastructure and promotes economic development. Through the centralization model, the layout of the town and villages can allow intensive industry and residential zones that drive the growth of the local economy and increase the income as well as diversify the structure of revenue of peasants.

4.0 NEW MODEL CONSTRUCTION
Currently, land development in China, it is based on persuasion of peasants to live in the relatively densely populated areas to enhance the utility rate of the land. Another advantage of this intensive living is as rural housing density increases, more public services (e.g., roads, water lines, and schools) are provided, in turn attracting more development for rural areas (Gudea, Hansen, Rasker, & Maxwell, 2006). However, another principle in the land consolidation should be considered is that the layout of the residential area should be arranged based on the convenience of living and production. The centralized consolidation in some areas may go against with productive convenience consideration as the peasants live far from their farmland. And in most planting areas, some peasants build the house in the orchard to store agricultural implements or to live for preventing from thieves and easy to product.

Knowledge of factors that increase growth potential should be highlighted because several characteristics of development patterns tend to be problematic for production. To group the peasants together or even in some areas to encourage the peasants to live in the apartments for consolidation is not feasible. As in some villages, some peasants whose main incomes come from planting require a large space to store the farming tools such as the tractors and baskets and food production that restrains them to live in the apartments. For this kind of peasants, living in their own land where they farm is more feasible to enhance the efficiency in the production.

The existing house located inside the cultivation areas demonstrated that the farmers have already found their most suitable location in terms of living and economics. So the government should accede to their wishes rather than move them to a less desirable area. Nowadays, many houses are built in the planting areas. Gudea et al. (2006) pointed out that it is the natural resource constraints of early settlement patterns that caused the new households continue to live where their farms are soils rather than relative intensive areas. Many scholars who studied the land development thought the advance of technology that allows efficient transport may cause the weakening relationship between the natural resource and rural living patterns. So, they suspect they can easily arrange them to live together. However the theory is not supported by evidence conducted by Gudea et al. (2006) in America. Scholars who researched the China economy pointed out the Chinese rural reform should stress the importance of spontaneous and innovative steps taken by the peasants in creating opportunities for themselves (Zhou, 1996). Respecting their willingness and combining the extensive with intensive living model should be key success in orchard dominant villages.

This kind of fragmented living model was used and explored in Japan originally in their rural construction and got some achievements. In their rural development, Japanese government guided the peasants extensively rather than intensively (Liu, 2000). More specifically, groups of farmers...
were spontaneously gathered to live fragmentally in the farming land, roadsides, beside the rivers and on the hillsides where the living places were near their farmland and production areas which demonstrate the theory of convenience in location in the urban planning. Besides that, Japanese government also constructed the public facilities and infrastructure in relatively centralized areas which was the same direction in the Chinese rural land development. This kind of fragmented living model is beneficial to keep the rural areas ecologically sustainable. In addition, fragmented living in their own plating areas makes for more efficiency in using the available land as they would be willing to use it for planting for more benefits. The peasants can feed the animals among their farmland and by using the space between the trees to store their farming tools. Roads that have already been in place remain and no new roads are constructed. However, from more general point of view, the rural land development will increase the areas for cultivation which is more than the land occupied.

So by combining the extensive and intensive living model, for the villages where peasants incomes are dominated by planting, the residence land development should divide into three kinds of sections: firstly, for those peasants who are in old-age that cannot be engaged in planting and those who cannot plant due to the lack of land, they should be guided to live in the more population-dense residences such as apartments. Secondly, houses in the abandoned areas ,it should be demolished and the land used for construction and reclamation .Lastly ,the residential peasants who own the farmland , are willing to plant and relatively young should be assisted to build their houses in their own planting areas and to remove their houses if located in the village .The infrastructure such as the public park ,hospitals ,markets and schools are constructed in the relative centralized areas .This land development model can systemize and optimize the rural living areas which takes the consideration into ecological sustainable ,intensive use of land and convenience in living and production.

The case of Southeast will demonstrate the ichnography of the model as following:
The left graph demonstrates the original layout of the village; while, the right one is the layout when using the “Orchard Growing Model”. Source of graph: Land Consolidation Project Ichnography of Southeast Village in Qixia by Jiante Water Conservancy Construction Corporation. Identifier: QK-NYKF2013GLZ-001

5.0 CHALLENGES AND RESPONSES
In the arrangement of land, the desire for profit and priorities of peasants, have generated frictions such as the conflicts between peasants and local government tasked with removing original houses in the villages. This issues and ways to resolve them are discussed next.

5.1 House Removal Issues
In land development, houses removal is vital. However, many of peasants who own the planting areas are not willing to have their original houses in the village demolished. They are concerned that in their old age they may not be able to move back to their original houses. During the young age for them, the advantages of proximity to their farms outweigh those of better access to services which may be adverse when they are old. So is there the apartment available for them to live in when they are old? All these issues made the house removal process in land consolidation. Besides that, it is hard for the peasants to go through certain formalities to get the approval to build in the planting areas as it occupies some cultivated land. Moreover, some abandoned areas forcibly demolished may stir up resistance of peasants who own that houses. These factors slow down the land development process which must be based on the peasants’ willingness regulated by central government.

How can this problem be overcome? The local government can contract with the peasants with the items about details by guaranteeing them that their living standards will be maintained or improved if their houses were to be demolished. More specifically, the government should assist the peasants to construct the houses in their planting areas by providing financial assistance, expediting the approval process, and providing utilities. They should be given preference in the allocation of apartments. For those with abandoned houses, claims should be distributed to them after the houses are demolished. If their houses is planned to be commercialized, the peasants can get compensation from the firms. Alternatively, if the land is reclaimed, they should have first right to cultivate it.

5.2 Land-Grab
Driven by profitability, some of cultivated land is seized for commercialized and construction. This is more likely to happen in this model, as the peasants are encouraged to live in the planting areas. In this situation, the approval of house construction in the planting areas should be carefully regulated and monitored by local governments based on the limitation of Homestead area regulation that the average is 150m² (Ministry of Construction of PRC, 1994).

5.3 Mindset of Peasant
Education and better living conditions have changed the attitudes of many peasants. However, some still cling to outdate traditional views such as superstition which instigate them to oppose land development as they may consider the process can damage the geomancy of their homes. In their
mind, the locations of a house have the influence on the fortune of a family. So they oppose the movement or demolish of their houses. Besides due to lacking the legal consciousness, some villagers have violated the laws when conflicts occurs between them and local government in the land consolidation process.

However, the issues have already been put forward by many scholars in their research of rural land consolidation. Currently the issues have not been addressed due to lax implementing policy, low motivation in peasants, and uncompleted feedback system. The suggestions for solving these issues is to get to know the perspective of peasants then we can find the best way of solving them (Zhou, 2011). So, the government should motivate the peasants by being transparent in their plans and bring them into the reform process, convincing them of the benefits of the proposed land reform. Feedback from the peasants who are key stakeholders is in any case the determinant to the success of any reform.

6.0 CONCLUSION
In this article, we have reviewed the current models used in the land development in China and based on the criterion of efficiency of production, a new model in the planting villages are constructed which has been successful in Japanese land consolidation. Overall, the model can be applied in practice by addressing financing issue, changing the views of peasants with perusing them to join the reform process, ensuring “one household, one house” principle and preventing unnecessary occupation of cultivated and planting land. The combination of fragment and centralized layout of residential areas can make the local villages to be ecological, sound and intensive use in the new rural construction.

7.0 ACKNOWLEDGEMENTS
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8.0 REFERENCES
A REVIEW ON PLACE ATTACHMENT INDICATORS AND CHARACTERISTIC OF PLACES

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Abstract
Identity makes places recognizable, having unique character of its own, being distinct from elsewhere and support social cohesion and well-being. Equally important, it is also appears to develop unique and multiple experiences, meanings and emotional sense among people with the places they live in, which referred to as a sense of place or its associated concept called Genius Loci. Realizing the importance of the concept of identity, this paper seeks to discover the unique and distinct characteristic of places which attuned to create unique environment and make a continuing contribution to the small town’s image; places where old historical reserves remain unspoil yet is largely being neglected and threatened in this new paced of twenty first century. Through detailed and critical review of existing literature, it is evident that physical built environment by means of the cultural built heritage of a place act as an important trigger for identity to emerge. While it is undeniable that such resources are indeed the product of non-visual sources by means of subjective meanings, experiences, beliefs and past history of the milieu, the paper further concludes by illustrating people-environment relationship as a form of symbiosis that is vital for place identity development.

Keywords: historic building, identity, place, small town, values

1. INTRODUCTION
Each place has historical reserves that confer on them a sense of place and identity through the meanings and values that they provide. Nevertheless, the role of place or physical built environment in identity development has not been brought to adequate attention in psychology literature (Hauge 2007). In fact, there is promising tie between the two (Graham et al. 2009). Notwithstanding the lack attentiveness of a place, it is evident that other formulated identity theories such as the social identity and identity process theory will, to a lesser degree be accompanied with the place reference (Hauge 2007; Twigger-Ross &Uzzell 1996). In this sense, the necessity of incorporating place in establishing and sustaining the identity is thus unquestionable. Simultaneously, it is essential to propagate the notion that identity of a place is not only influenced by the meanings held by the inhabitants but also by the quality of the physical elements presence on that setting.

Place definitions include the concentration area of in situ cultural material or region of land where past human activity is manifested physically (Pearson & Sullivan 1995). According to English Heritage (2008), any fixed part of historic environment with distinctive identity can be regarded as a place. Inevitably, it is human experience and value that give meaning to any particular place (Tuan 1977). This is what Shuhana &Norsidah (2008) is suggesting when they view place as a setting that
is constructed by physical, social and psychological components. To continue, Lewicka (2008) broadly defines place as the city, the district, the street, and the house. The focus of this study is on small-scale town: a place where significant number of historic buildings remained intact yet often underestimated and overlooked (Yuksel & Iclal 2005).

Ministry of Housing and Local Government (2010; 2006) in the National Physical Plan-2 (NPP-2) and National Urbanization Plan (NUP) has calls for the identification and development of any potential small towns in respect to their special features and historical niches. This encouragement however cannot be achieved without knowing the unique identities and characteristics that can contribute to the overall sense of the towns. In this regard, this paper critically reviews the key concept of identity comprising the definitions, and characteristics of place in influencing identity development. These will be discussed consecutively in the following sections.

2. PLACE IDENTITY
Identity makes places recognizable, having unique character of its own, being distinct from elsewhere (Lynch 1996; Noor Suzaini 2007), and support social cohesion and well-being (Faizah 2009; Pearson & Sullivan 1995; Rodwell 2007; Twigger-Ross & Uzzell 1996). Equally important, it is also appears to develop unique and multiple experiences, meanings and emotional sense among people with the places they live in, which referred to as a sense of place or its associated concept called Genius Loci (Puren et al. 2008). Realizing the importance of the concept of identity, this paper seeks to discover the elements of identity which attuned to create unique environment and make a continuing contribution to the small town’s image.

Place identity found to carry two meanings, one of which is a set of place features that guarantee the place’s distinctiveness and continuity in time (Lewicka 2008). As suggested by Shuhana (2011), distinct elements or characters present in a place are the qualities that one should consider when describing identity. In addition, Lynch (1960) asserts the significance of physical features such as the landmarks, paths, nodes, edges and district when defining place identity. While some emphasize the physicality of place as an important aspect of identity, others may have slightly different version of this construct. Harner (2001), for example, advocates place identity to be intertwined with meaning and experience people have with a place. To put in differently, it is values or meanings that make a place distinct and significance transcending others (The Getty Conservation Institute 2000).

For the purpose of this study, the emphasis is on physical and non-physical qualities, as both are often emphasized as the two primary elements in identity development (Haug 2007; Norsidah 2010; Shuhana 2011). As argued by Relph (1976), they are the raw materials of the identity of a place that complement and influence each other.

2.1 Physical Qualities
Until very recently, drastic changes in the physical environments due to imbalance development would very likely cause loss of distinct identity and exceptional character present in most urban centers in Malaysia (MHLG 2006). From this commentary, it is understood that one of the most
important elements that play an important role in influencing the identity of place constitutes the physical form of human works. As suggested by Shuhana (2011), identity is about ‘…distinctiveness of the physical environment and the ability for it to be recognized or recalled vividly by the observer’. This notion is further supported by Lynch (1960), however, the author argues that such physical elements must be visible, easily readable, adaptable to human inquiry, serve an emotional importance to inhabitants and importantly, to be of significance in the cityscape.

A study runs by Izuandi (2010) in Pekan Parit, a small town in the second largest state of Peninsular Malaysia reports ten physical elements of townscape that are critical for building place identity. These attributes include the enclosure or outdoor room, gateways and change of level, closed vista, deflection, incident, punctuation, narrowing, fluctuation, projection or recession, and public and private space of the town. On the other hand, the term townscape as referred by Feilden (2005) depends upon ensembles of building, the spaces they stand in, roads and public spaces. Furthermore, Stubbs (2004) opines landmarks and neighbourhoods which familiar among the local to be another important physical component of imageability that serve intrinsic motivation for any city to work better. Apart from accessibility, legibility, vitality, diversity and comfort qualities, the responsiveness or the ability of place to accommodate activities is also found as a vital attribute of place that influence the place distinctiveness (Norsidah 2010). This suggests human activities as one among other characters of place that shapes the identity of that place (Relph 1976; Shuhana &Norsidah 2008).

Despite the plethora of notions on what constitute to place distinctiveness, many of the authors have referred to these vivid or unique character as the historic buildings present in heritage place. Conservation of these old legacies in itself is largely inspired by its role in instigating, preserving and promoting the identity of a place (Arazi et al. 2010; Kamarul Syahril et al. 2008; Lee & Lim 2010; Noor Amila et al. 2010; Suhana et al. 2011). For real, it is undeniable that there are other possible reasons for their protection but these will not be discussed explicitly in this paper.

Along with collective memory and social value, historic urban features are believed to be salient sources for both local and national identity (Goad & Ngiom 2007; Mansfield 2008). As Kamarul Syahril et al. (2008) suggest, historic buildings which are of immense architectural and historical value are the one that provide us a sense of identity and continuity especially in this ever changing world. Noor Suzaini (2007) however made a point that only buildings that are unique to the city can be measured as part of identity to the city. In similar context with a small town, Muhamad Khairuddin (1996) believes that the physical elements particularly the old historical buildings are the one that make the most significant contribution in conferring such township its unique image. Nevertheless, qualities of such assets have not always been appreciated and valued in a small-scale town. As argued by Yuksel &Iclal (2005), they became indispensable if only the resources of the big historical cities start to be exhausted.

It is argued in this study that the concept of identity essentially derived from a complex combination of physical observable feature and the abstract qualities it has. While it is true that architectural
distinction of historic buildings heighten the sense of place, it is the meaning or value embedded in places that bind people intimately and make ordinary places became unique and distinct from elsewhere. The latter is thus to be discussed in the following section.

2.2 Non-Physical qualities
Lack of meanings weakens the identity of a place (Shuhana & Norsidah 2008). Readiness and distinctiveness of physical structures are essential prerequisite for building identity but people’s feelings, perceptions or meanings always form the very basis for this construct (Arreola 1995). This is where the attachment to a place develops and secures the place identity (Norsidah 2010). It is generally view as an affective bond or link that always present between people and specific settings (Norsidah 2010; Schroder 2008). Despite being influenced by the physical and functional qualities of a place, place attachment is strongly facilitated by symbolic meanings and emotions attributed to such place (Shuhana & Norsidah 2008). The role of this attribute in defining the identity of a place was noted to be one of the inherent qualities of historic places (Pearson & Sullivan 1995; Rodwell 2007).

In Harner’s (2001) study of place identity in two copper mining towns in Sonora, Mexico, the author opines that place identity develops when meaning of a place for the majority of residents matches the ideological beliefs of those in power. In this circumstance, equilibrium between means and meaning is claim to be achieved. In essence, Shuhana (2011) refers this notion as a social construct of the image. To continue, from Pearson and Sullivan (1995) point of view, a place in itself may have no tangible evidence of human works but to embed with particular legend or belief. Overall, it is evident that intangible elements of meanings or values are important to local uniqueness and identity for particular places.

Cultural heritage value of a place is not static, multi-faceted and dependent on human’s perceptions. These attribute of significance has implications, one of which is that there is no international agreed on typology of values, nor any definitive method for assessing them (Mason 2002; Pearson & Sullivan 1995). Diversity in interpretations of the values in cultural property as illustrated in Table 1 is therefore needed in that it simply establish some ground in finding agreement for these values. In most instances, there is a great overlap among the values devised by individuals from different disciplines and interest backgrounds. For instances, scientific or technological value outline in Feilden’s typology of value (as an architect) is minimized in the category suggested by Mason (as preservationist) as it is seen to be derived from historical value.

Table 1: Diverse categories of heritage values developed by different stakeholders

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<td>Emotional: Wonder, identity, continuity, respect and veneration, symbolic and spiritual</td>
<td>Associative or symbolic Aesthetic Economic Informational</td>
<td>Sociocultural: Historical, cultural or symbolic, social, spiritual or religious, aesthetic</td>
<td>Use: Economic Non-use Option, existence, altruistic, bequest</td>
<td>Public or community: Historic, aesthetic, social Traditional, historic and contemporary</td>
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Cultural
- Documentary, historic, archaeological and age, aesthetic and architectural, townscape, landscape and ecological, technological and scientific use
- Functional, economic, social, educational, political

Economic
- Use (market)
- Non use (nonmarket)
Existence, option, bequest

or endowment

Scientific and research


Table 2: Criteria for assessment of local heritage places in Australia and England

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<th>Criteria</th>
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<td>Design landscape</td>
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Source: Adapted from Development Act 1993; English Heritage (2010; 2008); NSWHO (2011); HCWA (2012)

Similarly in Malaysia, the criteria outlined under Section 67 of the National Heritage Act 2005 are also found to be common to the four generic values given in the interpretation of cultural significance in the Charter. Nevertheless, while being too broad to be used in real assessment practices in Malaysia, the criteria are only pertinent for assessing places at the national level and thus, not readily adapted for local use (Ahmad Sarji 2007). Absence of provision for their identification and protection in some cases cause the significance of such places to be underestimated. English Heritage (2008) sees detail study and analysis to be the right steps to be undertaken in establishing value for these places. The task, as described by Australia ICOMOS (2000) requires the assessment and preparation of the statement of cultural significance. Comparing the value with existing criteria for assessment as have been devised in Australia and England can make the process more efficient and hence bridge to value establishment.

Further to this, it is imperative to have some idea of what the criteria means before the assessment take place. It would appear that the terms provided in the ICOMOS Burra Charter 1999 are used as the main headings for the criteria outlined below. The Charter, as Pearson & Sullivan (1995) emphasize is widely accepted and therefore ‘…helpful, where appropriate, to use the terms and processes laid down there’.

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i. Aesthetic value
A place is deemed to be of aesthetically valuable when its particular design was judged to be universally admired. Nevertheless, a place without supreme architectural quality may also acquire this value through the accretions of time.

ii. Historic value
In most cases, the very notion of heritage is deeply rooted in this value. A place with historic value tends to connect or carry present’s mind back into the past people, events and aspects of life. And this will become stronger and more noticeable if it is manifested in physical form of a place.

iii. Scientific value
Various called as archaeological, research or informational value, a place is claimed to be scientifically significant if it has demonstrable potential to yield information that will contribute to an understanding of the architecture, earlier technology, behavior, environment, culture and history of the local district.

iv. Social value
A place with social value tends to develop positive local’s sense of place and identity. It is often regarded as significant through association with a community or cultural group in particular local district for cultural, educational or spiritual reasons. While being the hardest criterion to be identified, people often mistakenly believe that places are socially valuable for amenity reasons.

Off the four organizations present in the horizontal row of Table 2, only Heritage Council of South Australia considers economic value as one of the criteria for assessing place that are important to their locality. As described by Mason (2002), one of the hostile challenges in considering this new value is because it differs from other cultural values established in the traditional modes of assessment process. Notwithstanding the fact, this paper tends to address economic value as one of the prominent criteria to be considered especially in this new paced of 21st century. As one would expect, modernization or globalization brings about much strain on old historical reserves present in particular place. For this reason, there must be an economic potential proffer by them in order to remain revered and preserved (Tiesdell et al. 1996).

The term ‘valuable’ which often correlates to historical reserves itself hold these resources to be meaningful in economic globalization (Rypkema 2002). This is especially true when linking heritage conservation with tourism (Chang 2010; Henderson 2002; Rypkema 2001; 2002; Feilden 2005). This notion can be seen in Henderson’s work in which majority of the principal urban heritage found in the former colonial cities of Malacca, Penang and Singapore are transformed into places for tourists to visit though some might regard it as a new form of imperialism (2002). Clearly, it is wise to preserve the quality of irreplaceable historic resources while making revenues from them.
3. CONCLUSION
Symbiosis between physical form of environment and social meanings appear to be central to the
delineation of identity. Previously, not been adequately explored, the role of the former as one of the
important factor for identity is provable through the imageability, legibility and visibility qualities it
provides. As a rule of thumb, people tend to remember things that are observable and it is difficult to
evoke human senses without distinctive physical marks. Form as part of the place’s charm and
appeal, any historic building, groups of buildings or more generally a place, which constitutes to
local distinctiveness, and which embodies community’s experience and meanings need to be
preserved and enhanced. This is especially important in small historic towns that often see as an
alternative provider for built heritage. The risks of being deteriorated by traditional causes of decay
and threatened with exhaustion by the process of globalization certainly aggravate the situation. For
these reasons, it is important to identify the resources while examining the meanings that people
attach to them. As practiced in Australia and England, aesthetic, historic, scientific, social, economic,
evidential, age, group and design landscape are the established criteria used in identifying elements
that will be of significance to their locality. The first four values have been identified to be common
to the most enduring definition of cultural significance given in the Australia ICOMOS Burra
Charter. Such established practice is what our country Malaysia needs to learn as the first step
towards sustaining distinctive characteristics of local heritage places.

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THE GAJAH MENYUSU (SUCKLING ELEPHANT) HOUSE – THE MALAY VERNACULAR ARCHITECTURE OF LANGKAWI

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Abstract
This paper examines the traditional Malay architecture of the gajah menyusu (suckling elephant) house of the island of Langkawi. It is dwindling in number and faces crisis in sustaining its architectural image. It is rich with cultural, social and environmental attributes and it has portrayed an enormous consideration for construction in the way it relates to nature and its surroundings. The methodology of this research requires thorough literature review supported by surveys, architectural documentation, interviews and visual data collection. The gajah menyusu house exhibits many ways of designing a house that is suited for the climate, weather and the environment. Importantly, the early builders knew how to construct a habitation for comfort that serves its function as a place for shelter from the elements and safety from wild animals. The gajah menyusu house although features a humble appearance, is rich with traditions that are almost spiritual. It manages to create a more meaningful space for habitation. It is a clear indication that the constructions, the embellishments and the space planning that make up the house strengthen the spiritual being right from the exterior to the interior living space. The history and the heritage of this house speak of the glorious yesteryears. Learning from the gajah menyusu house’s past and customs that are associated with it will revive the knowledge in designing and constructing houses in the tropical climate for the comfort of the inhabitants. It will also breathe a new life into this iconic feature of Langkawi.

Keywords: traditional, spiritual, customs, space planning, embellishments

1. INTRODUCTION
Langkawi Island, known for its tourism activities is in search of its own iconic traditional Malay architecture. Through the legend and history of Langkawi, being ruled under the king known as Maharaja Merong Mahawangsa (Hanapiah, 1995) and other rulers relating to the Hindu Kingdom of Langkasuka and the Malay Muslim Kingdom of Patani, this island is known to have a rich cultural heritage. One aspect of this island’s charm lies in its traditional Malay house. The traditional Malay house of gajah menyusu or ‘suckling elephant’ house is one form of traditional Malay architecture that began the evolution of house design in Malaysia. It is also an indicator of a regional style of a village house (figure 1).
It is a familiar form of a village house in the northern region of the Peninsular Malaysia; however, this style of architecture has long seen its glory days (Chen, 1998). It is facing extinction coupled with the development of modern housing that moves away from any traditional form of house design. This paper investigates the *gajah menyusu* house in Langkawi, an island off the north-west coast of the Peninsular of Malaysia (figure 2). The region comprising particularly of Penang, Kedah and Perlis states, sees the dwindling in numbers of this type of traditional Malay house due to rapid housing development and new technology in construction materials.

In Langkawi, traces of this type of house can still be detected although the original form no longer exists. This is due to the houses being abandoned and in dilapidating conditions due to lack of maintenance. However, some of the houses, although still retaining the original form of the *gajah menyusu*, have seen new extensions added on due to the space demands of the owners (figure 3). This is particularly true when the owners require new and easy types of construction for the
additional spaces. It is apparent particularly in the new form of the rumah dapur (kitchen). It no longer features the original form but of a more modern appearance with bricks and mortar as materials of the house and corrugated zinc roof to replace the nipah (palm) fronds roofing (figure 4). The gajah menyusu house (figure 5) is derived from the act of an elephant suckling its young. The formation of the gajah menyusu house (figure 6) is recognised by the shape of its roof whereby the form of the main house is higher than the roof of the veranda (Mat Jusin & Irin, 2000). Hence, the structure is seen as similar to a baby elephant being fed by its mother. Information that is available on the gajah menyusu house talks only about the architecture with little emphasis on interior space planning, the detail embellishments and the philosophy or cultural relationships that will explain how this style of architecture came onto the scene. Historically, the gajah menyusu formation is said to have been derived from the mode of transportation of using elephants to move around as well as to carry loads. This is true in Langkawi as previously many rulers were involved in many battles that used elephants as military animals. It is a reflection of the animal’s agility being portrayed in the features of the house.

Current information available only points out the basic data and neglects the cultural and social aspects in detail. This is regarding the cultural influences particularly of the Malay culture, the philosophy and the ‘whys’ of the design was created as well as the environment that this architecture style was erected within its perimeters (Hanafi, 1999). Every space designed for this house carries its own meaning and the space planning involved speaks of a deeper cultural background. The rituals, customs and traditions that are associated with the gajah menyusu present a new understanding and meaning to the interior space planning and the display of the detail embellishments. The detail embellishments relate to the decoration such a carving, air vent, interior finishes and many more detailed embellishments to the house. Many people do not understand the importance of the elephant suckling house in terms of its design and knowledge that it imparts on its association with sustainable design, the current hot and debated issue. The elephant suckling house has a lot to offer regarding the application of nature related elements such as natural ventilation and natural lighting and resorts to less dependency on modern technologies and facilities.
2. OBJECTIVES
The objectives of this research are mainly to stress the importance of investigating the remainder of the *gajah menyusu* houses on the island of Langkawi. The objectives are as follows:

a. To examine the interior space planning of the *gajah menyusu* houses for their functions
b. To study the philosophy that is related to the interior space planning, the surrounding environment as well as the functions
c. To analyse the cultural influences on the interior space planning and the functions of the detail embellishments and the philosophy associated with them

3. METHODOLOGY
The research is applying a qualitative method. Some of the processes run concurrently with others due to their close vicinity to the running activities or requiring some methods to be applied at the same time. The first stage sees the reviewing of the existing literature on the *gajah menyusu* house. The importance of the configuration of this house has to be taken into consideration for the understanding of the interior space planning.

Other related literature will look into Malay cultural issues that comprise customs and traditions relating to building a house. Thus information acquired to all cultural related literature will be used to relate to the *gajah menyusu* house. These additional sources are specifically in Malay culture and other influences that could be found in Malaysia. The island of Langkawi (figure 7) is the location for the field work. There are a few villages that still maintain the existence of the house though some of them have seen some modifications due to the requirements of the owners. These include the

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Figure 7: Map of Langkawi Island
villages of Kampung Bukit Temin, Kampung Temoyong, Jalan Kedawang and Kampung Padang Matsirat located in the Mukim of Ulu Melaka, Mukim of Kedawang and Mukim of Padang Matsirat respectively. Apparently, the identified houses are located in the central part of the Langkawi Island and close to the location of the tomb of Mahsuri. A pilot study identifies specific houses in these areas before further work takes place. This research method involves some experts on the traditional Malay house with the structured interview as well as the owners of the identified *gajah menyusu* houses through non-structured interview. This process runs simultaneously with visual data collection. These steps are focussed on the house usage by the owners and their perception of the detail embellishments of the interior of the house. Visual data collection is the collection of evidence of the *gajah menyusu* house relating them to the findings of the cultural philosophy, customs and rituals. Images are still and moving images to capture the lifestyle of the dwellers of this type of house and decorative details incorporated into the house. Visual data is strengthened with the analysis from the field work before documenting it into a written format. The documentation presents a better understanding of the *gajah menyusu* house.

4. **THE GAJAH MENYUSU HOUSE IN LANGKAWI**

Through the process of interviews with several house owners in Langkawi, the identified *gajah menyusu* houses are, on average, fifty years old or more. Although some of the houses still feature the original forms of the *gajah menyusu* house, they have already shown signs of deterioration due to lack of maintenance (figure 8), being abandoned (figure 9), the house owners building new houses next to the old ones or the owners simply moved away and only come back to the house every once in a while (figure 10).

![Figure 8: Lack of maintenance house in Kampung Bukit Temin](image1)

![Figure 9: Abandoned *gajah menyusu* house in Kampung Temoyong](image2)
Physically, the *gajah menyusu* house is a two-structure form that resembles a baby elephant suckling its mother but on the whole it is divided into three compartments. It comprises a kitchen, a smaller version of the structure, separated by *selang* (figure 11), the passageway that connects to the *rumah ibu* (main house) the biggest structure of the two (figure 9) (Chen, 1998). Every component has specific and different functions although they are interconnected by a passageway. The unique functions, divided into domains, communal and personal spaces, of these components contribute to the creation of the suckling baby elephant house. The kitchen (figure 12) portrays a difference between the two structures by a drop in its floor level and the ridge of its roof (figure 13).
All these spaces have specific functions and are divided into the domains of men and women (figure 14). Most active areas for the women are the kitchen and the passageway (figure 13) while for men the area is the front of the house, the veranda (Lim, 1987). The main form of the house defines a communal space where all community activities take place. The front space of the house is where guests are received (figure 15) and will be brought into the main area where more formal functions take place (figure 17).

Externally, the gajah menyusu house is a construction that combines physical and psychological factors (Mat Jusin & Irin, 2000). It takes priority of the location and the climate that houses the structure (figure 18). The design for the house always responds to the climate where orientation of the sun plays an important role in locating the house. Controlling the direct solar radiation is vital while controlling glare from the open skies and surroundings by ample overhangs also doubles as a protection against rain.

Most of the time, this house is built with greenery and plantations surrounding it to cool the temperature off the air that envelops the house. Often, of these trees are fruit trees with spice plants and herbal gardens that provide food supplies for the house owners. Ventilation is also important to provide an adequate cooling effect, while reducing the impact of humidity for the tropical setting requires methods for such effect (figure 19). Thus the house form constructed complies with the design that is influenced by the weather (Hanafi, 1996). The house design exhibits the traditional way of constructing it. It is always built on stilts or columns to reduce humidity as well as to provide natural ventilation and to avoid flood. At times the house on stilts provides protection from wild animals as most of these houses are built close to the forested areas while keeping the interior spaces dry during rainy season (Killmann, 1994). Lightweight material (figures 20 & 21) is used for the walls to avoid heat retention while roof material is made of nipah palm fronds that provide good insulation against heat.
Figure 18: External environment of a typical traditional Malay house (Adapted from Lim, 1987)

Figure 19: Physical and psychological factors affecting the design (Adapted from Lim, 1987)
Internally, the house designed is not just for personal use to shelter families but also a place for communal activities, a gathering space for comfort and peace. The breakdown of the interior space planning iterates the various functional spaces. However, all of these spaces function with no definite boundaries. Only the activities can determine the use of the spaces (i.e. cooking – kitchen, communal activities – main area). The invisible borders create an openness of the interior of the house thus making the internal part seem big and airy. Since there is no ceiling constructed, the roof structure is left open directly to the underside of the roof. Spacious interior is created with almost a double volume due to the open roof configuration. This situation in the interior design of the gajah menyusu house provides a cool interior in tropical climes that is governed by sun heat, radiation, rain, wind and humidity. The components of the gajah menyusu house go further, with not only providing the basic shape and construction of a house but also displaying a lot of embellishments that function just as importantly as the main structure of the house.

5. EMBELLISHMENTS, SYMBOLISM AND IDENTITY
The identity of the gajah menyusu house reflects the details that are involved in the creation of a holistic construction. The details are heavily laced with customs, traditions, rituals and philosophies hence the embellishments. Although simplicity is the utmost goal for constructing the gajah menyusu house, the embellishments are ornate thus giving pleasant aesthetical values. As all of the embellishment motifs are derived from nature, they reflect the sensitivity and observation of the Malay people of respecting the environment (Bahauddin, 1999). The Malay people have gone through various cultural influences namely beginning from the animism, Hindu-Buddhism, Islam and Western periods (Dawa, 1995). In particular, the island of Langkawi had been under the influences of the Hindu Kingdom of Langkasuka and the Muslim Malay Kingdom of Patani. These various traces of influences are visible in the embellishments in one house design. The interlace meanings can be found and interpreted according to the rituals and customs. The ornate air vent functions as an opening to allow natural ventilation to pass through to cool the interior of the house. Its design will always be one of the Malay traditional flowers motifs derived from flowers such as rose (mawar – rosa spp), bunga tanjung (mimosops elengi L), tropical gardenia (bunga china – gardenia augusta), tropical magnolia (bunga cempaka – michelia champaca) (figure 22), frangipani (bunga kemboja – plumeria acuminata) (figure 23), ylang ylang (bunga kenanga – canagium
orodatum) (figure 24) and jasmine (bunga melur – jasminum sambac) (figure 25) motifs. These flowers are considered the sacred flowers in Malay culture.

![Figure 22: Frangipani](image1) ![Figure 23: Tropical Magnolia](image2)

Figure 22: Frangipani     Figure 23: Tropical Magnolia

![Figure 24: Ylang ylang](image3) ![Figure 25: Jasmine](image4)

Figure 24: Ylang ylang     Figure 25: Jasmine

It is believed that the air passing through the opening vents is perfumed like the flowers that the motifs have been carved from and featured in the air vents. The same case applies to other type of embellishments (figures 26 & 27).

![Figure 26 – Ornate embellishment based on a flower motif](image5) ![Figure 27 – Flower motifs for air vents](image6)

Figure 26 – Ornate embellishment based on a flower motif     Figure 27 – Flower motifs for air vents

The gajah menyusu house displays a unique understanding of traditional Malay customs and rituals. It is shown that the embellishments found in the gajah menyusu house are constructed for the aspects of air ventilation, sun shading devices, aesthetical reasons and security (Hanafi, 1999). Although the embellishments are seen as traditional art forms, they are functional art forms to support the existence of the gajah menyusu house. The detailed motifs of the embellishments are basically patterns derived from plants or flora, stylised animals or fauna, geometrical or arabesque, food and court objects (Bahauddin, 2002). The symbolism that involves any type of traditional Malay house often refers to the application of materials according to instinct (Nasir & Wan Teh, 1996). This is true with the case of the gajah menyusu house. Nature and the environment become the reference.
points for construction materials and at the same time the examples for embellishments in making the houses more aesthetically pleasing (figure 28).

![Image of window rail](image1.png) ![Image of authentic design of air vent](image2.png)

However, the reference point only features a simple appearance yet effective with the design of the details that contribute to the authenticity of its design (figure 29). The details in totality give birth to the high quality of display of house construction and reflecting the Malay life style that is full of traditions and spiritual beliefs. In this humble design and construction, a lot of information on designing related to nature and designing with nature is tabled. Methods, details and processes from the past can be reused as they have succeeded in blending in nature. Above all, this design has shown that human kind has coexisted with nature with the humans respecting nature to ensure comfort for generations to come in their house construction.

6. CONCLUSIONS

The *gajah menyusu* house in Langkawi, though humble in its appearance, has shown a house construction that is intelligent and smart in responding to nature and its surroundings. The analysis of the facts of the *gajah menyusu* house that incorporated traditional cultural issues such as philosophy, traditions, rituals and customs have resulted in the outcomes as follows:

- An understanding of interior space planning in a traditional Malay house according to functions.
- The determination of an excellent ventilation system, natural lighting, and energy efficient artificial lighting of the interior.
- A deeper comprehension of the application of detail embellishments in relation to their function and cultural requirements. This is also true with the vernacular design of ventilation, natural lighting, and artificial lighting.
- A comprehension on the interior space layout in relation to sustainable home design which can be used further as a comparison to modern design dwellings.
- A deeper understanding of the traditional construction of a traditional Malay house according to rituals, customs and traditions.
- An analysis of the decoration and furnishing that have been integrated with the local identity and appearance as well as the needs of durability and easy maintenance services.
• An understanding of the requirements of this house design for construction in specific environments and climates that also exploits exceptional views and access to the natural surroundings.

• A finding that the minimal partitions or interior walls of the traditional Malay house have allowed for the flexible use of space, mainly for communal activity.

This paper has shown that the heritage and culture that are represented in the *gajah menyusu* house is a treasure that has been passed on through generations. However, the culture is dying out due to the modernisation and new technology in building construction. The lack of interest in this type of architecture especially among the young generations ensures the demise of the knowledge. The *gajah menyusu* house in Langkawi has outlined all the rules about designing in and with nature. It has also shown that mankind can coexist with nature that perpetuates their existence. The heritage and culture found in this simple house are more than meets the eye. The *gajah menyusu* house is the embodiment of the Malay culture starting from its uncomplicated beginning to a higher standard finishing. It features knowledge that tells stories of bygone eras through its construction, embellishments, interior space planning, materials, form and shape. Most important of all, the *gajah menyusu* house in Langkawi has put forward an identity that is intelligent in design and in combining traditional customs, rituals and philosophies in every element of the form. It is a house that displays design sustainability with aspects of economy, social and environmental as the prime factors, that at the end creates its character and identity in a cause that is full of history and cultural elements.

Above all, the *gajah menyusu* house in Langkawi can be viewed as the iconic architectural element of the island in perpetuating the valuable asset of the tangible cultural component of Langkawi. Under the *Pelan Pengurusan Langkawi Geopark 2012-2030* (Langkawi Geopark Management Plan 2012-2030), Lembaga Pembangunan Langkawi (LADA) has pointed out that any traditional house falling under the category of current cultural heritage and must be preserved (Hashim et. al, 2011). Ultimately, the *gajah menyusu* house can play a role in making the plan a success.

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8. REFERENCES


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POST-PROJECT REVIEWS IN CONSTRUCTION MANAGEMENT: BENEFITS, BARRIERS AND SUCCESS FACTORS

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Abstract
Learning lessons from projects can feed into the project assessment, risk analysis, or initial planning of the next project. However, according to the nature of the projects which are temporary organizations any accumulated learning in the project will dissipate at the end of the project without paying attention to collecting and disseminating of that knowledge. It is argued that Post-project reviews as one of the most effective techniques in knowledge management play an important role in capturing, sharing and transferring knowledge between projects. However, increasing evidence points to a paucity of research that has investigated the nature of the different approaches to improving the effectiveness of knowledge sharing, the appropriate organizational factors at play for knowledge sharing to be fully exploited, and its benefits to construction Firms. Therefore, this paper aims to provide an insight into the key factors, barriers and presents different views over conducting post-project reviews in construction projects. Through literature reviews the key issues associated with conducting effective post-project reviews in organizations were listed and opinions on these were sought from authors. Moreover, the paper presents some key aspects of the findings and offers targeted conclusions and recommendations for the benefit of organizations, industry and academia.

Keywords: construction management, lessons learned, post-project review

1. INTRODUCTION
How to learn from projects has long been a problem with project-based organizations, almost forty years ago Middleton (1967) stated that lessons learned on one project may not be communicated to other projects, and he identified that splitting normal functional responsibilities and not having enough qualified experienced employees to spread among all organization as two reasons for this problem in project-based organizations, but today our views might be different, Packendorff (1995) looked at projects as organizations rather than tools and said “Theories on learning in projects -- i.e. theories on how project work causes learning at the organizational as well as the individual level, and how this learning can be made useful to the organization in subsequent projects -- are almost non-existent today”, he emphasizes on studying learning between projects not only within one projects, and Sense (2002) claims that there is a great potential for learning in projects even though this is neglected in traditional project processes, and looked at project as organization.

Construction is a complex mix of several sectors of the economy. It is not only a project-oriented industry (Egbru, 2004; Ellis et al., 2004; Chen et al., 2005; Fong and Chu, 2006) in which a project is the typical and symbolic business manner where construction-related organizations interact and new participation and human relationship take place whenever a new project starts. It reflects a
knowledge based industry (Carrillo and Anumba, 2002; Carrillo et al., 2005; Fong and Chu, 2006) that relies heavily on knowledge input by different participants within the overall project team, and a labour-intensive business sector that requires the necessary manpower to continually seek and apply knowledge for performance improvement during the course business via the project mode (Nesan, 2004).

Post-project reviews are debriefing sessions which are used to highlight lessons learned during (or at the end of) the projects (Tan et al., 2010), they are the most common approach used in construction industry to capture the learning from projects (Orange et al., 1999). The importance of post-project reviews is to capture knowledge about reasons of failures, how they were tackled and (in some cases) identification of best practices in a project (Ruikar et al., 2003). Interchangeably the term of "post-project review" is used with its variants, such as Debriefing (Schindler and Eppler, 2003), Post Project Appraisal (Gulliver, 1987), After Action Review (Cross and Baird, 2000), Project Post-Mortem (Williams et al., 2001), Post Implementation Evaluation (Kartam, 1996), Project Audit, Project Closeout and Post Completion Review.

2. VIEWS OVER POST-PROJECT REVIEWS

von Zedwits (2002) state that among a number of important mechanism, the post project review is one of the most structured and most widely applicable approaches to passing on experience from one team to the next and the main objective of post-project reviews is to initiate and facilitate continuous learning on all levels within an organization. He considers post-project review as one opportunity to improve performance in future projects systematically, and states that post-project reviews should focus on capturing process knowledge in order to enhance the subsequent project performance, and consequently it is differ from regular project audits (duffy, 1989;neal and homes, 1990) or project evaluations (Saladis, 1993).

Anbari et al. (2008) indicate that the historical database which is the product of post-project reviews process, enables project teams to develop meaningful project plans based on their organizational learning cycle. The information on specific staff set needs, and the profile of the customer and operating environment can be provided by this database and be used by managers and project team, and consequently the ultimate success of projects and project management can be achieved. He then identifies that providing an important opportunity to link the effectiveness in meeting project goals, efficiency in utilizing the resources assigned to the project, and transfer of the special knowledge gained in performing the project to other projects, which is essential to the overall performance improvement of current and future projects, project management processes, and the organization as a whole is one of the main role of post-project reviews.

Disterer (2002) indicates that the ability of comparing various projects in a company more systematically and systematic documentation of its most effective problem solving mechanism is another benefits of having the formal retention of project experiences and in addition helps to reduce project risks, from a long term perspective, it enables the enterprise to develop project competencies which lead to a sustainable competitive advantage. He then argue that many technical issues,
organizational aspects or special social situation can be covered through questions and discussions which are raised during reflection and documentation process in lessons learned.

Disterer (2002) claim that losing the knowledge at the end of the project is a serious problem which many companies are faced especially in a knowledge intensive industries (like construction industry), considerable costs, which results from redundant work and the repetition of mistakes, could be avoided if they run the project learning cycle. He then claims that experiences which are created during the course of the projects are often not a part of a project's documentation and hardly accessible to other project team. it's mainly due to returning project team members to their line functions after completing their tasks in the project and partly due to taking their new experiences with them which are only accessible through informal networks.

2.1 Why Learning from Projects and Learning Lessons are Important?
Abramovici (1999) states that “lessons learned” is a good thing to do, while outlining some basic practices. Also, Pinto (1999) indicates that information systems projects have a poor success recode, describes evidence supporting this and reason for it, then goes on to stress the need to pass lessons learned downstream through post-project review meeting. In the field of complex product systems Davis and Brady (2000) emphasize on a step in the learning cycle of such projects, and said that “lessons learned from the project and recommendations for improvements can be transferred to current or succeeding projects.” Kerzner (2000) allocates the highest level of project management maturity in organization to continuous learning and improvement, and states that “without ‘discounted’ lessons learned, a company can quickly revert from maturity to immaturity in project management. Knowledge is lost and past mistakes are repeated.” Berke (2001) places Best practices and lessons learned as the building blocks of organizational learning and organizational knowledge.

Kotnour’s (2000) influential survey of 43 project managers within the Project Management Institute, based on subjective measures, indicates that project management performance is associated with project knowledge; project management knowledge is supported by project learning activities; the level of activity of producing lessons learned is related to inter-project learning; and that “learning support” is needed for all learning activities.

Turner, Keegan, and Crawford (2000) state that Learning how to manage experientially and reflect and gain of these lessons are very important for project managers.

Learning lessons from projects can feed into the project assessment, risk analysis, or initial planning of the next project. Neale and Holmes (1990) describe a survey of finance directors in 1,000 companies regarding post-auditing procedures for Capital projects, they conclude that post auditing can "radically improve the quality of investment decision-making". Azzone and Maccarrone's (2001) survey of 124 Italian firms indicates that generally lessons are used to feed into improving project-management processes and improve management decision-making.
Lessons learned procedures are important to disseminate knowledge within the project team, beyond the team to other projects, and even to other organizations (T. Williams 2007). Busby’s (1999) study of post-project review meetings highlighted one main strength as disseminating knowledge within the project team and promoting remedies; dissemination to other projects was also mentioned.

Lessons learned are useful for benchmarking. Garnett and Pickrell (2000) describe some action research developing a methodology for benchmarking in the construction industry, noting that much of the benefit was derived from generating and sharing ideas in the interactive activity rather than fact finding about hard measures.

Kumar and Terpstra (2004) note the key role that a post-mortem can play at the stage-gates of the new product development process, as lessons learned in one (usually less costly) phase can feed through to the next phase.

Projects are naturally temporary organizations and any learning which is accumulated in the project will dissipate at the end of the project without paying attention to collecting and disseminating of that knowledge. Ekstedt (1999), for example, defines the idea of “knowledge formation” as combination of learning and embedding that learning in project. He states that permanent organization generally have mechanism for learning but temporary organization not geared for learning, and although individuals become more experienced and able but, there is not mechanism or motivation for that learning to be shared within the company.

2.2 Useful Lessons Learned Specification
There are two particular issues which need more attention to make the lessons useful; First the need to gain depth in the lessons rather than obvious or simple lessons (T Williams 2007). Busby’s (1999) survey identified one limitation of the reviews he studied as shallow diagnosis, he claimed because of (1) a preference for causal rather than diagnostic reasoning (diagnostic learning is harder to do and involves more blame, which is socially awkward but leads to deeper diagnosis), (2) not enough “why,” (3) a norm of constructive criticism inhibits criticism with no immediate solutions. In addition, there is a need to gain generalized lessons rather than lessons specific to that one project. Lack of generalization was another main limitation that Busby (1999) saw in the reviews he studied.

Procedures to learn and disseminate lessons from projects need to be organized. Davies and Brady (2000) claimed in their study of suppliers of Complex Product Systems that “learning tends to be on an ad-hoc basis, with few systematic efforts to spread the initial learning throughout the organization.”

3. PROBLEMS IN CONDUCTING POST-PROJECT REVIEWS
projects are temporary by nature and team members usually are being dissolved after completion the projects, this situation were addressed by many researchers and considered as one of the main problems in conducting post-project reviews, Disterer (2002) indicates this point and argue that spreading people all over the company usually occur after finishing the projects, this situation along with storing documents in some folders which are not contain essential for future use cause project amnesia. He then claim that most companies investing nothing in evaluation and learning from their
projects in comparison with their investment in innovative projects. Another problem is the lack of resources, time and budget are counted as main restricted resources in conducting post-project reviews, so most project teams are losing the chance for systematical rework and document the knowledge and experience (Disterer 2002). In addition to this remarkable individual and social obstacles make articulating and documenting individual knowledge very hard (Disdtere 2001). Another problem is the lack of constructive atmosphere to analyze and articulate failures (Disterer 2002). This situation also cause that project team members avoid admitting mistakes due to scare of negative effects for them. Ann keegan (2001) claim that post-project reviews rarely happen due to time constrain and people without having time for lessons learned are immediately reassigned to new projects so they do not have time for meeting or review lessons learned. In their study they show that learning is spurious and accidental, and emphasis on the importance of willingness of the project team members in capturing and sharing knowledge, at project or organization scale, to report and codify the changes. The results of their study also indicate that the effectiveness of after action review and other efforts to retain what has been learned on projects has been reduced due to time pressure.

Another problem which was mentioned in papers is the inability of ICT in sharing the project learning, "learning from other projects occurred through a process of dialogue, and was only rarely mediated through ICT" (Sue Newell 2004). Schindler and Eppler (2003) during their studies identify many causes for project amnesia as follows: 1) The lack of willingness for learning from mistakes among the people in the project. 2) Inability to do right debriefing methods due to lack of knowledge. 3) Lack of enforcement in conducting project evaluation 4) Lacking recording experience and use them in project process 5) Lacking use of coding experience 6) Inability to coordinate debriefing. Then they identify some other risks related to the lessons which are gathered through debriefing sessions; 1) Lack of well documenting and are not easy to locate 2) Being too generally and are not visualized where necessary 3) Lack of retrieving them due to inappropriate archiving 4) Although they are well documented but not accepted by others.

Another key inhibitor is clearly the lack of time available to undertake such exercises. In Carillo and others’ (2004) survey, 68% stated “not enough time” as a main barrier to learning. Keegan and Turner (2001) cite inadequate time and too many other pressures as inhibitors (also too much focus on retention/exploitation and not enough on exploration). Pan and Flynn (2003) also point to the lack of time as a major reason for a failed lessons learned exercise. Styhre, Josephson, and Knauseder (2004) call for more slack to allow for discussions and training, and cite practical difficulties of arranging a meeting after the project team has dispersed as a significant problem. Schindler and Eppler (2003) also point to the difficulty in coordinating debriefings when people are engaged in new projects, and also point out that there is particular time pressure towards the project’s end.

Neale and Holmes (1990) indicate that an important deterrent to introducing post auditing is that it is costly to do. In Carrillo and others’ (2004) survey, 62% quoted “not enough money” and 49% stated “employee resistance” as main barriers. Bresnen et al. (2002) cite incentives and resources as key factors enabling organizational learning; “implementing reward systems that encourage people to
engage in thoughtful dialogue” is one of Kotnour and Hjelm’s (2002) five management actions to encourage learning; Keegan and Turner (2001) claim that inadequate resources is a cause of unsatisfactory learning. Pitagorsky (2000) said that one common barrier is the “lack of awareness of the connection between process review, lessons learned, and process improvement” so that workers are unwilling to allocate time. More generally, Nonaka (1991) said that the key reasons for tapping tacit knowledge are “personnel commitment, the employees’ sense of identity with the enterprise, and its mission” (quoted by Scarbrough, Swan, and Preston (1999)). The issue of available resources depends on senior management support. Crosman (2002), for example, talking about lessons learned in the U.S. Army says that establishing a lessons learned process needs management support, Pan and Flynn (2003) likewise call for the commitment of senior management on incentives, Winch (1998) notes the increase in sub-contract/self-employed workers in the British construction industry and suggests that this takes away the incentive to provide organizational learning.

In Carrillo and others’ (2004) survey, 76% quoted organizational culture as a barrier. Kotnour and Hjelm’s (2002) argue that four management actions to encourage learning are part of the organizational culture: making learning an organizational goal, reinforcing the learning mind-set of leaders, encouraging experimentation, and building a community of learners. In particular, Pitagorsky [2000], Neale and Holmes [1990], and Busby [1999]) claim that a blame culture will inhibit learning. Styhre et al. (2004) say that when a meeting does happen it’s easier just to praise one another and not address the problems. Glanville (2003) claim that factors which can limit the effectiveness of project reviews include fear of failure, ambition, unwillingness to speak about difficult issues, threat that the project might be stopped or curtailed, and a desire to justify the past rather than manage the future. Two of Schindler and Eppler’s (2003) reasons for failing to learn lessons are “insufficient willingness for learning from mistakes of the persons involved,” and “missing communication of the experience . . . due to ‘wrong modesty’ . . . or the fear of negative sanctions.” Morris and Loch (2004) point to “culture and strategic intent” as “very evident influences” in their empirical work. Pan and Flynn (2003) discuss a case study of a failed project in a Japanese organization, where there was a strong, collective culture that inhibited people from criticizing others and jeopardizing relationships; people were embarrassed by failure and saw it as a threat to their job security. “Maintaining social relationships typically matters more to most people than accurate diagnoses of isolated events”; critical success factors to a project post-mortem they say include an open and forgiving corporate culture. Ayas and Zenuik (2001) cite psychological safety as an important factor, and for von Zedwitz (2002), two of the four barriers to success are psychological and team-based shortcomings. On the more positive side, von Krogh (1998) says that the key enabler is care, which brings trust, empathy, and lenience in judgment, etc. Barker and Neailey (1999) call for an inclusive process, team (not individual) learning, supporting the learner, not stifling creative thinking, and setting and communicating a powerful context for the review.

T. Williams (2007) point to some other factors as follows;

• The most well-known of these is perhaps hindsight bias: Bukszpar and Connolly (1988) showed that even trained people could not ignore what they had been told about the actual
results of a choice when evaluating decisions (Busby [1999] also notes the issue of hindsight bias).

- Brown and Jones (1998) showed that individuals tend to attribute blame for failure either on inevitability (particular events that made failure unavoidable) or conspiracy (deliberate actions of other participants); no allowance is made for unintended consequences (denial of agency).

Brady, Marshall, Principe, and Tell (2002) describe the number of barriers to learning from projects, particularly the absence of departmentally held “knowledge silos”; the uniqueness of projects, with long life cycle, so a long time interval elapses before lessons are retrieved; and their temporary nature, requiring new “human encounters” for each project. Similarly, Disterer (2002) looks at the need to manage the retention of knowledge because of the fragmentation of the organization into project teams, concluding: “only a few firms manage systematically to identify and transfer valuable knowledge from projects to following projects.” And Salter (2000) looks to integration of project processes and business processes, he notes that the experience of the projects need to be integrated into business processes, and knowledge acquired from projects needs to flow back to the core resources of the firm.

Lilly and Porter (2003) point to the formal review processes and said that formal reviews were more effective than informal reviews. Styhre et al. (2004) called for more formal meetings. Schindler and Eppler (2003) claimed two reasons for not learning lessons were “lacking knowledge of project debriefing methods” and “lacking enforcement of the procedures in project manuals.” Neale and Letza’s (1996) advice that an organization should have clear procedures. Pitagorsky (2000) said that one problem was that workers not knowing how to go about learning lessons. Styhre, Josephson, and Knauseder(2004) suggest introducing the role of knowledge broker, and Williams et al. (2005) say that "It is important to have a cross-section of people available when collecting lessons”, Further Styhre et al. (2004) and Lilly and Porter (2003) suggest this should be doing with formal meetings between different groups and across different phases and obtaining multiple perspectives, involving, for example, someone external to the team. Cicmil (2005) assert that projects can only be understood by looking at a number of perspectives simultaneously.

The organizational structure is clearly key in promoting organizational learning and transfer of knowledge. Cassells (1999) warns against good post-project audits that are left “on the shelf” and emphasizes the need to change formal structures to allow information and learning to flow more freely across the organization. Reger and von Wichert-Nick (1997) show that the structure and culture of an organization are important factors in determining how effectively it can learn, and conclude that organizational learning needs: (a) hierarchy free communication and flow of information, (b) a primary structure that is hierarchical and a secondary structure that is “supra-hierarchical and coordination-oriented,” (c) a culture that supports teamwork, and (d) a culture that supports experimentation and is open to risks. Lytras and Pouloudi (2003) say that “A knowledge and learning management infrastructure is required in order to realize every knowledge organization as a learning organization capable of exploiting the organizational knowledge wealth.”
Structure and Culture are two important factors in organizational learning [Reger and von Wichert-Nick (1997)]. Hobday (2000) compared project-based and functional/matrix structures for carrying out projects and concluded that organizational learning, both formal and informal, was better in the functional matrix structure. In the project-based division, there was little incentive or structure for learning and so many of the learning activities didn’t happen: staff training younger staff, sharing lessons between projects, and completing post-project reviews. The management was able to address some of these issues by allocating time for learning/training/reflection/post-project reviews and creating more formal and informal opportunities for learning (e.g., mentoring). Stephens et al. (1999) found that it was harder to communicate lessons learned in cross-functional teams, and in a case study in a pharmaceutical company, they had to establish alternate learning structures. On the other hand, Ayas (1996), based on action research in an aircraft manufacturing company, proposed structuring projects using an information-based approach instead of traditional project-management methods.

Levene and Gale’s (2000) argue that key enablers to learning include management systems, that is, methods and procedures such as post-project reviews and learning histories.

Storey and Barnett (2000) indicate that top management support is important in all knowledge management initiatives but particularly in encouraging a culture of learning, motivating members of the organization to invest in sharing lessons, and in seeking learning. Newell (2004) points the issue that project teams often only seek help when they perceive a need. In Fong’s (2005) survey of knowledge management among quantity surveyors in Hong Kong and the UK, the most critical factor for knowledge management success was found to be top management support, followed by employee participation. Other similar motivational factors are highlighted by a number of authors. Hall and Sapsed (2005) ask what motivates people to share knowledge, and develop a 2x2 matrix based on control mechanisms (mechanistic or social, the latter getting employees’ preferences to coincide with those of management) versus motivation (extrinsic, i.e., pay for performance, or intrinsic, i.e., for satisfaction).

Gann and Salter (2000), highlights the reluctance to seeking out lessons learned as one problem with capturing and transferring knowledge in the construction industry, which rewards novelty rather than standardization. motivation and the ability to learn are affected by organizational learning. Sense (2003b) divides learning into four types with a 2x2 matrix depending on the sources being formal or informal, and the project manager’s political approach being influencing or accommodating. These four types of learning are purposeful, networked, adaptive, and opportunistic.

Bourne and Walker (2004) indicates that besides soft and hard skills in project management, for succeeding in projects there is a need to have a good understanding of organizational politics. Oshri (2000) note tensions between knowledge transfer and expertise development among other problems. However, while these motivational factors are certainly important, it should be noted that Szulanski (1996) claims that “contrary to conventional wisdom that places primary blame on motivational
factors, the major barriers to internal knowledge transfer are shown to be knowledge-related factors such as the recipient’s lack of absorptive capacity, causal ambiguity, and an arduous relationship between the source and the recipient.” He concludes that understanding systematically and communities’ practices are in need for organization to transfer knowledge and incentives alone are not sufficient for transferring knowledge.

4. CONCLUSION
This paper has presented different perspectives over post-project reviews and its role in enhancing learning from project, simultaneously it refers many key inhabitants in the way of conducting post-project reviews and according to the related papers it is clear that the major barriers are lack of resources, top management support, informal procedure and the nature of construction projects. It is assumed that construction companies as highly knowledge intensive organizations can gain many useful lessons learned through conducting post-project reviews, but it needs having hierarchical free structure and knowledge sharing culture in which all project team members be able to capture and share their knowledge easily.

5. REFERENCES


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STRATEGY CUSTOMER RELATIONSHIP MANAGEMENT (CRM) IN THE AREAS OF CONSTRUCTION BUSINESSES

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Abstract
Customer-orientation and customer satisfaction is one of the new subjects in today the world. Marketing viewpoint starts with production orientation and centrality of production and changed into consumer-orientation, centrality of market, and finally with using Information Technology altered into customer-oriented. Today, the most important commercial and technological challenges in construction industry include attracting and maintaining customers, customer loyalty and increasing customer profitability. Successful elimination of such challenges is necessary for all organizations and companies in construction industry. However, final goal of all organizations and companies in relation to customers and understanding what is required for maintaining such high levels of customer satisfaction and loyalty, is strong structural development. Customers are smart enough to be aware of their rights to choose, and in case they have bad experience of using services provided by the organization, they will claim such as right and step toward competitors. In fact, it means of power have shifted from company to customers. In this article with studying marketing science in construction industry, varied viewpoints about customer relationship management, its importance and its powerful role in today world, different kinds of customers based on their satisfaction and based on their behaviors, income rate, and profitability of managing a relationship with customers, describing managing systems of customer relationship, marketing based on customer relationship management, and also marketing approach of discussed relations will be studied and discussed.

Keywords: construction businesses, customer relationship management, customer-oriented, marketing

1. INTRODUCTION
In order to create value, customer relationship management (CRM) puts emphasis on cooperation between transaction parties. Through collection and management of customers’ data in databases, such as perspective attempts to fulfill customers’ needs more properly and in a faster way and therefore, establishes a relationship with customer and helps the organization to survive. Furthermore, through continuance of this relationship, customers gain confidence, become distinguished from others and receive priority and additional benefits.

Customer-oriented management requires suitable technical and economic infrastructures as well as human resources. Evidently, development of electronic commerce in the country necessitates
entering to global markets and membership in such organizations as World Trade Organization (WTO) and embracing customer relationship management.

CRM, customer satisfaction, cost saving and production saving provides organizations with more revenues. Therefore, due to alignment of business processes and customer tactics that pave the way for customer loyalty and more profitability, establishment of the customer-oriented system is one of the important issues, which is now among survival necessities of organizations in today's competitive world (Richheld.F. and Rigboy.D.2002).

Importance of CRM: As a modern term, customer relationship management which is defined as follows became common in mid-1990s:

“A working tactic which chooses and manages the most valuable relationships with customer and the one which requires customer-oriented working culture in order to efficiently support such processes as marketing, sales and service.”

CRM is an organizational approach to understand customer behavior, affect customer through an appropriate and ongoing relationship and development of long-term relationships in order to enhance loyalty, attract and maintain customers and achieve profitability.

CRM focuses on strengthening closer and deeper relationships with customers. In other words, CRM is equal to being determined to and being capable of changing behavior toward a customer, based on what customers communicate with organization and all organizations knows about customer (Pekers, C. and Beveridge, T.2003).

Significant Role of Customer in Today’s World: Such General procedures as economic liberalization, technological convergence and fast evolution of the internet, have significantly changed the role that companies play in their relations with other companies.

Business experts and academic professionals talk about coalitions, networks and cooperation between organizations, while managers and scholars have mostly ignored elements that are weirdly changing industrial systems.

Customer (Consumer): At present, in a market, in which consumers can dynamically communicate with producers, organizations have to accept that customers are changing into partners of the value creation tasks. Furthermore, they are colleagues, joint developers and competitors. Not only, they act as individuals, but also are a part of newly-structured cultural and social context.

Customer Value: Before knowing customer, we will take a look at his importance in systemic view and as a value system:

1- Customer value in seller’s perspective: customer value is defined as the ratio of resultant benefits to essential things, which are sacrificed by organization in order to gain those benefits.
2- Value in the customer's eye: value in customer’s view is defined as a set of usages customers have of product or service, after deduction of all their necessary purchase costs.

3- Cost is the total sources which have been spent to purchase or maintain product or service or to eliminate defects, delays, expectations and mistakes and lead into value reduction.

4- Therefore, having a value model is necessary for customer-oriented companies and in order to present such a model, initially its prerequisite and then, main rules of customer-oriented organizations and having a long-term perspective are described and finally, practical steps toward evolution of the model are studied.

Value-Based Model Prerequisites: The following principles should be considered as main rules, by which organization can become customer-oriented and meet customers’ satisfaction:

1- Value creation is equal to implicit obligations and promises that organizations make to customers to supply them with value services such as high quality and proper price.

2- Choosing a value-oriented operational model in which, organizational structure, culture and administrative system are incorporated.

Value-based model is equal to having a regular work plan, based on which obtaining zero errors and a hundred percent efficiency is possible. Continuing such as plan as well as an honest and serious effort to realize the plan, may result in honesty proof and attracts customers to the organization.

Types of Customers:
Considering the following aspects, this paper studies customer:

a) With respect to their satisfaction: Customer satisfaction is the extent of emotions people have as a result of fulfillment of customers’ expectations or addition to his expectations.

In this level, awareness of customers’ opinions after receiving the product or service is offered and the level of customers’ satisfaction is considered with respect to behaviorism.

Having information on customers’ ratings with regard to this aspect can be very effective in setting future sales policies. Thus, these customers are of the following types: satisfied customer
(who lives in present but is not among loyal and permanent valuable customers), happy customer (who has increased loyalty and in a one year or several years, purchases from the organization more than satisfied customer), dissatisfied customer (who due to not having fulfilled by the organization and after receiving better services by competitors, joins opponents), infatuate customer (who is among the most valuable customers of the organization) and angry customer (who not only is dissatisfied by the operation of organization, but also is angry by damages incurred).

b) With Respect to Their Behavior: Customer is the most important asset of every organization. Therefore, preserving him is the most important policy of every entity. As a consequence, organization should be aware of mental and behavioral attributes as well as traditions of customer in order to maintain him and should create opportunities through proper and timely reaction to his behavior and conduct and use such opportunities.

c) With Respect to Oldness: Due to continuance of their orders and more profitability that they bring in for the organization, permanent customers should be considered and even the smallest negligence regarding their treatment results in irreparable damages to the organization. It should be considered that current customers are the result of organization’s big efforts to attract them.

d) With Respect to Revenue and Profitability: Due to their more expensive orders and purchases, customers who have more income and provide an organization with more profitability should be taken into account. Based on Pareto criterion, 80 percent of organization’s revenue and profitability is the result of purchases that 20 percent of customers have from the organization. However, based on the guideline of focusing on a certain type of product (third guideline of porter), organization attempts to focus on particular sectors of market or on a special group of buyers. Firm is willing to gain such a goal by reducing costs, distinguishing product and restricting the market. Among characteristics of this guideline is flexibility in rewarding and establishing friendly relationships with employees and offering necessary services to customer in order to enhance customer loyalty (Gronross. C. 2001).

Characteristics of Customer Relationship Management (CRM):

- Relationship Management: Establishing direct relationship with customers and attempting to fulfill demands of every customer, specifically and offer immediate services to meet his needs. Such measures will enhance customer satisfaction, attracting new customers, maintaining current customers and adjustment of services with customers’ needs.
- Sales Force Automation: It provides the possibility of following up and investigating customers’ information and accounts. This measure makes analyzing sales possible without time limits and provides some information on future sales and re purchase.
- Incorporating Technology: In fact, technology is used in order to create value.
- Opportunities Management: Is growth management, management of unpredictable demands and changes as well as creating information and facilitating methods to better predict changes, better
answer to future demands of customers and optimize a supply-demand level (Richheld? F. and Rigboy. D. 2002).

Explanation of CRM Systems:
1- Focus of Customer Information in One Sector: Today, full customers’ information, which is preserved by a majority of organizations, are collected in various sectors (by seller, financial affairs department and after-sales services) and this due to dispersion of information sources leads to many problems when it comes to using them and expand market.

2- Analyzing and Segmenting Information: If goods and services that the organization offers are diversified, such as the system attempts to segment and analyzes for the current situation and development of target markets based on the information of every segment.

3- Specializing Customer Demand: With regard to the possibility of making a special connection with customer, such as a system is able to collect customers’ needs specifically and if the organization attempts to develop and meet their specific demand, this system will provide it with information.

4- Possibility of Making Connections with Customer via his Favorite Means of Communication: Some customers use fax, e-mail and mail. While making active and quick connections with all customers, such as a system contacts every one of them via his/her or her favorite means of communication.

5- Transferring Information and Transactions between Customer and Organization: All communications and transactions between customer and organization are managed through this system. This information includes information on goods or service's order, financial data and information on payments, information on manufacturing and completion of customer’s orders, sending goods or services to customer, sending bills, information on goods sending or after sales services and informing customers based on their individual interest and need.

2. CONCLUSION
If we are willing to use CRM and marketing discussion in construction industry, the following steps in the marketing process are influenced and should be taken:

- Analyzing Market Opportunities: This step is related to analyzing demand and competition in distinctive sectors of the market. That is, is related to knowing market and its different sectors. The following questions are formed when using relational marketing discussion: what relations between us and market are profitable? What relationships are compulsory to attract fresh customers? What relationships are indispensable to introduce modern products?

- Choosing Target Markets: After assessing and analyzing different sectors of the market, most attractive sector of it must be recognized and chosen. Identifying the most attractive sector of the market is conducted based on economic, demographic, psychological and geographical criteria. However, when relational marketing discussion is used, “capability of identifying and providing different types of relationships and extent of current and optimized relationships between sectors of the market should be taken into account.

- Developing Marketing Guidelines: This includes determining distinctions from competitors, using the best method for entering the market, determining quality and price setting.
• Planning: This is equal to making decisions about production, price setting, distribution and sales. Regarding relational marketing approach, it should be considered that were each of this plan is heading to.

Organization, Implementation and Control: Plans should be turned into practice and then, control, and feedback are necessary in order not to get diverted from the predetermined course. Meanwhile, it should be considered that discussion over the status of relationships and extent of closeness to customers might be difficult in practice. Therefore, it should be determined that how to implement constituting elements of relationships and control them continuously.

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BIDDING EVALUATION CRITERIA FOR SELECTION OF CONTRACTOR: A COMPARATIVE STUDY

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Abstract
The cause of delays in Malaysian construction projects are, in some way or another, associated with contractor’s improper planning, poor site management and inadequate experience. These suggest that the current system of awarding the contracts is inefficient in selecting the contractor capable of meeting the demands and challenges of present times and hence needs to be reviewed accordingly. Therefore, this paper aims at identifying problems and weaknesses with the current system of awarding the contracts for construction projects in Malaysia. The research method selected for this study comprised of both literature review and interview with experienced professionals. An extensive literature review and experienced professionals’ opinion on current bid evaluation process being sought to identify the issues associated with the current system. The findings indicate that the most common criteria considered during bid evaluation process are financial soundness, technical ability, management capability and the health and safety of contractor. However, attributes that indicate contractors’ performance such as past performance; quality of workmanship in past projects, success and failure rate of past projects, past relationship and performance potential; depth of experience on similar project, quality control programme/system, current workload and staff qualifications are rarely being considered. The study also highlights that there are significant difference in opinions regarding criteria considered by Malaysia construction industry with other countries. The findings from the study may act as an aid in improving Malaysia construction industry by highlighting improvements to be made to the current system of awarding the contracts for construction projects in Malaysia.

Keywords: bid evaluation, contractor performance, selection criteria

1. INTRODUCTION
Contractor selection is the most importance task in order to select the appropriate contractor to deliver a successful project within an appropriate budget, time and quality standard (Hatush and Skitmore, 1998; Russell and Jaselskis, 1992; Kumaraswamy, 1996; Alarcon and Mourgues, 2002; Li, et al., 2002; Fong and Choi, 2000; and Kumaraswamy, 2000). The complex and unique nature of construction demands the involvement of multiple participants in the delivery of a project. As the contractor plays the vital role in the overall project performance, selecting the right contractor for the right project is the most crucial challenge for any construction client (Singh and Tiong, 2006).

The selection of contractor in public procurement system involved a series of procedures and complex processes which were bound by rules and regulations. The processes were carried out by the
public officials who represented the public authority or the government department that gave the approval (Othman et al, 2010).

Although contractor selection process were carried out in accordance to standard procedures, there are many reports on cases that contractor failed to complete the project. The delays in the projects continue to occurs (Assaf and Al-Hejji, 2006; Ajanleko, 1987; Odeyinka and Yusif, 1997; Ogunlana and Promkuntong, 1996; Sambasivan and Yau, 2007).

The impression of current system of awarding the contracts is decreased due to inefficient in selecting the capable contractor in carried out the project in competitive, challenging and demanding present times. This is due to several failures of many contractors due to varying reasons such as financial problems, poor performance, or accidents causing from the lack of adequate safety consideration at worksites (Singh and Tiong, 2006).

The use of the criterion of the lowest bid to finally select a contractor has been criticized by many (e.g., Hatush and Skitmore, 1998; Stein et al. 2003; Al-Reshad and Kartam, 2005). According to them, a contractor who wins the tender with low bid price will suffers a limited budget to finish the project with appropriate time, quality and standard. Such a contractor often resorts to various cost-cutting measures, which lead to serious time and cost overruns, serious quality problems, and to increase number of litigations. A contractor who won a contract with a poor record of past performance is likely to deliver a poor project standard. Holt et al. (1995) and El-Sawalhi et al. (2007), for example, found the contractors to be unreliable when their past work performance was not considered in the selection process.

Therefore, this research is conducted in order to make an attempt to identify problems and weaknesses of current contractor selection criteria. The research is focused to the construction industry of Malaysia. This paper introduces attributes that indicate the common criteria considered during bid evaluation. The attributes were generated through extensive literature review. The results of the research, may act as an aid in improving Malaysia construction industry by highlighting improvements to be made to the current system of awarding the contracts for construction projects in Malaysia. The approach undertaken for this study comprised two components. First, we conducted interviews with senior managers who had experience in tender evaluations and contractor selection in public sector in Malaysia. Discussion notes were taken and a generalized description developed. Second, the literature review several search criteria were used across a number of academic databases. These included tender evaluation and or assessment, contractor or supplier selection and project appraisal.

2. LITERATURE REVIEW

The prequalification and bid evaluation process requires the development of necessary and sufficient criteria (Hatush and Skitmore, 1997). Contractor evaluation and selection is a difficult and challenging task plagued with many uncertainties. It is a complex multi-attribute decision problem that requires individuals to make judgments and trade-offs between competing objectives and limited
resources. Selecting the contractor is a tricky and hard procedure. Bid evaluation is one of the major challenges that face owners and consultants in the public and private sectors (Alsugair, 1999).

Russell (1996) reviewed a number of methods that have been developed. Cost (price) was always considered in the main evaluation factor for a long time. Although the lowest bidder system protects the public from improper practices, it has certain disadvantages. These include unreasonable low bids either accidentally or deliberately or unqualified contractor which cause extensive delay, cost overrun, quality problems and increased number of disputes. Over the years some modification to the lowest bidder system were made, such as reasonable bidder, public interest and prequalification list which open the door to other evaluation methods to be adopted instead of the single criterion system lowest bidder system.

The Multi Criteria Bidding System is an evaluation method that considers not only the price as the awarding reason, but also considers other important attributes. The key of Multi attributes system is that the selection process of the contractors is based on more attributes such as, bid price or cost, time, quality, managerial safety accountability, competence and sufficiency of contractors (Liu et al., 2000). The main concept of the Multi Attributes Bidding System is that the selection process of the contractors will be based on more attributes than just the price, and the successful bidder will be the one who has the highest combined bidding value of the multiple attributes. The scores of those attributes are transformed into values and those values of all the attributes are totaled to give the combined bidding value.

2.1 Criteria of Prequalification and Bid Evaluation

Pre-qualification and bid evaluation procedures involve different types of criterion to evaluate the overall suitability of contractors such as: General, technical, managerial, and financial criteria (Hunt et al., 1966); Financial stability, managerial capability and organizational strength, technical expertise and experience of comparable construction (Merna and Smith, 1990); Relevance of experience, size of firm, and safety record (Moselhi and Martinelli, 1990).

Hatush and Skitmore (1997) have identified five main criteria for contractor prequalification and bid evaluation along with the information necessary to assess these criteria as shown in Table 1.

<table>
<thead>
<tr>
<th>Main Criteria</th>
<th>Sub criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial Soundness</td>
<td>Financial stability.</td>
</tr>
<tr>
<td></td>
<td>Credit rating.</td>
</tr>
<tr>
<td></td>
<td>Banking arrangements and bonding.</td>
</tr>
<tr>
<td></td>
<td>Financial status.</td>
</tr>
<tr>
<td>Technical ability</td>
<td>Experience.</td>
</tr>
<tr>
<td></td>
<td>Plant and equipment.</td>
</tr>
<tr>
<td></td>
<td>Personnel.</td>
</tr>
</tbody>
</table>

Table 1: Main criteria and sub criteria for prequalification and bid evaluation
The review of literature revealed the existence of various criteria considered in prequalification and bid evaluation. Table 2 shows some of the contractor selection attributes considered in bid evaluation process.

Table 2: Common criteria considered during contractor selection

<table>
<thead>
<tr>
<th>Author</th>
<th>Common criteria considered</th>
</tr>
</thead>
<tbody>
<tr>
<td>Holt. 1994.</td>
<td>experience in projects of similar size and type, current workload, management qualifications, and time of year were considered important</td>
</tr>
<tr>
<td>Holt et al. 1994.</td>
<td>organizational structure, management skills, banking arrangements, cash flow, management qualifications and experience, and past performance</td>
</tr>
<tr>
<td>Proverbs et al. 1997.</td>
<td>organizational structure, management skills, banking arrangements, cash flow, management qualifications and experience, and past performance</td>
</tr>
<tr>
<td>Jennings and Holt. 1998.</td>
<td>company reputation, financial standing, workload and capacity and prior business relationships.</td>
</tr>
<tr>
<td>Wong et al. 2000.</td>
<td>contractor organisation, financial considerations, management resources, past experience, past performance and a number of project specific criteria.</td>
</tr>
<tr>
<td>Hatush and Skitmore. 1997.</td>
<td>managerial capability, financial soundness, technical personnel and their ability, past performance, experience, financial status, project management organization, and capacity to undertake or support the intended scope of work</td>
</tr>
<tr>
<td>Hatush and Skitmore. 1998.</td>
<td>Technical ability, health and safety, reputation, management capability, and bid amount (cost)</td>
</tr>
<tr>
<td>Alarcon and Morgues. 2002.</td>
<td>company, past performance, financial and contract management, and price, planning and programming, field management, and bid quality</td>
</tr>
<tr>
<td>Waara and Brochner. 2006.</td>
<td>company, past performance, financial and contract management, and price, functional characteristics, technical merit, post delivery service and operational cost</td>
</tr>
<tr>
<td>Watt et al. 2009.</td>
<td>Management and technical capability, past experience and performance, reputation, and the</td>
</tr>
</tbody>
</table>
proposed method of delivery or technical solution.

Cheng and Li. 2004  Tender price, financial capability, past performance, past experience, resources, current workload, past relationship and safety management.

Singh and Tiong. 2006  Contractor experience in similar projects, qualification and experience level of project manager and management staff, track records of working in similar project and working capital.

From the above brief literature review, most of the researchers indicates the past performance as one of the criteria should be considered in bid evaluation process. This shows that the past performance of contractor represents a reliable indicator of their performance on future project. Research by Watt et al (2009), has identified 8 (eight) principle categories, along with example criteria as a representative set of criteria suitable for the evaluation and selection of contractor, as shows in Table 3.

Table 3: Principle evaluation categories of criteria (Watt et al. 2009)

<table>
<thead>
<tr>
<th>Category</th>
<th>Specific criteria</th>
</tr>
</thead>
<tbody>
<tr>
<td>Organization experience</td>
<td>Past or Similar Experience, Market Familiarity, Commercial Experience, Understanding of Regulations, Related Experience, Size and Type of Projects Completed, Yrs in Similar Projects</td>
</tr>
<tr>
<td>Project management expertise</td>
<td>Controls Cost, Project Management Ability, Management Competencies, Management Structure, Scope and Risk Control, Project Management Organisation and Skills, Project Management Qualifications, Project Management Monitoring and Controls</td>
</tr>
<tr>
<td>Past project performance</td>
<td>Ability to Deliver, Demonstrated Performance, Track Record, Past Performance, Reliability, Cost Outcomes or Overruns, Past Failures, Performance History, Schedule Performance, Results from Previous Projects</td>
</tr>
<tr>
<td>Company standing (reputation)</td>
<td>Company Reputation, Organisational Maturity or Stability, References, Responsiveness, Business Ethics, Amount of Past Business, Company Image and Size, Trade Union Record, Litigation Tendency, Reputation</td>
</tr>
<tr>
<td>Client-supplier relations</td>
<td>Ability to Work as Team, Stakeholder Management, Customer Focus/Relationship, Client/Customer Attitude and Relations, Trust, Commitment to Support, Responsiveness</td>
</tr>
<tr>
<td>Technical expertise</td>
<td>Availability and Experience of Technical Design Experts, Availability of Technical Experts, Key Technical Staff Experience, Experience of Technical Personnel, Technical Competence and Ability</td>
</tr>
<tr>
<td>Method/technical solution</td>
<td>Compliance with Stated Needs or Requirements, Proposed System Solution, Plant/Equipment Type, Viability of Technical Solution, Technology Base, Proposed Design, Functionality, Life Cycle Requirements, Technological Growth Capability</td>
</tr>
</tbody>
</table>

One of the main categories is past project performance, which include the ability of contractor to deliver the project, track record, past performance, past history and past failure. Watt research has reflects most of the research done by others. Hence, it could be concluded that past performance of contractor is an important criteria need to be considered for contractor selection. This study will reflect on the selection criteria according to the current practice in Malaysia.
3. RESEARCH METHOD
The research method selected for this study comprised of both literature review and interview with experienced professionals. The data collected to pursuit of an answer to the research question: what are the main characteristics of the current practice in Malaysia?

The questionnaire was developed through several stages until it reached the final form. In the first stage, the interview questionnaire was designed based on the literature review to verify the actual selection methods used to select the most suitable contractor for a project and to identify the different criteria actually used in evaluating contractors’ pre-qualification and bid information. In the second stage, the pre-test were conducted with experienced local professionals in order to find out the shortcomings and the ambiguities in the first draft of the questionnaire.

The main questions asked in these interviews were whether the points covered in the questionnaire were sufficient, clear and relevant to the Malaysia construction industry.

Based on the pre-test, some adjustments were introduced to enhance clarity and to assure consistency in pursuit of appropriate results and conclusions. In the final stage, interviews were conducted among project managers and professionals with experience in bid evaluation in public sector in Malaysia. The sample included project managers from the main sectors of the construction industry in Malaysia public sector because public sector represents the largest client in construction industry.

4. DATA ANALYSIS
4.1 Method Used for Contractors’ Selection
In construction industry there are three different types of tender which is open tender, restricted tender and negotiated tender. Tendering processes in construction sector involve a client and consultant as contracting authorities as well as interested organizations or contractors. Usually in many countries, the government is the largest construction client. The most eligible contractor will be select after the assessment of all tenderers. It is a difficult process where multi criteria need to be considered during assessment such as bid price, time for project completion, financial capability, work experience, technical staff available, equipment facilities and current list of works. These criteria contribute to identify potential contractor that capable to deliver high quality of completed service, within time and under budget allocated (Topcu, 2004). Usually, the assessment is carried out by the group of appointed committees. This task is under responsibility of client or his representative and tender administration committee.

The process starts when the client initializes a construction project. Client hires consultant to prepare tender specification by conducting feasibility study. It involves typical activities such as determining estimated cost, time for project completion and procurement procedures. Consultant also responsible to prepare tender documents including qualification documents and bill of quantities. These documents require an approval from client. In order to ensure fair competition and transparency, it is compulsory for client to display notice call for tender invitation. Normally, client advertises the notice within a period of time on printed media such as newspaper, public media or website.
Subsequently, contractor who intends to bid for the tender will purchase the tender documents and give appropriate information required, and then submits the completed tender before reaching the deadline. Normally, tender documents consist of information regarding on instruction to tenderers, conditions of contract, technical specifications, drawings, bill of quantities (BQ) and list of forms to be completed by the contractor. All the submitted tenders will be aggregated and opened after the deadline.

All the tenders received will be assessed in order to select the most eligible contractor. Assessment is the most crucial stage in tendering processes because it contributes to the decision in choosing the most qualified contractor to win the tender. It is an unstructured and complex process where multi criteria need to be considered during assessment such as bid price, time for project completion, financial capability, work experience, technical staff available, equipment facilities and current list of works. These criteria contribute to identify potential contractor that capable to deliver high quality of completed service, within time and under budget allocated. Usually, the assessment is carried out by the group of appointed committees. There are two stages of assessment before qualified contractors will be listed out.

The first stage of evaluation is the prequalified stage for contractors where they are primarily evaluated for their minimum capabilities to satisfactorily carry out the contract if they are awarded. In this paper, we called this stage as prequalification phase. This stage helps to screen out ineligible or unsuitable candidates thus minimizing the amount of available contractors in the list. Different countries or organizations might evaluate dissimilar criteria. In Malaysia, contractors will be screening through a ‘cut-off method’ based on their tender price. The contractors within the range of ‘cut-off price’ will be qualified for first stage evaluation. The criteria for the first stage evaluation are based on basic requirements specified in tender notification or advertisement such as sufficiency of tender documents submitted (compulsory and supporting documents), consistency of information provided, adequate financial resources and others. Contractors who have passed these requirements according to certain standard value will be preceded to the next stage of evaluation.

The second stage of evaluation normally comprises a detailed technical evaluation of prequalified candidates. In Malaysia, contractors are evaluated according to critical criteria such as such as working experience, current work performance, technical staff, plant and equipment as well as estimated project duration. There are some evaluations practices only consider on the lowest bidding price as implemented in Nigeria and Turkey. The qualified applicants who have fulfilled all the requirements and conditions are ranked in ascending order according to their points/credits. Contractors who do not fulfill any stage of evaluation will be automatically removed from the list. Finally, the result will be announced by client and display it either on printed media or website. Generally, the construction contract is awarded to the contractor with the highest score.
4.2 Main Criteria Used for Prequalification and Bid Evaluation

Table 4 summarizes the relative weight of different criteria used for contractor prequalification and bid evaluation. This result indicates that financial soundness is the most dominant criteria considered in contractor selection followed by working experience on similar past project.

<table>
<thead>
<tr>
<th>Main prequalification criteria</th>
<th>Relative weight (%)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Financial</td>
<td>45%</td>
</tr>
<tr>
<td>Technical</td>
<td></td>
</tr>
<tr>
<td>Work experience</td>
<td>30%</td>
</tr>
<tr>
<td>Technical staff</td>
<td>15%</td>
</tr>
<tr>
<td>Plant and equipment</td>
<td>10%</td>
</tr>
<tr>
<td>Total</td>
<td>100%</td>
</tr>
</tbody>
</table>

The evaluation of financial criteria required information such as contractor minimum capital, balance sheet, three months bank statements and credit facilities of contractor. In technical criteria, there are three sub criteria to be evaluate, which is 5 years working experience on similar projects, technical staff qualifications and plant and equipment.

The final score of contractor will be calculated and three contractors will be choosing for final evaluation stage. Three contractors with lower price bid and higher score will be considered in final stage. The contractor who benefits the government the most will be awarded.

Despite from the literature review, contractor performance indicators such as past performance, quality of workmanship, past failure, quality program and safety and health is given a least attention in the prequalification stage. The result also shows the awareness of decision maker of the importance criteria in contractor selection.

5. CONCLUSION

The study shows that in the pre-qualification stage, the Malaysian construction industry seems consistent with the literature in regarding criteria such as the firm’s experience in similar projects, the firm’s resources and financial status to be the most dominant criteria. Also, the scoring system is widely used in evaluating the contractors’ bids in both the pre-qualification and the bid evaluation stages. However, in contrast with the literature, the contractor performance indicators such as past performance, quality of workmanship, success and failure rate of past project, quality program, past relationship and performance potential are given the least attention in the pre-qualification and bid evaluation stage. These, may be, due to the lack of information or formal records about the contractors’ history in Malaysia. The study reflects the awareness of project managers in Malaysia of the importance of the past performance of contractor which leads to quality aspects of current project. However, the study shows that the bid price is still the most dominant criterion in the contractor evaluation. Also in the final evaluation, the lowest bid price is still the most dominant criterion for selecting the most suitable contractor among several qualified contractors. This is clearly reflected in public sector projects, the transparency of contractor selection in bid evaluation can be arguable.
6. ACKNOWLEDGEMENTS
My appreciation and thanks go to several colleagues who have contributed the development and review of this paper. In particular, thanks to Associate Professor Dr. Roslan Bin Amirudin, Universiti Teknologi Malaysia for his guidance on this paper. In addition, much credit goes to respondents in Jabatan Kerja Raya (JKR) Malaysia and Jabatan Pengairan dan Saliran (JPS) Malaysia for identifying relevant criteria and categories that applicable in bid evaluation in contractor selection in public sector.

7. REFERENCES


CONCEPTUALISING ISSUES RELATING TO THE BILLS OF QUANTITIES

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Abstract

Bills of Quantities (BQ) are an indispensable tool for the management of a construction project. In recent years, numerous studies have been conducted to assess its applicability and many without doubt have recognized its significance in the construction process. Despite this recognition, reviews of the literatures have suggested that the BQ is flagged with issues which rendered it to be less useful to certain parties in construction. Empirical evidence from past researches have justified the presence of the issues, however without any coordinated effort in drawing the desired solution, the issues remain daunting and continue to become an academic and industry-wide concern. In view of the above, this paper seeks to critically identify and classify all issues related to the BQ with an aim to propose a conceptual framework as a basis to understand BQ related issues in a holistic manner. The paper which employed an extensive, broad based literature review approach had established that issues related to the inadequacy of BQ information as significant across the literatures thus prompting for action to be carried out. As an approach to understand the significant issue further, the paper has proposed the conceptual framework which contains what supposed to be the ideal situation as opposed to the current situation and further called for the establishment of the line of information equilibriums as the basis for assessing the issue. With such a framework in place, it is envisaged that the issue concerning BQ information imbalance could be untangled to achieve the desired solution.

Keywords: adequacy, bills of quantities (BQ), conceptualizing, information, research

1. INTRODUCTION

Information is the life-blood of a construction project (Atkin, 1995). Information generation is in fact a major source of activity in any construction projects (Kwakye, 1997; Nourbakhsh et al., 2012) and the essence of construction management (Winch, 2010) without which a construction organisation would cease to function (Griffith et al., 2000). As one of the important activities in the construction process, the construction industry generates a massive amount of information (Atkin, 1995). According to Atkin (1995), on average, a project worth £25 million will generate some 150,000 drawings and 6,000 site instructions. Given the sheer volume of information generated, effective and efficient communication is an integral part of the construction process (Griffith, et al., 2000) in ensuring an effective performance by project participants.

The demand placed upon information on the construction project is enormous. By and large, the progress of construction activities depends on the right parties receiving the right information at the right time (Kwakye, 1997). In addition, there is also a growing awareness on the significance of information as the hallmark in increasing efficiency (McDonagh, 1995). Owing to this reason, it is
imperative for all parties in a project to be supplied with the right information in an adequate and timely manner (Hackett et al., 2006; Kwakye, 1997; Laing, 1976) in order to achieve the objectives of a project.

According to Barton (1985), information represents data or knowledge evaluated for specific use. Subsequently, the data are processed to provide meaningful information and transmitted by the process of communication (Barton, 1985; Dainty et al., 2005). At present, the information requirements in construction organizations are considerable due to the increasing complexity of buildings, legal, statutory and contractual requirements (Griffith et al., 2000). From the literature point of views, the types of information required in a typical construction project could be classified into commercial (or financial), technical, legal and managerial (or administrative) information (Atkin, 1995; Griffith et al., 2000). These types of information were later represented in various forms such as reports and drawings which will be produced by various participants in a project. Irrespective of the forms it represents, the amount of information undeniably needs to be adequate (Kwakye, 1997) and matches with the needs of others (Atkin, 1995) to ensure effective performance by project participants.

In the area of quantity surveying, the BQ is regarded as an important form of information produced by the Quantity Surveyor in the design phase of a project (Kwakye, 1997). According to Hughes (1978) and Turner (1983), the BQ represent an itemisation breakdown of construction works into components parts such that their sum equates with the whole. The itemisation process carried out by the Quantity Surveyor results in numerical and structured textual information (Fryer et al., 2004) which is envisaged to fully and accurately describe a project. According to Atkin (1995), the BQ is a type of technical information. It sets down the various items of work in a logical and recognized sequence in an order ready to be priced by the contractors. In order to discharge this function effectively, it is essential that it conveys as much information and details as possible (Ahenkorah, 1993; Hackett et al., 2006). The inclusion of necessary information in the BQ with level of details will assist tenderers and project participants to function more effectively hence purporting construction project to be delivered successfully thus meeting its objectives (Hackett et al., 2006).

The BQ has a strong relationship with and was regarded as fundamental to the traditional lump sum system of construction procurement (Jaggar et al., 2001; Seeley, 1997). The relationship has proven to remain strong given the acceptance of the traditional lump sum system of construction procurement in the local construction industry (Khairuddin, 2002). This was affirmed by the Construction Industry Development Board (CIDB) record for the year 2007 to 2011 (CIDB, 2009, 2010, 2011, 2012) as shown in ‘Table 1’ which reflects more than 90% adoption for the said procurement system compared to other types of procurement systems used locally. Hence, the relatively strong adoption of the said procurement system indicated a seamless, unified and centrality of the BQ in the construction industry.
Table 1: The frequencies on the use of the traditional lump sum system as compared to other types of procurement

<table>
<thead>
<tr>
<th>Type of procurement</th>
<th>Year/Percentage</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>2007</td>
</tr>
<tr>
<td>Traditional lump sum system</td>
<td>6906</td>
</tr>
<tr>
<td>Other types of procurement</td>
<td>452</td>
</tr>
<tr>
<td>Total number of projects executed</td>
<td>7358</td>
</tr>
</tbody>
</table>

Source: Adapted from CIDB quarterly construction statistical bulletin. Data as at Mac 2012

However, regardless of the centrality of the BQ in the Malaysian construction industry, review of relevant literatures has indicated that the BQ is flagged with various issues in its use and application (Kwakye, 1997). The literatures which covered much on issues related to the BQ have focused on identifying the issues and yet, no conceptualization has been proposed as an approach to achieve a workable solution. This is considered as a serious gap with the previous literatures and amount to a missing link with the current research effort and understanding. In order to bridge the gap, there is a need to conceptualize the issues related to BQ, and through conceptualizing, actions could then be planned to achieve the desired solution.

The aim of this paper is to propose a conceptual framework as a basis to understand the BQ related issues holistically before a plan of actions could be drafted to achieve the desired solution. The study has employed an extensive literature review on BQ related issues in identifying the most significant issue as the basis for developing the conceptual framework. This will pave the way for a conclusive solution to the main issue and a catalyst for further works to be carried out.

2. LITERATURE REVIEW

The construction industry is an important economic sector in Malaysia. It is central as being the catalyst for development and a major indicator and determinant of domestic performance in the economy (Abdul Razak et al., 2010). In order to sustain the industry’s growth, there is an urgent need within the industry to streamline the construction processes and to coordinate information in a quest for an improved construction performance. The need for streamlining and coordination was evident due to the nature and the environment in which the industry operates which was characterized hardly by separation and fragmentation of different organizations (Kwakye, 1997; Ofori, 1990). Fragmentation in the construction industry exists due to the diversification of its participants. Although volatile and sometimes adversarial, it is an indispensable character of the industry which may impede the success and performance of a construction project.

The issue on information in the construction industry has received considerable attention among researchers and many have associated the information advancement with the computing technology. For instance, studies by Chen and Kamara (2011) and Nourbakhsh, et al. (2012) delved into the development of mobile computing technology in a quest to improve site information management in a construction project. Yet, regardless of the gains from the leap, the studies admit that the
establishment of user’s information requirements and identification of any factors that affects its development were of paramount prerequisite for such technology to kick-off. Their opinions were in line with Atkin (1995) who has foreseen the difficulty to provide sufficient information that matches precisely with the needs of others and hence, on the onset, instilling the awareness on the significance of information as the hallmark in increasing construction efficiency (McDonagh, 1995).

To the Quantity Surveyors, the BQ is regarded as an important output that represents information produced in the design phase of a project (Kwakye, 1997). It contains a schedule of fully described and quantified items of labor, plant, materials and other works which is set down in a systematic and recognized manner (Kwakye, 1997). The BQ entails vast amount of information that can be used in many ways (Hackett, et al., 2006) and the only real communications between the client and the contractor (Laing, 1976). According to Seeley (Seeley, 1997), with the increasing scale and complexity of building operations, it would be impossible for contractor to price a medium and large sized project without a BQ. The recognition indicates the position of the BQ in the construction industry and reinforcing its status as an important medium of communication.

In the context of the Malaysian construction industry, BQ preparation lay at the centre of services offered by the independent quantity surveying firms in Malaysia (Abdul Rashid and Normah, 2004; Fadhlin and Ismail, 2006; Rosli et al., 2008). According to Abdul Rashid and Normah (2004), BQ preparation formed 84.4% of total works outsourced by the Public Works Department of Malaysia (PWD). BQ preparation was also reiterated by Rosli et al.(2008) as the backbone of the Malaysian Quantity Surveyors professional’s fees. It forms the majority of their income and a prominent activity in any quantity surveying establishments throughout Malaysia. The familiarity of the Malaysian construction industry with the traditional lump sum system of construction procurement and the amount of BQ related workload shows that the BQ is still relevant and worth for further improvement.

Regardless of the position of the BQ in the construction industry, there were evidences from the UK that showed the application of the BQ was in fact declining. The eleventh survey report on contract in use published by the Royal Institution of Chartered Surveyors (RICS) (Ashworth and Hogg, 2007; RICS, 2010) for instance, has reported a measurable decline in the use of the BQ since 1985 as shown in ‘Table 2’. It was also perturbing to learn that for the first time, the use of the BQ by value of projects has dropped below 20% from 64.7% recorded in 1985.

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<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>The use of the BQ by value of projects</td>
<td>64.7</td>
<td>55.5</td>
<td>55.9</td>
<td>50.8</td>
<td>45.7</td>
<td>46.1</td>
<td>30.1</td>
<td>23.1</td>
<td>26.1</td>
<td>15.2</td>
</tr>
</tbody>
</table>

Source: Adapted from RICS (2010, p.8) and Ashworth and Hogg (2007, p.256)
Base on the report published by RICS, there were possibly many reasons that had contributed to the decline. For instance, according to Hodgetts (1985) and Ferry et al. (1999) the function of the BQ was limited for calling in tenders only despite its image for being a laborious and costly exercise (Blyth, 2001; Charles, 2007; Khairuddin, 2011; Rosli, et al., 2008). To make matters worse, the data in the BQ was also found to be hardly manipulated (Jaggar, et al., 2001) which requires some sort of rework (Kodikara et al., 1993) in order to adequately adhere to the demand of the construction process. The piles of the issues which were not properly addressed over the years have let the BQ stagnant and less appealing to the industry, hence purporting for its decline in the construction industry.

Although the report showed that the BQ is facing a bitter reality of waning, the attention and awareness given by the industry on the importance to improve the BQ was actually increasing. This is apparent from various studies conducted that talked on the issues as well the moves from the professional bodies – for instance, the RICS with the New Rules of Measurement or NRM - with varying interest. However, the effort to improve the BQ could move to despair if the industry disregards the requirements to understand the issues in a holistic manner. By understanding the issues through proper conceptualising, robust actions could be planned which in return, yield favourable and useful results applicable to the industry.

3. METHODOLOGY
In order to come out with the conceptual framework, a thorough literature reviews was conducted to identify all issues related to the application of the BQ. The reviews process, which was broad based, was aimed at examining, synthesizing and recording all issues discussed by various authors in books, journals and other scholarly works. The recorded issues were later categorized according to themes in view of determining and identifying an issue considered as significant. The significant issue will become the focus of this paper and will be conceptualised further for better understanding.

4. CONCEPTUALIZING THE ISSUE
The literature review process had generally managed to reveal that issues concerning the BQ could be broadly categorized into eight categories: 1) inadequate information, (2) unreliable and inaccurate rates and quantities (3) poor and unimproved production technique (4) unimproved format (5) limited function (6) poor and unimproved presentation (7) failure to recognised builder’s knowledge and (8) unable to fulfil the current demand of construction environment. ‘Table 3’ is the outcome of the review process which had classified the issues according to the appropriate categories. According to ‘Table 3’ issue pertaining to ‘inadequate information’ was identified as the most significant issue surrounding the BQ based on the number of previous studies dedicated to discuss on the subject. In addition, this issue was also found to be significant as all other issues are similarly related to the aspect of information. Generally, the issue has stemmed out from its inadequacy to satisfy varying management aspects of a construction project. This issue has eventually led to dissatisfaction from the construction industry.
On the understanding gained through examining, synthesizing and classifying the literatures, the inadequacy of BQ information could be conceptualised to surface due to the imbalance that exist between the producer and the subsequent users of the BQ. The imbalance in this instance refers to the lop-sidedness from the line of information equilibrium on the part of the BQ producer and the expectation of its users. The situation in return, has prompted disequilibrium to exist which renders the information unfit and inadequate for its intended purpose.

Table 3: The synthesis - summary on the issues identified from the literature review process

<table>
<thead>
<tr>
<th>Category</th>
<th>Issues identified</th>
<th>Authors</th>
</tr>
</thead>
<tbody>
<tr>
<td>(1) Inadequate information</td>
<td>1) Inadequate information and form for site management purpose</td>
<td>(Contributed, 1964; Holes, 1990; Kodikara, et al., 1993; Leon, 1966; Rosli et al., 2006; Smith and Hoong, 1985; Waterworth and Weddle, 1978)</td>
</tr>
<tr>
<td></td>
<td>2) Inadequate information details for contractor's use</td>
<td>(Ahenkorah, 1993; Hamimah et al., 2011; Holes, 1990)</td>
</tr>
<tr>
<td></td>
<td>3) Inadequate information for cash flow projection</td>
<td>(Hamimah, et al., 2011; Smith and Hoong, 1985)</td>
</tr>
<tr>
<td></td>
<td>4) Inadequate information for site operation</td>
<td>(Baccarini and Davis, 2002; Hamimah, et al., 2011; Leon, 1966; Smith and Hoong, 1985)</td>
</tr>
<tr>
<td></td>
<td>5) Inadequate information on connection between cost and time related parameters</td>
<td>(Mohd Hisham and Azman, 2008)</td>
</tr>
<tr>
<td></td>
<td>6) Inadequate information on time related parameter</td>
<td>(Contributed, 1964; Hamimah, et al., 2011; Jaggar, et al., 2001; Mohd Hisham and Azman, 2008; Morledge and Kings, 2006; Smith and Hoong, 1985)</td>
</tr>
<tr>
<td></td>
<td>7) Inadequate information to address the user's need</td>
<td>(Wood and Kenley, 2004)</td>
</tr>
<tr>
<td></td>
<td>8) Inadequate information to convey the quality of material</td>
<td>(Hamimah, et al., 2011; Kinlay, 1984a)</td>
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<td>9) Inflexible information for data coordination</td>
<td>(Kodikara, et al., 1993; Smith and Hoong, 1985)</td>
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<td></td>
<td>10) The information provided does not fulfil the contractor's need for accurate pricing</td>
<td>(Benedict, 1972; Kinlay, 1984b; Morledge and Kings, 2006)</td>
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<td>11) The information provided is not in final form</td>
<td>(Kodikara and McCaffer, 1993; Kodikara, et al., 1993)</td>
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<td>12) The information provided is unstandardized and require sub-processes</td>
<td>(Cornick and Osbon, 1994)</td>
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<td>14) Location of information is not adequate for contractor's utilization</td>
<td>(Baccarini and Davis, 2002; Wood and Kenley, 2004)</td>
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<td>15) Location of quantified items in the proposed building is inadequately indicated</td>
<td>(Slattery, 1994)</td>
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<td>16) Potential of information for other purpose is not fully explored</td>
<td>(Kinlay, 1984b)</td>
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<td></td>
<td>17) Unclear connection between BQ and construction process</td>
<td>(Jaggar, et al., 2001; Rosli, et al., 2008)</td>
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<td>(2) Unreliable and inaccurate rates and quantities</td>
<td>1) Its accuracy depends on drawings and specifications provided by the designers.</td>
<td>(Leon, 1966)</td>
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<td></td>
<td>2) BQ production can only begin when certainty is established in the design</td>
<td>(Ashworth and Hogg, 2007; Matipa et al., 2008)</td>
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<td>(3) Poor and unimproved production technique</td>
<td>BQ inaccuracy promotes disputes.</td>
<td>(M. F. Hodgetts, 1984)</td>
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<td>4)</td>
<td>BQ produced is inaccurate in terms of its quantities and descriptions.</td>
<td>(Abdul Rashid and Normah, 2004; Rosli, et al., 2008)</td>
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<td>5)</td>
<td>Nett quantities and inaccurate quantities are major dissatisfaction among contractors in the way quantities are provided in BQ.</td>
<td>(Hamimah, et al., 2011)</td>
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<td>6)</td>
<td>BQ rates are unreliable as it vulnerable to human error (artificially high and low) and variability in contractor's pricing.</td>
<td>(Akintoye et al., 1992)</td>
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<td>7)</td>
<td>BQ descriptions compel estimators to use unit rates as the pricing basis.</td>
<td>(Mohd Hisham and Azman, 2008)</td>
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<td>8)</td>
<td>SMM measurement approach (the case of Australia) is overly complex.</td>
<td>(Davis and Baccarini, 2004)</td>
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<td>9)</td>
<td>SMM rules promote quantities inaccuracies in BQ.</td>
<td>(Leon, 1966)</td>
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<tr>
<th>(4) Unimproved format</th>
<th>BQ preparation takes extra time and delaying the date for calling tenders.</th>
<th>(Abdul Rashid and Normah, 2004; Ashworth and Hogg, 2007; Khairuddin, 2011; Kinlay, 1984a; Rosli, et al., 2008)</th>
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<td>2)</td>
<td>BQ production is a sequential process and is normally prepared at the late stage of the design process.</td>
<td>(Ferry, et al., 1999; Matipa, et al., 2008)</td>
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<td>3)</td>
<td>Inadequate time to prepare BQ lead to poor BQ quality.</td>
<td>(The BOQ Working Group, 1995)</td>
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<td>4)</td>
<td>BQ production is labour intensive and requires significant portion of QS cost.</td>
<td>(Charles, 2007)</td>
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<th>(5) Limited function</th>
<th>BQ format other than trade fails to facilitate contractor pricing.</th>
<th>(The BOQ Working Group, 1995)</th>
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<td>2)</td>
<td>BQ format do not indicate project's buildability, work sequence and control of work.</td>
<td>(Skoyles, 1968)</td>
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<td>3)</td>
<td>BQ format do not adequately reflect the interaction between the design and the production process.</td>
<td>(Skoyles, 1964)</td>
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<td>4)</td>
<td>BQ format is not adequate to fulfil its maximum functions.</td>
<td>(Hughes, 1978)</td>
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<td>5)</td>
<td>BQ format and data presentation are the major cause for inefficient flow of estimating data.</td>
<td>(Kodikara and McCaffer, 1993)</td>
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<th>(6) Poor and unimproved presentation</th>
<th>BQ primary function is limited to just calling competitive tenders rather than a document for management and cost control of construction on site.</th>
<th>(Ferry, et al., 1999; M. Hodgetts, 1985)</th>
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<td>2)</td>
<td>BQ benefit as checking and coordinating document is not fully explored.</td>
<td>(Blyth, 2001)</td>
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<td>3)</td>
<td>Some limitations of BQ as tender document are: (1) presence of errors (2) incomplete (3) cannot be used to control project cost (4) cannot facilitate the use of probability cost estimating (5) poorly structured and too bulky.</td>
<td>(Uher, 1996)</td>
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<tr>
<td>4)</td>
<td>BQ is too detailed, not appropriate for all types of construction works.</td>
<td>(Ashworth and Hogg, 2007; Khairuddin, 2011)</td>
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<tr>
<td>5)</td>
<td>BQ is no use to the client and inaccessible to the client who has paid for their production.</td>
<td>(Blyth, 2001; Kinlay, 1984a)</td>
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| (6) Poor and unimproved presentation | BIM technology is able to respond faster and challenging the traditional method for producing quantity. | (Barker, 2011) |
| 2) | Traditional measurement would not be able to | (Barker, 2011) |


5. THE CONCEPTUAL FRAMEWORK

Skinner(1979), whose research concentrated primarily on examining the utility of the BQ in the process of building contracting, has defined the concept of adequacy as “the absence of any necessity to make additional allowances, alterations or amendments before making use of the information presented in the bill” (p. 50). Taking cue from the work of the author, the concept of the inadequacy of BQ information applicable to this paper could be referred to as the need to make such allowances etc. due to the deviation, in comparison to what is perceived as the ideal situation. ‘Figure 1’ in this instance, is the representation of the concept. By referring to ‘Figure 1’, the ‘IDEAL SITUATION’ will amount to perfect equilibrium where the requirements for information from BQ users are met by the amount of information given by the producers. In order for the ideal situation to take place, both BQ producer and BQ users need to be cleared with their own requirements and this will also involve both parties to let the other party know every bit of their requirements. For example, if a contractor (i.e. BQ users) requiring information on the location of a measured item in the BQ (i.e. the information), he or she has to let the Quantity Surveyor (i.e. BQ producer) knows his requirement in order to situate his information requirement on the baseline. The Quantity Surveyor in return, has to let the contractor get the information otherwise equilibrium will not be created.

In contrast, review of the literatures has indicated that the ideal situation is currently smeared by the ‘IMPERFECT SITUATION’. Worse, further review of the literature has indicated that the type, amount and forms of information that will establish the baseline were currently uncoordinated and disorganized. The establishment of the baseline by ascertaining the type, amount and forms of BQ information is therefore prerequisite before attempt could be made in assessing the current deviation from the ideal situation.

Following the breadth of the issue, there are many situations which could lead to the imperfect situation or simply, n. As an example in ‘Figure 1’, BQ users are expecting beyond what are needed while BQ producer is giving too few information. In this situation, vacuum will be created along the information continuum (i.e. area of BQ information imbalance) and this will create a hurdle as far as information in the construction industry is concerned. The information vacuum created though the illustration is currently the concern of various authors. However, approach to identify every
imperfect situation as an effort to rectify every type of BQ information disequilibrium will not be possible given the limitless combination that may occur in the construction industry - n. Regardless of the limitation, the establishment of the baseline will act as a gauging scale where any situation could be compared to in pursuit of the ultimate solution.

Figure 1: The conceptual framework on the inadequacy of BQ information

6. BEYOND THE CONCEPT

By understanding the issue conceptually, further action could be planned in order to solve the imperfections through scientific approach. This will involve identifying the step which is considered prerequisite before the next step could follow suit. Based on the understanding from the concept, the establishment of the line of BQ information equilibrium or simply the baseline is the prerequisite before current situation could be assessed.

For this reason, actions need to be planned for the purpose of establishing the baseline. This will involve thorough investigation on its usage among the users, examining the problems associated with its current use and probably, identifying any impacts the problems give to the construction projects. Following this, the specific requirements of the users could be identified and these requirements should partly amount to the baseline of BQ information.

In order to complete the baseline, comparison needs to be made between the user’s requirements and the current form and presentation of the BQ. The process will highlight the information which is currently unmet by the BQ producer thus formulating the complete baseline.
For the purpose of assessing the adequacy of the BQ information, the comparison process which is conducted between the user’s requirements and the current form and presentation of the BQ is itself an assessment of its adequacy. Besides formulating the baseline, the process will also indicate either the current information is adequate or not which should be considered as another milestone in the process.

7. CONCLUSION
The paper has reviewed issues pertaining to the application of the BQ in the construction industry and has found that the issues could be categorised to eight broad categories. Following the categorisation, the most significant issue discussed in the literature was identified and focus was then given to further conceptualise the issue as a preliminary approach to plan for a solution. According to the outcome of the synthesis, issues pertaining to the adequacy of the BQ information were identified as significant thus requiring immediate attention. In order to understand the issue holistically, the paper has proposed a conceptual framework as a basis to plan the steps of actions. According to the conceptual framework proposed, the issue with the adequacy of the BQ information had risen due to the deviation from the ideal situation which had been caused by the lop-sidedness of information from the line of the information equilibrium. The situation in return, has prompted disequilibrium to exist which renders the information unfit for its intended purposes. Beyond the proposed conceptual framework, the paper had called for the establishment of the line of the BQ information equilibrium or simply the baseline in assessing the adequacy of the current information provided in the BQ. By having the baseline in hand, the current situation could be assessed as one of the prerequisite step in suggesting the desired solution.

8. ACKNOWLEDGEMENT
The authors wish to thank the reviewers for the constructive comments made during the review process.

9. REFERENCES


THE EMPLOYER’S CLAIM AGAINST THE CONTRACTOR FOR DAMAGES FOR DEFECTIVE WORK

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Abstract
Where the contractor is liable for defective work, there is often a tussle between two dominant types of measure of damages that may be available to the employer: the cost of reinstatement and diminution in value. This paper examines the attitudes of the courts towards the issue of the appropriate measure of damages for defective work and the various factors to be considered. A doctrinal analysis is conducted on relevant court decisions to extract the legal principles involved. The courts seem to generally agree that the normal measure of damages should be the cost of reinstatement since this would meet the expectation interest of the employer under the contract. However, if the cost of rectifying the defects is disproportionate to the end to be attained, then damages fall to be measured by the diminution in value. Cost of reinstatement and diminution in value are not invariably mutually exclusive measures of damages as where after the repair work has been done, there is still a residual depreciation in the investment value of the property. An intention to repair the defects is a relevant factor to be considered as to whether it is reasonable for cost of reinstatement to be awarded. If the employer has in fact repaired the works, the cost may be recoverable if it is reasonable. The result of this research will benefit those involved in construction through an awareness of the rights of the employer should the contractor fail to meet his contractual obligations.

Keywords: construction contract, contractor, damages, defective work, employer

1. INTRODUCTION
Construction defects arise as a result of the contractor's failure to achieve the precise contractual objective. Usually the building is functional and capable of being used for its purpose. Nevertheless the employer has not got what he contracted for and the loss is normally reflected in financial terms.

An appropriate starting point for an appraisal of measure of damages harks back to the year 1848 with Parke B’s much quoted words in Robinson v Harman (1848) 1 Exch 850, 'The rule of the common law is that where a party sustains a loss by reason of a breach of contract, he is, so far as money can do it, to be placed in the same situation, with respect to damages, as if the contract had been performed'. This rule has wielded enormous influence over the development of the law on remedies for breach of contract.

Where the contractor is liable for defective work, there are two dominant types of measure of damages that may be available to the employer: the cost of reinstatement and diminution in value.
The cost of reinstatement is the ordinary measure of damages for defective work by the contractor as illustrated by the case of Lim Chon Jet & Ors v Yusen Jaya Sdn Bhd [2011] 8 CLJ 598.

As Oliver J said in Radford v De Frobery [1977] 1 WLR 1262:
If [the plaintiff] contracts for the supply of that which he thinks serves his interests—be they commercial, aesthetic or merely eccentric—then if that which he contracts for is not supplied by the other contracting party I do not see why, in principle, he should not be compensated by being provided with the cost of supplying it through someone else or in a different way, subject to the proviso, of course, that he is seeking compensation for a genuine loss and not merely using a technical breach to secure an uncovenanted profit.

2. RESEARCH METHODOLOGY
Analysis of relevant court decisions both from Malaysia and other jurisdictions is conducted to extract the legal principles involved.

3. TEST OF REASONABLENESS
In Ruxley Electronics and Construction Ltd v Forsyth [1996] AC 344, the defendant had contracted to build a swimming pool for the plaintiff. The contract stipulated that the deep end of the pool should be 7 feet 6 inches deep but as constructed, it was only 6 feet deep. The plaintiff claimed damages in the sum required to reconstruct the pool to the specified depth. The House of Lords rejected the plaintiff's claim for reinstatement costs on the ground that such costs were out of all proportion to the benefit to be obtained. The pool was held to be perfectly safe to dive in. The court also found that there was no diminution in value so a claim on this ground also failed.

In articulating the principles to be applied in granting damages for construction defects, the House of Lords in Ruxley invoked not only English authority, notably the speech of Lord Cohen in East Ham Corp v Bernard Sunley & Sons Ltd [1966] AC 406, but also authoritative statements of principle from the High Court of Australia (Bellgrove v Eldridge (1954) 90 CLR 613) and the United States (Jacob & Youngs Inc v Kent (1921) 129 NE 889). Lord Lloyd gave guidance as to the circumstances in which cost of reinstatement is the appropriate measure of damages:

Where the cost of reinstatement is less than the difference in value, the measure of damages will invariably be the cost of reinstatement. By claiming the difference in value the plaintiff would be failing to take reasonable steps to mitigate his loss. In many ordinary cases, too, where reinstatement presents no special problem, the cost of reinstatement will be the obvious measure of damages, even where there is little or no difference in value, or where the difference in value is hard to assess. This is why it is often said that the cost of reinstatement is the ordinary measure of damages for defective performance under a building contract.

Lord Lloyd further added that if it is unreasonable for the plaintiff to insist on reinstatement, for example where the expense of the work involved would be out of all proportion to the benefit to be
obtained, then the plaintiff will be confined to the loss in value. The cost of remedy is central, and often decisive, to the issue of reasonableness in this context.

In the same case, Lord Mustill observed:
… the test of reasonableness plays a central part in determining the basis of recovery, and will indeed be decisive in a case such as the present when the cost of reinstatement would be wholly disproportionate to the non-monetary loss suffered by the employer.

Another judge who delivered his decision in the same case, Lord Jauncey, was of the opinion that if it is unreasonable in a particular case to award the cost of reinstatement it must be that the loss sustained does not extend to the need to reinstate.

Lord Lloyd adopted the principles laid down by Cardozo J in *Jacob & Youngs* that first, the cost of reinstatement is not the appropriate measure of damages if the expenditure would be out of all proportion to the benefit to be obtained and, secondly, the appropriate measure of damages in such a case is the difference in value, even though this may result in a nominal award. He then restated these principles, expressed in terms of reasonableness:

Once again one finds the court emphasising the central importance of reasonableness in selecting the appropriate measure of damages. If reinstatement is not the reasonable way of dealing with the situation, then diminution in value, if any, is the true measure of the plaintiff’s loss. If there is no diminution in value, the plaintiff has suffered no loss. His damages will be nominal.

Where repairing the defects is a reasonable course to take, then the cost of reinstatement will be the preferred award even where this is substantially greater than the diminution in value (*Ruxley* and see also *Bellgrove v Eldridge* [1954] 90 CLR 613; *East Ham Corp v Bernard Sunley & Sons Ltd* [1966] AC 406). Whether it is reasonable or not to award the cost of remedial work, the context of the particular contract must be considered (per Lord Jauncey).

It was argued for the defendant in *Ruxley* that because there was no diminution in value, the cost of reinstatement was the proper measure. Lord Bridge's response to this was that to hold that the measure of the building owner's loss is the cost of reinstatement, however unreasonable it would be to incur that cost, seems to fly in the face of common sense. He said:

The circumstances giving rise to the present appeal exemplify a situation which one might suppose to be of not infrequent occurrence. A landowner contracts for building works to be executed on his land. When the work is complete it serves the practical purpose for which it was required perfectly satisfactorily. But in some minor respect the finished work falls short of the contract specification. The difference in commercial value between the work as built and the work as specified is nil. But the owner can honestly say: 'This work does not please me as well as would that for which I expressly stipulated. It does not satisfy my personal preference. In terms of amenity, convenience or aesthetic satisfaction I have lost something.' Nevertheless the contractual defect could only be remedied by demolishing the work and starting again from scratch. The cost of doing this would be
so great in proportion to any benefit it would confer on the owner that no reasonable owner would think of incurring it.

The critical importance of reasonableness was emphasised in *Southampton Container Terminals Ltd v Schiffahrtsge nosseldorf “Hansa Australia” MGH & Co (The MV “Maersk Colombo”)* [2001] EWCA Civ 717 where Clarke LJ said, ‘As I read the authorities, where reinstatement is the appropriate basis for the assessment of damages, it must be both reasonable to reinstate and the amount awarded must be objectively fair as between the claimants and the defendants’.

The court in *Vercoe v Rutland Fund Management Ltd* [2010] EWHC 424 (Ch) was of the view that in controlling the amount of damages to be awarded for breach of contract as in *Ruxley*, reference should be made to the strength of the plaintiff’s interest in performance of a contractual duty, judged objectively and weighing that against the legitimate interests of the defendant so that the remedy awarded is not oppressive to the defendant and is properly proportionate to the wrong done to the plaintiff.

In *McGlinn v Waltham Contractors Ltd* [2007] EWHC 149 (TCC), the court held that foreseeability is plainly of importance in assessing the correct measure of damage. The court added that if the plaintiff 'only has a limited interest in the property, or if he could obtain a satisfactory replacement for the property by buying elsewhere, then it would not be foreseeable that he would carry out repair/reinstatement, and his loss would be accurately assessed by reference to the diminution in the value of the land or the cost of purchasing a replacement’.

4. INTENTION TO SELL THE DEFECTIVE PROPERTY

Where the owner of a building sells the property with defects due to the contractor's fault for which the cost of reinstatement is the appropriate measure, but such sale does not result in loss due to the defects, then the loss that the law supposes is avoided and no damages are recoverable. It is not in law right or reasonable to compensate the owner for such a loss. An illustration of this principle is afforded by the case of *Birse Construction Ltd v Eastern Telegraph Co Ltd* [2004] EWHC 2512 (TCC) where the defendant construction company failed to properly construct a residential training college. The claimants intended to sell the college without remedying the defects. The court rejected the claimants’ claim for recovery of the cost of rectifying the defects.

If the sale of the property without rectification of the defects results in a loss to the owner, then that loss may be recoverable as the proper measure of loss. Such diminution in value was awarded in *Rawlings v Rentokil Laboratories Ltd* (1972) 223 EG 1947.

5. DEMOLITION AND REBUILDING

There may be situations where it is justifiable for the employer to recover the cost of demolishing the property and building afresh as damages on the basis of the cost of reinstatement. In *Ruxley*, Lord Jauncey said:
What constitutes the aggrieved party's loss is in every case a question of fact and degree. Where the contract breaker has entirely failed to achieve the contractual objective it may not be difficult to conclude that the loss is the necessary cost of achieving that objective. Thus if a building is constructed so defectively that it is of no use for its designed purpose the owner may have little difficulty in establishing that his loss is the necessary cost of reconstructing.

In *Harrison v Shepherd Homes Ltd* [2011] EWHC 1811 (TCC), the claimants had bought houses which had defective piles. The court had to decide on the question whether it was reasonable for the claimants to be awarded damages representing the full cost of repiling the properties and the necessary costs associated with vacating the houses when being partly demolished and rebuilt. The court held that the claim for reinstatement cost was not reasonable in the circumstances. Among the reasons given by the court in reaching this decision were first, the engineering experts agreed that from a structural engineering point of view the cracking and movement would not warrant those works. The cracks were so fine that they were difficult to see and those that were larger were below the threshold that engineers would normally be concerned about. Secondly, there were only remote to low probabilities of significant movements of the foundations in the future. Thirdly, the claimants would likely sell their existing houses and use the money to move elsewhere. Fourthly, the costs of repiling and associated costs would be out of all proportion to the loss suffered. Fifthly, the houses had already been built for some eight years. Investigations had been made and there was less uncertainty as to the future performance of the houses. Upon these reasons, the court held that it was unreasonable to award the cost of major remedial works and that the proper compensation was an award based on diminution in value.

In *McGlinn*, the defendants had built a house for the claimant. The claimant being dissatisfied with the works completely demolished the house. The claimant sought to recover the costs of demolition and of building anew. The defects affected the whole house: the floors, the walls and the roof. However, those defects were mainly aesthetic in nature. The house was not structurally unsound or dangerous. The court said it was an extreme course to knock down a newly completed building in such circumstances. The court concluded that the right measure of loss was the cost of repair work for the defects and that it would be unreasonable to assess the damages by reference to any other methodology.

However, in *Bellgrove*, the High Court of Australia did allow the plaintiff's claim for the cost of demolishing and rebuilding a house. The builder had put grossly under-strength concrete and mortar in the foundations of the house and in its brickwork. The builder argued that the foundations could be underpinned, or alternatively replaced in small sections. The builder also contended that the house had a marketable value for speculative builders prepared to do reinstatement of this kind and therefore diminution in value would be the appropriate compensation. On the facts, these arguments were not acceptable to the court.
6. INTENTION TO REINSTATE
Concerning the question of whether the intention to reinstate is relevant in considering whether cost of reinstatement should be awarded, Lord Jauncey said this in *Ruxley*:

The appellant argued that the cost of reinstatement should only be allowed as damages where there was shown to be an intention on the part of the aggrieved party to carry out the work. Having already decided that the appeal should be allowed I no longer find it necessary to reach a conclusion on this matter. However I should emphasise that in the normal case the court has no concern with the use to which a plaintiff puts an award of damages for a loss which has been established. Thus irreparable damage to an article as a result of a breach of contract will entitle the owner to recover the value of the article irrespective of whether he intends to replace it with a similar one or to spend the money on something else. Intention, or lack of it, to reinstate can have relevance only to reasonableness and hence to the extent of the loss which has been sustained. Once that loss has been established intention as to the subsequent use of the damages ceases to be relevant.

Lord Lloyd in the same case said, 'I fully accept that the courts are not normally concerned with what a plaintiff does with his damages. But it does not follow that intention is not relevant to reasonableness, at least in those cases where the plaintiff does not intend to reinstate'. He then said, 'Where a plaintiff is contending for a high as opposed to a low cost measure of damages the court must decide whether in the circumstances of the particular case such high cost measure is reasonable. One of the factors that may be relevant is the genuineness of the plaintiff's desire to pursue the course which involves the higher cost. Absence of such desire (indicated by untruths about intention) may undermine the reasonableness of the higher cost measure'.

Accordingly, the intention to reinstate is relevant because it may be some evidence of whether the cost of carrying out remedial works is disproportionate to the benefit to be obtained and whether it is reasonable to reinstate.

In *Ruxley*, the plaintiff gave an undertaking that he would spend any damages which he might receive on rebuilding the swimming pool in support of his claim for reinstatement cost. The question was whether this would make any difference. Lord Lloyd answered:

Clearly not. He cannot be allowed to create a loss which does not exist in order to punish the defendants for their breach of contract. The basic rule of damages, to which exemplary damages are the only exception, is that they are compensatory not punitive.

Where there is no diminution in value and no intention to remedy, it is unlikely that the court will award remedial cost. As Sir Robert Megarry VC said in *Tito v Waddell (No 2)* [1977] Ch 106, 'Per contra, if the plaintiff has suffered little or no monetary loss in the reduction of value of his land, and he has no intention of applying any damages towards carrying out the work contracted for, or its equivalent, I cannot see why he should recover the cost of doing work which will never be done. It would be a mere pretence to say that this cost was a loss and so should be recoverable as damages'.

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7. THE EXISTENCE OF DIFFERENT REMEDIAL SCHEMES

Reasonableness is also the critical factor where a plaintiff carries out reinstatement of his property. The court in *Hospitals for Sick Children Board of Governors v McLaughlin & Harvey Plc* (referred to below as *Great Ormond Street*) (1987) 19 Con LR 25 said:

The plaintiff who carries out either repair or reinstatement of his property must act reasonably. He can only recover as damages the cost which the defendant ought reasonably to have foreseen that he would incur and the defendant would not have foreseen unreasonable expenditure. Reasonable costs do not, however, mean the minimum amount which, with hindsight, it could be held would have sufficed. When the nature of the repairs is such that the plaintiff can only make them with the assistance of expert advice the defendant should have foreseen that he would take such advice and be influenced by it.

If there are two or more equally effective remedial schemes available, the plaintiff should opt for the cheapest. If he chooses otherwise, then he cannot recover more than the cost of the cheapest scheme. Such a proposition was made in *Great Ormond Street*, where the court said:

The plaintiff has, whether as part of the requirement that he acts reasonably or otherwise, a duty to mitigate his loss. This may require him, if presented with two or more choices, to choose the one which will keep his losses to the minimum. If he is incurring loss because he cannot use his property, his duty to mitigate may require him to repair it as quickly as possible, even if earlier repairs would cost more than later repairs would. The duty to mitigate may require the plaintiff to have regard to advice from third parties, or even from the defendant, or from the defendant’s advisers.

In the case of *George Fischer Holding Ltd v Multi Design Consultants Ltd* (1998) 61 Con LR 85, the remedial work had not been undertaken at the time of the trial. There were two proposed remedial schemes, one of which was significantly cheaper than the one favoured by the claimant. In holding that the proper measure of loss was by reference to the less expensive scheme, the court said:

Each scheme was criticised by the proponents of the other. Neither had been designed in full detail, so acceptance of either is to some extent dependent, first, on a judgment as to the ability of a designer, with the assistance of the specialist knowledge of the relevant manufacturer and a contractor experienced in using the system, to devise suitable detailed treatment of all the potential trouble-spots and, second, on an assessment of the guarantees and bonds offered by the manufacturer and contractor. Since Soladex would be so much the cheaper and cannot be said to be the more detrimental to the appearance of the buildings – I should have thought, if anything, the reverse – it must clearly be preferred unless the criticisms of its expected effectiveness are, taking the above considerations into account, made good on the balance of probabilities. In my judgment they are not. A different approach may apply if a plaintiff has taken professional advice and implemented a repair scheme based on that advice. The court in the *Great Ormond Street* held that in certain cases it would be foreseeable that a plaintiff would decide which remedial scheme to adopt with the help of
expert advice, and that it would be foreseeable that the plaintiff would be influenced by and comply with such advice. In such cases, prima facie, the plaintiff is entitled to the cost of the work carried out in accordance with that expert advice, even if, with hindsight, criticism could be made of the scheme that was carried out. In such a case, for the defendant to defeat the damages claim based on work actually carried out, the defendant must normally show that the advice upon which the plaintiff relied on was negligently given.

The court summarised its conclusions in *Great Ormond Street* thus:

If at the date of the trial no remedial works have been carried out by the plaintiff, then the court has in order to assess damages to decide what work should be done. The parties are entitled to put forward rival schemes and the court has to choose between them or variants of them … The assessment has to be made on the basis of what the plaintiff can reasonably do. … where works have been carried out, it is not for the court to consider de novo what should have been done and what costs should have been incurred either as a check upon the reasonableness of the plaintiff’s actions or otherwise.

The importance of the plaintiff’s reliance on expert advice was considered in the context of an assessment of damages in *Skandia Property (UK) Ltd v Thames Water Utilities Ltd* [1999] BLR 338. In that case, the claimant was advised by experts that a tanking system was the only practical way to protect a building that had been damaged by a flood caused by the defendant. However, unknown to the experts at the time of such advice, pressure grouting treatment had been performed some time prior to the flood. This meant that the flood had not in fact damaged the integrity of the building. The system that was put in place as part of the remedial scheme was thus unnecessary. In assessing damages, the court rejected the claimant’s claim for the cost of the tanking system, despite the absence of any suggestion of negligent advice by the experts. The Court of Appeal held as follows:

If there has been an escape of water that causes some physical damage then prima facie it is only the cost of reinstatement of that physical damage which is recoverable. If a plaintiff is to recover damages for something beyond the cost of reinstatement of physical damage then he must on any view show that it was reasonable to incur expenditure beyond that quantifiable figure … What should be emphasised is that it must be rare if ever that a plaintiff will be able to establish the reasonableness of any assumption of damage to something which is accessible and inspectable. Certainly, simple reliance by a plaintiff on an expert cannot be the test as to whether a plaintiff has acted reasonably in making an assumption, albeit, provided the plaintiff has provided the expert with all material facts and the expert has made all reasonable investigations, the advice will be a highly significant factor.

*Great Ormond Street* is therefore doubtful as an authority for the wide proposition that the employer's decision to demolish and rebuild if made with expert advice will conclusively pin the contractor with the costs of such work, and that all other considerations are essentially rendered irrelevant (*McGlinn*).
8. DOUBLE RECOVERY
Reinstatement cost and diminution in value are not mutually exclusive heads of damages. There may be situations where even with remedial works, there is still a diminution in value. If the remedial work is substantial, it may affect the investment value of the property. It may also affect the property aesthetically resulting in a depreciation of its value. In such circumstances, it may be proper to award both repair cost and diminution in value. This is not a matter of double recovery but of adequately compensating the plaintiff for his loss.

9. CONCLUSION
The above analysis seems to lead to the following principles governing the measure of damages for construction defects. The cost of reinstatement is the normal measure of damages for defective work by the contractor. Where the cost of reinstatement is less than the diminution in value, the measure of damages will invariably be the cost of reinstatement. The cost of reinstatement is not the appropriate measure of damages if it is not reasonable in the circumstances, most notably where the expenditure would be out of all proportion to the benefit to be obtained. Where this is so, the appropriate measure of damages is the difference in value, even though it would result in a nominal award. Certain circumstances may justify the cost of reinstatement to be based on the demolition of the defective property and rebuilding especially where the building is structurally unsound and unsafe. An intention to repair the defects is a relevant factor to be considered as to whether it is reasonable for cost of reinstatement to be awarded.

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THE EFFECTS OF PROCUREMENT SYSTEMS TOWARD PERFORMANCE OF THE REFURBISHMENT PROJECTS

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Abstract
Different types of procurement systems have different methods and process of designs and constructions whereby it described different systems and different organization structures in terms of roles, responsibility and the authority of each member in the team. However, it’s still inconclusive to what extent that different types of procurement systems could have different methods, process and organization structure would affect the performance of refurbishment projects. The paper aim to investigate, evaluate and analyses the most suitable procurement method to be implemented in refurbishment project. In order to achieve this goal, the objective of this paper is to identify types of procurement methods used in Malaysian refurbishment projects and their effect toward project performance. Triangulation technique was used in the study. From the questionnaire sent out, 368 questionnaires were found to be useful for data analysis, giving a final response percentage of 24.53%. Semi-structured interview has been carried out with 15 contractors to ensure the result is reliable. Descriptive and mean comparisons were used in data analysis. The findings shows that 54.3% of the projects are using traditional procurement systems, 39.9% using design and build, 4.3% using management procurement, whereas 1.1% of the refurbishment project using turnkey system and 0.3% using built-operate-transfer (BOT) system. Refurbishment projects using traditional procurement systems were found performing well if compare to others.

Keywords: Malaysia, procurement systems, performance, refurbishment

1.0 INTRODUCTION

Compared to new build project, the refurbishment projects are more risky and complex, in which makes it more difficult to manage (Egbu, 1988, and Ali, 2008). A review of current practices in Malaysia shows different approaches to the refurbishment procurement systems. The introduction of different types of procurement systems has contributed to higher difficulties in managing refurbishment project under various circumstances (Ali et al., 2011). Hardcastle and Tookey (1998) also has highlighted that the refurbishment industry has been heavily criticized for its inefficient and ineffective procurement strategies and processes. The inefficient and ineffective procurement strategies and processes have been considered as a factor that has affected the industry's performance.

The different types of procurement system have different methods and process of designs and constructions. It described a different systems and a different organization structure in term of roles, responsibility and the authority of each members in the team. However, it’s still uncertain on how far do the different types of procurement system have different methods, process and organization structure and how it can affect the performance of a refurbishment project in term of cost, time and
quality. Therefore, it is essential to understand today’s practice procurement method and to identify the most suitable procurement systems for refurbishment projects and the impact of the different types of procurement systems towards project performance in term of cost, time and quality.

2.0 TYPES OF PROCUREMENT SYSTEMS
There are numerous types or variations of project procurement systems being widely used in the refurbishment industry from the range from the traditional system to the many variations of “fast-tracking” systems such as turnkey, design and build, build-operate-transfer and management contracting, (Rosli et al., 2006; Jim Smith et al., 2004; Masterman, 1996; Huges et al., 2006).

Figure 1: Types of Project Procurement Systems in Construction Industry

2.1 Traditional System
The traditional procurement system is predominant in the Malaysian construction industry and, until 1992 at least, able to satisfy its requirements (Masterman, 1992). It is characterized by the contractor not being responsible for the design or the documentation work (Goldfayl, 1999; Rwelamila and Meyer 1999) and with a clear division between the design and construction process responsibilities (Rowlinson, 1999; Martin, 2000).The main advantages of using a traditional approach to procurement are produces lowest bid, assuring quality control and familiar in the industry whereby its disadvantages are builders not involved in design process, slower speed and potential adversarial (Peter et al., 2008).

2.2 Design And Build System
The term “Design and Build” refers to the procurement strategy that entails the contractor carrying out the work; the design works as well as the construction and completion of the work. The main advantages of using a design and construct approach to procurement are contractor act as single point of responsibility, Price Certainty, Effective communication and Multi-disciplinary approach and the disadvantages are higher costs, the limitation of competition in the public section, Difficulties in
preparing an adequate and sufficiently comprehensive brief, requires early confirmation of concept design and absence of a bill of quantities (Peter et al., 2008).

2.3 Management Procurement System
Several variants of management procurement forms exist, which include; management contracting, construction management and design and manage. In the case of management contracting, the contractor has direct contractual links with all the works and a contractor is responsible for all construction work. In construction management, a contractor is paid a fee to professionally manage, develop a programme and coordinate the design and construction activities, and to facilitate collaboration to improve the project’s constructability. The main advantages of using a management approach to procurement are enables improved coordination and collaboration, potential for time savings, roles, risks and responsibilities for all parties are clear and flexibility for changes in design. The main disadvantages are proactive client is required, poor price certainty, client loses direct control, time and information control required and client must provide a good quality brief to the design team (Peter et al., 2008):

2.4 Built-Own-Operate-Transfer (BOOT)
Developers use their own funding sources to build a public facility in return for the right to operate it and charge a fee for its use. At the end of an agreed period the facility may revert to the landlord. This type of contract focuses on final service delivery and relies upon the required performance standards being properly documented. Building contractors involved in this type of development are usually part of a consortium (Department of Infrastructure Building Services Agency, 1998). BOOT procurement system is less implemented in Malaysia refurbishment project. The main advantages of using these approaches is time and cost savings whereby the main disadvantages of BOOT procurement system are due to additional cost and inflexibility.

From this chapter, it can be concluded that there are four main types of procurement systems which are traditional, design and build, management contract and BOOT systems. Different types of procurement systems have different characteristics and it serve a different way in affecting the refurbishment project performance.

3.0 KEY PERFORMANCE INDICATORS FOR PROJECT PERFORMANCE
Thomas et al. (2002) and Josephson and Lindstrom (2007) developed numerous parameters for measuring project performance. Figure 2 shows key performance indicators to measure performance of refurbishment project

The three performance measure categories form a basis for designing the performance indicators, which are the elements of performance within the ambit of each measure category.
3.1 Meets Budget
Cost is one of the key performance indicators (KPI) used to measure performance of a project. There are four areas that are highly related to the project cost control which are Interim Payments, Variation Orders, Cost and Prolongation Claims, and Budget versus Actual cost Forecast. Project cost performance is used to show the effectiveness of the project adheres to the budgeted cost.

3.2 Meets Time
According to Hatush and Skitmore (1997), time refers to the duration for completing the project. It is scheduled to enable the building to be used by a date determined by the client’s future plans. A success project is able to perform by completing the project within the time frame given.

3.3 Meets Quality
The quality of the project can be measured by determining numbers of defects and customers complaints, number of non-conformance report, work rejection rates and sample rejection for the project. Different types of procurements system might serve different impact of quality of the project.

Ling (2004) also stated that the performance of a project is multifaceted and may include unit cost, refurbishment and delivery speeds and the level of clients’ satisfaction. Moreover, research conducted by Atkinson, et al., (1997) reveals that clients will not be satisfied if the end product (project) fails to meet their price, quality, time frame, functionality and delivery performance standard.

4.0 METHODOLOGY
The study approach incorporated triangulation techniques that combined both qualitative and quantitative approaches. The objective of employing a quantitative method is to minimize personal prejudice or bias and to ensure that the social reality would be presented as it is. It is expected to have true value, applicability, consistency and conformability (Guba and Lincoln, 1989). In addition to that, quantitative data collection procedures create epistemological postulations that reality is objective and unitary. On the other hand, qualitative data refer to information gathered in a narrative through interviews, experience and observations (Sekaran, 2005). The combination of both research
methods in a social science study could produce robust and valid findings at the end of the study. This is because the qualitative approach could complement results obtained from a quantitative approach, which would make it more reliable (Ali et al, 2009).

Four hundred and ten, 410 closed-ended questionnaires were obtained and received and the targeted respondents included site agents, project engineer, contract administrator, contract manager, project manager and other parties who are working in Construction Company; which three hundred sixty eight, 368 questionnaires were found to be useful for data analysis, giving a final response percentage of approximately 24.53%. Findings from the questionnaire survey shows that almost 60% of the respondents were manager and director level and 63.3% of them had more than 10 years’ experience in construction industries. This indicated the data collected from this survey are reliable.

5.0 RESULT AND DISCUSSION

Figure 3 illustrated types of procurement systems used in Malaysian Refurbishment Projects. The result indicated that traditional systems is the most preferred system used in Malaysia with record of 54.4%, followed by design and build with record of 39.9%, Management procurement, 4.3%, Turnkey System with record of 1.1% and Built-Operate-Transfer BOT with record of 0.3%. Besides, based on the findings from semi-structured interview, 12 out of 15 interviewees highlighted that traditional is the most preferred and suitable procurement system for Malaysia Refurbishment Projects if the contract value exceeded RM500, 000.00. Turnkey, management and built-operate-transfer BOT system are less opted in Malaysian Refurbishment Projects as they are found not suitable.

![Figure 3: Types of Procurement Systems in Malaysia](image)

As pointed out by Peter et al., (2008), there are three types of traditional procurement method which is consist of lump sum contract, measurement contract and cost reimbursement/cost plus contract. Most of the interviewees mentioned that cost reimbursement/cost plus are the best option opted for refurbishment project due to the activities carried out are uncertain. For this contract, the contractors were being paid for an agreed fee to cover management, overheads and profits.
Thomas et al. (2002) and Josephson and Lindstrom (2007) developed numerous parameters for measuring project performance which are cost, time and quality. The results shows most of the refurbishment projects using traditional system were completed within time, budget and quality (less complaint and NCR received) whereby refurbishment projects using design and build procurement system were completed within time. The results also shows that the refurbishment projects using BOT systems were completed with less non-compliance records (NCR).

Table 1: Performance of the refurbishment project in Malaysia

<table>
<thead>
<tr>
<th>PROCUREMENT/PERFORMANCE</th>
<th>COST</th>
<th>TIME</th>
<th>% VO</th>
<th>COMPL</th>
<th>NCR</th>
</tr>
</thead>
<tbody>
<tr>
<td>TRADITIONAL SYSTEM</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
<td>✦</td>
</tr>
<tr>
<td>DESIGN &amp; BUILD SYSTEM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>TURNKEY SYSTEM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>MANAGEMENT CONTRACT SYSTEM</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>BUILT-OPERATE-TRANSFER, BOT</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>✦</td>
</tr>
</tbody>
</table>

Legend: ✦ - Within targeted (perform)

Walker and Hampson (2003), and (Wearne 1997) emphasize that traditional system is separated into different process with design and construction. The drawings, specification, and bill of quantities breakdown are provided by the client to the contractor during tender stage for ease of pricing. It also gives the client firmer and more competitive price because the design plus the complete working drawings have been fully developed and detailed out prior to tendering. It eliminates any design or construction ambiguity or uncertainty which often causes the contractors to unnecessarily inflate the price. In the case where bill of quantities is used, the bidding tend to be more fair as such the project cost is lower. The system also has a better cost control (Masterman, 1996). In design and Build and Turnkey procurement system, the cost to construct the refurbishment works is often higher than the traditional contracting system. This is due to the lack of design, specification detailing and absence of bill of quantities during tender and contractors are not considering the certain part of the work that are uncertain. This will consequently increase the construction cost and lead to the construction cost exceeded the budgeted cost. Furthermore, client is required to come out with a concept design at an early stage for design and build system. Undecided and incomplete concept committed to contractor at the early stage of the project will lead to higher frequent change order by client during construction stage.

Peter et al. (2008) also highlighted that contractors are more familiar with traditional system as it is the most common types of procurement use in construction industry. Most of the contractors have much experience with this type of procurement method in Refurbishment Projects. In addition to this, the completed or largely completed designs would help contractors in forecasting workloads, allocation of resources, prepare programmes, method of statement. Design and build and Turnkey procurement systems which are also called “Fast-tracking” project delivery system where design and
construction is put in one hand and its pre-tender process can allow fast construction date. In other words, it also allows the details of the project to run almost at the same time to each other, this means that it is going to reduce the overall project development period considerably. In the case where this method of procurement has the single entity responsibility for both design and construction, contractor should be able to control not only the construction aspect of the project at a time but also there should be time reserved for the design of the project; this goes at long run to reduce the overall time duration of the project. In short, the construction time will be reduced because the process of design and build is able to work parallel. Built-operate-transfer BOT, turnkey system and management contracting opted for Refurbishment Project are completed more than the time frame have exceed the time frame given. This implies that contractor have no experience in handling the Refurbishment Project using these procurement systems.

The traditional procurement also known as the design-bid-build system of procurement provides its clients a higher degree of quality project with more functional standards. In terms of quality, traditional procurement provides more opportunities for the clients to combine the best design, management and construction knowledge between the contractor and consultant more than that of the design-build method. The traditional procurement system also provides a high degree of quality certainty and functional standards. It also provides more time for client and consultants to review and fully develop the design and specification thus allowing better documentation preparation. Design-build and Turnkey form of procurement system is not mean to compromise with the use of quality; nevertheless, design-build procurement systems reputation has been suffering from criticism from the owners. It is more often found that the quality of work under this contracting system tend to be questionable. The assigning of the designing and construction to a contractor has caused the client to lose control of the design and supervision of the work. This is extraordinary significant when the client does not have his own team of consultants. As far the contractor is concerned, they tend to cut corners in order to maximize their profit, especially when they feel that they have under-priced the quotation during when tendering for the work. For Instance, contractor can always come out with the cheaper proposal in order to save cost which this indirectly prompt to high defects and contribute to low quality.

6.0 CONCLUSION
The results obtained from the questionnaire surveys and semi-structured interview, it’s concluded that traditional procurement systems are the most preferred system used in Malaysia Refurbishment projects, then followed by design and build. The findings also shows that traditional procurement systems is the most suitable to be used in refurbishment project with contract value more than RM500, 000.00 due to its uncertainty. Management procurement, Turnkey system and built-operate transfer, BOT are less used in refurbishment project.

7.0 REFERENCES


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AN INVESTIGATION OF WINDOW-TO-WALL RATIO ON DAYLIGHTING OPTIMIZATION IN HIGH RISE OFFICE BUILDINGS IN KUALA LUMPUR

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Abstract
Daylight usage has been identified as one of the potential source of energy-efficiency measures in office buildings. It can be an energy-saving feature by reducing electrical lighting demand that depends on a good and proper configuration of the fenestrations; meanwhile they can control the amount and distribution of natural light entering a space as a pleasant daylight strategy. Architects should consider to some Passive Design factors such as fenestrations, climate conditions, orientations, and shading devices. This paper studies the impact of WWR (Window-to-Wall Ratio) as one of the passive design strategies to optimize day lighting in high-rise office building in Kuala Lumpur as a recommendation for building designers to use it in the early stages of design. It was carried out by simulation method of IESVE software by using RADIANCE program for calculation the illuminance daylight distribution due to WWR on daily office working hours. Investigation on the optimum amount of window size has been done by studying an office room model with 6m x 6m x 4m dimension. WWR was considered from 20% to 50% at 5% interval in two sky conditions (Sunny sky and standard CIE overcast sky) on different dates and times. The preliminary findings of the paper show 25% - 35% WWR has more pleasant daylight in office room due to the artificial lighting reduction and saving energy.

Keywords: daylight, window-to-wall ratio (WWR), simulation, CIE over cast sky, office

1. INTRODUCTION
Daylighting is one of the most important parts in passive design strategies which architects and building designers consider about. Since 2000s there are increasing concern and awareness toward design and built energy efficiency building by government and decision maker in Malaysia (Lim, Kandar, Ahmad, Ossen, & Abdullah, 2012). The importance of daylight is not only due to energy conservation but also because of visual comfort, health, lighting quality, and human performance (Ko, Elnineiri, & Clark, 2008). There are some studies that show by applying proper daylight at the perimeter zone electrical energy consumption can decrease up to 30-40% due to lighting power and produced cooling load derived from artificial lighting system(Ibrahim & Zain-Ahmed, 2007; Ko, et al., 2008). Daylighting as a passive energy efficiency strategy is more relevant in tropical country like Malaysia due to its long hours of sun shine over the whole year as well as the great day light luminous in Malaysia could meet most of the luminance internal demand during a day which would lead to significant amount of energy saving (Ibrahim & Zain-Ahmed, 2007). Hot-humid area is one of the hardest climate in terms of architectural design due to high percentage of relative humidity and high temperature exceeding the ASHRAE comfort limit for most of the year (Al-Tamimi, Fadzil, &
Harun, 2011; Hyde, 2008) and protection the building façade against the overheating and sun glare in tropical country like Malaysia while the proper daylighting is achieved, is the a biggest challenge that architects are facing in designing window process. (Zain-Ahmed, Sopian, Zainol Abidin, & Othman, 2002) have studied the impact of window geometry on daylight and their finding shows that the 25% is the optimum window to wall ratio (WWR). The objective of this study is to finding the optimum WWR in different sky condition and orientation in Malaysia.

2. RESEARCH METHODOLOGY
The method applied in this study is simulation experiments. The simulations were conducted in Radiance software of Integrated Environmental Solution-Virtual Environment (IESVE) on a model that presents an office room. Simulation runs were carried out for Malaysia location between 1º and 7º north and 100º and 120º east at 10 am, 1 pm and 4 pm on 21th March ,June and December and with two models facing north and south. Each model was simulated under two different skies: the standard CIE overcast sky and sunny sky.

3.1 Model Description
A simple room was used as an office room with external dimension of 6m in width, 6 m in depth and 4m in height, located in 12th floor of a hypothetically 25 story high rise (Figure 1). To find the optimum WWR, two kind of range were applied to window size including vertical expanded and horizontal expanded which varied from 20% to 50% (Figure 2).

![Figure 1: A general view of a 25 story office building modeled in IES](image)

The windows were assumed with no shading device as well as with 85 % visible transmittance glazing type and light color internal surface. For both vertical and horizontal expanded type window sill were considered identically 1 m height from the floor. As it can be seen in Figure 2 the first group (vertical expanded) was started by a window with 6m wide and 0.80m high and it was ended by a window with 6m wide and 2 m high. As well as for the second group, horizontal expanded, it was started and ended by the windows with dimension of 2.4m x 2m and 6m x 2m respectively.
3.2 Evaluation Method
A comparison between simulation results helped with finding of how the changes of WWR influence the day lighting appearance under deferent sky condition, orientation, time over a day and time over a year. To find optimum WWR in different condition two indexes were applied including Suitable Area Zone (SAZ) according absolute LUX and Daylight Factor. In each simulation results SAZ (absolute Lux) stand to percentage of area where had a proper internal daylit between 300 and 2000 Lux (as recommended average illuminance levels in MS1525) in both sunny and CIE overcast sky. In daylight evaluation according to Malaysian Standard a daylight factor between 2% and 6% for working plane is considered as a suitable daylight (MS1525, 2007). In this study SAZ (DF) stand to percentage of occupied area where their daylight factor were between 2% to 6%.since daylight factor calculated by Equation1 is considered in overcast sky only, in this study the DFI is simulated in only overcast CIE sky.

\[
\text{Daylight Factor (DF)} = \frac{\text{Internal illuminance}}{\text{External illuminance}} \times 100
\]  

3. RESULT AND DISCUSSION
3.1 Daylight Evaluation of Vertical Expanded WWR
The results obtained from 210 simulation runs were analysed in Microsoft Excel. Simulation runs were classified in two main groups in terms of expanding direction namely vertical expanded and horizontal expanded. Table 1 demonstrates the result of various WWR of horizontal expanded briefly. As it was pointed out the models were simulated in two different orientations, including south and north and each direction was simulated in 3 main months namely March, June and December. The complete result of this part can be seen in Appendix A, Table A1 and Table A2.

As it is shown in Table 1 for horizontal expanded WWR, based on SAZ (absolute Lux), the maximum percentage in sunny sky is for 30% WWR which is 70.9% while the maximum percentage in over cast sky belongs to 25% WWR. Also based on SAZ (DF), the best WWR is for 25% in overcast sky that is in agreement with previous study done by Zain-Ahmed (Kandar et al., 2011; Zain-Ahmed, et al., 2002)
Table 1: Variables for various horizontal expanded WWR in two sky conditions

<table>
<thead>
<tr>
<th>sky</th>
<th>index</th>
<th>WWR 20%</th>
<th>WWR 25%</th>
<th>WWR 30%</th>
<th>WWR 35%</th>
<th>WWR 40%</th>
<th>WWR 45%</th>
<th>WWR 50%</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sunny sky</td>
<td>SAZ (AL) %</td>
<td>58.7</td>
<td>61.2</td>
<td>70.9</td>
<td>63.4</td>
<td>58.7</td>
<td>55.8</td>
<td>52.5</td>
</tr>
<tr>
<td>CIE Overcast sky</td>
<td>SAZ (AL) %</td>
<td>79.5</td>
<td>87.6</td>
<td>84.3</td>
<td>79.3</td>
<td>74.4</td>
<td>71.3</td>
<td>67.8</td>
</tr>
<tr>
<td>CIE Overcast sky</td>
<td>SAZ (DF)%</td>
<td>48.6</td>
<td>71.1</td>
<td>62.8</td>
<td>57.2</td>
<td>50.4</td>
<td>45.5</td>
<td>45.0</td>
</tr>
</tbody>
</table>

Window to wall ratio (WWR), Suitable area zone (SAZ), Daylight Factor (DF), absolute Lux (AL)

3.2 Daylight Evaluation of Vertical Expanded WWR

Table 2 represents the SAZ (absolute LUX) and SAZ (DF) in two sky conditions for vertical expanded WWR briefly. The complete results which demonstrate the SAZ (absolute LUX) and SAZ (DF) in different orientations and months separately can be found in Appendix Table A3 and A4. As Table 2 shows the best WWR in terms of SAZ (Absolute Lux) is for 35% in sunny sky and the maximum percentage of SAZ (Absolute lux) in overcast CIE sky belongs to 30% WWR. As it is cleared there is 5% difference in best WWR between two expanded directions in two sky condition. Based on SAZ (DF) the best WWR is 35 % in CIE overcast sky.

Table 2: Variables for various vertical expanded WWR in two sky condition

<table>
<thead>
<tr>
<th>sky</th>
<th>index</th>
<th>WWR 20%</th>
<th>WWR 25%</th>
<th>WWR 30%</th>
<th>WWR 35%</th>
<th>WWR 40%</th>
<th>WWR 45%</th>
<th>WWR 50%</th>
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<tr>
<td>Sunny sky</td>
<td>SAZ (AL) %</td>
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<td>59.0</td>
<td>70.7</td>
<td>62.4</td>
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<td>SAZ (AL) %</td>
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<td>53.7</td>
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<td>81.8</td>
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<td>72.7</td>
<td>67.8</td>
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<td>CIE Overcast sky</td>
<td>SAZ (DF)%</td>
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<td>63.6</td>
<td>54.5</td>
<td>49.9</td>
<td>45.5</td>
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</table>

Window to wall ratio (WWR), Suitable area zone (SAZ), Daylight Factor (DF), absolute Lux (AL)

3.3 Daylight evaluation in different sky condition

To find the difference between daylight behaviour in various sky condition Figure 3 and Figure 4 illustrate SAZ (absolute LUX) in Various expanding types of WWR in Two sky condition including sunny and overcast CIE sky. As it is clarified in Figure 3, in sunny sky 35% and 30% WWR are the best in vertical expanded and horizontal respectively. While in CIE overcast sky the best WWR stand for 35% and 25% in vertical and horizontal expanding respectively. In addition an interesting result was found that in overcast sky all the horizontal expanded windows played better roles in terms of SAZ in comparison to vertical expanded windows.
4. CONCLUSION

A field study of daylight evaluation of an office area in various WWR carried out by simulation method illustrated:

- The best WWR for an office room with external dimension 6m in width and 4m in height in CIE overcast sky is 25% in horizontal expanding window which is the representative of a 3m wide and 2m high window. The second position is 30% WWR which is a 3.60m in width and 2m in height window.
- In sunny sky the best WWR is for 35% of vertical expanded which is a 6m in width and 1.40m in height. The second one is 30% of horizontal expanding window that is the representative of a 2m wide and 3.60m high window.
- In sunny sky most of the vertical expanded based on SAZ (absolute Lux) had a better daylight while in overcast all the horizontal expanding window achieved the higher SAZ (absolute Lux) than the vertical expanding windows.

In overcast sky according SAZ (DF) the best WWR were for 25% WWR in horizontal expanding and second position was for 35% WWR in vertical expanding.
5. **APPENDIX A**

Table A1: horizontal expanded in sunny sky, different orientation and different date

<table>
<thead>
<tr>
<th>WWR%</th>
<th>Orientation</th>
<th>Month</th>
<th>Grid point No. Suitable area</th>
<th>Suitable Area (m²)</th>
<th>SAZ Of room (absolute lux %)</th>
<th>Ave SAZ (absolute lux %)</th>
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<td>2 * 2.40 - 20%</td>
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<tr>
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<td>36.4</td>
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<tr>
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</tr>
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<td>66.9</td>
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</tr>
<tr>
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### Table A2: horizontal expanded in CIE overcast sky

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<th>Suitable area (m²)</th>
<th>SAZ Of room (%</th>
<th>Ave SAZ (absolute lux %)</th>
<th>Ave SAZ (DF%)</th>
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<td>88</td>
<td>22.00</td>
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Table A3: Vertical expanded in sunny sky, different orientation and different date

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<th>Suitable zone area (m²)</th>
<th>SAZ Of room (%)</th>
<th>Ave SAZ % (Orientation)</th>
<th>Ave SAZ % (WWR)</th>
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### Table A4: Vertical expanded in CIE overcast sky

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<th>Grid point No.</th>
<th>Suitable area (m²)</th>
<th>SAZ Of room (%)</th>
<th>Ave. SAZ (absolute lux%)</th>
<th>Ave. SAZ (absolute lux)%</th>
<th>Ave. SAZ(DF)%</th>
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</thead>
<tbody>
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6. REFERENCES


STUDY ON EFFICIENCY OF PASSIVE COOLING STRATEGIES ON THERMAL COMFORT ATTAINMENT WITHIN TROPICAL CLIMATE

Ardalan Aflaki, Norhayati Mahyuddin and Zakaria Al-Cheikh Mahmoud Awad
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Abstract
One of the imperative functions through the design of built environment which have been considered by scholars is thermal comfort. It is defined as the sensation of well-being of an individual and condition of mind which explain satisfaction in particular environment. Achievement of this environment is affected by air and radiant temperature, relative humidity and air velocity. Although, there are numerous studies related to thermal comfort and thermal sensation in different climates to appoint comfort zone for occupants, limited researches have been implemented on strategies to achieve comfortable indoor environment. Passive cooling strategies have been applied recently through primary stage of building design in tropical climate whilst reduction of operation costs, preparing satisfactory thermal comfort and prevention from climate changes will be attained. Based on these studies, further investigations on various passive cooling strategies are carried out in this paper to finalize the relevant strategy for thermal comfort achievement within tropical climate. In particular, this research looks into related review of literature and their significant results to suggest more effective and adequate cooling strategies that would reduce the high amount of temperature and humidity in tropical climate. Results from these findings would be useful for designing architectural elements in new buildings within hot-humid climate hence reducing the energy consumption and the amount of green gas emission.

Keywords: comfort zone, energy efficiency, passive cooling strategies, thermal comfort, tropical climate

1. INTRODUCTION
Today’s, demand for high amounts of energy for cooling and heating of buildings is not avoidable. High consumption of fossil energy especially in developing countries makes complicated challenge namely as global warming, air pollution and carbon distribution which may be as a constraint for human life due to obvious consequences on the environment. According to these challenges, attempts are done in different scales to deduce cooling and heating load in whole of the world. Under design and construction zone, bioclimatic design, utilizing renewable energy and passive design strategies have been considered as the main solution for the decrease of environmental load by scholars recently. Passive design strategies which are applicable solution at the first stage of designing process is the main concern of this research. The most effective passive design techniques for confrontation with harsh climate are reviewed in this study to finalize the best ways to reduce energy consumption within tropical climate.
2. PASSIVE COOLING TECHNIQUES AND THEIR APPLICABILITY IN HOT-HUMID CLIMATE

The term “passive cooling” was clearly defined by Jeffry Cook in 1989 as any building design technique that not only prevent outdoor heat, but also transfers indoor heat to natural heat sink. Abrams (1986) and Cook (1989) summarize all passive cooling researches in their studies where passive cooling techniques are categorize into five major methods including; radiative cooling, evaporate cooling, heat avoidance, earth coupling, ventilative cooling.

As explained by Martin (1989; ref. Cook 1989, p.139), radiative cooling is a long process during the day while the heat is absorbed by building materials and then during the nighttime when the weather is more cooler, the heat radiate to the sky in the form of infrared radiation. Based on field studies in different climates, it is found that this strategy is more efficient in hot-arid climate where the temperature swings between day and night is more considerable. For hot and humid climate, high amount of humidity and cloud cover in the sky decrease the rate of heat transfer and most of the time heat trap inside the building and cause uncomfortable thermal condition. Evaporate cooling is another sufficient technique which is used by designers in hot-arid climate. Unfortunately the high amounts of humidity in tropical climate persist against application of this strategy. Yellot (1989; ref. Cook 1989, p.85) claimed that evaporate cooling effectively work when the tangible heat in air stream is changed for the latent heat of water droplets or wetted surfaces. However, in hot-humid climate, firstly there is need to remove moisture from indoor environment where it condenses into air or even on surfaces and then apply air velocity from outdoor to achieve applicable evaporation and bring sensible thermal comfort for residence.

Refer to Balaras in 1996; all strategies to avoid building from solar radiation can be included into heat avoidance techniques. Appropriate shading especially for apertures, building orientation, vegetation surrounding building and relevant materials for façade is some intelligent strategies to prepare comfortable indoor temperature. These strategies are applicable in different climate and they are suggested for tropical climate where high amount of solar radiation is not preventable. According to Kenneth Labs (1989; ref. Cook 1989, p.197), in earth-coupled buildings the indoor spaces is thermally coupled into the subsoil by conduction and convection through the building slabs. In this technique, the earth acts as a heat sink and gains overall heating from indoor environment. However, the main priority for application of earth-coupling technique is earth temperature range. This strategy is more applicable where the earth temperature in comfort zone (Labs, 1989). It is applied in temperate climate where earth temperature is within the range of standard comfort zone (ASHRAE, 1998). Although this technique is more sufficient in temperate climate, there is no research on application of this strategy in tropical climate such as Malaysia.

Based on Abrams research back in 1986, cooling effect in ventilation cooling strategy occurs by means of convection regarding surrounding air as a heat sink. Ventilation cooling has been established in design of building in tropical climate to create at least more tolerable indoor environment if not perfectly comfortable. Review of studies show that thermal comfort in tropical climate can be achieved by application of ventilation cooling. Based on Chandra’s claim, air
exchanges at 5-500 air changes per hour is necessary to comply thermal comfort within building (Chandra, 1989). Refer to literatures, it can be realized that heat avoidance and use of natural ventilation for cooling are more applicable and feasible to attain indoor thermal comfort in hot and humid climate. This implies that reducing building surfaces perpendicular to solar radiation and applying natural ventilation system in buildings are the main design strategies to decrease the humidity and temperature levels hence reducing the demands for energy usage. Due to these matters, the performance of these techniques, their applicability and efficiency will be reviewed at the following parts.

3. HEAT AVOIDANCE TECHNIQUE
3.1 Heat Avoidance Strategy and its Efficiency in Tropical Climate
Passive architecture is a protective approach to shield occupants from the outdoor condition. According to Zaki et al. (2007), the main task for passive architecture is to respond to the local climate conditions to would offer a comfortable indoor thermal condition. Fundamentally, the role of passive design strategies in hot and humid climate can be defined as heat avoidance from the sun, increase natural ventilation from prevailing wind side and preparing sufficient day lighting concisely (Zaki et al. 2008). Although these strategies are examined in vernacular architecture and have relevant respond to microclimate, many designers have deliberated on the critical passive design techniques for modern building in hot and humid climate. Review of passive design strategies shows that orientation, building form and its opening and shading are some effective strategies to avoid external heat in tropical climate. Below are more details of these strategies and their application in hot climate in summary;

3.1.1 Orientation
Thomas and Garnham (2007) declared that building orientation is the most effective passive strategies and should be defined based on prevailing wind and sun angle. In different study in tropical climate by La Roche et al. (2001), it is found that building must avoid large apertures on the east and west where it receives approximately twice amount of radiation in compare to north and south elevation. (Figure 3.1)

![Figure 3.1 Building orientations in tropical climate](source: La Roche et al. (2001))
3.1.2 Building Form
Rectangular plan alongside east-west is inevitable alternative in the tropics where designers should limit the exposure on east and west sides (Konya, 1980). Furthermore, shallow floor plan is more efficient where it encourages more air-flow inside the building (Tombazis and Preuss, 2001).

3.1.3 Window Openings for Ventilation
Windows and apertures play significant in cross ventilation strategy. Obviously, proper location and accurate size of windows can reduce cooling load in buildings (Konya, 1980). Furthermore, small openings near ceiling level can guarantee minimum air exchange in a room without rising heat gain significantly (Koch-Nielson, 2007) (Figure 3.2).

Figure 3.2 Cross and stack ventilation diagram
Source: La Roche et al. (2001)

3.1.4 Sun Shading Devices
Study by Koch-Nielson (2007) shows that projected canopy at the top of the openings on the east and west is the best strategy to respond to the sun path. He also declared that, protruding fins at the side of the apertures on the north and south reduce amount of radiation and consequently effect on building cooling load.

4. NATURAL VENTILATION
4.1 Natural Ventilation and its Efficiency
“As advantages of using natural ventilation through built environment”, reduction of energy consumption and green gasses emissions have been mentioned by Kubota et. al in 2006. Furthermore, it raises the degree of thermal comfort in indoor and outdoor environment. Another study regarding to usage of fresh air in buildings indicates that greater occupant control and high level of environmental quality can be achieved in compare to mechanical ventilation by application of natural ventilation in design of residential buildings (de Dear & Brager 1998). Comparing study on health cost saving between natural and mechanical ventilation shows that it will be rised up to 18% by prevailing usages of natural ventilation in mixed mode systems (Brager & Borgeson & Lee 2007). Study through office buildings by Fisk (2002) shows that sick building condition can be decreased by intensifying use of fresh air and it saves US$10 billion to US$30 billion in the USA (Fisk, 2002). This concept is similar to residential building where studies indicates that high indoor air quality and thermal comfort improvement can be achieved by application of fresh natural ventilation in
residential blocks (CHPS, 2002). As the benefits of natural ventilation, compromising operation costs reduction, preparing satisfactory thermal comfort and modifying indoor air quality, are realized, applying natural ventilation as a passive cooling strategy of buildings has become a significant opportunity to improve associated issues with artificial cooling buildings (Wang, Wong Nyuk, & Li, 2007).

4.2 Natural Ventilation Application in Buildings
Application of natural ventilation in buildings refers back to establishment of some architectural elements in traditional building before active systems such as air-conditioning comes into building sector. Some of these elements still are used in modern constructions. Overall, they ensure relevant air changes and velocity rates within indoor environment by simple mechanism. In other word, the objective of these elements is preparing sufficient wind and can be categorized as below;

4.2.1 Air Well Design
Through the stack effect process, this design strategy produce air flow vertically in building to replace hot air to fresh and cool air. This ancient passive element is known as wind catcher in hot and arid climate. It has simple function to produce wind whilst it takes fresh air through the building façade and discharges warm air through the vertical duct in the building form (Claude-Alain Roulet et al. 2005). During this process, the polluted indoor air can be disposed effectively and replace with cool air to bring comfortable indoor condition (Camille Allocca et al. 2003 S.M.Jafarian et al. 2010). Alternatively, chimneys and stack air duct can be applied for small sized building while larger air well or known as atrium can be utilized for bigger scales to ensure sufficient wind to comply thermal comfort.

4.2.2 Façade Design
The building façade including walls, roof and all openings such as windows play significant role on controlling air flow and they prepare one of the choices to ensure the indoor air can be maintained through the combination of fresh outdoor air and indoor air. Obviously, the proper façade design decrease the cooling load overall and minimize the usage of air-conditioning (E.M.Okba, 2005). This circulation process is occurred by creating rough surfaces in order to make turbulent effects. Double skin façade is one of effective strategies in design of façade which decrease transmission through the protection of reflective glass walls (Cristian Ghiaus and Claude-Alain Roulet, 2005, M.Haase, et al. 2009).

4.2.3 Ventilation Openings
By the effect of air pressure difference between outdoor and indoor spaces, ventilation openings in the windward sides play significant role to lead fresh air to the building and discharged used air on the leeward side of the building. Proper design and sufficient location of the opening accompanying with the relevant amounts of windows and doors are main factors to produce required amount of wind for thermal comfort (Heiselberg P. 2002). Furthermore, to prevent from artificial lighting and ventilation, apertures such as windows, doors, vents and louvers can be considered as significant components (Eley Associates 2004, Claude-Alain Roulet and Cristian Ghiaus 2005). Based on
literatures, single side ventilation and night ventilation can decrease the cooling needs by 30% if the apertures are located in relevant part of windward side. Study by E. Gratia et al in 2004 shows that the combination of these design strategies can reduce cooling requirements more than 40% per unit.

### 4.2.4 Building Corridors

Building corridors can be explained as the connectors between outdoor environments and isolated indoor spaces. They play significant role to channel and deliver the air fellow into some parts of building. In response to microclimate, Mohamed et al (2008) declared that integrated and well design of corridors inside the building can deliver local wind sufficiently. Based on their study, it is revealed that corridors transfer outdoor air by providing an air pressure zone for outdoor air. By integration with other passive design strategies, air pressure intensification can be attained and consequently the air change requirement per hour in specific zone of building can be reached (Cristian Ghiaus and Claude-Alain Roulet 2005, Junli Zhou et al. 2008)

### 4.3 Natural Ventilation Strategy and its Efficiency in Tropical Climate

They are several buildings and even neighborhood which is established either design elements or guidelines to enhance thermal comfort by application of natural ventilation (Wang et al., 2007). In the study on climate responsive design for building, Hyde applied some strategies such as permeable wall and roof designs, use of shade verandahs, plan orientation and court yards to evaluate passive design concepts and their impacts on thermal comfort. His research stated that plan dimensions more than 15 meter decrease the efficiency of natural ventilation and consequently degree of thermal comfort (Hyde, 2000).

Study on natural ventilation design for house in Thailand was conducted to evaluate air-rate, size of apertures, form and orientation of house in specific climate to achieve thermal comfort. Thermal comfort and climate analysis with CFD simulation model was carried out to realize optimum site planning and design in tropical climate. The result shows that an indoor air velocity of .04m/s may be improved indoor thermal comfort. Furthermore, it indicates that the total area of inlet and outlet apertures must be 40% of the total floor area roughly. Simulation program has evaluated different conditions and clarify that ceiling fan should be used to rise up air velocity while the total size of apertures is reduced to 25%. This study also claims that the main orientation of building may not be to prevailing orientation which is NEE or SSW in Thailand. Simulation results indicate that north-south direction of building could acquire more ventilation while it avoids excessive solar radiation. Coupled with orientation, study suggests square form to enhance better ventilation in compare to rectangular form according to land lots and house floor area values (Tantasavasdi, Srebric, & Chen, 2001).

Givoni (1994) studied on application of natural ventilation and it impacts on high mass buildings in California. He declared that, night ventilation accompanying with exhausted fan present more comfortable indoor environment in high mass buildings in compare to low mass building in tropical climate (Givoni, 1998). Another study on efficiency of night ventilation in hot-humid climate was done by field measurement. Findings shows that night ventilation strategy can be decrease indoor
temperature by 2.5 C and it may be more suitable if evaporate cooling is applied during day time (Kubota, Chyee, & Ahmad, 2009). Study on application of natural ventilation in high density building was carried out to propose an ideal model for reducing environmental load. Field experiment and CFD simulation was established to evaluate reduction of CO2 emission by application of natural ventilation in different design models. Results show that it can be reduced CO2 emission at running stage by 30% and for whole life cycle of building by 22% when high ventilation is enhanced by ideal porous-design models (Murakami, Kato, Ooka, & Shiraishi, 2004).

4.4 Passive Controls by Pressure Differences
Pressure discrepancy can be generated by wind and temperature (Szokolay, 1986). In general, the main objective of natural ventilation is to capture available wind to prepare sufficient air movement inside the building. Whilst a flow of wind is obstructed by a building, its velocity makes high pressure in windward side of the building. However, in other side of the building namely as leeward, the pressure is low and it cause air movement flow through the building and offer relevant condition to occupants. This basic principle of air flow has been used by Szokolay (1980), Allard and Herlin (1989) and Givoni (1994). Pressure difference also can be made by differences in temperature which is called stack effect. Generally, it is the effect of buoyancy because of discrepancy between inside and outside air in different zones of building (Allard and Herrlin, 1989). The density differences are created by discrepancy between outdoor and indoor temperature (Evans, 1990). Based on Abdul Rahman’s study in 1999, the magnitude of the pressure between outdoor and indoor depends on temperature differences between them and the height between the inlet and outlet opening in building. Clearly, in stack ventilation effect, the warmer indoor air due to lighter weight flow out at the top outlet and the cooler air, denser outdoor air will flow in at the bottom inlet. Therefore, heat and humidity produced by occupants and other internal sources tend to make air rise.

4.4.1 Application of Stack Ventilation by Proposing Solar Induce Ventilation in Tropical Climate
Studies in tropical climate like Malaysia reveal that stack ventilation is inefficient because of lower air temperature range (less than 5 C) between inside and outside of buildings (Rajeh M. 1989, Nugroho AM et al 2007). On the other hand, high amount of solar radiation can be a viable alternative to induce ventilation in tropical climate. Due to this fact, solar induce ventilation is presented by Awbi (2003) to achieve sufficient ventilation inside buildings. Metallic solar wall as solar induce ventilation was tested by Hirunlabh et al. (1999) in Thailand to remove heat from indoor spaces. The designed solar wall produced air flow rate of 0.01e0.02. According to results from solar wall, Hirunlabh et al. (2001) applied various shape of roof solar collector in order to achieve more ventilation. Among the different shape of roofs, solar collector titled at 60 can produce higher amount of air flow rate which is about 3 m/s. Also the application of roof solar collector in accompanying with metallic solar wall and Trombe wall at a school building reduce overheating by about 50% (Khedari J, et al. 2000).

In Malaysia, study by Nugroho AM et al. (2007) shows that the application of solar chimney in terrace houses can increase the amount of air velocity up to .058 m/s. the research on solar chimney
in southern Spain revealed air velocity of 3 m/s can be achieved inside the building if it is designed in proper size (5.6 m total height, 1.0 m wide and 0.3 m air gap width). Furthermore, results from the potential of solar induce ventilation investigated in multi story buildings in Thailand reveals that room temperature is 5k lower than the other buildings without this (Punyasompun et al. 2009).

Due to efficiency of solar induce ventilation; the strategy was applied with other passive cooling techniques in other researches to evaluate degree of air velocity (Bansal et al. 1994, Chungloo S et al. 2007). Roof solar collector integrated with wind tower was examined in study by Bansal et al. (1994) in hot and humid climate. The model increased the air flow rate up to 1.4 kg/s which was twice more in compare to wind tower alone. In study by Chungloo and Limmeechokchai (2007), roof solar collector combined with wetted ceiling for deducting indoor air temperature. Room temperature was decreased by about 1k to 3.5k when the roof solar collector was established alone. However, the mixture of both strategies decreased the room temperature up to 2k to 6.2k. Because of this potential, Chungloo and Limmeechokchai (2007) combined cool ceiling with the roof solar collector. Results show the system can reduce room temperature more than the application of roof solar collector alone. These studies prove that solar induce ventilation can be a relevant alternative to induce the stack ventilation in tropical climate (Bansal et al. 1994, Khedari J, et al. 2000, Chungloo S et al. 2007). However most of the researches were investigated roof solar collector efficiency as its inclination shape has enabled to catch more solar radiation in compare to perpendicular solar induce ventilation systems such as Trombe wall due to higher sun altitude in tropical climate (Awbi, 2003). However, the roof slope still is a challenge which influence on stack height in construction (Harris DJ, Helwig N, 2007)

5. CONCLUSION
The present paper advocates application of passive cooling strategies in tropical climate in order to achieve sufficient degree of thermal comfort. Based on previous literatures, the most effective passive design techniques for dealing with harsh climate were reviewed and it was found that due to high humidity and temperature levels in a building, heat avoidance and natural ventilation cooling could be the best options to adapt comfort in indoor spaces. Due to this fact, studies on heat avoidance strategy in tropical climate was reviewed and results indicate that orientation, building form, opening and shading are four major design solutions to avoid building from high amount of solar radiation in equatorial region. In addition, review on passive cooling ventilation is done to find out relevant strategy for tropical climate. Apart from using cross ventilation to attain thermal comfort in buildings, the application of stack ventilation in previous research also proves that this system could be incorporated if tangible amount of indoor outdoor temperature difference occurs. Based on these findings, a combined solar wall and roof collectors with in tropical regions would further increase the efficiency of the stack ventilation processes. Results show that sufficient amount of air flow can be achieved and indoor temperature decrease up to 6K (Chungloo and Limmeechokchai, 2007). Although these integrated techniques on stack ventilation respond to the microclimate well, overall findings of this research indicate that there is no integrated study including heat avoidance and cooling ventilation strategy to shield built environment from harsh climate. It is obvious that the combination of these relevant strategies in primary stages of design can improve indoor temperature.
more in compare to their separated application. Therefore, the combined strategy is offered for further research to actualize better indoor condition and decrease high amount of temperature and humidity.

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APPLICATION OF SUSTAINABILITY IN HIGH RISE BUILDINGS

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Abstract
Technology development in construction industry could be aligned by sustainability practices. Sustainability aims to decrease negative impact of various developments on the environment. If construction industry gets advantages from passive energy within nature, the result not only meets human energy requirements, but also forms an innovative outline for improving environmental quality. For prolonged years, in Iran, majority of buildings were constructed in accordance with climatic and environmental conditions. Sun, wind, humidity, topography and generally climatic and geographic conditions had great effects on Iranian traditional architecture in diverse regions, but by entering modern architecture and specially usage of mechanical installations; role of climate in buildings’ design has become trivial. Sustainable design ideas are mostly practiced in small buildings, but in this research the feasibility of benefiting from mentioned factors in large scale buildings is examined. By integrating modern construction technologies and traditional architecture practices, negative impacts of buildings on environment can be considerably dwindled. High rise buildings can be designed in a consistent way with their sites and environment in order to promote energy efficiency. The aim of this research is to demonstrate a sustainable architecture for a high rise building which gets benefits from both modern technology and traditional sustainable practices, therefore, a typical case study for sustainable high rise buildings in hot and humid climate region is explained and various solutions are described by schematic figures, additionally some practices are proposed in order to enhance the sustainable performance of these kinds of buildings.

Keywords: environment, high rise, regional architecture, sustainability

1. INTRODUCTION
The International Energy Agency publicized that, in general, one-third of energy end-use in the developed countries is currently being utilized by heating, cooling, lighting appliances as well as general services in non-industrial (i.e. residential, commercial and public) buildings (UNEP, 2003). Among the direct environmental outcomes of construction, the most significant impact pertains to energy consumption and other resources. It is also perceived that buildings intake around fifty percent of the resources. It should be mentioned that, buildings would consume one-quarter to one-third of the total energy produced globally (Parameshwaran et al., 2012). Compared with many other industries, the construction industry’s products are long-lasting that have a great impact on the environment. Hence, sustainability principles should be considered in corporate with building design from the early stages (UNEP, 2003).
Both construction and operation in building industry have a great impact on the economy and environment, consequently an integrated design approach which is called sustainability is increasingly used by practitioners. This approach improves efficiency, minimizes resource impact and results in human and environment’s health.

During design stage of a building in which the sustainability is primary concern, it should be considered that the design would not result in any negative effects on existing nature and adjacent sites. In addition, it should be emphasized that a sustainable design must be in a manner that is satisfying for users and occupants. Moreover, economic goals should be highlighted regarding to sustainable design (Tuluca, 2004).

Many people believe that sustainability concentrates just on the environmental aspects. However, sustainability approaches should cover both social and economic aspects alongside environmental aspect. As a result of an integrated sustainable approach, building would represent healthier and more comfortable living, working and entertaining spaces.

Spaces with above-mentioned characteristics can be achieved by increasing utilization of renewal energy, natural ventilation, natural light, applying appropriate materials, considering physiological needs of occupants and ultimately cultural aspects which can lead to productivity of occupants and users. It should be added that in most cases, these considerations in design stage lead to sustainable economic development. Sustainable buildings’ construction costs are higher than conventional buildings, but in the long-term the benefits of sustainable buildings far outweigh their primary costs (Lucuik et al., 2005).

2. SUSTAINABLE DESIGN
The term sustainability in construction industry is not just applied in products, but also in construction strategies, building design and orientation, landscaping, building operations, maintenance, and so forth. The less impact a building has on human health and the environment, the more green it is (Satterfield, 2009).

As it can be seen in Fig. 1 most part of energy usage in buildings is related to cooling, heating and lighting. By implementing a proper design this amount can be reduced considerably.

Impacts of energy utilization in buildings should be considered in their whole life cycle from early design stage till demolition stage. Ventilation, lighting and air quality are crucial criteria in order to have a sustainable building. In such sustainable cases, we should increase application of clean and natural resources. In addition, usage of renewal energies such as wind, sun and planting has a vital role in reduction of pollutant and consequently climatic changes (Todorovic, 2012).

As a result, the important benefits of sustainability are as follows:
- Energy efficiency
- Reducing climatic changes
• Human comfort and health
• Increasing human productivity

Sustainable buildings are more expensive compared to conventional buildings in terms of design and construct, generally because of greater design time, application of special materials and noble systems. Although initial expenses in sustainable buildings are greater than conventional buildings in the long term sustainable buildings are more economical (Lucuik et al., 2005).

Traditional buildings’ architectural methods in a nation are not created spontaneously. They are the result of many years of experience in regional architecture. These methods are usually the most suitable alternative for that region regards to cultural and climatic compatibility. By focusing on regional building design specifications and combining them with modern and updated construction methods, architects are able to produce a design approach which fulfills most of environmental, economic and social needs. Designers can catch the spirit of traditional architecture in concordance with modern man’s life style (Todorovsc, 2012).

High rise buildings as a great portion of today’s architecture could possibly have a couple of advantages of centralization and also economies of scale; however they include built-in challenges with regards to the social and also psychological needs of occupants. In such buildings, occupants are remarkably in need of technology for air and light. It should be noticed that in large structures, building users are more deprived from natural elements. However, the sustainable high-rise buildings have the capacity to improve upon this situation by addressing all of these issues (Wener and Carmalt, 2006).

From the social sustainability point of view, applying natural light, view to outdoor spaces as well as noise and temperature control makes work places more efficient. Besides social advantages, considering these principles leads to economic benefits because employees do not feel bored and exhausted due to lack of fresh air and also heating and cooling problems, and so their productivity increases noticeably (Lucuik et al., 2005). These kinds of buildings should be designed in a way
which maximizes the users’ ability to control their environment. Empowerment of controlling ability would increase comfort and satisfaction, and consequently reduction of stress (Wener and Carmalt, 2006). For instance, in the current project, designers considered the personal privacy which is a cultural trend in this region by usage of partitions. Moreover, in each office there is a potential for workers to control their environment -each small group of employers can use semi private green space, control natural ventilation and they have view to outdoor spaces by considering the design of proper windows.

Designers should facilitate occupants’ access to nature especially in the regions where people traditionally are used to such a life style. This can be accomplished by providing easy and multiple options to access daylight and vegetation in buildings, providing proper natural ventilation, reduction of toxic materials, and maximizing access to natural light and views. Therefore, users should have the opportunity to be able to control their internal environment such as temperature, airflow and lighting which will lead to an increase in human satisfaction and comfort (Wener and Carmalt, 2006). Daylight connects people to outside conditions and also yields an expression of well-being. Moreover, a direct view of the sky is psychologically beneficial. In office spaces, this kind of views can be attained with transoms situated at the top of the wall between interior and exterior offices. In addition to psychological benefits, daylighting cuts down the requirement of electric lighting when it is adequately controlled. Daylighting delivers plenty of psychological as well as physiological advantages which can represent significantly higher productivity, improved sales, or even higher rent value. In addition, exterior shading devices could in fact be basically installed to increase quality and also functionality of the spaces (Tuluca, 2004).

Design features of a highly efficient exterior building enclosure include:

- Exterior sun shades for day lighting and glare management
- Natural ventilation with usage of operable windows
- Reduced lighting power densities with utilization of natural lighting
- Wind turbines along the façade
- Roof top solar panels (photovoltaic)
- More efficient use of all types of resources (energy, building materials, water)
- Improved indoor air quality
- Vegetated roofs
- Energy efficiency, reduction in atmospheric pollution, daylighting, views, thermal comfort
- Sustainable sites
- Water efficiency
- Innovation and design process (Sinopoli, 2012; Tuluca, 2004).

3. PROJECT DESCRIPTION
The case study is related to sustainable design of a commercial-administrative high rise building which is located in Chabahar in southern part of Iran with a hot and humid climate. In the first step the site was selected in accordance with many factors such as (Fig 2):
- Easy accessibility from roads to reduce traffic;
- Using the sea view;
- Using the sea breeze;
- Being compatible with neighborhoods;
- Having the future expansion ability;

Figure 2: Site Analysis

Complex design characteristics:
This complex has been designed on the basis of regional architectural elements aimed at improving quality of work place. Main design ideas are as follows:

1. Roof gardens
2. Sewage and waste recycling
3. Solar energy usage
4. Natural ventilation usage

The main inspiration origin of the design was the traditional architecture of hot and humid regions in Iran. (Fig 3, Fig. 4)

Figure 3: Bushehr, Low thickness of the house for better circulation (http://www.virtualtourist.com)
In the current project, in accordance with the hot and humid climate of Chabahar, some special aspects have been considered in the design:

1. The building has an east-west extension with a 15° rotation to the east (Fig. 5)

2. The whole complex is divided into two separate buildings; this approach aims at reduction of the width of the complex in order to have a better natural ventilation and sun light, and also facilitation of wind movement between two buildings.

3. The distance between two towers is limited to make a shadow between them in order to reduce the temperature in interior spaces.

4. The southern tower is shorter than the northern one to maximize the sun radiation effect on photovoltaic panels which are placed on the roofs.
5. The linear green spaces on the tower which are used in the eastern and western sides of the buildings aim at controlling the undesired sun radiation (Fig 6). These green areas make shadow which result in temperature reduction and psychological effects optimization.

![Figure 6: longitude green spaces on the tower](image)

6. The openings on eastern and western sides are minimized.
7. The application of photovoltaic panels on the roof in order to produce a part of electricity and also to make hot water to decrease pollutant energies. (Fig 7)

![Figure 7: Photovoltaic Panels on the Roof](image)

8. The utilization of wind catchers to increase natural and passive ventilation which lead to a decrease in artificial and active ventilation. (Fig 8)
9. The application of a concrete shell with the 50 cm distance from the exterior wall to reduce heat by making shadow and moisture exchange. (Fig 9)
Architects should use the appropriate form in accordance with natural ventilation, thermal control, solar radiation and proper view. Hence, eco-cultural architecture and esthetic arts should be combined to create an applicable form for the structure (Todorovic, 2012). In current project the selected configuration was in order to:

- Using curative form to increase the wind catching surfaces and maximize the usage of sea view
- Using extended form to have a reduced ratio of width to length in accordance with hot and humid regional (Iran) design which results in optimized natural ventilation
• Using the stair type forms in accordance with the regional ornamentation (Fig 10, Fig 11)

Figure 10: Stair type forms

Figure 11: Stair type forms

For material selection, project-specific circumstances and goals may dictate different criteria (Tuluca, 2004), in this case we can use natural and renewable materials such as soil, wood and stone (Todorovic, 2012). In design of this project we tried to use natural and recyclable materials. For instance wood was proposed as a proper material for doors and windows in accordance with humid climate of region. Also, combination of stone and wood was used in elevation design and for ornaments. The soil, stone and wood were the majority materials which were used in site design.

4. CONCLUSION
The traditional architectural methods were not created spontaneously; they are results of valuable experiences of our ancestors. In general, traditional architectural methods are compatible with environment. In addition, some social aspects of sustainability are in correlation with environmental aspects such as visual comfort and psychological needs. In this case study, the Iranian traditional
architectural elements such as wind catchers and local materials were adopted alongside with modern technologies such as photovoltaic panels in the structure of a commercial-administrative high rise building in order to increase sustainability. The implementation of these elements has significant effects on reduction of pollutant energies. This approach is applicable in the high rise buildings by considering their context.

5. REFERENCES
EVALUATION OF ENVIRONMENTAL SUSTAINABLE DESIGN PRINCIPLE IN IRANIAN PRIMARY SCHOOL

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Abstract
Democracy, public engagements and social activities all start from primary school as the first educational space young children spend most of their daily time in. Therefore, it could be the best start point to foster in children the awareness of and affection for nature. Still, environmental sustainability in educational spaces of developing world is suffering from lack of consideration, and this clearly shows the absence of environmental sustainable requirements in the guiding design principles for the above mentioned spaces. Iran, as part of this developing world, seeks sustainability in order to face today’s environmental crises, and like any other nation, has to focus on its young generation and their related educational spaces. Yet, what are the shortcomings of the design principles in Iranian primary schools? This paper presents discovered shortcomings of the design principles in Iranian primary schools and recommendation which can be considered and used by responsible Iranian school designers. In the first step of this qualitative research, importance of environmental sustainability in primary school is highlighted and the effect of governmental design principles on the design of school building is demonstrated. In the second step, environmental considerations of the design principles presented by State Organization of School Renovation, Development and mobilization in Iran is examined on the grounds of Environmental Sustainability, by the rating system of LEED for school. In addition, one of the primary school which was successfully built on design principle of State Organization of School Renovation in Iran – Maryam School – is selected as a case study. Through a visual analysis, the result these principles is examined practically on Maryam School. The shortcomings of the above mentioned design principles will be discovered afterwards and recommendations will be presented.

Keywords: design principles, environmental sustainability, Iran, primary school

1. INTRODUCTION
Protecting the environmental capabilities of planet earth, paying attention to environmental needs of future generation and overall, environmental sustainable architecture, has become one of the most important discussions of today’s scientific and professional gatherings. Primary School, as the first social space a child experiences, can have an effective role in training and fostering sustainable priorities of environment to future decision makers of a nation. Therefore, the existence of environmental sustainability in school architecture becomes so important.

In Iran, the design principles set and presented by the State Organization of School Renovation can be known as the most effective factor in school architecture. The approach of this Organization in the
last decade, and the control it has over the construction of school building in this developing country, makes a researcher believe that improvement of organizational design principles will lead to the improvement of school architecture.

In this study, the design principles of State Organization of School Renovation in Iran are examined through an environmental approach to explore the current shortcomings in the principles of primary school. It is hoped that with fulfilling the discovered shortcomings, educating in a sustainable environment becomes a possibility for Iranian children.

2. SUSTAINABLE ARCHITECTURE
2.1 Environmental Sustainability in Iran
Sustainability means capable of being sustained or best described through Brundtland Report at 1987; “Humanity has the ability to make development sustainable. To ensure that it meets the needs of the present without compromising the ability of future generation to meet their own needs…it is a process of change…” (Sassi, 2006, p. 3)

Environmental crises, which involved the world after industrial revolution, led to the formation of design principles under the heading of Environmental Sustainable Architecture. These principles were in line with retaining the non-renewable sources of the earth and using environmental capabilities without destroying the opportunities of future generation. Iran, also, under the effects of the above said crises has no way other than accepting and developing sustainability according to the requirements and needs of Iranian society.

A sustainable development is a development which is based on a commitment for creating better life for all people. In order to reach higher quality of life, much more attention should be paid towards immaterial properties, human interrelationship and environment, and this would not be achieved except by better acquirement of knowledge and promotion of culture (Khan Mohamadi, 2009). Sustainable foundations have been successful in achieving its special place in academic gatherings of Iran, yet professional field of architecture has left behind. Professional architects should also desultorily put attention on the priorities and principles of sustainable architecture in order to reach sustainable development in Iran. However, as development can only be gained through public support and social participation (Lahsayeezadeh, 2007), Social acceptance is needed for sustainable development to achieve its correct process. It is only through this path that sustainability could present its values and priorities, practically and professionally, using the framework of sustainable architectural principles.

2.2 Necessity of Environmental Sustainability in Primary School
Acceptance requires cognition, and primary school is a suitable environment to gain cognition. Educational space of primary school can be the best starting point for social elucidation towards environmental sustainable priorities. “Primary School” is generally known to be a particular educational space for a certain age group, yet, it is also the building which young children spend
most of their daily time, or in other words, most of their childhood, in! “… Architectural design of school, in that sense is a very important element of mental education.” (Tominga, 1995, p. 5)

“In 1993, Fedricho Mayor, former president of UNESCO officially informed the world of arranging two international committees on ‘culture and development’ and also on ‘teaching and training’ in the 21st Century” (Dresner, 2008, p. 8). It was through the detailed, comprehensive study of these committees that inefficiency of educational methods and their low quality was introduced as the drawback of sustainable development. Committees concluded the ‘Learning Method’ as the first stage in the remedy of teaching, which was again based on four factors; 1) Learning to live together, 2) Learning to learn, 3) Learning to practice, 4) Learning to be.

Education, as the most effective device of societies for entering future challenges, has finally achieved a worldwide consensus and is now accepted as the most important factor in changing the way of human thinking and behavior. Education in that sense will be applied in economic growth, life quality, promoting knowledge, providing job opportunities and increasing the local production (Khan Mohamadi, 2009). This is the exact reason why education has managed to gain a unique degree in societies. The importance of sustainable education is not limited to academic researches, but is also agreed on in practice, through international institutes. In 1997, United Nations General Assembly approbated a statement with a focus on the 21st agenda. This statement introduced the educational system in whole, and primary education in particular, as the foundational base for reaching sustainable development, and therefore, pressured on the necessity of over reviewing the educational orientations of all countries in the world (Blewitt, 2008; Curlwell, 2005). Sustainable education, in its extensive concept, will have the capability to establish a strong bridge, as a reliable device, between classroom and society and between classroom and market of future decades.

The start point of learning democracy, public engagements and social activities is in the primary school, and it is only succeeded though educational process and its continuity (Zahedi, 2012). Therefore, the most suitable place for fostering the principles and priorities of environmental sustainability to children, as the most effective part of society, can be known as the school itself. Training values of sustainability to children can simply be accomplished through architecture of the primary school building, and this logic gives architecture the ability to teach sustainability.

3. EXAMINING THE SUSTAINABLE DESIGN PRINCIPLES OF IRANIAN PRIMARY SCHOOLS
The most efficient way to discover the shortcomings of school design principles set by the State Organization of School Renovation in Iran, is through comparative examination. LEED 2009 for Schools New Construction and Major Renovations is a guide line presented by an internationally known sustainable rating system of U.S. Green Building Council in year 2009. Through comparison between Iranian design principles and international guide lines, shortcomings of open and close spaces in primary schools will be discovered. In addition, Maryam School, which was successfully built based on the design principle of State Organization of School Renovation in Iran, is selected as
a case study to examine the result of these design principles in practice. The following sections demonstrate this process.

3.1 Design Principles for School
The international LEED organization, which is the abbreviation of ‘Leadership in Energy Environmental Design’, pointed out the importance of sustainability in educational spaces in 2009 and provided a guide line in order to achieve sustainability in schools. This guide line could be used as a reliable source to evaluate sustainability in schools all over the world. Appendix A illustrates LEED guide line for design of environmental sustainable school.

In Iran, the design principle for school is provided by State Organization of School Renovation. Therefore, a complete report on principles and guide lines published by this organization for the close spaces of Iranian primary schools is presented in Appendix B. Furthermore, the standards for required open space in primary school are shown in Appendix C.

3.2 Comparison Of LEED 2009 For School And Design Principle Of State Organization Of School Renovation In Iran
A review on principles presented by State Organization of School Renovation shows that the mentioned principles are more similar to a physical programming of space! Moreover, it is evident that the presented principles for Iranian primary school design have not considered the quality of design of this space and they have just pointed to the necessity of existence of a particular space in a primary school. Even though, the demonstrated design principles, or better said as ‘physical program’, includes valuable environmental points, lack of attention to environmental sustainable priorities is undeniable. In other words, the environmental attention discovered in the current Iranian design principles, show the importance of this issue for the above mentioned organization, yet, the arrangement and the concept of their established principles clearly presents their lack of knowledge in this field. There are seven main branches in LEED 2009 for schools (Appendix A), yet only the branch of ‘Sustainable Site’ had 6 items in common with Iranian organizational design principles. It’s clear that the common points are mostly due to open spaces, rather than close spaces. In Table1; common principles between LEED and State Organization of School Renovation in Iran are specified:

| Table 1: Similarities between LEED 2009 for school and Iran design principles for school |
|-------------------------------|---------------------------------|---------------------------------|-----------------|
| **Main Branch**               | **Factor**                      | **Open Space**                  | **Close Space** |
| Sustainable site              | Maximizing open space           | Demanding Landscape, using      |                 |
|                               |                                 | flower boxes and trees          |                 |
| Sustainable site              | Multipurpose use of facilities  | Demanding Queue up space         |                 |
|                               |                                 | and playground                   |                 |
| Sustainable site              | Creating appropriate parking    | Demanding Vehicle parking        |                 |
|                               | capacity                        | space                            |                 |
| Sustainable site              | Site development plan           | Preserving space for future      |                 |

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3.3 Visual Analysis of Maryam School

Exploring the effect of Current Iranian Primary School’s Design principles on the design of a school building, and examining their shortcomings in accordance to the requirements of Sustainable Architecture, can be clearly achieved through analysis the close and open space of a school which is Certificated by the State Organization of School Renovation. Different schools have been built in various cities of Iran recently, all following the above mentioned principles, yet, selected school of this study is a school called Maryam Primary School, located in the central part of Tehran. Tehran is the capital city of Iran which is usually known and used for international examples. It also contains most of the acceptable design samples of the country and plays as a pioneer for any kind of development in Iran. Therefore, findings based on an acceptable sample of Tehran will be spotted and used in the rest of the country as well as Tehran Itself.

As mentioned, Maryam Primary School is located in the central part of Tehran, it is a public school which serves middle class families of Iranian society and it contains 13 classrooms. The 24 employees, including 18 teachers are employed in Maryam Primary schools and 200 pupils are gaining education in it. This study has tried to examine the school as detailed as possible in order to reach a clear view on the topic, yet, since part of the LEED guideline is due to construction process and energy consumption which requires accurate data collecting, and gathering the mentioned data besides analyzing the school by all of the parts of LEED guideline was practically out of the limits of the time being, this study limits the research to visual analysis on the grounds of related LEED2009 guidelines on open and close spaces of the Primary School.

(a) Environmental sustainability in open spaces of Maryam primary school

Lack of green natural space in the school yard can be spotted in Figure1 and figure2. Landscaping and natural spaces are considered as the primary necessities of environmental sustainable architecture. Planting and greenery not only improve the space quality, but improves the ability of learning in young children. “It is nature itself that can teach our children about respecting and relating with their natural environment”(Lynch & Hack, 1984, p. 74), While Child is learning to respect the nature, he/she will also learn to communicate with the society and respect other humans(Beer, 2000). Inattention to green, natural space in Maryam Primary School is undeniable in all of the figures presented in this study and will have negative effects on the pupil of this educational space, besides presenting a direct, clear sign of unsustainability. In Figure3, the design of the main entrance of school in a semi-closed form with use of various colors and materials shows the creativity of the designer, which can also improve the sense of creativity in children. According to Iranian culture, school entrances are usually closed and completely solid. Use of semi closed design at the entrance allows children and their parents to feel safe and respected, besides enjoyment of watching creative form, framing the outside view of the school. The yard is no longer isolated from
the rest of the world and children could feel indirectly connected with the community from their own school yard. On the other hand, no provision for restoring rain water can be spotted in the entire yard (Figure 4), and therefore, it can be assumed that no rain water management is predicted.

(b) Environmental sustainability in close spaces of Maryam primary school

The materials mostly used in this school consist of brick, concrete and stone, which are assumed as local materials for the city of Tehran. Regional materials can also be noticed in the closed space of Maryam Primary School (Figure 5). Using local material is a necessity in environmental sustainable architecture and donates a positive point to this school. Existence of multifunctional space (Figure 6), donates another positive point for Maryam Primary School. Linking spaces such as corridors and stairways are also effective in child’s creativity and quality of learning. Closed, teacher-oriented classroom limits children’s spirits and has negative effects on their creativity (Tominga, 1995). This is while educational system in Iran’s primary school is still focused on the above mentioned teaching system. As Figure 7 presents, class rooms of Maryam primary school is not an exemption in this field. Class rooms have closed and limited arrangement and don’t encourage group activities, which, due to the recently studied teaching methods, is known to be the best method of teaching responsibility and fostering creativity in young children (Khan Mohamadi, 2009). On the other hand, library has used an open design with more flexible arrangement, which is
completely appropriate for group activities (Figure 8). Linking spaces such as corridors and stairways should act as a space of movement. They embody the movement circulation of mind, and terminate movement or motionlessness, creativity or imitation (Tominga, 1995). Yet, we cannot notice creativity in Maryam Primary School’s linking spaces. Simple, single purposed corridors and stairways of this school do not carry the ability of encouraging creativity in children (Figure 9).

In Figure 10, innovation in design is spotted. Using natural daylight and allowing it in closed spaces from the ceiling is a design pattern of Iranian Traditional Architecture and has not regularly noticed in recent decades. Architect of this school has presented an old pattern through a new form, which suites the rest of the design patterns used in Maryam Primary School. This innovation allows pupil use good amount of daylight within their school building. Separate sports center in the other side of the building shows the importance of this space in the school (Figure 11). This center includes changing room and has also got a separate space for bicycles. Toilets on the other hand, are not following environmental sustainable guide lines in order to reduce water consumption (Figure 12). Mechanical, out dated rolling water taps are not sensible or smart enough to control water consumption, and this carelessness in using new technologies will have a negative effect in water consumption and waste of Maryam Primary School.
3.3 Evaluation of Environmental Sustainability in Maryam Primary School

Environmental sustainability in Maryam School can be assessed based on LEED2009 guideline for schools (Appendix A). This assessment can illuminate the existing shortcomings in architectural environmental sustainability of Iranian schools and consequently, in the presented design principles. Table 2 presents the result of this assessment.

Table 2: Similarities between guideline of LEED 2009 for school and architecture of Maryam Primary School

<table>
<thead>
<tr>
<th>Main Branch</th>
<th>Guide line of LEED2009 for Schools</th>
<th>Environmental Sustainability in Maryam Primary School</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable site</td>
<td>Construction activity pollution prevention (obligatory)- Correct site selection - Access to optimum density in build environments and adjacent to urban servitudes system - Renovation of damaged sites and environmental pollutions - Providing appropriate public transportation access - Providing space for bicycle storage and changing rooms - Using low-emitting and fuel-efficient vehicles - Creating appropriate parking capacity- Protection or restoring of animal habitat - Maximizing open space - Rain quantity management - Rain quality</td>
<td>Providing space for bicycle storage and changing rooms</td>
</tr>
</tbody>
</table>

Figure 9: simple corridors
Source: www.Nosazimaderers.ir

Figure 10: innovation in the design of ceiling
Source: www.Nosazimaderers.ir

Figure 11: Separate sport center
Source: www.Nosazimaderers.ir

Figure 12: Unsustainable bathroom equipment
Source: www.Nosazimaderers.ir
Existing figures show that facilities, sports and multifunctional spaces have been provided in this school. However, its green, natural space is so limited and there is no picture of rainwater management or appropriate parking space. In addition, Maryam Primary School has taken important steps toward sustainability in materials and sources by using regional materials. Innovation in design is also seen in some parts of the school. In regards to indoor space quality, Maryam School has been successful in natural light provision. On the other hand, the school is not equipped with appropriate bathroom equipment and therefore, will not be able to control its water consumption and waste.

Overall, Maryam School cannot be considered as an educational device and has not provided the possibility of teaching indirect environmental sustainability to its pupil. In fact, it has considered the primary school structure as a dead physical body including wall, ceiling, and floor. In this school, the structure and space does not have any educational function and is merely considered for teaching predetermined courses.
4. EXISTING SHORTCOMINGS IN IRANIAN PRIMARY SCHOOL DESIGN PRINCIPLES AND SUGGESTED TECHNIQUES

This study shows that State Organization of School Renovation has only few points in common with “LEED 2009 for school” which are all due to the branch of ‘Sustainable Site’. These points are limited to five items in outdoor space and one item in indoor space (Refer to Table 1). This is while Environmental Sustainability guideline of LEED is described under seven main branches. (Appendix1).

Visual analysis of Maryam Primary School show another three in common items between LEED and State Organization of School Renovation; Using regional materials and natural light provision were observed in this primary school and are the subsets of ‘materials and sources’ and ‘indoor building quality’ branches. In addition, architectural design of this building is not inattentive to the branch of ‘innovation in design’. However, in order to reach environmental sustainability in the architecture of Iranian primary schools, all international guidelines of environmental sustainability need to be followed completely. The following shortcomings are discovered in the design principles of State Organization of School Renovation on the grounds of international guideline of ‘LEED for school’: 1) Insufficient attention to the pollution caused in the process of school construction; 2) Insufficient attention to rain water management; 3) Insufficient attention to heat island and light pollution in school; 3) Insufficient attention to decrease water consumption; 4) Insufficient attention to save energy use in school building; 5) Insufficient attention to use of renewable energy; 6) Insufficient attention to save recyclable materials; 6) Insufficient attention to use low hidden energy materials; 7) Insufficient attention to control chemical and biological pollutants; 8) Insufficient attention to provide appropriate landscaping; 9) Insufficient attention to innovation in design; 10) No consideration in promoting a primary school building to an educational device.

5. CONCLUSION

The discovered shortcomings of this study can be a serious alarm for responsible Iranian architects and decision makers. They show the importance of pursuing an environmental sustainable approach in Iranian Design Principles. In addition, by discovering the existing shortcomings of Iranian design principles, the possibility of recommending strategies and promoting new design principles based on the recognized priorities are provided and eventually the shortcomings can be fulfilled. As the conclusion of this research, a set of recommendations are presented in Table 3. The concluded suggestions can strongly guide to improvement in the design principles of Iranian Primary Schools.

Table 3: Shortcomings and Techniques

<table>
<thead>
<tr>
<th>Shortcomings</th>
<th>Recommendations</th>
</tr>
</thead>
<tbody>
<tr>
<td>Insufficient attention to environmental sustainability in school yard</td>
<td>Correct selection of site, access to optimum density in built environments and adjacent to public transport system, protecting or restoring animal habitat, paying attention to local and regional priorities</td>
</tr>
<tr>
<td>Insufficient attention to pollution caused while building the school</td>
<td>Prevention of causing pollution by constructional activities, Renovation of damaged and pollutant sites, using low-emitting and fuel-efficient vehicles</td>
</tr>
<tr>
<td>Insufficient attention to rain water management</td>
<td>Quantitative management of rain, qualitative management of rain</td>
</tr>
<tr>
<td>Insufficient attention to heat island and</td>
<td>Heat island prevention in non-roof, heat island prevention in roof, light</td>
</tr>
</tbody>
</table>

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Discovering the existing shortcomings in principles requires full understanding and recognition of patterns and priorities in environmental sustainability. This recognition can be considered as the most initial and effective step for achieving environmental sustainability in primary school architecture. Findings of this study - the shortcomings of design principle of State Organization of School Renovation in Iran, based on environmental sustainability - and effective recommendations it concluded, can provide the basis of creation for a Sustainable Educational Architecture in Iran.

6. REFERENCES

### 7. APPENDIX A

**LEED for school**

<table>
<thead>
<tr>
<th>Main Branch</th>
<th>Guideline of LEED 2009 For Schools</th>
</tr>
</thead>
<tbody>
<tr>
<td>Sustainable site</td>
<td>Construction activity pollution prevention (obligatory) - Correct site selection - Access to optimum density in build environments and adjacent to urban servitudes system - Renovation of damaged sites and environmental pollutants - Providing appropriate public transportation access - Providing space for bicycle storage and changing rooms - Using low-emitting and fuel-efficient vehicles - Creating appropriate parking capacity - Protection or restoring of animal habitat - Maximizing open space - Rain quantity management - Rain quality management - Heat island prevention in non-roof - Heat island prevention in roof - Light pollution reduction - Site development plan - Multipurpose use of facilities</td>
</tr>
<tr>
<td>Water Efficiency (WE)</td>
<td>Water use reduction (obligatory) - Saving water in irrigation systems - Recycling water through innovative technologies - More reduction of water use</td>
</tr>
<tr>
<td>Energy and Atmosphere (EA)</td>
<td>Ensuring accurate performance of Building Energy Systems (obligatory) - Minimum building Energy use (obligatory) - Prevention from ozone layer depletion through cooling facilities (obligatory) - Optimizing building energy use - In site renewable energy sources use - More assurance of systems and building elements correct performance - Full prevention from ozone layer depletion through refrigerant facilities - Measurement and verification of energy in buildings - Using green powers</td>
</tr>
<tr>
<td>Materials and Resources (MR)</td>
<td>Storage and collection of Recyclables (obligatory) - Building reuse by maintaining existing walls and floors - Building Reuse by maintaining interior nonstructural elements - Construction waste management - Building materials use - Recyclable elements use - Local and regional materials use - Rapidly renewable materials use - Certified wood use</td>
</tr>
<tr>
<td>Indoor Environmental Quality (IEQ)</td>
<td>Minimum building indoor air desired quality access (obligatory) - Environmental tobacco smoke (ETS) control (obligatory) - Increased ventilation - CO₂ measuring systems installation - Indoor air quality management plan during construction - Construction indoor air quality management plan before occupancy - Low-emitting pollutants, glues, caulks - Low-emitting pollutants, colors, and coatings - Low-emitting pollutants, flooring - Low-emitting pollutants, timber products - Indoor Chemical and biological pollutants and dangerous particles Control - Controllability of lighting systems - Controllability of thermal and conditioning systems - Thermal comfort system design - Thermal comfort system verification - Natural light provision - Appropriate light provision</td>
</tr>
<tr>
<td>Innovation in Design (ID)</td>
<td>Innovation in design - LEED associated design - School as a teaching tool</td>
</tr>
<tr>
<td>Regional Priorities (RP)</td>
<td>Regional and local priorities importance</td>
</tr>
</tbody>
</table>

Source: [www.leed.net](http://www.leed.net)
## APPENDIX B

### Summary of closed spaces data of Iran primary school

<table>
<thead>
<tr>
<th>Urban Area</th>
<th>Urban Unit</th>
<th>Rural Area</th>
<th>Rural Unit</th>
<th>No. of Classes</th>
<th>Capacity</th>
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<tbody>
<tr>
<td>25</td>
<td>300</td>
<td>15</td>
<td>5</td>
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<td>1000</td>
<td>50</td>
<td>30</td>
<td>10</td>
<td>10</td>
</tr>
</tbody>
</table>

**School Type**

- **Primary School Class 1 (1)**
- **Physical Education Class 2 (2)**
- **Library (3)**
- **Extra Curricular Room (4)**
- **Staff Room (5)**
- **Office (6)**
- **Library (7)**
- **Classroom (8)**
- **Teacher Room (9)**
- **Classroom (10)**
- **Classroom (11)**
- **Classroom (12)**
- **Classroom (13)**
- **Classroom (14)**

**Area of Each Room (in m²)**

<table>
<thead>
<tr>
<th>Area</th>
<th>25</th>
<th>30</th>
<th>35</th>
<th>40</th>
<th>50</th>
<th>60</th>
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<tr>
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<td>30</td>
<td>35</td>
<td>40</td>
<td>50</td>
<td>60</td>
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**Average of Net Per Capita**

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<th>80</th>
<th>100</th>
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<th>150</th>
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<td>2</td>
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**Urban Core Area**

<table>
<thead>
<tr>
<th>Area</th>
<th>25</th>
<th>30</th>
<th>35</th>
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<th>80</th>
<th>100</th>
<th>125</th>
<th>150</th>
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<tbody>
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<td>Urban</td>
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**Rural Core Area**

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<tbody>
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</table>
9. APPENDIX C

Required open space in Iran primary school

<table>
<thead>
<tr>
<th>School Type</th>
<th>Rural</th>
<th>Urban</th>
</tr>
</thead>
<tbody>
<tr>
<td>Number of classes</td>
<td>1</td>
<td>2</td>
</tr>
<tr>
<td>Number of student</td>
<td>24</td>
<td>48</td>
</tr>
<tr>
<td>Demanding Queue up space and playground(1)</td>
<td>136</td>
<td>136</td>
</tr>
<tr>
<td>Demanding Sport’s field (2)</td>
<td>12</td>
<td>24</td>
</tr>
<tr>
<td>Demanding Landscape, flower boxes and trees (3)</td>
<td>25</td>
<td>30</td>
</tr>
<tr>
<td>Demanding Parking space(4)</td>
<td>17</td>
<td>19</td>
</tr>
<tr>
<td>Demanding Linking path for public transport, Preserving space for future development (5)</td>
<td>190</td>
<td>209</td>
</tr>
<tr>
<td>Total demanded area of the open space (6)</td>
<td>7.91</td>
<td>4.35</td>
</tr>
</tbody>
</table>

Source: State Organization of School Renovation Development and mobilization; Architectural Group (2009, p. 7)

- **Explanation**

1. Needed space for student to queue is 1.6 square meter per student, and the space needed for the morning exercise is 1.7 square meter in average. Yet, because of land limitations in urban spaces, in the above table, the biggest number for per capita of queue area (1.6 square meters) is considered as the basis for calculation of sport’s Field.

2. In schools with up to 120 capacities (rural), because the total area of queue space is less than volleyball mini playground, in calculation of the open space in the school, the mini volleyball playground (136 square meters) has been considered.

3. This part includes garden, planting, growing vegetables and allocating a part of garden for growing vegetables by students. The 30%-50% square meter has been considered as Per capita for landscape in schools.

4. Twenty-five square meters is needed for one class, and for every extra class, an extra 5 Meters should be considered.

5. The 10% of the above area should be considered for linking spaces, waste spaces and preserved spaces for further developments.

6. The custodianship and student washrooms areas, which are built outside of the school building and in the school area, should be included in the open space area and should be totally considered in the land per capita table. (State Organization of School Renovation Development and mobilization; Architectural Group, 2009)
ACCORDANCE WITH NATURE, THE SECRET OF SUSTAINABILITY IN HISTORICAL VILLAGES OF IRAN

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²University Technology Malaysia (UTM)
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Abstract
Today, the debate on sustainable architecture and harmony of city and buildings with nature is one of the most important concerns of urban planners and designers in most countries of the world. Iran is one of the few areas in the world that has four different climatic consist of: hot and arid, cold mountainous, warm and humid and also temperate climate. This feature has created villages with unique characteristics as well as various and beautiful architectural landscapes that are active and sustainable after hundreds of years old. The purpose of this study is investigating the effective factors on sustainability architectural structures in these rural contexts. In this regard by introducing six effectiveness principles on stabilizing of these complexes of life, and by investigating the accurate effect of most important of principle (Self-Efficiency or using of local regional building materials) on the design and construction, it will appear the relationship between these principles with nature. The results of this study will show that the approach of accordance with nature how and to what extent has effect in sustainability in the rural complexes.

Keywords: climatic condition, rural texture, stability principles, sustainable architecture

1- INTRODUCTION
Human life is feasible only in the context of nature. The human has been part of the nature, as their life without harmony with nature will encounter with many problem. Creating the industrial cities has solved rational relationship between human with nature. Environment includes as set of balances that disturb of which one undermines the sustainable living. In the past, people have believed that the earth are made of four elements consist of: water, fire, wind and soil. However to create the universe there are so many complexities, but still, this four elements have solutions fore relationship between buildings and environment (Jencks, 1977). The main roots of environment preserve movement and sustainable architecture trace back to the 19th century. John Ruskin and William Morris are the pioneers of this movement. According to Raskin in his book (the seven lamp of architecture): to achieve growth and development, harmonic order can be placed in the nature of the model.

In Iranian traditional architecture, sustainable in built environment is very important, as architecture for each region was appropriate with its climate of the rejoin. Convergence and alignment of Iranian traditional architecture principles with sustainability principles are not coincidence, rather sustainability and continuity concepts and practical ideas of architects of the past, indicate the existence of such thoughts in the traditional architecture of Iran.
Certainly, the vernacular architecture is related to time and space, and it is useless to repeat it. This article aims to extract the repeatable attributes of climatic and vernacular architecture of Iranian historical villages to achieve sustainable architecture purposes also to find out the secret of sustainability in these historical villages. The method of this research is based on study on related books and articles as well as visit of villages and interview with people who live in this selected villages.

2. SUSTAINABLE ARCHITECTURE
"Sustainable development is development which meets the needs of the present without compromising the ability of future generations to meet their own needs. The term sustainable development means that builders, architects, designers, community planners, and real estate developers strive to create buildings and communities that will not deplete natural resources. The goal is to meet today's needs using renewable resources so that the needs of future generations will be provided for. Sustainable development attempts to minimize greenhouse gases, reduce global warming, preserve environmental resources, and provide communities that allow people to reach their fullest potentials.

2.1 Sustainable Architecture:
Sustainable architecture is a general term that describes environmentally conscious design techniques in the field of architecture. Sustainable architecture is framed by the larger discussion of sustainability and the pressing economic and political issues of our world.

In the broad context, sustainable architecture seeks to minimize the negative environmental impact of buildings by enhancing efficiency and moderation in the use of materials, energy, and development space. The idea of sustainability, or ecological design, is to ensure that our actions and decisions today do not inhibit the opportunities of future generations.

3. RESULT AND DISCUSSION
In this section, at first, the climatic conditions of Iran will be briefly explained; and after introducing the principles of Iranian architecture, the solutions of traditional architects will be completely described on utilizing of these principles for sustaining the historical villages of Iran.

3.1 Climatic Conditions of Iran:
Generally, country of Iran has four different climates consist of: : hot and arid, Cold mountainous climate, warm and humid and also temperate climate (Ghobadian, 1998).

Temperate climate: Due to high sun energy in this area, the most attempts are made to locate the buildings in the shadows. In this area, wide and roofed verandas are used to prevent rain and provide a shadow on room walls, too. Because of the high rainfall in these areas, the roofs are made with high slope. The slope level with west-east direction gets lighter in summer in comparison with winter. Surfaces with the slope toward south get more sun radiation in winter. In autumn and spring, the
south slope surfaces get 20% or more than the east and west slope surfaces. Surfaces with the slope towards north receive the less sun radiation during the year.

**Hot and arid region:** Hard and cold winters, warm and dry summers, very low rate of rain, air humidity, herbal cover, so much difference between day and night temperature and in salt desert and salt-desert border regions, the dusty winds are the outstanding climatic specifications in this region (NAJAFABADI, 2006).

**Cold mountainous climate:** In traditional Iranian architecture in cold regions form and way of building locating were designed for the maximum use of the sun in cold climate. Buildings are designed in the way to decrease the surface which exposed to outdoor weather. In these areas the roofs are flat, and horizontal surfaces and flat roofs absorb the most of direct sun light. Another reason for choosing for the flat roof in these areas is to keep the snow on the roof as the heat isolator. Location and size of windows were according to the wind and sunshine. Doors, windows and openers were located in a place with the least air pressure (Mastor Surat, 2009).

**Hot and humid climate:** This region has hot and humid summers and mild, short winters. In summer, the maximum of temperature is between 95 to 105°F (35 to 40°C) and the maximum of relative humidity is 70 percent. The humidity is high in all seasons and thus, the diurnal and annual temperature ranges are small. The temperature differences between land and water create sea and land breezes in summer. However, the breezes are confined to the coastline and the speed of wind is low in internal regions (Azari Najafabadi 2006).

3.2 **Sustainable Approach in Iranian Architecture Principles:**
The existence of principles in Persian architecture allows all stakeholders to take the advantage of a common language among them. This fact provides them with an assessment method to evaluate and to compare building designs and related activities, applied in facilities management. Persian traditional building principles are emerged based on standard measurement unit, modular design and proportions in design. Persian architecture principles are presented based on consideration of different stages and levels in design and construction management. in general there are 6 principles and codes in Iranian architecture (Vakili, 2006).

1- **To Be in Accordance with people needs (Mardomvary)**
This issue concerns user needs and functionality issues in a building. It means that all needs of a user in a building regardless their social class should be responded. Therefore the first mission in a design deals with fulfilments of human basic needs through reasonable functions.

2- **Self-Efficiency (Khod-Basandegy)**
Use of vernacular materials (Boom-Avard in Persian) is always one of the concerns in Persian architecture. As an example they used to use excavated foundation soil in order to make bricks. There are many examples like this which are placed in today architectural concepts in sustainable building design (SBD). Vernacular material selection, compatibility, Embodied energy, application
of passive energy and design environmental strategies in waste and technology management concerning the impacts in the environment are concepts pointed out in SBD.

3- Module Unit (Peymoon)
The basic unit of measurement in building is called Peymoon. This unit (module) is a base for other measurements. This means that other parts of building are measured based on this module and the dimensions are a proportion of this unit. The measurement unit in Iran was called Gaz (103 cm). All elements used to be built based on this unit and its proportions in the building system. This system of measurement supported stakeholders to apply geometry and its advantages for better perception of forces behaviour in building structure.

4- Inward-Looking (Daroon-Garaei)
Each community has a great respect for their culture, habits, and traditions. Persians culture has a respect for family and its privacy. Based on this fact they had two types of spaces in their designs. The activities pertained to the family and their privacy should locate in separate spaces from public activities. Therefore the functional zoning was arranged in a way to fulfil this objective. This code in their design shows that how sensitive their architecture behaves towards society members cultural issues. In this approach customers satisfaction based on their real needs and desires are addressed.

5- Avoiding Un-necessities (Parhiz Az Bihoudegy)
This code in this section attempts to address all practical efforts made to achieve the highest performance for user regarding issues such as waste control, cost, and avoiding construction loads (making the structure as light as possible through removing some parts of dead loads). Today the equal terms for such concepts could be gaining more from the less, efficiency, performance, dematerialisation, different levels of economics and technology management.

6- Structural Rigidity (Niaresh)
This code embraces the necessities required in building statistics and dynamics and includes all endeavours carried out in construction in accordance with the existing level of knowledge and technology.

This paper attempts to show that there are many concepts in precedent rural architectures which are applicable in today architecture and design. As it is seen, some of them are concepts presented in SBD and sustainability related terms. Identification and perception of the concepts regarding their application in building might help building stakeholders to benefit what precedents had and could be a heritage for today use.

Perhaps one of the most important principles in the rural planning is consideration to natural elements in environment.

3.2.1 The Elements of the Nature:
There is a respect for all elements of nature in Persian rural textures. In mysticism, it is believed that water, wind (air), soil and fire (light and temporal factors) are the basic elements forming our
surroundings. Hence, in Persian rural architecture the presence of these elements are always apparent. Existence of wind catcher, water pond in the court-yard could be good examples of Persian architecture scopes. Inspiration of nature can be seen in many features of building. Benefiting natural vegetation, natural lighting, natural ventilation, earth geo-thermal and other potencies of nature are all included in this architecture. Also in the scale of urban and rural planning and programming and application of nature potencies are observed. Building orientation (Rown in Persian) is a compass reading direction which is the most effective direction in benefiting natural potencies and resources within reach. Due to Persian principles any effect causing harm to the environment and its component is forbidden. This is what is considered as the first step or base in sustainability. As it is perceived, respect to the nature and its elements have an effective influence on conceptualism and initial innovation in early design stage.

3.3 Accordance with Nature in four historical villages of Iran:
This section aims to select 4 historical villages from 4 different climatic rejoins of Iran for investigating the effective factors which impact on sustainability of these villages, particularly the factors which are related to nature. These villages are Masouleh from temperate climate, Abyaneh from hot and dry climate, Meymand from cold climate and Loft from hot and humid climate.

3.3.1 Masouleh:
This historic town, during its 1000 age, is an obvious type in fantastic harmony between nature and human. It is located at 37, 09,13N latitude and at 48, 59,14E longitude and farthest end of damp Caspian climate region. It is situated valley of river, whose sources are near the second high peak of Talesh mountain (Masouleh-Dagh with 3050m height). Its height is 1050 m from open sea and difference between its the highest the lowest points are more than 120m.

Construction of houses throughout the sloped foothills has created an eye-catching view of this village's architecture, such that the majority of paths and pavements are in fact the roofs of houses situated in the lower terraces and so on (figure 1). In other words, when we cover a walkway and a road, we are actually walking on the rooftops of other houses. These paths are inter-linked with stone-made steps, which portray a uniformed and beautiful village. The configuration of the houses has made it impossible for cars to drive in, leaving the village pathways and rooftops indistinguishable.

The majority of houses are two-floored and one-storey and three-storey houses are rare. A large and complete house in this village consists of a corridor, a warehouse and long steps to link the ground floor with the second floor and the hall. Most houses have rooms specially designed for winter and summer and a small veranda extends from the front of the house. The room used in the winter, known as Sumeh, is at the far end of the house, and does not allow in much light. In the middle of the room is a fireplace, which the household uses to cook and keep warm. The summer room has lattice windows made out of wood and colourful glasses, which should be pushed upward to open. The rooms usually contain built-in shelves decorated with copperware, small pantries, tiny windowpanes and mirror frames mounted on the wall. A small balcony makes it possible for the
residents to view the beautiful landscape. Meanwhile, the smaller houses are simpler and cover a smaller space.

![Figure 1: Masouleh](image)

In Masouleh it has been customary for locals to make their houses out of sun-dried bricks, stone, wooden bars, and wild ferns. Wild ferns largely grow in Masouleh and its environs and are insulators against water. The majority of locals in "Masouleh" cover the façade of their houses with yellow mud, and cover their houses' roofs with red mud once a year.

3.3.2 Abyaneh:
A village of great antiquity, Abyaneh is like a living architectural and anthropological museum. Considering the evidence found in Abyaneh, it dates back to antiquity, but its golden age was during the Safavid period. Walking through the streets of Abyaneh, one can see men and women, young and old, in traditional costumes. It seems modern life has created no changes in their clothes and they still prefer their traditional garments. It affords an impressive exponent of the adaptation of man with his environment.

It is located on the northwestern slope of Mountain Karkas, 2 km away from Natanz (a town in Isfahan Province). It is 2500 meters above sea level. Abyaneh is mainly watered by the river of Barzrud. Set on the slope of the lofty mountain of Karkas. Being down the hill toward a fertile valley, it's protected by the natural landscape. Yet, since antiquity, the inhabitants had planned certain measures and structures to safeguard the lives of the people from bandits and other invaders.

The first architectural feature of this village is the adobe color of its houses. They are mud-made houses built in absolute harmony with the color of the surrounding nature and cold of the winter. Abyaneh is a multi-leveled village constructed with local materials accessible in the surrounding mountains.

Houses are built with thick bearing walls, rock foundations, wooden beam ceilings and beautiful wood windows. The lanes between them are narrow with tall walls. Many houses have got terraces in
front them which are part of the lower house ceiling. The entrances of some of the houses are recessed within a chamber-like space having a low ceiling. At some cases, there are two seats built with constructional materials at both sides of the entrances. Each room is used for various purposes. For example, a single room may be used as a dining-room, a sitting-room, a bed-room and a guest-room. To economize in the use of fuel, the rooms and used in winter are architecturally different from those used in summer. For providing equal light for all parts of the rooms, there are several small openings in the roofs. The size of the rooms, windows and doors all indicate the simplicity of life in this old village.

![Figure 2: Abyanehe](image)

The houses are arranged like steps up the hillside (figure 2), so the roofs of some houses are the front yards of the next one up. The roofs/yards are built using traditional materials, timber, straw and clay. The walls, also red mud bricks, are impressive. Uniquely, these bricks get stronger when exposed to the rain. To make as much use of the sun as possible, the houses face the east. Most of the houses are uniform in appearance. The doors also feature beautiful patterns, poems and, sometimes, the names of the owner and mason are carved on the front.

### 3.3.3 Meymand:

38 km northeast Meymand Babak city within 30 degrees 16 minutes and 55 degrees and 25 minutes during the Contract. The height of 2240 meters above sea level and the extent is 420 kilometers. Annual rainfall is 185 mm. Meymand Situated between a desert and a mountain; it enjoys a mountainous climate with freezing winters and hot summers. Meymand has been continuously inhabited for the past 2,000 to 3,000 years, which makes it one of Iran’s oldest surviving villages. Archaeological finds date the site back to 12,000 years or the Middle Stone Age.
What is undoubtedly the importance of how knowledge is put Meymand of housing put on the bricks and so does not develop, is not made in the open, but with the elimination of piles of dirt and people need arises Clay and no bricks and mortar, but should take up mass shelters to be provided (figure 3).

The traditional houses of the village are hewn into rocks and include corridors, pillars and a stove, which is used for both cooking and heating the home during the freezing winters. Created in Oven and local language Dydvn (didon) within rooms and wood burning many years in the black ceiling and caused Bdnh rooms and set fires inside the rooms and the food has been caused to the body and cause life of isolation rooms Unfortunately, because most rooms and many other rooms are not lit the fire has caused the soil to find roofs falling slowly.

Meymand’s sedimentary rocks are soft enough to be shaped by hand and hard enough to support the roof of cave units.

Their houses usually consist of a single square or round room with windows carved wherever possible. Some dwellings are windowless and dark due to lack of natural light and soot-coated walls. Larger houses have more than one room and sometimes an adjacent stable or animal shelter. Doors are usually rectangular and made of wood, with a latch that locks onto a hole drilled into a stone frame. Thresholds of Kicheh doors are raised some 15 to 20 centimetres above the ground to keep water from flowing into the alley.

In lower units, there is often a trench before the entrance with walls tall enough to accommodate a dwelling unit. In some parts, the lower units are made in groups so that the entrance trenches of up to five houses open onto a terrace known as a Dalan. Dalans are used for family and social gatherings. Villagers also use round sedimentary rocks to build dividing walls and buildings on the valley floor. Those who spend summers in the village build special dwellings called Kapars, which allow the circulation of air to cool the interior.
Meymand villagers use another type of shelter known as Gonbeh that are not as cool as Kapars. Gonbehs are circular structures with stone walls and a conical roof made of wooden rafters.

The nomads of Meymand also make different types of shelters outside the village, such as Aghol, Abadi and Pollas. These shelters are usually made of wood and stone. Aghols are constructed as semi subterranean buildings, similar to a Gonbeh in appearance. Abadis are built above the ground while Pollas is a type of tent made of a white fabric with cotton warps and wefts made of goat wool.

3.3.4 Loft:
Loft is located at the southern shores of Iran, in the northernmost of the Qeshm Island and at the east of Hera Forest, in 55 degrees and 5 minutes east longitude and 54 degrees and 26 minutes north latitude.

The history of settlement in this region dates back to ancient days (before Islam) and possibly Medes dynasty, and like the other spots of the Persian Gulf, had been the battlefield between Iranians, Dutch, Portuguese, English and Arabs in prolonged centuries. Remains of the buildings built by all these parties are spread all around the island. Loft that is famous as the port of wind towers and is one of the oldest villages of the region.

The traditional architecture of Loft actually is identified by the beautiful wind towers, which give the village a homogeneous look. Wind towers are not just beautiful; they catch the wind and suck it into the house to cool it up. Wind towers are generally constructed in the residential buildings, at the southern part of the yard, at the summer residence of the house. They are generally made of mud brick, brick, mud, plaster and wood, and usually are two or four sided. Loft is known as the town of thousand wind towers (figure 4).

In this region some materials have been used (are used) that each has a lower thermal mass and has the capability to store and keep as reserved the volume of heat neither (Soflaee, 2005). For this reason, wood, as an example, is considered to serve as a good material. However, since in these regions, there is little grass covering, wood was merely used for roof framing and windows or doors woodworking. And in making other parts of building uses are made of native and local materials existing in any region there such adobe, bake brick, brick and alluvial rocks, marine coral stone and reed. As these kinds of stones (rocks) are porous and they can be used as good thermal and acoustic insulators.
4. CONCLUSIONS
Vernacular architecture has always found its course through response to climate as one of the main factors which affects physical comfort. One of the most important principles in Iranian rural architecture is to use of local regional building materials for construction work where possible; it is preferable to use materials requiring low inputs of non-renewable energy in fabrication, transportation to the site and in the construction process itself. Those materials which are labour intensive rather than energy intensive in their extraction, dressing and erection being more environmentally friendly and equitable in terms of the distribution of resources, are more acceptable for purposes of sustainability. The used materials such as clay and mud in rural regions require only man’s efforts to make a structure from them. Most people on this planet live in building made from earth. Building from earth does least damage to the environment: It is close to the building site and so does not involve transport energy costs. Until the later stages of the industrial revolution in the nineteen-century, settlements were constructed largely from building materials obtained close to the site. Moreover, when no longer required, the building decomposes naturally and without pollution, return to the earth from where it comes before. Nevertheless, it can stimulate the imagination as an analogy for sustainable development.

5. ACKNOWLEDGEMENTS
The work is financed by Zamalah/Institutional Scholarship provided by Universiti Teknologi Malaysia and the Ministry of Higher Education of Malaysia.

6. REFERENCES


Abstract
Sustainable development has received encouraging attention since Rio Declaration on Environment and Development was signed in 1992 Earth Summit. More local governments worldwide are now adopting green and sustainable building standards and regulations or providing financial incentives for sustainable development. Essentially sustainable construction also has experienced significant growth due to the awareness of the benefits of sustainability among the construction players for instance, ‘green and ‘sustainable building’ are increasingly important to tenants, owners and property developers. However, the term ‘sustainable’ is always being diluted by the commercialisation and marketing of the green movement. Both the words ‘green’ and ‘sustainable’ are often used synonymously and interchangeably. It was argued to be confusing people in understanding and practising the terms as evident in the application of ‘green building’ and ‘sustainable building’. Therefore, as an initiative, this paper presents an overview of the differences and similarities between ‘green’ and ‘sustainable’ as well as between ‘green building’ and ‘sustainable building’. Even though there are many researches on the benefits and significant growths of green and sustainable building construction, they are not without challenges and barriers. It is revealed that the most common reason for not incorporating green and sustainable elements into the construction of building project is the ‘increase in first cost’. Thus, this paper will also discuss the costs barrier and other possible barriers as well as the benefits of green and sustainable buildings toward sustainable construction.

Keywords: green building, sustainable building, construction project, sustainable development

1. INTRODUCTION
The world has come to the consensus that sustainable development is essential as a result of rise of global environmental crisis that threaten human safety and health as well as food production. Chaharbaghi & Wilis (1999) proclaimed that there is a growing concern about the long-term future, the resources of the planet, the environment and high levels of poverty, which are linked with the spread of disease, social unrest, population growth and environmental degradation. Although these issues could stem from various causes, unsustainable construction project could be one of them. As stated by Zainul Abidin (2010) that construction activities will influence to the sustainable development from its impact to the output. A building imposes in-use impact to the environment such as energy wastage, waste disposals, greenhouse emission, and soil contamination (Zainul Abidin, 2010). This is based on several arguments that building sector is the largest sources of greenhouse gas emission around the globe (Wu & Low, 2010). Buildings account for around 45% of...
carbon dioxide (CO$_2$) emission and therefore, a key element in the strategy to combat global warming (Edwards, 1998). In 2003, it was reported that 44% of carbon emissions in United Kingdom are generated by buildings (CBRE, 2009). Therefore, by considering sustainability in building construction project would bridge toward sustainable construction (Hayles, 2004).

2. THE DIFFERENCES BETWEEN ‘SUSTAINABLE’ AND ‘GREEN BUILDING’
Green and sustainable building has different views, meanings and interpretations to different people. There is currently no single agreed definition of them that encompassed all aspects of design, development and use (CBRE, 2009). Presently, the words ‘green’ and ‘sustainable’ are often used synonymously and interchangeably (CBRE, 2009; and Schumann, 2010). However, these expressions have to be explained clearly as they have separate and different meanings. As stated by Building Science Corporation (2008), green building focuses on solving known and measurable problems with the current practice, whereas sustainable building seeks models for an unidentified future state of society.

2.1 Sustainable Building
The concept of sustainability was argued as non rigid doctrine (Wang, 2004). Thus, the term and concept of sustainability are actively redesigned for the specific purpose at any given time and context (DAC, 2010). For instances, in construction industry, a variety of sustainable based concepts were used such as sustainable and green building, sustainable and green construction and sustainable and green project management and so on. However, by referring to the Bruntdland Report published in 1987, sustainable means ‘meeting the needs of the present generation without compromising the needs of future generations’ (World Bank, 1992). Due to flexible nature of the concept (DAC, 2010), many definitions currently exist for the term ‘sustainable’ and ‘sustainable development’ which most of them have been extended to be based upon the three pillars of ‘triple bottom line’ concept which developed in 1997 by John Elkington (Edward, 1998; Popea et al., 2004; Magis & Shinn, 2009; Larsen, 2009 and Grevelman & Kluiwstra, 2010).

Meanwhile, in construction industry, the concept of sustainability has initially focused on the issues of limited resources especially energy consumption and how to reduce impacts on the natural environment with emphasis on the technical issues such as materials, building components, construction technologies and energy related design concepts (Md Darus et al., 2009; and Zainul Abidin, 2009). This concept is seen to be influenced by the Bruntdland’s definition in 1987. Therefore, undeniably most of the parties who involved in construction industry are still convenient with this concept as evidenced by these two out of hundreds popular definitions of sustainable construction and sustainable building as follows;

1. The creation and operation of a healthy built environment based on resource efficiency and ecological design with an emphasis on seven core principles across the building life cycle which are, 1) reducing resource consumption, 2) reusing resources, 3) using recyclable resources, 4) protecting nature, 5) eliminating toxics, 6) applying life cycle costing, and 7) focusing on quality (Kibert, 2005).
2. The adoption of materials and products in building and construction that will require less use of natural resources and increase the reusability of such materials and products for the same or similar purposes in order reducing waste (BCA, 2007).

It was noticed that most of the definitions of sustainable building and construction tend to focus more on environmental measure. The other sustainable development measures such as social and economic have been relatively forgotten. Most of the authors and construction players also use to relate ‘sustainable construction’ with materials used and final product without exploring the holistic process of the building whole life. In Malaysia for instance, a survey by Zainul Abidin in 2009 found that most of the Malaysian developers understand ‘sustainable construction’ only from environmental perspective (88.6%) and valued social and economic elements as separate entities.

Various techniques and methodologies exist to measure the principles for sustainable construction and sustainable building. Some only consider very specific aspects of building performance such as energy usage (for example Energy Star), materials used or waste generated during construction or operation. Others try to take a broader view, through a set of design and operational criteria. For commercial building for instance, the two most commonly used criteria are BREEAM (Building Research Establishment Environmental Assessment Method) and LEED (Leadership in Energy and Environmental Design) (CBRE, 2009). However, most of them are actually covering a range of schemes for assessing environmental impact; the other two main principles of sustainability seem forgotten and less considered in those measures (CBRE, 2009).

According to Adler et al. (2006) the definition of sustainable building should go far beyond the environmental aspect. In accordance with the three aspects of sustainable development, which are economic, social and environmental, sustainable buildings can benefit human well being, community, environmental health and life cycle costs. Fortunately, nowadays the significance of the non technical issues such as economic, social and cultural aspects have been emphasized gradually (DETR, 2000; Zainul Abidin, 2009; and AggRegain, 2010). For example, as highlighted by CSIR-Boutek (2001), sustainable construction is a holistic system which is the sustainable development principles applied into the whole construction cycle, encompassing matters such as tendering, site planning and organization, material selection, recycling, and waste minimization. This practice not only helps the environment but also improves economic profitability and relationships with stakeholder groups (AggRegain, 2010). In other words, it can benefit both the economic and social aspects.

2.2 The Principles of Sustainable Building
A number of frameworks such as Global Reporting Initiative, Green Building Index, Malaysia, the BCA Green Mark Method, Report of the World Summit on Sustainable Development by United Nation in 2002, World Development Report, the BREEAM method, the LEED method and Green Globes System have been reviewed to determine relevant sustainable development principles that should be considered for a sustainable building. The selection of principles reviewed was based on the indicator framework that addresses all three dimensions of sustainability, the indicator
framework has a wide focus at a national, community or company level and the frameworks have been proposed at a country level with slight modifications of the United Nation’s framework. Besides, to support the sustainability frameworks and harmonising them into the contemporary researches, current studies and practical implementation on sustainable construction, sustainable and green building and their whole life cycle processes worldwide were also reviewed. Based on the findings, green and sustainable building principles have been summarised as shown in Table 1.

<table>
<thead>
<tr>
<th>Sustainable Development Principles that should be incorporated during the whole life of building</th>
</tr>
</thead>
<tbody>
<tr>
<td><strong>ENVIRONMENTAL SUSTAINABILITY</strong></td>
</tr>
<tr>
<td>1. Optimise materials and resources used</td>
</tr>
<tr>
<td>2. Materials and resources selection</td>
</tr>
<tr>
<td>3. Sustainable method</td>
</tr>
<tr>
<td>4. Energy efficient</td>
</tr>
<tr>
<td>5. Efficient water consumption and effluents treatment</td>
</tr>
<tr>
<td>6. Noise control</td>
</tr>
<tr>
<td>7. Visual impact and Aesthetic</td>
</tr>
<tr>
<td>8. Site Planning and management</td>
</tr>
<tr>
<td>9. Transport Management</td>
</tr>
<tr>
<td>10. Concern on quality of land, river and sea</td>
</tr>
<tr>
<td>11. Air and emissions quality</td>
</tr>
<tr>
<td>12. Maintaining cultural and heritage</td>
</tr>
<tr>
<td>13. Efficient environmental management</td>
</tr>
<tr>
<td><strong>ECONOMICAL SUSTAINABILITY</strong></td>
</tr>
<tr>
<td>14. Benefit to the stakeholders</td>
</tr>
<tr>
<td>15. Improve local market present</td>
</tr>
<tr>
<td>16. Whole life cost efficiency</td>
</tr>
<tr>
<td>17. Indirect economic impact</td>
</tr>
<tr>
<td><strong>SOCIAL SUSTAINABILITY</strong></td>
</tr>
<tr>
<td>18. Excellent Labour Practices</td>
</tr>
<tr>
<td>19. Health and Safety</td>
</tr>
<tr>
<td>20. Training and Education</td>
</tr>
<tr>
<td>21. Fairness</td>
</tr>
<tr>
<td>22. Human right performance</td>
</tr>
<tr>
<td>23. Society Performance</td>
</tr>
<tr>
<td>24. Product responsibility performance</td>
</tr>
<tr>
<td>25. Stakeholders participation</td>
</tr>
<tr>
<td>26. Macro social performance</td>
</tr>
<tr>
<td><strong>DESIGN AND INNOVATION</strong></td>
</tr>
<tr>
<td>27. Sustainable Design</td>
</tr>
<tr>
<td>28. Innovation</td>
</tr>
</tbody>
</table>

The brief checklist as developed in Table 1 allows the right mix of sustainable development parameters to be established. In conclusion, sustainable building is a project that performs as a sustainable product, sustainable in application and is constructed in a sustainable manner. Sustainable building also should consider the integration of environment, social, economic in their innovative design and the building whole life. It should be stressed that the life cycle analysis of a
building needs to be carried out in determining whether or not the building is categorised as a sustainable or otherwise.

2.3 The Principles of Green Building
As in the case of ‘sustainable’, there is no single, widely accepted definition for ‘green’. ‘Green’ is commonly found in its ties to nature such as regeneration, fertility and rebirth which recently the colour is used as a symbol of environmental protection and social justice (Greenbuildingideas, 2011). Consequently, a variety of ‘green’ terms were used in construction industry such as ‘green construction’, ‘green project’ and so on. In 1980s, under the cover of sustainable development (Rees, 1989) and sustainable design (St. John, 1992), green building has proven to be successful in contributing toward sustainability. It is a division under the umbrella of sustainable development (Wu & Low, 2010; and Schumann, 2010). Green buildings are argued to be more focused on environmental aspect such as deliver low energy consumption (Schumann, 2010). However, lately, the significance of the non technical issues such as economic and social aspects have been incorporated gradually in the definitions of green building as highlighted below;

1. Buildings that are designed, constructed and operated to boost environmental, economic, health and productivity performance over conventional building (US Green Building Council, 2003).
2. The practice of (1) increasing the efficiency with which buildings and their sites use energy, water and materials and (2) reducing impacts on human health and the environment through better planning, design, construction, operation, maintenance and removal process (Cassidy, 2003).
3. The process of building that incorporates environmental considerations into every phases of the building process which is energy and water efficiency, resource-efficient building design and materials, indoor environmental quality, homeowner maintenance and the building’s overall impact on the environment are all taken into account during the design, construction and operation of a building (National Association of Homebuilders, 2006).
4. Green building is a way of enhancing the environment, which benefits human well being, community, environmental health and life cycle costs (Adler et al., 2006).
5. The way structures are designed, constructed and maintained in order to decrease energy and water consumption and costs, improve the efficiency and sustainability of the building systems and reduce the negative impact buildings impose on the environment and public health (Beatley, 2008).

Green building belongs to the concept of sustainable development (Wu & Low, 2010; and Schumann, 2010). Therefore, instead of simply regarding green building as an assembly of new materials, technologies and other pieces of environment-friendly innovations, many authors and researchers agreed that it should be a holistic solution to achieve the sustainable development in the whole life of project toward sustainable construction (refer to Figure 1).
2.4 Sustainable versus Green

One consensus that repeatedly comes up from the literatures on green building standards is that of ‘sustainable products’. However, based on the original definition of the term ‘green’ and ‘sustainable’, green building does not necessarily mean ‘sustainable’. Building can be green in its ultimate application but not sustainable in its manufacture and initial use. Building as well can be ‘green’ if environmental aspects are incorporated, but not sustainable enough if economic and social aspects are left behind. A green building that made of sustainable materials and fits the BREEAM or LEED Certified program’s guidelines is still unsustainable if the seemingly green building is constructed in a way that it harms the environment or workers. Many researchers agreed that sustainable building means the integration of sustainable development principles (environmental, economic and social aspects) through the whole life of building process (Carnevaleustis Architects Inc, 2011; Greenbuildingideas, 2011; and Zainul Abidin, 2009). The differentiations of green and sustainable buildings are shown in Table 2.

Even if there are clear differences in meaning and concept of green and sustainable buildings from the original term perspectives, however presently, both the terms and concepts are commonly used synonymously and interchangeably by the researchers and practitioners including in awarding sustainable and green building project. Some of them are proved by the definitions discussed previously in this paper. Therefore, it is very complicated to differentiate between green and sustainable building unless a thorough investigation is carried out through whole life of the building process.
Table 2: Differentiations of Sustainable and Green Building

<table>
<thead>
<tr>
<th>Aspect</th>
<th>Sustainability Consideration</th>
</tr>
</thead>
<tbody>
<tr>
<td>Ecological</td>
<td>Use of resources - Air and Emissions - Waste management</td>
</tr>
<tr>
<td>Socio-cultural</td>
<td>Well being, comfort - User satisfaction - Functionality</td>
</tr>
<tr>
<td>Economic</td>
<td>Life-cycle costs - Value growth - Flexible use</td>
</tr>
<tr>
<td>Technical</td>
<td>Durability of materials - Ability of deconstruction/recycling</td>
</tr>
<tr>
<td></td>
<td>- Ease of maintenance</td>
</tr>
<tr>
<td>Process</td>
<td>Planning - Building construction - Maintenance</td>
</tr>
<tr>
<td>Location</td>
<td>Micro Location – Utilities - Infrastructure provision</td>
</tr>
</tbody>
</table>

Most of the standards and methodologies that have been developed are more focused on evaluating environmental performance of buildings such as LEED, a method developed in the United State of America with a world wide application, CASBEE (Comprehensive Assessment System for Building Environmental Efficiency), a method developed in Japan, BREEAM in the United Kingdom, HQE (High Environmental Quality) developed in France, VERDE developed in Spain, and Green Building Index, an environmental rating system for building, which is developed in 2009 by PAM (Malaysian Institute of Architects and ACEM (The Association of Consulting Engineers Malaysia). Meanwhile, the standards and methodologies for sustainable building which include social and economic aspects are rarely found.

This situation arises due to lack of understanding on the exact concept of sustainability and due to the dilution of the term ‘sustainable’ itself by commercialisation of green movement. Green building is easier to be recognised due to the known and measurable environmental criteria, whereas sustainable building is more complex because it goes far beyond the environmental aspects (Adler et al., 2006). The life cycle analysis of a building needs to be done in judging whether or not the building is categorised as a sustainable or otherwise. However, it is a good news to have a green building which measured as the same as a sustainable building. It is because they are both come from the same concept of sustainable development which able to facilitate sustainable construction.

3. THE BARRIERS OF GREEN AND SUSTAINABLE BUILDING

Even though there are many researches on the benefits and significant growths of green and sustainable buildings, there are not without challenges and barriers. A survey of building industry professionals conducted by McGraw-Hill Construction (2006) evidenced that perception of higher costs or increase in the first cost is the most commonly found barrier to the green and sustainable building construction. Truthfully, as believed by people, green and sustainable buildings tend to cost more to construct than conventional building (Building Science Corporation, 2008; and Morris, 2007). The industry would normally expect the extra cost of initiatives for innovative materials and technologies (McKee, 1998; CBRE, 2009; and Korkmaz, 2010) and added personnel hours (Korkmaz, 2010) to be recovered in five to eight years. Development of green and sustainable building as well is likely to add between 5% to 7.5% to construction cost (CBRE, 2009). Although
many researches evidenced that green and sustainable building would contribute in operational and long term savings, nevertheless the benefits of operational savings can be less important to a speculative developer who has no long-term interest in operating or leasing a building (Anantatmula & Robichaud, 2011).

Furthermore, the developers and investors claim that the risks are too high in the uncertain business of property development (CBRE, 2009; McKee, 1998; and Francis, 1998). The sustainable and green building carries certain risk, in practical terms, for example, they require more time to design, the need to bring together appropriately skilled professionals, the need to visit green buildings and become familiar with research reports, the preparedness to take risks in developing new building prototypes and the need a proper understanding of the relationship between the capital and running costs in financial, energy and environmental terms (Francis, 1998).

Added to that, there are problems which parallel to those of the green and sustainable client including time required for the design in relation to the client programme and fee, the risks and costs of innovation especially against competitive fee scale, the need to develop and test prototypes, the need to manage contractor/sub-contractor relationships and understanding, problems with certain contract forms such as design and build, the need for feedback and monitoring to inform new projects, lack of coherent government initiatives, lack of consistent performance standard and feedback and the lack of exemplar projects (Francis, 1998).

4. THE BENEFITS OF GREEN AND SUSTAINABLE BUILDING
Sustainable and green buildings impact the environment less during construction, provide healthier place for their occupants and are more cost-efficient over the life cycle than conventional structures (Doyle et al., 2009). To be commercially, socially and environmentally sustainable building, measurable and immeasurable benefits need to be revealed in order to persuade developers and clients to risk new approaches and use the new sustainable technologies. Several authors have found the net benefits of green and sustainable building as follows:

4.1 Direct Benefits
1. Reduce energy consumption, economies in operational cost and fuel bills either for owner or tenant

According to Yates (2001), capital costs are not higher for many green and sustainable building elements and even where upfront costs are more elevated, they can be offset by decreased operational costs. Research shows that green and sustainable building practices can considerably reduce the built environment’s role in energy consumption (CBRE, 2009; and Edward, 1998). Depending on the level of improvement, these savings at least exceed 10% and could be well over 50% (CBRE, 2009). A survey of 99 green buildings in the United State showed they use an average of 30% less energy than conventional buildings. Meanwhile, other research in United State also found that Energy efficient design able to reduce building energy consumption by as much as 50% (The Economist, 2004). An example of a successful sustainable building is the head-quarters of the NMB
in Amsterdam constructed in 1990, built to meet low-energy and high environmental standards, with plenty of user control over the temperature and humidity of working areas. It was reported to have saved more than £300 000 a year in energy costs against a conventional office building of similar size. The energy consumption is one-twelfth that of the bank’s former building allowing the owner to calculate that the additional cost of plant and equipment was paid for in three months of occupation. Furthermore, NMB have found that absenteeism is 15% lower than in the old building adding considerably to the bank’s performance. Therefore, it has proved a success in financial and productivity term.

Although initial costs of sustainable construction can be higher than conventional projects, it is widely held that longer-term cost savings in operations and maintenance can help recover those costs. Green and Sustainable buildings are expected to decrease operating costs between 8-9%, increase total building value by about 7.5% and increase occupancy rates by 3.5% (U.S Green Building Council, 2006a; b). More examples of worldwide successful green and sustainable buildings are shown in Table 3.

2. Market advantage and lower long-term exposure to environmental or health problems

The evidence record for this is limited, but analysis from the US indicates that the green and sustainable buildings do attract higher rents than conventional ones and also enjoy higher rates of rental growth (CBRE, 2009). A survey by developer St James’ on their Kennet Island sustainable residential scheme in Reading, England revealed that four-fifths of residents would pay up to £3,000 for each of a select group of green and sustainable features, including solar PV tiles, solar hot water tiles, PowerPipe hot water heat exchangers, grey water recycling and wind turbine. A research by real estate experts in Australia found out that majority of Australian investors are willing to pay more for a Green Star building (Muldavin, 2011). The improved marketability subject of green and sustainable buildings is the main current competitive advantage which are easier to sell and lease, which reduces vacancy times and hence income losses (McKee, 1998). The buildings also are able to fulfil user satisfaction, benefits to health and comfort, increase company image, having commercial advantage for environmental ethics, value for money in long term, adding the sale value of buildings and simpler to re-lease in the future (Edward, 1998; and McKee, 1998).

3. Greater productivity of workforce

Green and sustainable buildings also have social impacts on the health and wellbeing of building occupants. Design features that promote sustainability have resulted in lower absenteeism and higher productivity rates among employees. A study conducted after Lockheed Martin completed green engineering and design facility in Sunnyvale, California showed that absenteeism rates dropped by 15% in the new building. Another California study of test scores from 21,000 students concluded that students in classrooms with more natural light scored 29% higher on math tests and 26% higher on reading tests than students in rooms with less natural light (U.S. Green Building Council, 2003).
4.2 Indirect Benefits
There are three main indirect benefits of sustainable building which are followings:

1. Healthier to use

The use of more natural sources of light, solar energy and more organic materials in the green and sustainable building, end up to a healthier building than the traditional one. As reported by Edward (1998) and U.S Green Building Council (2003), the building has proven to contribute in lower levels of sickness and absenteeism (refer Table 3).

2. Psychological advantage

People feel better in green and sustainable building. Research in the USA by Edward (1998) claimed that people are not only healthier but they claim an enhance sense of wellbeing. 1% absenteeism reduction in the building able to pays for the energy costs of a conventional building.

3. Enhances company image

Green and sustainable building is normally the result of holistic thinking by a team of professionals, including the client, who share similar green and sustainable ideas which spread from a company to its buildings, the building to the company and the company to the individual thereby enhance its image (Edward, 1998; and McKee, 1998).

4. Global benefits

The philosophy of green and sustainable buildings is about considering the whole range of environmental and ecological impacts. Therefore, the design and construction of the building has to consider global warming, ozone layer depletion, biodiversity, product miles and recycling (Zainul Abidin, 2009; and Edward, 1998).

Table 3: The Successful Green and Sustainable Building Worldwide

<table>
<thead>
<tr>
<th>Authors</th>
<th>Case Studies</th>
<th>Benefits of Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td>Edward (1998)</td>
<td>The head-quarters of the NMB in Amsterdam</td>
<td>- saved more than £300 000 a year in energy costs against a conventional office building of similar size</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- the additional cost of sustainable plant and equipment was paid for in three months of occupation</td>
</tr>
<tr>
<td></td>
<td>Student residences at Strathclyde University</td>
<td>- Bank performance - absenteeism is 15% lower than</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Contented student</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- The attraction of good quality academic staff</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Improved output</td>
</tr>
<tr>
<td>U.S. Green Building Council (2003)</td>
<td>A building by Lockheed Martin in Sunnyvale, California</td>
<td>- absenteeism rates dropped by 15%</td>
</tr>
</tbody>
</table>
5. CONCLUSION
Green and sustainable buildings are naturally different from conventional buildings. They require special materials and building practices as well as management commitment to sustainability (Anantatmula & Robichaud, 2011). Due to the barriers reported, the unique characteristics of sustainable building project required adjustments to conventional project management practices to minimise risks and improve the chances of delivering the project within acceptable costs and schedule. Realistic financial and time constraints, superior planning, design and construction processes are needed to deliver a green and sustainable building project (Korkmaz et al., 2010). Sustainable and Green buildings will only result from building professionals working together to achieve this common objective. It is important to explore the strategies for containing cost during the planning phase of a project to reduce developers first cost in delivering the green and sustainable building project (Korkmaz et al., 2010). Sustainable and green building requires a client who is sympathetic to this ideal, user who understands and values the concepts and designers and contractors who as a team evolve the design with a sustainable outlook (Edward, 1998).

6. REFERENCES

<table>
<thead>
<tr>
<th>Authors</th>
<th>Case Studies</th>
<th>Benefits of Sustainability</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td></td>
<td>- Energy running costs – £50/m² per year which is significantly less than that of conventional office buildings.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Displacement air-conditioning which uses water-filled panels at ceiling level for cooling - The system costs 15% more, but 16% cheaper to run.</td>
</tr>
<tr>
<td>Shuttleworth (1998)</td>
<td>Mistral Building, Reading</td>
<td>- Energy bills about 20% off those of a more conventionally design office.</td>
</tr>
<tr>
<td>Grut (1998)</td>
<td>Daimler Benz Building, Berlin</td>
<td>- Facade cost 20% higher than usual (facade costs are 9% of total building cost) but help to reduce running cost by 60%, annual energy consumption predicted as 75kWh/m² which is a quarter of that consumed by a typical building office.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Embodies energy and CO₂ emission 30% less than typical office building in Berlin.</td>
</tr>
<tr>
<td>Roy, K et al (2005)</td>
<td>LEO Building, Putrajaya, Malaysia</td>
<td>- The extra cost for energy features is 10% (5 million) top of the usual construction cost.</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Energy savings 100-150kWh/m² year compared to the design without the energy features.</td>
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<td></td>
<td></td>
<td>- Payback time – less than 10 years</td>
</tr>
<tr>
<td></td>
<td></td>
<td>- Energy savings of more than 50% compared to conventional building design</td>
</tr>
</tbody>
</table>

5. CONCLUSION
Green and sustainable buildings are naturally different from conventional buildings. They require special materials and building practices as well as management commitment to sustainability (Anantatmula & Robichaud, 2011). Due to the barriers reported, the unique characteristics of sustainable building project required adjustments to conventional project management practices to minimise risks and improve the chances of delivering the project within acceptable costs and schedule. Realistic financial and time constraints, superior planning, design and construction processes are needed to deliver a green and sustainable building project (Korkmaz et al., 2010). Sustainable and Green buildings will only results from building professionals working together to achieve this common objective. It is important to explore the strategies for containing cost during the planning phase of a project to reduce developers first cost in delivering the green and sustainable building project (Korkmaz et al., 2010). Sustainable and green building requires a client who is sympathetic to this ideal, user who understands and values the concepts and designers and contractors who as a team evolve the design with a sustainable outlook (Edward, 1998).

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4 December 2012
Faculty of Built Environment, University of Malaya, Kuala Lumpur, Malaysia


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NEIGHBOURHOOD DESIGN AND THE YOUNG ELDERLY ACTIVE LIFESTYLE: A PILOT SURVEY

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Abstract
According to census figures the number of elderly in Malaysia was approximately 1.15 million in 2005, in 2010 the number has risen to 2.1 million (Census 2010, Department of Statistics, Malaysia). This number is expected to increase to be 3.4 million by 2020. There is considerable evidence that active lifestyle at older age contributes to improved health. Most research concerning elderly active lifestyle focused on the relationship between healthy aging and physical activity while little focused on the validity of the measures. In Malaysia, active lifestyle among the young elderly is greatly understudied. This paper is one among the few that looks at young elderly active lifestyle from the social and physical perspectives. The purpose of the pilot study is to measure the validity and reliability of the scales used to measure active lifestyle. The factors are further examined to identify the salient factors that impact young elderly active lifestyle. 50 residents were surveyed from Taman Tun neighbourhood in KL. The study found that the scales can be used to examine the impact of neighbourhood environmental factors on active lifestyle. Further findings included that the hypothesized neighbourhood factors are associated with young elderly active lifestyle.

Keywords: active lifestyle, neighbourhood environmental factors, young elderly, Malaysia

1. INTRODUCTION
In the coming decades the number and percentage of older people in the population of developed and developing countries will be increasing. According to census figures the number of elderly in Malaysia was approximately 1.15 million in 2005 (4.3% of the total population), in 2010 the number has risen to 2.1 million (7.7% of the total population) (Census 2010, Department of Statistics Economic Planning Unit). This number is expected to increase to be 3.4 million by 2020 (10.8 of the total population). This increase in aging population is an indicator for improved health and low mortality. The old old (75 years and over) represent 18.7% of the total elderly population and the young old (60-75) represent 81.3% of the total elderly population and is projected to be 82.15 in 2020 (Department of Statistics, Malaysia-2005). There is considerable evidence that active lifestyle at older age contributes to improved health. Most research concerning elderly active lifestyle focused on the relationship between healthy aging and physical activity while little focused on the validity and reliability of the measures. The purpose of the pilot study was to fill this gap and to examine the reliability and validity of the neighbourhood environmental factors that influence active lifestyle among the elderly. Previous studies scale and the NEWS scale are used to compare neighbourhood environmental factors ratings among young elderly residing in Taman Tun Dr Ismail (TTDI) neighbourhood in Kuala Lumpur. The study further examined the potential relationship between neighbourhood environmental factors and elderly active lifestyle to identify the neighbourhood
environmental factors that might influence elderly active lifestyle. In Malaysia, active lifestyle among the young elderly is greatly understudied. This paper is one among the few that looks at young elderly active lifestyle from the social and physical perspectives.

2. OBJECTIVES

1. To identify the neighbourhood environmental factors that promote active lifestyle among young elderly.
2. To examine the construct validity and reliability of the items hypothesized to influence active lifestyle among young elderly.
3. To investigate the relationship between objective neighbourhood environmental factors and young elderly active lifestyle.

3. LITERATURE REVIEW

Researchers from the different disciplines have developed diverse theories of aging from the wide range of disciplines in order to provide an understanding and description of how and why we age (Bengston et al, 2009). Urban planning is interested to know the impact of place, demographic characteristics and socio-economic status on the patterns that are related to age, such as health and longevity. (Frumkin et al, 2004; Crawford, 2010) argued that the aim of urban planning is to examine the influence of the built environment on health and that urban planners’ research focus on the impact of spatial planning on health. Furthermore, (Sallis, & Owen, 1977; Green, & Kreuter, 2004) argued that urban planning research in aging summarized the relationship between person and the environment by explaining and describing the complex mixture of the various disciplines that occurs at the personal and social levels alike to provide the big picture of that relationship. However, in Malaysia, the contribution of the planning profession regarding elderly active lifestyle as related to the built environment explained by two related factors: social cohesion and physical activity is little, the majority of the researches conducted were from the medical field.

Social cohesion and physical activity as main factors influencing active lifestyle among elderly are important issues that have been a concern of most researchers from the different disciplines. (Young, 2008) argued that in developed countries, the contribution of transportation and urban planning research in the field paved the way for the multi-disciplinary research on how neighbourhood environmental factors influence social cohesion and physical activity. Medical researchers applied findings from these researches to provide a better understanding of how the physical environment impact social cohesion and physical activity among the elderly. The elderly have usually a limited capacity to socialize and to participate in the different activities within the community. This brings out the question on how the built environment impacts our public life. The capacity of the elderly to participate in the community and socialize has become a problem and a challenge; and always brings out the question of the role of the outdoor environment on our public life. Urban planners have been seeking a way to provide new, stylish, clean and safe outdoor environment in an attempt to promote our public life. Previous research on public life did not show whether there is a relationship between our public life and the outside public space (Avermaete and Treeds, 2007; Low, 2005). However, Dill, et al (2010) suggested that promoting social cohesion and physical activity through
neighbourhood design would compensate the elderly for their deteriorating mental and physical health. This argument supports (King, 2006) findings which showed that the built environment provide the elderly with chances to meet and interact and perform physical activity in its simplest form such as walking. This would result in a prolonged independence among the elderly. Furthermore, Albrecht, (2010) studied the relationship between urban parks and social cohesion among the elderly and found that urban design has a crucial role in enhancing social interaction among strangers and suggested that social interaction among individuals represents a vital part of the social fabric. She further argued that the existence of certain leisure facilities, street furniture such as benches and accessibility of the various outdoor activities play a crucial role in enhancing social interaction between the different community members. This highlights the importance of urban environment in providing chances for the community members to socially interact (du Toit et al, 2007).

Physical activity, on the other hand, has been directly associated with the elderly health and well being. Elderly who do not perform physical activity would suffer from increased health problems. Previous researches showed that physical activity is the key factor for promoting both health and functioning among elderly (Moudon & Lee, 2003). Moreover, Abbot et al, (2004) argued that recently, research has identified the vital role of physical activity in promoting cognitive performance amongst the elderly. Generally, researchers have agreed that improving the neighbourhood characteristics would encourage physical activity in its simplest form such as walking (Strath et al, 2012; Rodriguez, et al, 2006). Attributes of the built environment for example, width of pedestrian walks, walkway conditions, clean and textured walkways promote physical activity such as walking among the elderly (Macintyre, Ellaway & Cummins, 2002). Harris Kojetin et al (2005) examined the physical activities pattern of recent retirees residing in independent dwelling units in CCRC (Continuing Care Retired Communities) in USA. They found showed that the elderly who live in campuses that facilitated physical activity were more physically active than their counterparts who lived in campuses with fewer facilities for physical activities.

However, Satariano, (2010) argued that physical activity among the elderly is influenced by personal factors (attitudes, demographic characteristics, beliefs and knowledge about the importance of physical activity) and neighbourhood factors (aesthetics, walkways conditions, traffic flow, proximity to destinations and safety- Cunningham et al, 2005; Glanz, 2011) and psychological factors (health and functional status, self-efficacy, and perceived barriers to walking-Resnick & Nigg, 2003). The study focus is on the neighbourhood factors.

The study identified social interaction, walkability, convenience, accessibility, permeability, maintenance and safety as neighbourhood environmental factors associated with elderly active lifestyle. The walkability factor includes two sections: facilitators to walking and barriers to walkability.
4. METHODOLOGY
4.1 Target Population
Gilbert (2005) suggested a 0.5% -1% of the sample size for pilot studies. Moreover, Saunders et al, (2009) suggested that a minimum pilot sample for student questionnaires is 10 respondents. However, 50 respondents were selected for the pilot study to include variations in the population that might affect responses.

The United Nations considered age 60+ is the age for addressing issues related to aging (United Nations World Assembly, Vienna, 1982). In Malaysia the retirement age is 58+ suggesting the start of aging. The study is interested to examine the active lifestyle among age group 60-75 years (young elderly) in residential areas. However, the study also included age group under 60 (45+) to enable comparison and consider needs of young elderly as they age.

4.2 Selection Procedures
The researchers decided to survey neighbourhood residential areas from districts with planning units of highest population of elderly. The sampling frame was the list of all the planning units with high percentage of elderly obtained from the Department of Statistics, Malaysia, 2010. The study areas were selected because they represented areas with the highest elderly population. Kuala Lumpur is the city with the highest elderly population in W.P. Kuala Lumpur (127,400) and Taman Tun DR Ismail (TTDI) in Kuala Lumpur is the neighbourhood with highest elderly population (2,768.8) (Department of Statistics, Malaysia, 2010; DBKL, 2012). Therefore, the target population is young elderly residing in Taman Tun Dr Ismail in Kuala Lumpur.

Criteria for housing area selection:
1- The housing areas under the housing department in Kuala Lumpur with highest population and therefore, highest percentage of elderly,
2- The housing area that is viable for assessment i.e. has been occupied for 10+ years.

4.3 Study Areas
The neighbourhood was chosen based on the above criteria. Taman Tun Dr Ismail (TTDI) neighbourhood is located on the north-west on the Kuala Lumpur and Selangor border. It is a major neighbourhood in Kuala Lumpur. Its topography is slightly hilly, a grid-like street system with many intersections and with no cul-de-sacs (Fig 1). According to the 2010 census, the population of TTDI is 35808.72. 6.9% of this population is young elderly aged 60-74. The average household is 3.72 (Department of Statistics, Malaysia, 2010). A considerable number of young married couples live with their parents. 11% of the residents live in single families, where the old family members live on their own especially among the Malay and Chinese ethnic groups. The block sizes are diverse in size; some are fairly large (multiple storey detached and semi-detached houses) and others are quite small (two-storey terrace houses). The pedestrian walks throughout the neigbourhood are narrow and in most cases are blocked by plants. The main street is fairly busy with few bus-stops, wide padestrian walks and no retail shops or services. There are few children playgrounds within the residential area and the main park is within a 20-25 minutes walking distance. The offices, services, retail shops and
restaurants are within 20 minutes’ walk. There are also two Masjids: Masjid Al-Gofran within the housing areas and Masjid Al-Motageen along the main road. Few community centers are found throughout the neighbourhood (Fig 1).

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Items to measure dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Cohesion measures attitudes towards social relations and community participations (Chan et al, 2006).</td>
<td>1. Maintaining close relations with existing social group</td>
</tr>
<tr>
<td></td>
<td>2. Ability to make new friends in the community</td>
</tr>
<tr>
<td></td>
<td>3. Ability to contribute to local community work</td>
</tr>
<tr>
<td></td>
<td>4. Good perception of the neighbourhood</td>
</tr>
<tr>
<td></td>
<td>5. Neighbourhood design encourages social relations</td>
</tr>
<tr>
<td>Physical Activity measures level of physically active of the elderly within the neighbourhood in relation to the neighbourhood environmental factors as encouraging or discouraging physical activity (Handy et al, 2008).</td>
<td>1. Conditions of sidewalks</td>
</tr>
<tr>
<td></td>
<td>2. Conditions of Parks</td>
</tr>
<tr>
<td></td>
<td>3. Neighbourhood programs</td>
</tr>
<tr>
<td></td>
<td>4. Efficiency of public transport</td>
</tr>
<tr>
<td></td>
<td>5. Proximity of locations</td>
</tr>
</tbody>
</table>

4.4 Research Variables

Dependent Variables: Active Lifestyle-social cohesion and physical activity
Independent Variables: Neighbourhood environmental factors

Table 1: Dependent variables

<table>
<thead>
<tr>
<th>Dependent variables</th>
<th>Items to measure dependent variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>Social Interaction ( Oluseyi, 2006; Lund, 2009) measures people interaction while walking.</td>
<td>1. None</td>
</tr>
<tr>
<td></td>
<td>2. Neighbourhood watch group</td>
</tr>
<tr>
<td></td>
<td>3. Knowing neighbours</td>
</tr>
<tr>
<td></td>
<td>4. Visiting neighbours</td>
</tr>
<tr>
<td></td>
<td>5. All</td>
</tr>
<tr>
<td>Walkability (Ewing and Handy, 2009) measures the frequency of people walking within the neighbourhood.</td>
<td>1. Never go for a walk</td>
</tr>
<tr>
<td></td>
<td>2. Rarely go for a walk</td>
</tr>
<tr>
<td></td>
<td>3. Sometimes go for a walk</td>
</tr>
</tbody>
</table>

Figure 1: 1a- Key Plan of Kuala Lumpur; 1b Plan of TTDI Neighbourhood
4. Often go for a walk
5. Everyday go for a walk

Facilitator to walking measures the factors that encourage people to walk (Ewing and Handy, 2009)

1. More choice interconnected streets
2. Shorter distances to destinations
3. Well connected pedestrian walkways
4. Safe crossing
5. No fear of potential victimization

Physical barrier to walking is a measure of the factors that deter people from walking (Ewing and Handy, 2009)

1. Lack of walkways
2. Poor conditions of walkways
3. Lack of shading paths
4. Lack of curb cuts
5. Lack of street benches

Convenience (Alfonzo et al 2008; Strath et al, 2012) measures residents satisfaction with the neighbourhood.

1. Affordable housing
2. Adequate services
3. Street furniture
4. Adequate public transport
5. Mix use neighbourhood

Accessibility (Alfonzo et al, 2008 & Aspinal, 2010) measures connectivity from home to basic amenities and safe navigation in the neighbourhood.

1. Access to and within the neighbourhood
2. Connectivity to basic amenities
3. Grade changes limitation
4. Width of walkways
5. Provision of handrails

Permeability (Forsyth, et al, 2008) measures easy and barrier free walkways, choice of travel routes and easy way finding.

1. More route choice
2. Link to facilities
3. Level of isolation
4. Alternative routes
5. Distance to daily needs

Maintenance (Aspinal, 2010) measures how well the neighbourhood is cared for.

1. Level of noise
2. Graffiti
3. Watch group
4. House maintenance
5. Neighbourhood well cared for

Safety (Newman, 1981), (Mendes de Leon et al, 2009) measures the residents perception of how safe they feel while navigating in their neighbourhood

1. Blind corners
2. Lighting
3. Gabs in the walkways
4. Heavy and speedy traffic
5. Crime risk

4.5 Main Survey
Considering the respondents age, the researchers chose to administer a face-to-face questionnaire, to ensure inclusion of respondents with limited ability to read or limited access to internet. To obtain measurement reliability, researchers employed five items to measure each construct. The questionnaire consists of three sections. All the sections consist of five items based on a five-point Likert format. The first section involved two active lifestyle attitude variables. The second section included seven questions: the neighbourhood design. The third section included the demographic characteristics of the respondents. Table 3 shows the questionnaire structure.

Table 3: The structure of the questionnaire

<table>
<thead>
<tr>
<th>Section</th>
<th>Variables</th>
<th>Number of Items</th>
<th>Scale</th>
<th>Source</th>
</tr>
</thead>
<tbody>
<tr>
<td>A</td>
<td>Elderly Active Lifestyle</td>
<td>5</td>
<td>5 pt Likert format</td>
<td>Handy et al, (2006)</td>
</tr>
<tr>
<td></td>
<td>1- Physical Activity</td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td></td>
<td>2- Social Cohesion</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
### B Neighbourhood Environmental factors

<table>
<thead>
<tr>
<th></th>
<th></th>
<th></th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td>2</td>
<td>Walkability</td>
<td>5</td>
<td>5 pt Likert format</td>
</tr>
<tr>
<td></td>
<td>2.1 Facilitators to walkability</td>
<td>5</td>
<td>5 pt Likert format</td>
</tr>
<tr>
<td></td>
<td>2.2 Barriers to walkability</td>
<td>5</td>
<td>5 pt Likert format</td>
</tr>
<tr>
<td>3</td>
<td>Convenience</td>
<td>5</td>
<td>5 pt Likert format</td>
</tr>
<tr>
<td>4</td>
<td>Accessability</td>
<td>5</td>
<td>5 pt Likert format</td>
</tr>
<tr>
<td>5</td>
<td>Permeability</td>
<td>5</td>
<td>5 pt Likert format</td>
</tr>
<tr>
<td>6</td>
<td>Maintenance</td>
<td>5</td>
<td>5 pt Likert format</td>
</tr>
<tr>
<td>7</td>
<td>Safety</td>
<td>5</td>
<td>5 pt Likert format</td>
</tr>
</tbody>
</table>

### C Demographics

<table>
<thead>
<tr>
<th></th>
<th>Demographics</th>
<th>17</th>
<th>Categorical</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Researchers</td>
<td></td>
<td>(Standards)</td>
</tr>
</tbody>
</table>

### 4.6 Data Analysis

The researcher used Statistical Package for Social Science (SPSS) version 16 to analyse the data. Item to scale correlation was used to measure the constructs validity and Cronbach’s Alpha values examined the reliability test. Factor analysis is used to classify the neighbourhood environmental factors as an evidence for the constructs validity measuring a single active lifestyle scale. Spearman’s (rho) correlation is used to measure the strength and direction of the relationship between the dependent variables and the neighbourhood environmental factors respectively.
4.7 Sample Characteristics
The socio-economic characteristics of the residents showed that the majority of the respondents have stayed in the neighbourhood for more than 20 years; prevalence of house ownership; Malays constituted the majority of residents followed by the Chinese and Indian respectively; the median age of respondents was 60 years; the majority had attained an education above high school; the dominance of married couples- high percentage of marriage especially among the male; the median income is RM3000.

Table 4: Demographic characteristics of respondents

<table>
<thead>
<tr>
<th>Demographic Characteristics</th>
<th>Neighbourhoods</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Taman-Tun DR Ismail (n=50)</td>
<td>Taman-Meru (n=50)</td>
</tr>
<tr>
<td></td>
<td>Percentage</td>
<td>Percentage</td>
</tr>
<tr>
<td>Length of Stay</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Less than 1 Year</td>
<td>1</td>
<td>0</td>
</tr>
<tr>
<td>1-10 Years</td>
<td>10.5</td>
<td>9.5</td>
</tr>
<tr>
<td>11-20 Years</td>
<td>11</td>
<td>15.5</td>
</tr>
<tr>
<td>21-30 Years</td>
<td>22.5</td>
<td>17</td>
</tr>
<tr>
<td>31+ Year</td>
<td>5</td>
<td>8</td>
</tr>
<tr>
<td>House Ownership</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Owned</td>
<td>77</td>
<td>96</td>
</tr>
<tr>
<td>Rented</td>
<td>23</td>
<td>4</td>
</tr>
<tr>
<td>Gender</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Male</td>
<td>57</td>
<td>60</td>
</tr>
<tr>
<td>Female</td>
<td>43</td>
<td>40</td>
</tr>
<tr>
<td>Ethnicity</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Malay</td>
<td>58</td>
<td>96</td>
</tr>
<tr>
<td>Chinese</td>
<td>31</td>
<td>1</td>
</tr>
<tr>
<td>Indian</td>
<td>11</td>
<td>2</td>
</tr>
<tr>
<td>Others</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Age</td>
<td></td>
<td></td>
</tr>
<tr>
<td>45-50 Years</td>
<td>10</td>
<td>17</td>
</tr>
<tr>
<td>51-55 Years</td>
<td>22</td>
<td>13</td>
</tr>
<tr>
<td>56-60 Years</td>
<td>37</td>
<td>23</td>
</tr>
<tr>
<td>61-65 Years</td>
<td>19</td>
<td>26</td>
</tr>
<tr>
<td>66-70 Years</td>
<td>8</td>
<td>10</td>
</tr>
<tr>
<td>71-75 Years</td>
<td>4</td>
<td>11</td>
</tr>
<tr>
<td>Education</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Junior (grade 8 or less)</td>
<td>0</td>
<td>11</td>
</tr>
<tr>
<td>High School</td>
<td>20</td>
<td>41</td>
</tr>
<tr>
<td>College</td>
<td>22</td>
<td>26</td>
</tr>
<tr>
<td>Bachelor</td>
<td>39</td>
<td>17</td>
</tr>
<tr>
<td>Master</td>
<td>17</td>
<td>4</td>
</tr>
<tr>
<td>PhD</td>
<td>0</td>
<td>1</td>
</tr>
<tr>
<td>Marital Status</td>
<td></td>
<td></td>
</tr>
<tr>
<td>Single</td>
<td>2</td>
<td>4</td>
</tr>
<tr>
<td>Married</td>
<td>83</td>
<td>90</td>
</tr>
<tr>
<td>Separated</td>
<td>3</td>
<td>0</td>
</tr>
<tr>
<td>Divorced</td>
<td>3</td>
<td>2</td>
</tr>
<tr>
<td>Widowed</td>
<td>9</td>
<td>4</td>
</tr>
</tbody>
</table>
4.8 Validity

There are various methods to measure validity: criterion, content and construct-related. The study used construct validity. According to Dooley (2001) the intangible nature of the constructs makes it difficult to measure the constructs validity, and suggested a variety of evidence that can measure the validity of constructs, for example examining the relationships between the test items. Factor analysis (Kim & Mueller, 1978) was used as an evidence of construct validity by using correlation between the construct items. A value 0.3 is suggested as the minimum value for the scale (De Vaus, 2002, Nunnally and Bernstein 1994). All the measures showed values above 0.3. Kaiser Meyer-Olkin (KMO) was used to place more confidence on the results. KMO index ranges from 0-1. 0.6 is suggested as the minimum value for a valid construct (Tabachnick and Fidall, 2007). All the constructs showed a KMO value above 0.6. (Table 5).

4.9 Reliability

There are three approaches to test reliability: test re-test, internal consistency and alternative form (Mitchell, 1996; Saunders et al, 2009). The test re-test reliability involves conducting the same questions to the same people at two different periods of time and then calculating the correlation and comparing the two answers. However, considering the target population it was impractical, for the respondents to answer the same questionnaire twice.

The internal consistency involves examining the item to item correlation. The most frequently used method is Cronbach’s alpha-α (De Velliss, 2003 and Kline, 2005). De Vaus (2002) suggested an Alpha value of 0.7 as the minimum accepted value for a scale. However, 0.7 was used as the minimum accepted α value. Reliability values from previous studies were revised to reinforce our findings (table 5). Physical barriers to walkability did not have values recorded in the literature. Convenience items complied with the same items used by Strath, et al 2012 for general neighbourhood satisfaction.

Table 5: Validity Test-KMO Coefficients and Cronbach’s Alpha values of reliability test for Taman Tun Dr Ismail (TTDI), and previous studies

<table>
<thead>
<tr>
<th>Constructs</th>
<th>Validity (n=50) KMO</th>
<th>Reliability (50) Cronbach’s Alpha</th>
<th>Previous Studies Cronbach’s Alpha (α)</th>
</tr>
</thead>
<tbody>
<tr>
<td>Physical Activity</td>
<td>0.851</td>
<td>0.946</td>
<td>0.74 (Mujahid et al, 2007)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.82 (Echeverria, et al 2004)</td>
</tr>
<tr>
<td>Social Cohesion</td>
<td>0.858</td>
<td>0.912</td>
<td>0.77 (Evenson et al, 2009)</td>
</tr>
<tr>
<td>Social Interaction</td>
<td>0.831</td>
<td>0.852</td>
<td>0.738 (Mujahid et al, 2007)</td>
</tr>
<tr>
<td>Walkability</td>
<td>0.855</td>
<td>0.844</td>
<td>0.78 (Echeverria, et al 2004)</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td>0.73 (Mujahid et al, 2007)</td>
</tr>
<tr>
<td>Facilitators to walking</td>
<td>0.837</td>
<td>0.842</td>
<td>0.83 (Strath, et al 2012)</td>
</tr>
<tr>
<td>Barriers to walking</td>
<td>0.828</td>
<td>0.878</td>
<td>-</td>
</tr>
</tbody>
</table>
4.10 Correlation Test
The correlation between the dependent variable and the independent variables were examined (Table 6). All factors showed moderate-good correlations with social cohesion and physical activity as domains related to active lifestyle among the young elderly.

Table 8: Correlation Coefficients within the two Neighbourhoods

<table>
<thead>
<tr>
<th>Neighbourhood Environmental factors</th>
<th>TTDI (n=50)</th>
<th></th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>Social Cohesion (p-value)</td>
<td>Physical Activity (p-value)</td>
</tr>
<tr>
<td>Social Interaction</td>
<td>0.647 ** (0.000)</td>
<td>0.474 * (0.001)</td>
</tr>
<tr>
<td>Walkability</td>
<td>0.343 * (0.015)</td>
<td>0.333 * (0.018)</td>
</tr>
<tr>
<td>Facilitators to Walking</td>
<td>0.338 * (0.017)</td>
<td>0.279 * (0.050)</td>
</tr>
<tr>
<td>Barriers to walking</td>
<td>-0.376 (0.07)</td>
<td>-0.385 ** (0.006)</td>
</tr>
<tr>
<td>Convenience</td>
<td>0.737 ** (0.000)</td>
<td>0.519 ** (0.000)</td>
</tr>
<tr>
<td>Accessibility</td>
<td>0.458 ** (0.001)</td>
<td>0.497 ** (0.000)</td>
</tr>
<tr>
<td>Permeability</td>
<td>0.587 ** (0.000)</td>
<td>0.524 ** (0.000)</td>
</tr>
<tr>
<td>Maintenance</td>
<td>0.626 ** (0.000)</td>
<td>0.584 ** (0.000)</td>
</tr>
<tr>
<td>Safety</td>
<td>0.659 ** (0.000)</td>
<td>0.549 ** (0.000)</td>
</tr>
</tbody>
</table>

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

5. CONCLUSION
The aim of the study was to assess the validity of constructs and reliability of items hypothesized to impact elderly active lifestyle. Previous research found that there is a relationship between active lifestyle and neighbourhood environmental factors. These findings formed the theoretical framework and we identified eleven neighbourhood environmental factors hypothesized to enhance active lifestyle at an older age. The validity test showed that all the constructs were valid and measured active lifestyle. From the urban planning perspective, no previous studies in Malaysia assessed the constructs validity measuring active lifestyle among young elderly, thus the findings could contribute to knowledge in the field. The reliability test showed that all the items were reliable and supported the reliability values of previous researches. The correlation results showed important insights into the neighbourhood environmental factors that are most related with young elderly active lifestyle. The principle findings showed that the young elderly were more physically active than socially active. This highlights the need to investigate in more detail the relationship between objective and subjective neighbourhood environmental measures. Moreover, it implies that research to curb young elderly active lifestyle should be carried at a multi-disciplinary level.
More positive reliability and validity tests would fill the gap in knowledge for the urban planning field and other related fields. These would lead to transitional research to promote active lifestyle among the young elderly in different urban settings. It would also address the challenge that urban planning profession will be facing with active lifestyle within population aging. The above findings are outcomes of one neighbourhood in Malaysia. Future researchers are recommended to cross-validate the measures in other cities. Although the research focused on young elderly the valid and reliable findings could be generalized and extended to include other needs and age groups.

6. ACKNOWLEDGEMENT
The authors are thankful for the University of Malaya for supporting the research.

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FACTORS AFFECTING SITTING INTENTION IN OPEN SPACES BASED ON THE THEORY OF REASONED ACTION

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Abstract
This paper investigates the factors affecting sitting intention in open spaces based on the theory of reasoned action. Theory of reasoned action is one of the important and related theories that researchers used for measuring behavioural actions. Public spaces are perceived as being physically open and accessible to the general public that can help to promote a better relationship between the campus and students. Seating which enable these activities is vital to increase the quality of university campus’s open spaces. The methods for this study were observation, site visits, photography and survey. The survey is based on questionnaire of students in the Universiti Teknologi Malaysia (UTM). The results indicated that the two components of the Theory of Reasoned Action, attitude and subjective norm were positively and significantly related to sitting intention in open spaces. Moreover, the findings of this study indicated that comfort, safety, accessibility had significant effect on attitude towards sitting intention in university campus open spaces.

Keywords: open space, public spaces, sitting intention, theory of reasoned action

1. INTRODUCTION
College and university open spaces are for people. For learning, meeting, exploring, thinking, or relaxing. Campus spaces, particularly classrooms, and outsides of classrooms influenced students attitudes about education. Public open spaces in the universities offer a realm in which meaning and community can prevail through establishing social contact. Seating has a major role in this process of connection and re-connection between others and oneself. Seating allows students and staff to linger and enjoy the presence of others directly or indirectly, along with the sights, sounds and smells of open spaces.

Strange and Banning (2002) believe that open space impacts learning and teaching, whether that space is openly considered or not. In fact, Dewey (1925) stated that “whether we permit chance environments to do the work, or whether we design environments for the purpose makes a great difference” he also stated that educational settings are better handed out by specificity rather than chance. In his meta-analysis of environmental effect on human behaviour, Moos (1986) determined that “the arrangement of environments is perhaps the most powerful technique we have for influencing human behaviour”.

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Nowadays, open spaces, outside the classroom are more useful than ever as learning spaces, for two reasons. First, portable technology means you don’t have to be near a power outlet to work, and Wi-Fi brings online access to the remotest corner of campus. Second, college work now involves a lot of group projects. More assignments reflect and teach real-world knowledge economy skills: collaborating in pairs, small groups, and teams. Since many classrooms poorly support group work, students often decamp to places better suited to working together (Flint and Murphy, 2001).

According to Whyte (1980), successful open spaces have different kinds of users and they are places in which various kinds of activities occur. Based on Gehl (1987) study, good seating arrangements in open spaces are of primary importance and spending time at open spaces is possible only when places with seating opportunities exist.

Good seating opportunities enable numerous activities such as: studying, eating, reading, sleeping, watching people and talking; and these make open spaces attractive to people (Gehl, 1987). Therefore, seating which enable these activities is vital to increase the quality of open spaces.

According to the most important key aspects of the urban design, “places for the people” Marcous and Francis (1997) and based on importance of the open space in the university campus for create attractive and useful sitting area in public place, this is very important to find the factors that affect learning by sitting intention in open space. This study attempted to find these factors based on theory of reasoned action (TRA).

1.1 Research Question
This study intended to answer the following questions:
RQ-1. Do attitude, subjective norm affect the intention of sitting in open spaces at university campus?
RQ-2. What are the factors affecting attitude to intention to sitting in open spaces at university campus?

1.2 Aims and Objectives
The aim of this research is to investigate the factors (as show in the research questions section above) that affect sitting intention in open spaces at university campus (case study Universiti Teknologi Malaysia) based on theory of reasoned action (TRA).

1. To examine whether the factors i.e. comfort, safety, and accessibility has any affect on the attitude towards sitting in open spaces at university campus.
2. To examine whether the subjective norm has any effect on sitting intention in open spaces at university campus.

This study focuses only on public university campus. The main reason of selecting a public university is the availability of land for development of sitting opportunities compared to private universities. The site, which was selected for the study area, is University Teknologi Malaysia (UTM) campus that located in Johor Bahru, Johor. The main reason that UTM was selected was, UTM...
recognized as sustainable university campus among public universities in Malaysia. The research investigated the intention of students on sitting in open spaces. Figure 1.1 indicates scope of this study.

![Figure 1: Scope of study](image)

2. LITERATURE REVIEW

2.1 Defining Open Space

The term “open space” has different meanings to different people. Most of these meanings have in common the idea of lands that have not been intensively developed with structures. Common examples include forestlands, farmlands and parklands. While most people consider these lands to be natural areas, many lands that today serve as open space have been subject to deforestation, earthwork grading and replanting at some point in the past. Some of these lands have a small portion of their surfaces covered with buildings such as barns or picnic shelters while serving an overall open space function. While man-made intrusions such as ball fields and trails can occur on open space lands, most people believe that development more intensive than park facilities invalidates the land’s status as open space (Thompson, 2008).

Important to open space is the distinction between lands that have been formally designated as open space through official acts and lands that provide the benefits of open space despite having no guarantees that the open nature will be retained on a permanent basis. The development of previously open lands often upsets and confuses nearby residents who were unaware that the lands were privately held and eligible for development (Grahn and Stigsdotter, 2003).

A purpose of open space and funding the purchase of lands for open space is to assure sufficient open space on a continuing basis by converting some privately held open lands into lands that are protected from development.

2.2 Sitting in Open Spaces

Successful open spaces are places where citizens want to be. One of the best ways to encourage people to stay in an urban public space is to provide suitable opportunities to sit down. Indeed some
recent research that carried out was focus into the preferences of users of public space found that "sitting places" was their second most important requirement (after "space that is welcoming, regardless of age, culture or wealth"). Most public open spaces do contain seating, but far too often it is of the wrong kind in the wrong place. One can't help wondering if such seating has been installed because it fills a gap on the designer's plan; with the choice of seating being chosen for ease of maintenance rather than comfort or potential usage.

According to Sommer (1984) "sitting opportunities" are more important than "seating" because the most popular places for people to sit are not necessarily benches or seats as such. There appear to be some basic human preferences for seating, which if we note and address, could lead to much better design of sitting opportunities. Some of these preferences are to do with: protection from the rear, viewing position and alignment or distribution for social interaction.

2.3 Theory of Reasoned Action (TRA)
The theory of reasoned action was introduced by Fishbein and Ajzen (1975). Since then the theory has been used widely. According to TRA, individual’s attitude and subjective norms affect an individual’s intention which consequently affects the actual behaviour. According to the theory, if a person perceived that behaviour will have a positive outcome, he or she will show a positive attitude on performing the behaviour and vice versa.

The theory has been used to explain human behaviour (Sheppard et al., 1988). TRA assumes that human being to be rationale and explains that a human behaviour is the determinant of three elements: 1) attitude toward the behaviour, 2) subjective norms, and 3) behaviour intention. Miller (2005) defined these associated factors by providing following definitions;

**Attitudes:** ‘Attitude accounts for the sum of a person’s beliefs about a behaviour, with specific weights given to each aspect of that behaviour’.

**The Subjective Norms:** ‘The subjective norm consists of the opinions of people in a person’s environment’.

**Behaviour Intentions:** ‘Behaviour intention is a function of both attitudes and the subjective norm’
2.4 Research Model
As mentioned before, the theory that has been selected in this study is the theory of reasoned action (TRA) introduced by Ajzen and Fishbein (1975). In addition, the researcher extended the theory of reasoned action by incorporating additional constructs from the literature of urban design (i.e. comfort, safety, and accessibility). Figure 3 indicates the research model.

![Research Model Diagram]

3. METHODOLOGY
3.1 Study Design
In conducting this study, the first stage in the research process is establishing the sampling frame. Next, choose the method of the study. The third stage is developing the instrument for the study. The fourth stage is administering the survey. The fifth stage is data analysis. Finally, report the results of the study.

3.2 Study Site Overview
Universiti Teknologi Malaysia (UTM) is the oldest premier higher learning institution in Malaysia specializing in engineering and technology. The open space of the campus, comprised of forests, woods, wetland areas, lawns, landscaped areas, courtyards, pathways, and playing fields, is one of the key defining characteristics of UTM. Together, these open spaces are a rich tapestry within which individual buildings project their own unique identities, but never compete with the overall image of a green landscape. Figure 4 indicates the master plan of UTM.

![Site Master Plan Diagram]

Figure 4: Site master plan. Source: UTM Website (2010)
3.3 Sampling Design
Sampling design is an essential procedure for most of the researches. This study’s population involved students of University technology Malaysia (UTM). For selecting the sample to represent the population of this study, the researcher used the Krejcie and Morgan (1970) sample size technique. The target study population size was initially estimated to be close to 20,000 – the approximate students at Universiti Technologi Malaysia. According to table of Krejcie and Morgan (1970) for sample size, from population size of 20,000, the sample size should be from 377.

3.4 Data Collection Instrument
In this study, researcher utilizes the quantitative research methodology. In this study, the researcher uses a paper-based questionnaire as the instrument for the survey, and it is in English. A set of questionnaires containing 27 questions divided into 4 sections. First section has 4 questions to collect demographic profiles of the respondents. Second section will request responses about the interest variable in this study i.e., intention, attitude, subjective norm. Third section solicits responses on the preference of sitting in open space, the purpose of the sitting in the open space, and their preferred time of the day to use and sit in the open space. The last part of the questionnaire is concluding the type of sitting in the open space.

3.5 Data Collection Procedure
The questionnaires will be personally distributed to the respondents and explain the purpose of the study for them, and then pick the questionnaires up on the same place, or, alternately, ask the respondent to give the survey back when they have completed it.

3.6 Pre-Testing
To acquire valuable feedback, the questionnaire of the study pre-tested. This ensures that any possible problems related to the format of the questionnaire, wording, and the questions clarity and instructions will bring to light and correct. Moreover pre-testing allows us to examine the reliability of the instrument. Researcher conducted the pre-test. This pre-test was conducted on a focus group consisting of five senior students from the Universiti Technologi Malaysia (UTM).

3.7 Data Analysis
SPSS (originally, Statistical Package for the Social Sciences) is chosen as the analysis method for the survey results.

4. FINDINGS
4.1 Demographics of Samples
This section describes the demographic characteristics of the respondents. More specifically, it describes the respondents in terms of gender, race, age, faculties, working experience.

Based on the results, about 56% of the respondents were male and about 44% were female. Figure 5 indicates the percentage of gender
Their age ranged from 19-27 was the major percentage of the respondents with about 58.8%. About 33% of the respondents were 27-34. The rest only were 7.8% that were about 35-above. Figure 6 indicates the age percentage of the respondents.

With respect to their racial identity, about 36% of the respondents were Malay, 30% were Chinese, 14 % were Indian, and about 20% were others. Figure 7 shows the percentage of racial identity of the respondents.

Based on results, 43% of the respondents were studied in bachelor degree, about 37% of them were in Master level, and only 20% of the respondents were in PHD level. Figure 8 indicates the study level of the respondents.
4.2 Individual Item Reliability

The reliability analysis was conducted in order to ensure the internal validity and consistency of the items used for each variables. Hair et al. (1998) recommended that Cronbach alpha values from 0.6 to 0.7 should accepted. An alpha of more than 0.7 would indicate that the items are homogeneous and measuring the same constant. Otherwise, the item is not reliable. Here are the reliabilities of the items. Table 1 shows the Cronbach’s Alpha reliability test.

Table 1: Cornbach’s Alpha of Constructs

<table>
<thead>
<tr>
<th>Construct</th>
<th>Measurement of Items</th>
<th>Cornbach’s Alpha</th>
</tr>
</thead>
<tbody>
<tr>
<td>Attitude</td>
<td>4</td>
<td>0.674097</td>
</tr>
<tr>
<td>Subjective-Norm</td>
<td>3</td>
<td>0.80537</td>
</tr>
<tr>
<td>Intention</td>
<td>3</td>
<td>0.670081</td>
</tr>
<tr>
<td>Comfort</td>
<td>4</td>
<td>0.803727</td>
</tr>
<tr>
<td>Accessibility</td>
<td>3</td>
<td>0.723554</td>
</tr>
<tr>
<td>Safety</td>
<td>2</td>
<td>0.872115</td>
</tr>
</tbody>
</table>

5. DISCUSSION AND CONCLUSION

5.1 Factors Affect Sitting in Open Space

The results of this study meet the targeted objective by bringing the actual relationship between factors like: attitude, subjective norm, comfort, safety and accessibility and intention to sitting in open space. The brief discussion on these results and its practical implications are discussed as follow:

First of all, the results indicate a significant positive relationship between attitude and sitting intention in open space means that students have positive attitude about sitting in open space. This finding was consistent with other studies in the With Ulrich (1983) and others, they have determined
that favoured attitude toward sitting have undeniable effect on actual behavior. Another study by Kaplans (1989) has studied attitudes toward the open space. This study also confirmed that the results of this study. In addition, it implies individual may sit in open space when they have positive evaluation about open space. Therefore, in an effort to design suitable and appropriate seating area, designer should design suitable furniture and seating opportunities to form the positive attitude for the students in the university campus.

Secondly, the results show that subjective norm have a positive significant influence on intention towards sitting in open space. This finding was consistent with other studies in the sitting intention in the open space. The result of this study confirmed the results of Lemmetyinen (2007) the results indicate that, the subjective norm was important to form an impression on in the intention to sitting in the open space. This implies that students who had a more relation with their colleagues would perceive greater social pressure for sitting in open space, because a good relationship results in high expectations of colleagues, including favourable actions. Therefore, designer should provide opportunities that would increase student’s interaction with each other. This can be achieved through a appropriate plans and design to provide the opportunities for the students for more interactions.

Thirdly, the results show that comfort has positive significant influence on attitude towards knowledge sharing. The result is consistent with previous studies such as (Bruse, 2009; Neil, 2002; Helle, 2004; Latini et al., 2010). Comfort is a basic need for any open space. Comfortable and sufficient seating is also an important aspect of successfully open space. Particularly important features of physically comfortable seating include orientation of the seating, ism proximately to areas of the access, seating that is movable, seating for individuals and groups, seating that enable reading, studying, using internet, resting and privacy, and seats with back.

Fourthly, the results indicate that safety have positive and significant relationship with attitude towards sitting intention in open spaces. The result is consistent with previous studies such as (Wilson etal., 1982; Thompson, 2007; Cohen etal., 2007; Sallis 1998). The result is more consistent with Acierno and Mazza (2008) as they proved that, safety is a significant characteristic and also crucial element for the open spaces. This implies that by providing appropriate support to the planning, students would perceive the safety. Therefore, designer should provide and implement supportive plans for improving the safety in open space, particularly in seating area for student’s usage. This can be achieved through a positive and proper process like security checking points in the seating area or using CCTV for monitoring the zones.

Fifthly, the results show that accessibility has positive significant influence on attitude towards sitting intention in open space. The results of this study is consistent with the previous studies such as (Wobbrock, 2003; Lazar, 2002). Lynch (1981) proposed that a truly public space is one that is not only open to public use but accessible to different group and activities. One way of categorizing open spaces is to distinguish between “accessible” and “inaccessible”. The results indicate that accessibility will enhance individual’s usage of seating zones. Individual members will intend to attend and use open spaces when the equipment and seating will accessible. Accordingly, people
inherently like to use the open spaces particularly students like to attend in open space and chat with their colleague. Therefore, designer should pay more attention on how to design the seating areas and zones that all of them become accessible.

5.2 Contribution to Theory
From a theoretical perspective, this study contributes to the literature in several ways. First, in this study researcher used TRA to investigate the factors that affecting sitting intentions in the open space. This study provided a clear view on the relationship between the dependents variables, independent variables and theory that contribute to the body of knowledge. The researcher classified antecedents of attitudes into comfort, safety, and accessibility. Moreover, the researcher brought subjective norm from TRA. This offers a more clear vision of the factors that affect sitting intention in open space. Secondly, this study identifies factors which can influence the sitting intention in open space. Finally, the research shows that the TRA also can explain well sitting intentions in the Malaysian academic context since the effect of attitude and subjective norm are significant.

5.3 Limitations and Suggested Issues for Future Studies
The findings do naturally be interpreted by taking in consideration the limitations of the study. This study also had some limitations. This study employed a questionnaire instrument based on Theory of Reasoned Action (TRA). This instrument has not been previously applied to a university campus setting. Following are suggestions for future investigations pertaining to introduction of sitting intention in open spaces.

Firstly, this study employed TRA as the foundation of the research model to find the factors affect sitting intention in open spaces; Future studies could employ TPB theory. Theory of TPB is another theory related to the people intentional behaviour. This theory used by many researchers in the area of the intentional behaviour.

Secondly, further investigation about into other factors that affect sitting intention in open space. Moreover find the factors that most related to the students and particularly affected factors in university campus.

Lastly, this study conducted in one public university in Malaysia, the researcher did not take the culture particularly Malaysian culture factors into consideration, which may have important impacts on the propensity to sitting intention. Future research could explore the interaction of Malaysian culture factors and sitting intention in open spaces.

6. REFERENCES
THE IMPACTS OF VISIBILITY AND ACCESSIBILITY OF WORKPLACE LAYOUT ON ORGANIZATIONAL PRODUCTIVITY AS CONDUCTED THROUGH FACE-TO-FACE INTERACTIONS

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Abstract
The aim of this paper is to investigation two important factors of workplace layout, visibility and accessibility, and their impacts on “face to face” interaction in the workplace. It is believed that a certain space layout will provide the opportunity for employees to interact with each other thus increases the possibility of team working. The greater level of team working in any organization will lead to higher productivity. The methods to improve the possibility of unplanned communication and ease of interaction within a work area are classified under spatial interconnectedness. This spatial interconnectedness contains workers’ visibility, worker’s movements and accessibility within the work space. In this study, employees in an office were asked to complete a self-report survey that measured variables of the study. They received an online questionnaire including measures of each of the key variables. Some of these measures were taken from a survey created for a large corporation, and others were established measures from the physical workplace literature. SPSS statistic software was used as software to analyze the data and layout plans was analyzed by Depth map. The results indicate that the visibility of the worker’s and the accessibility in work area are significantly correlated to interaction. The study highlights the importance of workplace productivity and manipulating interaction as a measurement for productivity in the office space.

Keywords: visibility, accessibility, workplace layout, productivity and “face to face” interaction

1. INTRODUCTION
Experts from various fields of knowledge such as sociology, psychology studies, management and organization, architecture and design of the work area and have studied mainly agree on their proposed to create advanced and improved organizational life. This subject takes more credit when researchers in the workplace found that physical set-up of the social organization of everyday life using their spatial arrangements of space that people move, live and work through them (Sundstorm, 1990). However if the evolution of the factories and offices as workplaces has a central theme, it is the continued emphasis on the workplace as a resource for efficiency and productivity. The present organizations have become aware of the importance of informal interaction and look at it as a service and notable channel that contribute to individual satisfaction and organization effectiveness. Unofficial communication considered to relate to multitasking performance (Sundstorm, 1990).

Increased productivity is considered as a primary goal of business. Modern management all over the world believes that a better working environment relates to more productivity. A profit-oriented organization cannot survive without an acceptable level of productivity; and most if all nonprofit
organizations are interested in doing more work without a proportionate increase in money, equipment and employee hours (Becker, 1983).

For achieving more productivity, this research is attempting to use interaction as the mediator between layout plan variables and productivity. Visibility and accessibility have been considered in some old literature and selected for analyzing in this survey as layout variables; that those can affect the amount of interactions in the work area.

2. LITERATURE REVIEW
Productivity is a master key to a company's accomplishment; therefore, knowing how gently and rapidly your product line is running is very important. It is defined as the overall output measured against a given number of inputs. Rolloos (1997) defined the productivity as, “productivity is that which people can produce with the least effort.”

One of the biggest problems that managers face is how to measure productivity throughout the company. Some companies come up with measuring systems or formulas to measure it, but identifying a reliable metric system for a company can prove to be a bit difficult. Brynjolfsson and Hitt (1998) summarize the key measure for the productivity with the following humorous passage: Productivity is a simple concept. It is the amount of output produced per unit of input. However, in most of the times, input and output are too difficult to measure and researchers are searching and trying other new methods.

2.1 Communication in workplace and its importance in team work
French and Bell (1999) believed groups wield the power in organizations. They stated this belief in several instances. For example they said, “We think teams are the basic building blocks of organizations” (p. 27). And in another passage, they reiterated that thought more strongly. “The basic building blocks of an organization are groups (teams), Therefore, the basic units of change are groups, not individuals” (p. 66). In relation to group performances, interaction is seen as the most important part of working in a team. The ways and the quality of communication between team members, can improve productivity in the workplace.

Recent studies including landmark research McKinsey conducted in 1997 show that specialization, globalization, and technology are making interactions far more pervasive in developed economies. As Adam Smith predicted, specialization tends to atomize work and to increase the need to interact. Outsourcing, like the boom in global operations and marketing, has dramatically increased the need to interact with vendors and partners. And communications technologies such as e-mail and instant messaging have made interaction easier and far less expensive.

Communication is defined in the Oxford English dictionary (2008) as the "act of importing or exchange of information, letter, message or social dealings; connections or means of access. It is a science and the practice of transmitting information between at least two people." It has been defined also as the transmission and exchange of information, whether spoken or written. Information is
conveyed through formal organizational channels of downwards, upwards, and lateral communication. It is also passed along an informal channel—the grapevine. Individuals interact frequently; often develop identification with each other over time. Communication tends to be much faster in the informal group than formal group communication.

Smither (1988) indicates that the socialization procedure is a significant part of every worker’s experience. Studying the ropes usually means more than learning how to perform job duties. Similarly, Housel & Davis (1977) found that employees valued face-to-face communication with their supervisors more than through either telephone or written communication.

2.2 Face to Face interaction and its importance

Face-to-face interaction is remarkably significant in a work context when employees must work collaboratively on job tasks. Research on group work and teamwork provides especially strong support for this idea. The increasing specialization of work and complexity of products and services needs coordination, and the importance of interactions are growing. Interaction is a process that takes diverse forms on different levels of analysis that is the individual, small group, large group. The physical environment with its diversity and complexity has a great potential to shape the pattern of informal interaction.

In a broad survey on interactions, McKinsey has defined interactions as “the searching, coordinating, and monitoring required exchanging goods and services” [Butler et. al., 1997; Johnson et. al., 2005]. Furthermore, as an important dimension of work, collaboration seems to be getting more attention both from researchers and industrial practitioners. In a 2006 study of C-level executives, IBM [IBM, 2006] found that interaction and partnering are considered very significant for innovation by over 75 percent of the 765 executives participating in the survey.

In administering learning, retention and transfer tasks to a group of 70 high school biology students, Kirschner, et al. (2009) studied the effects of group work on performance, and found that communication within these groups is essential to coordination and team success. Their theory suggests that information retention take less mental effort for individuals learning in the presence of others than those learning alone because the cognitive load is distributed over a number of people. Strubler and York (2007) studied teamwork among 500 university staff members and discovered that collaboration increased satisfaction and control over the participants’ work, and an enhancement in productivity. Lastly, Reagans and Zuckerman (2001) found that frequent communication between employees with varying skills, information and experience increase the group’s capacity for creativity and productivity.

2.3 Effects of Layout on Ease of Face-to-Face Communication

Considering these expected benefits, organizations are interested in improving the chance and frequency of FTF interactions. One way to do so is by designing a physical layout helpful to frequent FTF interactions, and as noted by Penn, et al. (1999), the layout of a workplace affects how employees move into the office. On a basic level, the office layout can set up a connected, interactive
space or can separate work areas. By supervising a review exploring the frequency of connection with the employees in spatially isolated workspaces, Penn et al. (1999) found that employees are more likely to interact with their coworkers in spaces that are more accessible. They concluded that the spatial configuration of an office does have a direct impact on the frequency of reported interactions. Similarly, Peponis, et al. (2007) found that with more available locations for interaction (work-related or social), the density of interactions increased. That is, the roughly 50 employees interacted more frequently with a new workplace layout than they did in the old workplace layout.

Although density of interactions may not have a direct effect on an individual’s productivity, the increase in probability of interacting with other employees also increases the probability of teamwork. With team working it can then lead to better retention of information and in turn, higher productivity (Kirschner et al., 2009; Strubler & York, 2007).

2.4 Encouraging interaction by using visibility and accessibility

It is very important to see others and being seen in the workplace. Employees need to show their abilities in performing task to the management. Sheridan (2004, p. 207) labels this fact of constant visibility in the workplace and its organization with career accomplishment ‘chronic presenteeism’. Visibility is one aspect of spatial interconnectedness within an office that can predict face-to-face interactions. After making between 20 and 30 observations in four different organizations and work spaces, and by quantifying visibility through axial map drawings and spatial syntax software, Rashid et al. (2006) concluded that visibility and location play a role in the frequency of face-to-face, impromptu and informal interactions.

Backhouse and Drew (1992) videotaped interactions in a workplace and found that over 80% of the interactions were impromptu. When one worker is in motion and the other is at a visible workplace, the deciding item between an unintentional interaction and no interaction is nonverbal cues. Unplanned interactions are discouraged if the employee in motion is focused and looking ahead, or if the employee at the desk is leaning forward and focusing. Similarly, unwitting interactions are encouraged if the employee in motion is looking nearby or if the employee at the desk leaned back and looking around. While the Backhouse and Drew (1992) findings weigh on the notion that movement encourages unplanned interactions, Rashid et al. (2006) focus on the extent of visibility argues that visibility is a better predictor of face-to-face interactions than movement. However, Penn et al. (1999) make a note of situations in which lack of visibility promotes unplanned interactions between a seated and a moving person. If two people cannot see each other, then there is no way to know whether or not the other is available.

One way to control movement is through the use of integration, a spatial measurement defined by the accessibility of a local “line,” or pathway, within an office. Integration of pathways encourages people to choose to use the same pathways as others out of convenience (Hillier et al., 1990, Penn et al., 1999. By administering a survey investigating the frequency of contact with the employees in spatially isolated workspaces, Penn et al. (1999) found that employees are more likely to interact with their co-workers in spaces that are more accessible.
3. THEORETICAL FRAMEWORK
Visibility and accessibility are assumed as independent variables that can impact other elements. Informal and formal interactions are considered separate and together to achieve a better understanding of the model. Based on this model relationship was assumed, and two research questions were made.

![Conceptual Model](image)

Figure 1: conceptual model

4. METHODOLOGY
This study tried to determine the causal relationships between two variables of workplace layout, face to face interaction and organizational performance. Descriptive and correlation method is used to analyze the data.

5. RESEARCH QUESTIONS:
This study has two research questions as stated below:

*Q1: Is the visibility in office setting correlated to the interaction?*

*Q2: Is the accessibility in office setting correlated to the interaction?*

The present study sought to help the mediation model in which the office layout (consisting of visibility and accessibility) influences the nature and frequency of the FTF interactions. These interactions should then influence the productivity as seen in Figure 2. The purpose of this study was to investigate these ideas.

![Interaction Aspects](image)

Figure 2: interaction aspects
6. POPULATION, SAMPLE AND METHOD OF SAMPLING
In this study, an office with a population of approximately 250 people inhibited in one block of a building was taken as a case study. About 100 questionnaires has been distributed to the population in the selected work places that have various settings. As such the survey will get a better opinion about the impacts of proximity and privacy in various settings.

All the respondents work in all locations and work spaces that have different layout at different floors of the buildings and this will give a valid opinion about the level of visibility and accessibility of the workplace at the organization. This survey managed to get a good representation of the population as a total of 52% responded to the survey. The percentage of the male employee (55.8%) responded to the questionnaire is just slightly more than females respondents (44.2%). The relatively high number of responses (52%) to the questionnaire is expected as the study was conducted under one roof. In this study, visibility is measured by openness and clarity of employee’s location to observe other employees or facilities and accessibility is measured by the degree of permission of every employee to reach other employees and supervisors, the distance of movement, the level of comfort in this process.

7. ANALYSIS
Based on SPSS statistic, questionnaires has been analyzed statistically to find any relationship between variables. Space syntax is being used to find out about the most common space in the workplace for interaction. Depthmap is a one of UCL university product for presenting Space syntax in Architectural and Urban plans and it is a single software platform to perform a set of spatial network analyses designed to understand social processes within the built environment.

7.1 Reliability
To evaluate the reliability of the questionnaire, Cronbach's alpha test was used. As Table 1 shows, the reliability coefficient calculated for each Index is greater than 0.7.

<table>
<thead>
<tr>
<th>Total</th>
<th>Interaction</th>
<th>Layout</th>
<th>Visibility</th>
<th>accessibility</th>
<th>Productivity</th>
<th>Variables</th>
</tr>
</thead>
<tbody>
<tr>
<td>alpha</td>
<td></td>
<td></td>
<td></td>
<td></td>
<td></td>
<td>Number of questions</td>
</tr>
<tr>
<td>25</td>
<td>10</td>
<td>10</td>
<td>5</td>
<td>5</td>
<td>0.835</td>
<td>0.892</td>
</tr>
</tbody>
</table>

7.2 Result
In table 2, individual and organizational characteristics of the sample survey are presented.

<table>
<thead>
<tr>
<th>per cent</th>
<th>Frequency</th>
<th>Items</th>
<th>Characteristics</th>
</tr>
</thead>
<tbody>
<tr>
<td>55.8</td>
<td>29</td>
<td>Male</td>
<td>Gender</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>-----</td>
<td>-----</td>
<td>-----</td>
<td>-----</td>
</tr>
<tr>
<td></td>
<td></td>
<td></td>
<td></td>
</tr>
<tr>
<td>44.2</td>
<td>23</td>
<td>Female</td>
<td></td>
</tr>
<tr>
<td>21.16</td>
<td>11</td>
<td>Under 4 years</td>
<td></td>
</tr>
<tr>
<td>40.38</td>
<td>21</td>
<td>4 - 8</td>
<td></td>
</tr>
<tr>
<td>26.92</td>
<td>14</td>
<td>8 - 12</td>
<td></td>
</tr>
<tr>
<td>11.54</td>
<td>6</td>
<td>12 and higher</td>
<td></td>
</tr>
</tbody>
</table>

The relationships between all variables are shown in table 3. This study used Bivariate Correlations (Pearson Correlation Analysis) to understand the strength of the relationship between two variables, and the significant level set in this research is 0.05 for all relationships.

As it is shown in the table 3 there are acceptable relationships because of their (sig) is more than 0.05 that are not correct Based on SPSS data analyse visibility and interaction have a very strong relationship (R=0.784) and also there is acceptable relationship between accessibility and interaction (R=0.419).

Table 3: relationships between all variables

<table>
<thead>
<tr>
<th>Variables</th>
<th>Visibility</th>
<th>Accessibility</th>
<th>Interaction</th>
</tr>
</thead>
<tbody>
<tr>
<td></td>
<td>R</td>
<td>Sig</td>
<td>R</td>
</tr>
<tr>
<td>Accessibility</td>
<td>0.212**</td>
<td>0.027</td>
<td>-------</td>
</tr>
<tr>
<td>Interaction</td>
<td>0.784**</td>
<td>0.000</td>
<td>0.419**</td>
</tr>
</tbody>
</table>
| Productivity    | 0.621**    | 0.001         | 0.415**     | 0.006       | 0.519”| 0.000

In this survey, the relationship between visibility and interaction is found much stronger than the relation between accessibility and interaction. Visibility can be a one important encourager reason for formal and informal interaction. More visibility can help employees to choose the best possible time to interact with each other. Furthermore it can improve the employees’ general knowledge in work area. However interaction needs accessibility in the next level for face to face interaction. Also as shown from the table, all the variables have shown an acceptable correlation with each other except the relationship between visibility and accessibility that they have a weak relationship (R=0.212).

Table 3 also shows that the relationship between interaction and productivity is strong (R=0.519) as stated in the literature.

The theoretical framework of this study mixed with amount of correlations between variables in figure 3 to better understanding these relationships.
Hypotheses are analysed in table 4 and it shows us 2 hypotheses are acceptable in this study and one assumed relationship is not.

![Final model with linear structure](image)

**Figure 3: Final model with linear structure**

<table>
<thead>
<tr>
<th>Condition</th>
<th>Hypothesis</th>
<th>R</th>
<th>Sig</th>
<th>Variable</th>
<th>variable</th>
</tr>
</thead>
<tbody>
<tr>
<td>Highly correlated</td>
<td>RQ1</td>
<td>0.784**</td>
<td>0.000</td>
<td>Informal interaction</td>
<td>visibility</td>
</tr>
<tr>
<td>Highly correlated</td>
<td>RQ2</td>
<td>0.419**</td>
<td>0.025</td>
<td>Informal interaction</td>
<td>accessibility</td>
</tr>
</tbody>
</table>

As it was expected the impact of visibility on interaction is much more than accessibility, however both correlation between visibility and accessibility are highly positive. It means that more visibility and accessibility in the layout plan lead to more interaction between employees in the office.

### 7.3 Space syntax analyzes:
Graph1 and graph 2 are presenting of depth map result for space syntax analyze. One floor of workplace has been considered as an example to present the visibility graph of interaction in the work space. Graph1 is visibility graph and more visibility is shown with more whiteness in the layout plan.

Inside windows and openness in the workplaces cells can increase the visibility in the layout and can lead to more interaction and productivity.

Graph 2 is showing the accessibility level in the layout plan and it has been made by openness, location of employees and furniture. It seems that everything near the corridor or very basic circulation way is more accessible than other place and there is a much more possibility that interaction start from these places.
8. CONCLUSION
As we have seen through the results there are significant correlation between physical environment variables, visibility & accessibility with interaction. As we have discussed through the literature. It is widely assumed that the greater interaction increased the teamwork and organizational productivity. Physical workplace contributes to users’ productivity through interaction. Interaction in the workplace at first needs visibility for promoting the chance of interaction in the work area; however after that employees require accessibility also to interact and by making the chance of both formal
and informal face to face interaction increase the productivity. Visibility and accessibility also can increase knowledge sharing and team work by improving the quality of interaction. Considering them as two important in design can help designer to control amount of interaction in workplace that can lead to more productivity.

Finding also show field of architectural space contribute to organizational study aspect in human resource management. Two disciplines contribute to each other. Human resource management should also consider the role of physical workplace to organizational success. Workplace designer should include understanding of human resource management when designing, not only just provide beautiful workplace. Researchers still not much, explore more this kind of research.

9. SUGGESTION
Visibility and accessibility are not only variables that can affect workplace layout plan. Privacy, proximity, spatial connectivity, openness of workplace layout and density of employees must consider together in the work spaces to achieving high quality of interaction. For further research other layout variables that can affect interaction and productivity should also be taken into consideration.

10. REFERENCES


Wolfeld, Leah R. 2010 Effects of Office Layout on Job Satisfaction, Productivity and Organizational Commitment as Transmitted through Face-to-Face Interactions, Colonial Academic Alliance Undergraduate Research Journal: Vol. 1, Article 8
AN INVESTIGATION ON TRADITIONAL MODELS AND ELEMENTS IN THE CONTEMPORARY ARCHITECTURE OF IRAN

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Abstract
The aim of this paper is identifying the contemporary trends and movements to exploit Persian traditional architecture according to historical periods. The country has witnessed many attacks by different enemies and has been conquered by invaders many times. Additionally, cultural exchange with other nations and civilizations took place, each of which influenced the qualify and the style of architecture. Despite all these events, when we look back, the fact of continuity remains and can be recognized. The fall of the Qajar dynasty and the rise Pahlavi dynasty in 1921, marked the radical turning point in Iran. The inconsistency of the late of Qajar rulers was replaced by a rapid acceleration towards modernization. The continuity of Persian architecture has dropped drastically and this architecture could not compete with newfound movement (modern architecture). In contemporary history, several architects have tried to apply elements and concepts of traditional architecture of this country and also diverse movements have been created. These movements can be divide 3 historical periods: the late of Qajar period, Pahlavi period, , Islamic republic period. Throughout these periods, We can see diverse and even different type of using traditional architecture this vast category includes: superficial imitation from formal elements to application durable traditional concepts. The method is historical interpretation from famous architects’ works of these periods. After indication characteristic of each period, the amount of influence and efficiency of each period was determined.

Keywords: Persian architecture, traditional architecture, modern architecture

1. INTRODUCTION
The rise of every art is associated with a particular time and place. But once a phenomenon establishes itself as an art form after some time and through generations, the art no longer belongs to a particular place, for art is timeless and borderless. Art is transferred to other cultures as do cultures themselves (Memarian 2004).

An analysis of the historical models of Iranian architecture shows that these concepts, though each developed in a certain historical era, gained an independent identity in the course of time and free from time as they refined in subsequent eras, presenting a general concept of an abstract architectural model with emotive impressions. Perhaps it is because of this very reason that when attending one such building we associate with it a much higher significance than it really has (Memarian 2004).

The main question is: how can we use ancient concepts and values in contemporary architecture?
In history of contemporary Iranian architecture, the approaches for using traditional architecture can be divided into three main sections:

a) The first approach is to totally ignore the past and produce Western-oriented architecture that ignores the Islamic spirit and traditional culture.

b) The conflicting approach involves a retreat, at least superficially, to the architectural past. This can result in hybrid buildings where traditional facades of arches and domes are grafted onto modern high-rises.

c) A third approach is to realize the essence of traditional architecture and to allow contemporary building technology to be a tool in the expression of this essence. (Moradi & Akhtarkavan, 2008)

Each approach was studied in historical periods of contemporary architecture.

2. METHODOLOGY

In this research, by reviewing the tendencies of contemporary architecture of Iran, the influence of traditionalism and its conflict with modernism is analyzed.

The method is historical interpretation from famous architects’ works of these periods. After indication characteristic of each period, the amount of influence and efficiency from traditional Persian architecture was determined in each period.

3. A REVIEW OF IRAN’S HISTORY OF ARCHITECTURE

In the ancient Iranian architecture, any foreign architectural style was adopted to the Persian taste. For example, Persepolis was inspired from the architecture of the other nations which were subjects of the Iranian kingdom, but it shows a genuinely Iranian spirit. Or take the Seljuk period (10th - 13th), the architecture is at high level, as it took the concepts developed by Muslim architects and rendered it a genuinely Iranian spirit. In this period, many great examples of architecture appeared, one of them being Isfahan’s Jameh mosque (Pope, 1965).

The Seljuk’s architecture reached its zenith in the Safavid’s period (10th - 12th); magnificent decorations used in the previous periods were used in such novel and creative ways that the period may be called one of the revivals of Iranian architecture, an architecture symbolically representing the grandeur of the ancient Iranian architecture, presenting a new aesthetics (Stierlin & Stierlin, 2002).

The architects of this period were not consciously trying to recreate history; the past flowed into the present and the future. Thus, until 50 years ago, architects conventionally used the existing models and patterns. The classical architecture provided them with an unending treasure of possibilities, each architect using them as much as he could afford, depending on his creativity and experience (Memarian 2004).
4. CONTEMPORARY OF PERSIAN ARCHITECTURE

4.1. Gajar period

The beginnings of the Iranian contemporary architecture are found in the Qajar period. At that time, an increase in the journeys of Iranian court officials to Europe and the start of political, social and economic relations with European countries brought Iranians an awareness of their position in the world as they compared themselves with western nations, developing a sense of inferiority in them (Diba & Dehbashi, 2004).

In the Gajar period, resulted in a social despair and an attempt to copy the west as the only alternative to this backwardness. Some argued that the only way left to the nation is to copy the west in its entirety. This resulted in a separation from genuine Iranian art and culture. In architecture, there emerged a tendency to follow the western style of architecture (Ansari, 2003).

4.2. Pahlavi Period (1921_1978)

The fall of Gajar dynasty and the rise to power, in 1921, of Reza Khan, who founded the Pahlavi Dynasty I 1925, marked a radical turning point in Iran. The inconsistency of the late Gajar rules, was replaced by a rapid acceleration towards modernization and secularization similar in many respects to what was being realized by Ataturk in Turkey (Micara, 1999)

4.2.1. Elective Fusion (1921 _1942)

This trend embodied nationalistic and progressive goals and looked back to the example of pre-Islamic architecture that Strongly influenced by nineteenth-century neoclassical European architecture (Diba & Dehbashi, 2004).

It was argues that the architect should not accept a certain traditional style in its entirety; rather, the architect should be eclectic in his approach, developing a new combination. This tendency was developed as a result of a strong sense of nationalism prevalent at the time as it drew on the elements from the classical Iranian architecture, such as: the forms of Achaemenid and Sasanid architecture. In this period, the architects took familiar, formal elements from the classical architecture, but the function and the interior relations were borrowed from western architecture. Some designers, such as Andre Godard, created works, such as the National Museum of Iran that were reminiscent of Iran's historical architectural heritage(Figure 3,Figure 2,Figure 5)(azad 2007; Bani Masoud 2009).
4.2.2. The Dialogue between Tradition and Modernism (1965-1979)

The main part of this era was between 1969 to 1979. Because of increase in aid of oil income, the influence of classical Iranian architecture reached its zenith in the 1960s and 1970s, when architects turned their attention to national elements in line with the movement toward cultural nationalization. What emerged in this period as "national architecture" was nothing but fragmented modern architecture (Micara, 1999).

For these architects, nationalization has a broad and dynamic meaning; it involved the continuation of traditions and beliefs and the values of the national culture. It revealed itself in the idea of resisting the culture of the other, respecting the genuine national identity and a wish to return to untainted national values. In this period great architectural works were created by such artists as Nader Ardalan, Hooshang Seyhoon, Kamran Diba, all of which being reminiscent of the classical architecture of Iran (Error! Reference source not found.).

The intuitive approach toward history that draws on images deriving from important monuments is substituted by more structural and rational analysis of urban fabric. The primary values of architecture rather than the forms are brought into evidence, defining a more intellectual and abstract idea of tradition. The urban fabric of a desert town, consisting of a series of courtyards, or the use of vaults, cupolas and lanterns recalling badger-s became in the main device of composition. The abstract interpretation of the primary (Bani Masoud 2009).
About the this approach, Hoshang Seyhoun was the most prominent representative of the first generation of architects, his architectural work expresses a flexible and open-minded approach (Figure 10, Figure 9) (Diba & Dehbashi, 2004).

Seyhoun shows an unconstrained capacity for blending elements of the modern language of architecture such as the Plan Libre with the materials and forms taken from the Persian architectural tradition. An intuitive synthesis that reaches its apex in the rarefied atmosphere of the tombs and monuments revealing the delicate Persian Spirit. Also provided the occasion to several architects to reinterpret archetypes in an abstract manner, achieving timeless symbols and images of particular intensity (Micara, 1999).

4.3. Islamic Republic Period (1978-now)

After the Revolution, there was an even greater interest in the traditional architecture due to the tendency toward classical architecture, on the one hand creating architecture and urban planning to correspond with the values and ideals of Islamic society was an essential element in this period (azad, 2007; Zargar.a).

4.3.1. Revitalization / Rejuvenation (1978-now)

The use of materials like brickwork and tiles, and ornamental elements like molding and calligraphy, were part of the effort to give Islamic spirit to buildings. This approach was not confined to specifically Islamic architectural types, and forms like central gardens, domes, or arches were frequently seen. This trend is superficial imitation of past patterns and form detached from time and place. So it cannot have lasting place in contemporary Iranian architecture (Figure 11, Figure 12) (Diba & Dehbashi, 2004).

Figure 10, Nader tomb
Figure 9, Khayam tomb

Figure 12, the Sharif University Mosque (2000)
Figure 11, the shrine of Imam Khomeini (1991)
4.3.2. Creating a Dialogue between Iranian and World (1978-now)
In this trend, architects stride towards recognizing ‘real’ cultures, and see solutions in the opening of minds towards the world at large In the sense that they view the achievements of western society not as a pattern but as part of human heritage and seek to be contemporary with the people of their own times ,this is an attractive path.

By benefiting from their thinking, by incorporating the technological facilities of today, together with inspirations from universal Persian architecture as an abstract face, architects may indeed be able to generate a truly Persian contemporary architecture. It seems that with this new process of Iranian contemporary architecture, which is searching for the gist of universal art(Diba & Dehbashi, 2004).

The approach of Mirmiran is new in the Persian. his reflection on the architecture of the past go through a metaphysical equilibrium between past and present attaining a remarkable originality and identity. His basic attitude was timeless and borderless in architecture that can be seen in much famous architecture in world history. According to Mirmiran, one of fundamental values in Persian architecture is “decrease of mass and increase of space” as essence of the original Persian architecture from past up to nowadays. He used this concept in design of Iran embassy at Thailand(Figure 13)(Ghamami, 1998; Memarian 2004; Mirmiran)

![Figure 13, Iran embassy at Thailand, Mirmiran](image)

5. CONCLUSION
In conclusion, different level of using traditional architecture can be seen in contemporary period(Table 4):

Firstly, superficial imitation from the past, particularly in first decades of Pahlavi and Islamic Republic period. In Pahlavi period, the trend was based on elective fusion pre- Islamic Persian architecture with neoclassical European architecture. Beside that values and ideals of Islamic traditional architecture was an essential element for this tendency in Islamic Republic period.

Secondly, inspiration from Iranian architecture and true understanding for suitable applying traditional architecture, this attitude has formed in two different trends:
In Pahlavi period, the trend (the Dialogue between Tradition and Modernism) was used for sustainable values of traditional architecture as abstractive concepts. In this course, there exists a global look into the Iranian architecture and culture and its myths, subjects and motifs, in general.

In Islamic Republic Period, The trend (Dialogue between Iranian Architecture and World Architecture) is applied for the presentation of the values and concepts of the traditional architecture in a new form. Architects consider faith in traditions to be the solitary way to maintaining identity among modern universal movements alongside globalization.

Table 4: classification historical period according using tradinal architecture

<table>
<thead>
<tr>
<th>Name of period</th>
<th>Gajar period</th>
<th>Pahlavi period</th>
<th>Islamic Republic Period</th>
</tr>
</thead>
<tbody>
<tr>
<td>Name of trend</td>
<td>Elective Fusion</td>
<td>The Dialogue between Tradition and Modernism</td>
<td>Revitalization/ Rejuvenation</td>
</tr>
<tr>
<td>Main character</td>
<td>ignore the past</td>
<td>superficial imitation from the past</td>
<td>Applying the concepts and values of the past</td>
</tr>
</tbody>
</table>

6. REFERENCES
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Zargar.a. identity and architecture case study Iran. architectural knowledge and cultural diversity.
Abstract
Human is the only species which deliberately alters the design of his environment for pleasure rather than for survival. Water is one of the most important aesthetic elements of the landscape. It is essential to know visual qualities of water when planning and managing the landscape, so landscape architects routinely tame and shape water into many utilitarian and aesthetic forms such as fountains, ponds, creeks and rivers. Furthermore, it captivates the eye at a distance, invites approach, refreshes an open exposure, animates a shade and cheers the most crowded view in form, in style and in extent. It may spread in a calm expanse to soothe the tranquility of a peaceful scene, or adds glory and extravagance to a romantic situation. Water specifically has its own intrinsic quality of movement, of noise, of sparkle, of depth and coolness. In hot and arid climates there is a longing for falling water of all descriptions: fountains, cascades, waterfalls - the sight, sound and sense of water as a relief from the almost-incessant sun. Changes in the perception of nature in 20th century stimulated an interest among professionals in the styles of landscape and in the last few decades an increasing amount of landscape development in urban areas has involved the use of ‘naturalistic’ or ‘ecological’ styles. This paper aims to explore different typology of landscape forms and identify variables associated with design elements and principles to enhance design process that include water elements. Therefore the outcome is beneficial for designers, architects, gardeners and urban designers.

Keywords: landscape, architecture, water design

1. INTRODUCTION
As time passes, the countryside becomes more tamed and gradually losing its natural appeal, therefore people begin to look to gardens and green space to provide their desire for virgin nature. The urban natural areas range from highly formal, cultivated plots to naturalistic areas and public, as people are selective about what they see as ‘natural’. It is essential to know visual qualities of water when planning and managing the landscape. Water in the landscape tends to be dominant because of its visibility, its movement, reflections, and color, and its consequence contrasts to adjacent earth surfaces and surrounding (Litton 1997), but these visual qualities of water, not always unconditionally fascinate people. In a perceptual psychological approach, if water occupies a proportionally large section of the scene, it may have a negative effect on the scenic value (Shafer and Brush 1977).

2. WATER IN LANDSCAPE
Water is one of the most important aesthetic elements of the landscape. It is essential to know visual qualities of water when planning and managing the landscape (Sampei 2002). In prehistoric time
Water has been consumed only for basic physical needs, like drinking and cleaning. Then as population increased, settlements usually were located next to major permanent water resources. During the course of rapid urbanization, if water bodies were located in the urban areas or passing through it, they were mistreated and not being taken care of. Development has often results these water bodies to become waste dumping areas or being ignored.

However, over the course of time, some water bodies (lakes and rivers) have transformed from being a basic necessity to serving as means of aesthetic expression. The naturalistic landscape influenced from the 18th century English Landscape Garden and William Robinson’s 19th century concept of the Wild Garden spread throughout northern Europe and North America. The products of these influences returned from Holland, Germany and the United States of America to rekindle enthusiasm for naturalistic styles in UK public landscapes in the 20th century (Bisgrove, 1990). The role of water has varied over time and from one culture to another (Moore 1995). Water not only provides a basis for human existence, but also it considered to be a source of metaphysical symbolism, aesthetic pleasure and therapeutic value (Wylson 1986). For example, this metaphysical appreciation between Greeks and Romance influenced the position of the temples in the landscape and was expressed in the layout of the villas of the prosperous Romans. The traditional Persian gardens have utilized water for display and sound effect, and also irrigation. The basic form of these courtyard gardens was an enclosed square, divided into four symbolic sections (Rogers 2001). A naturalistic philosophy was the basis of the historic Chinese tradition in landscape design, as nature is above everything and water is one of its components, it is easy to understand why Chinese culture place grate value on water. In Islam water has served as a tool or purity, health and worship. The Islamic view of paradise includes a fabulous garden with cool rivers that flows under trees (picture 1 and 2).

Water in the landscape tends to be dominant because of its visibility, its movement, reflections, color, and its consequent contrast to adjacent earth surfaces (Litton 1977). But these visual qualities of water do not unconditionally fascinate people. If water occupies a proportionally large section of the scene, it may have a negative effect on the scenic value (Shafer and brush 1977). Another thing that should be mentioned is children tend to perceive and evaluate water differently from adults (Sampei
2002) and water significantly enhances scenic values for young children but is of minor importance to adults (Zube et al. 1983). Furthermore water is considered to have a special part of the play world of the child (Kate’s and Katz 1977). (Table 1 and 2)

There is also evidence that some people do not respond to natural landscapes in urban areas, and see them as unkempt, valueless or even frightening, and prefer the neat and tidy approach of formal, ornamental landscapes. The public can distinguish between naturalistic and more obviously designed landscapes, appreciate both types, and derive some similar and some different benefits from the two. The general public perceives ‘nature’ or ‘natural’ in two ways in different contexts: as the opposite of formal in a parks context and as the opposite of the built-up environment in a city-wide context. The public prefers both types of natural areas in an urban setting for different reasons and design styles seem to have an influence on preferences (Ozguner and Kendle 2004).

Table 1: Water function during the time

<table>
<thead>
<tr>
<th>Time</th>
<th>Water function</th>
<th>Source/ author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Early settlement/ prehistoric</td>
<td>Basic needs for drinking and cleaning</td>
<td>Wylson, 2009</td>
</tr>
<tr>
<td>Early civilization</td>
<td>Transportation</td>
<td>Zugner 2004</td>
</tr>
<tr>
<td>Renaissance</td>
<td>Urban maritime activity and pleasure</td>
<td>Wylson, 2009</td>
</tr>
<tr>
<td>Industrial revolution</td>
<td>Dumping site/ big drain</td>
<td>Moore 1998</td>
</tr>
</tbody>
</table>

Table 2: Water function in historic civilization

<table>
<thead>
<tr>
<th>Civilization</th>
<th>Water function</th>
<th>Source/ author</th>
</tr>
</thead>
<tbody>
<tr>
<td>Babylon</td>
<td>Defense and river transport</td>
<td>Moor 1995</td>
</tr>
<tr>
<td>India</td>
<td>Performance of religious ritual</td>
<td>Wylson, 2009</td>
</tr>
<tr>
<td>China</td>
<td>Peace, harmony and simplicity</td>
<td>Wylson, 2009</td>
</tr>
<tr>
<td>Persia (Iran)</td>
<td>Display sound effect and irrigation</td>
<td>Rogers 2001</td>
</tr>
</tbody>
</table>

3. CHANGING PERCEPTION ALONG THE TIME

Because of the industrial revolution with its massive urban settlements in the 19th century and the continued rapid growth of urban areas and the decline of nature throughout the first decades of 20th century, the separation between people and the natural world increased. As a result of this separation together with some other contributing factors, a new period of the relationship between humankind and nature appeared so with this perception more natural landscape has been seen as a way of protecting the natural environment (Kendle and Forbes, 1997).

Changing perceptions of nature and water as one of its components along the time have influenced changes in landscape design styles and have resulted in oscillations between ‘formality’ and
‘naturalism’ as the two contrasting concepts in landscape design and amenity land management (Ozguner and Kendle 2006).

The evidence of the benefits that comes from contact with nature is clear and rich. For instance, as soon as people’s incomes rise above the basic level of survival, many buy plants for their gardens or balconies and devote their time to nature-related hobbies and activities (Ozguner and Kendle 2004). Other indirect measures can be derived by examining the kinds of settings that are attractive to tourists and by looking at how people arrange their home environment (Kaplan, 1992) so the significance of nature in urban life is obvious.

4. DESIGN
There are some absolute connections between design elements, nature and water as one of its components. Different typologies of water have different connection with different design elements accordingly. For example, fountain with point, river with line, pond with plane, waterfront with volume and fall with form and texture (Dee 2001). Fountains have been used as focal points in the downtown plaza, ponds have been used as planes of reflection for the sky and nearby elements such as buildings, trees, and people, rivers have been used to link to cluster spread out elements on one side. There are five typologies of man-made water: fountain, fall, river, pound and water front (Motloch, 2001; Dee, 2001). A water feature may be indoor or outdoor and can be any size, from a desk top water fountain to a large indoor waterfall that covers an entire wall in a large commercial building, and can be made from any number of materials, including stone, stainless steel, granite, resin, and glass. Today’s water features mostly are electronically controlled, ranging from simple timer actuators to sophisticated computerized controls for synchronizing music to water and light animation.

Changes in the perception of nature as mentioned in previous part stimulate an interest among professionals in styles of landscape where control over the form and content of the plant communities has been abandoned to some degree, and in the last few decades an increasing amount of landscape development in urban areas has involved the use of ‘naturalistic’ or ‘ecological’ styles (Hough 1995). So water features changed from straight and right angle lines to organic and carve ones (picture3).
5. CONCLUSION
20th century has seen a rapid change in attitudes towards nature in the urban environment, which represent greater awareness of nature amongst the general public as well as landscape professionals. Therefore a fashion towards the production of more natural landscapes in urban areas emerged among landscape professionals, and an increasing amount of landscape practices in urban areas has involved the use of ‘naturalistic’ styles. At the same time, the possible benefits of contact with nature have been explored by environmental psychologists, and it has tended to be assumed that such contact is fundamental to human health and well-being there for this form of landscape represented ethical and aesthetic progress.

6. REFERENCES
Ozguner, H., 2004, Public attitudes towards naturalistic versus designed landscapes in the city of Sheffield (UK), S’uleyman Demirel University.
Ozguner, H., 2006, Attitudes of landscape professionals towards naturalistic versus formal urban landscapes in the UK, S’uleyman Demirel University.
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1) **Strength Characteristics of Steel Fibre Reinforced Geopolymer Concrete Composites**
   
   *K. Vijai, R. Kumutha*

2) **Analytical Models for FRP Confined Circular Concrete Columns**
   
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3) **Selection of Procurement Method For Building Maintenance Management: A Decision Making Model**
   
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4) **A Review of Public Housing Maintenance Issues and Its Impact on Building Quality and Tenants’ Satisfaction**
   
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STRENGTH CHARACTERISTICS OF STEEL FIBRE REINFORCED GEOPOLYMER CONCRETE COMPOSITES

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Abstract
This paper presents the results of an experimental investigation on the mechanical properties of Geopolymer Concrete Composites (GPCC) containing 90% Fly ash (FA), 10% Ordinary Portland Cement (OPC), alkaline liquids and steel fibers. The study analyses the impact of steel fibres on the mechanical properties such as density, Compressive Strength, Split Tensile strength and Flexural strength of hardened GPCC. Mixtures were prepared with alkaline liquid to fly ash ratio of 0.4 with 10% of fly ash replaced by OPC in mass basis. Steel fibers were added to the mix in the volume fractions of 0.25%, 0.5% and 0.75% volume of the concrete. The influence of fiber content in terms of volume fraction on the compressive, split tensile strength and flexural strengths of GPCC is presented. Based on the test results, empirical expressions were developed to predict 28-day compressive strength, split tensile strength and flexural strength of Steel fiber reinforced GPCC in terms of volume fraction of steel fiber.

Keywords: alkaline liquids, fly ash, geopolymer concrete composites, steel fibers

1. INTRODUCTION
Demand for concrete as construction material is on the increase and so is the production of cement. The production of one ton of cement liberates about one ton of CO₂ to atmosphere (Roy,1999). In order to address environmental effects associated with Portland cement, there is need to develop alternative binders to make concrete. The development and application of high volume fly ash concrete, which enabled the replacement of OPC up to 60% by mass (Malhotra,2002) is a significant development. Davi(dovits (1999) proposed that binders could be produced by a polymeric reaction of alkaline liquids with the silicon and the aluminium in source materials of geological origin or byproduct materials such as fly ash and rice husk ash. He termed these binders geopolymers. Compared with ordinary Portland cement concrete, geopolymers show many advantages. Low-calcium fly ash-based geopolymer concrete has excellent compressive strength, suffers very little drying shrinkage and low creep, excellent resistance to sulfate attack, and good acid resistance (Wallah, 2006). Geopolymer concrete is suitable for structural applications and the design provisions contained in the current standards and codes can be used to design reinforced fly ash-based geopolymer concrete structural members (Vijaya Rangan, 2006). Researches on concrete with more than 50% of fly ash are very rare since there is degradation in strength with higher percentages of fly ash. On the other hand, geopolymer concrete that is produced by a polymeric reaction of alkaline liquid with a byproduct material like fly ash with total replacement of cement by fly ash have several limitations such as necessity of heat curing and delay in setting time. In order to overcome these
limitations efforts have been taken in the present investigation to develop Geopolymer Concrete Composites with Fly ash, OPC and alkaline liquids.

Also the concept of using fibers as reinforcement is not new. By the 1960s, steel, glass (GFRC), and synthetic fibers such as polypropylene fibers were used in concrete, and research into new FRCs continues today. Some types of fibers produce greater impact, abrasion, and shatter resistance in concrete. Concerning the structural applications, fiber concrete possesses many advantages compared to the traditional structural concrete. Yeol Choi et al (2005) investigated the relationship between the splitting tensile strength and compressive strength of glass fiber reinforced concrete (GFRC) and polypropylene fiber reinforced concrete (PFRC). The splitting tensile strength and compressive strength of GFRC and PFRC at 7, 28 and 90 days were used as test results indicated that the addition of glass and polypropylene fibers to concrete increased the splitting tensile strength of concrete by approximately 20–50%, and the splitting tensile strength of GFRC and PFRC ranged from 9% to 13% of its compressive strength. Based on this investigation, a simple 0.5 power relationship between the splitting tensile strength and the compressive strength was derived for estimating the tensile strength of GFRC and PFRC.

Mazaheripour et al. (2011) analyzes the impact of polypropylene fibers on the performance of lightweight self compacting concrete at its fresh condition as well as its mechanical properties at the hardened condition and they found that applying 0.3% volume fractions of polypropylene fiber to the lightweight self compacting concrete resulted in 40% reduction in the slump flow (from 720 mm to 430 mm). Polypropylene fibers did not influence the compressive strength and elastic modulus of lightweight self compacting concrete, however applying these fibers at their maximum percentage volume determined through this study, increased the tensile strength by 14.4% in the splitting tensile strength test, and 10.7% in the flexural strength.

Okan Karahan et al. (2011) studied the durability properties of concrete containing polypropylene fiber and fly ash. The laboratory results showed that inclusion of fly ash either into Portland cement concrete or fly ash concrete, did not improve the compressive strength and elastic modulus. The positive interactions between polypropylene fibers and fly ash lead to the lowest drying shrinkage of fibrous concrete with fly ash. Freeze–thaw resistance of polypropylene fiber concrete was found to slightly increase when compared to concrete without fibers. Moreover, fly ash increased the freeze–thaw resistance more than the polypropylene fibers did. Songa et al.(2005) investigated the strength potential of nylon-fiber-reinforced concrete versus that of the polypropylene-fiber-reinforced concrete, at a fiber content of 0.6 kg/m³. The compressive and splitting tensile strengths and modulus of rupture of the nylon fiber concrete improved by 6.3%, 6.7%, and 4.3%, respectively, over those of the polypropylene fiber concrete. On the impact resistance, the first-crack and failure strengths and the percentage increase in the post first-crack blows improved more for the nylon fiber concrete than for its polypropylene counterpart. In addition, the shrinkage crack reduction potential also improved more for the nylon-fiber-reinforced mortar. The above-listed improvements stemmed from the nylon fibers registering a higher tensile strength and possibly due to its better distribution in concrete.
Literatures indicated that several researchers have investigated the effect of inclusion of fibers in concrete consisting of either 100% cement or partial replacement of cement by fly ash. The present investigation is designed to evaluate the mechanical properties of steel fibre reinforced Geopolymer Concrete Composites consisting of 90% Fly ash, 10% Cement and alkaline liquids.

2. EXPERIMENTAL INVESTIGATION

2.1 Materials

Low calcium fly ash (ASTM class F) collected from Mettur thermal power station was used as the source material to make geopolymer concrete in the laboratory. Ordinary Portland cement with a specific gravity of 3.15 was used in casting the specimens. Fine Aggregate (sand) used is clean dry river sand. The sand is sieved using 4.75 mm sieve to remove all the pebbles. Fine aggregate having a specific gravity of 2.81, bulk density of 1693 kg/m$^3$ and fineness modulus of 2.75 was used. Coarse aggregates of 19 mm maximum size having a fineness modulus of 6.64, bulk density of 1527 kg/m$^3$ and specific gravity of 2.73 were used. Water conforming to the requirements of water for concreting and curing was used throughout.

In this investigation, a combination of Sodium hydroxide solution and sodium silicate solution was used as alkaline activators for geopolymerisation. Sodium hydroxide is available commercially in flakes or pellets form. For the present study, sodium hydroxide flakes with 98% purity were used for the preparation of alkaline solution. Sodium silicate is available commercially in solution form and hence it can be used as such. The chemical composition of sodium silicate is: Na$_2$O-14.7%, SiO$_2$-29.4% and Water -55.9% by mass. In this work hooked-end steel fibers made with low carbon steel were used. These steel fibers have a length of 35 mm, nominal diameter of 0.5 mm and an aspect ratio of 70.

2.2 Mix Design of Geopolymer Concrete Composite

In the design of geopolymer concrete (GPC mix), coarse and fine aggregates together were taken as 77% of entire mixture by mass. This value is similar to that used in OPC concrete in which it will be in the range of 75% to 80% of the entire mixture by mass. Fine aggregate was taken as 30% of the total aggregates. From the past literatures it is clear that the average density of fly ash-based geopolymer concrete is similar to that of OPC concrete (2400kg/m$^3$). Knowing the density of concrete, the combined mass of alkaline liquid and fly ash can be arrived. By assuming the ratios of alkaline liquid to fly ash as 0.4, mass of fly ash and mass of alkaline liquid was found out. To obtain mass of sodium hydroxide and sodium silicate solutions, the ratio of sodium silicate solution to sodium hydroxide solution was fixed as 2.5. Extra water (other than the water used for the preparation of alkaline solutions) and super plasticizer Conplast SP 430 based on Sulphonated Naphthalene Polymers were added to the mix by 10% and 3% by weight of fly ash respectively to achieve workable concrete. This GPC mix has two limitations such as delay in setting time and necessity of heat curing to gain strength. In order to overcome these two limitations of GPC mix, 10% of fly ash was replaced by OPC and the mix design was altered accordingly which results in
Geopolymer Concrete Composite (GPCC mix). The mix proportions of GPC and GPCC are given in Table 1.

Table 1 Mix proportions

<table>
<thead>
<tr>
<th>Mix ID</th>
<th>Fly Ash Kg/m³</th>
<th>OPC Kg/m³</th>
<th>Fine Aggregate Kg/m³</th>
<th>Coarse Aggregate Kg/m³</th>
<th>NaOH Solution Kg/m³</th>
<th>Na₂SiO₃ Solution Kg/m³</th>
<th>Extra Water Kg/m³</th>
<th>Super plasticizer Kg/m³</th>
<th>Steel Fibers Kg/m³</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPC</td>
<td>394.3</td>
<td>--</td>
<td>554.4</td>
<td>1293.4</td>
<td>45.1</td>
<td>112.6</td>
<td>39.43</td>
<td>11.83</td>
<td>-</td>
</tr>
<tr>
<td>GPCC</td>
<td>354.87</td>
<td>39.43</td>
<td>554.4</td>
<td>1293.4</td>
<td>40.56</td>
<td>101.39</td>
<td>55.18</td>
<td>11.83</td>
<td>-</td>
</tr>
<tr>
<td>GPCC 1</td>
<td>354.87</td>
<td>39.43</td>
<td>554.4</td>
<td>1293.4</td>
<td>40.56</td>
<td>101.39</td>
<td>55.18</td>
<td>11.83</td>
<td>19.63</td>
</tr>
<tr>
<td>GPCC 2</td>
<td>354.87</td>
<td>39.43</td>
<td>554.4</td>
<td>1293.4</td>
<td>40.56</td>
<td>101.39</td>
<td>55.18</td>
<td>11.83</td>
<td>39.25</td>
</tr>
<tr>
<td>GPCC 3</td>
<td>354.87</td>
<td>39.43</td>
<td>554.4</td>
<td>1293.4</td>
<td>40.56</td>
<td>101.39</td>
<td>55.18</td>
<td>11.83</td>
<td>58.88</td>
</tr>
</tbody>
</table>

2.3 Preparation of GPCC

To prepare 12 molarity concentration of sodium hydroxide solution, 480 grams (molarity x molecular weight) of sodium hydroxide flakes was dissolved in distilled water and makeup to one liter. The mass of NaOH solids was measured as 354.45 grams per kg of NaOH solution of 12M concentration. The sodium hydroxide solution thus prepared is mixed with sodium silicate solution one day before mixing the concrete to get the desired alkaline solution. The solids constituents of the GPCC mix i.e. fly ash, OPC and the aggregates were dry mixed in the pan mixer for about three minutes. After dry mixing, alkaline solution was added to the dry mix and wet mixing was done for 4 minutes. Finally extra water along with super plasticizer was added to achieve workable GPCC mix. In case of steel fiber reinforced GPCC mixes fibers were added to the wet mix in three different proportions such as 0.25%, 0.5% and 0.75% volume of the concrete.

In this experimental work a total of 90 numbers of concrete specimens were cast with and without steel fibers. The specimens considered in this study consisted of 30 numbers of 150mm side cubes, 30 numbers of 150mm diameter and 300mm long cylinders and 30 numbers of 100 mm X 100mm X 500mm size prisms. Before casting machine oil was smeared on the inner surfaces of the cast iron mould. Concrete was poured into the moulds and compacted thoroughly using a table vibrator. The top surface was finished using a trowel. The GPC specimens were removed from the mould after 4 days while the GPCC specimens were removed from the mould immediately after 24 hours since they set in a similar fashion as that of conventional concrete. All the specimens were left at room temperature till the day of testing. Tests for compressive and split tensile strengths were conducted using a 2000kN Digital Compression testing machine and the test for flexural strength was conducted using a 100kN Flexural testing machine. These tests were conducted as per the relevant Indian standard specifications.
3. RESULTS AND DISCUSSION

3.1 Density

Density of geopolymer concrete composites is presented in Figure 1. Average Density values of Geopolymer concrete composites ranges from 2347 to 2448 kg/m$^3$ as shown in Table 2. As the age of concrete increases, there is a slight increase in the average density. The density of geopolymer concrete composites was found approximately equivalent to that of conventional concrete.

<table>
<thead>
<tr>
<th>Mix ID</th>
<th>Average Density in kg/m$^3$</th>
<th>7 Days</th>
<th>28 Days</th>
</tr>
</thead>
<tbody>
<tr>
<td>GPC</td>
<td>2347.16</td>
<td>2384.20</td>
<td></td>
</tr>
<tr>
<td>GPCC</td>
<td>2378.77</td>
<td>2385.88</td>
<td></td>
</tr>
<tr>
<td>GPCC 1</td>
<td>2396.05</td>
<td>2425.68</td>
<td></td>
</tr>
<tr>
<td>GPCC 2</td>
<td>2408.89</td>
<td>2428.64</td>
<td></td>
</tr>
<tr>
<td>GPCC 3</td>
<td>2443.45</td>
<td>2447.90</td>
<td></td>
</tr>
</tbody>
</table>

Figure 1: Density of Specimens

3.2 Compressive Strength

The compressive strength of different mixes at 7 days and 28 days are represented in Figure 2. Replacement of 10% of fly ash by OPC in GPC mix resulted in an enhanced compressive strength. Compressive strength of GPCC increases by about 73% with reference to GPC mix. As the age of concrete increases from 7 days to 28 days, compressive strength also increases for all the mixes.
From the test results it can be seen that, average compressive strengths of Geopolymer Concrete Composites containing steel fibers were higher than those of Geopolymer concrete composites without steel fibers. As the volume fraction increases from 0.25 to 0.75%, compressive strength increases with respect to the control mix. The increase in compressive strength was about 11%, 13% and 24% for GPCC1, GPCC2 and GPCC3 respectively with reference to GPCC mix. Based on the test results, using least square regression analysis the equation for predicting the 28 days compressive strength of steel fibre reinforced Geopolymer Concrete Composites in terms of percentage volume fraction of fibers ($V_f$) is obtained and given in Equation 1.

$$f_{cs} = f_{co} + 11.08 \times V_f$$

(1)

where,

- $f_{cs}$ = 28 days Compressive Strength of steel fibre reinforced Geopolymer Concrete Composites
- $f_{co}$ = 28 days Compressive Strength of Geopolymer Concrete Composites
- $V_f$ = Percentage Volume fraction of steel fibres.

Figure 2: Effect of addition of Steel fibres on Compressive strength

### 3.3 Split Tensile Strength

The split tensile strength of different mixes at 7 days and 28 days are represented in Figure 3. Replacement of 10% of fly ash by OPC in GPC mix resulted in an improved split tensile strength. Split tensile strength of GPCC increases by about 128% with reference to GPC mix. As the age of concrete increases from 7 days to 28 days, split tensile strength also increases for all the mixes. From the test results it can be seen that, average tensile strengths of Geopolymer Concrete Composites containing steel fibers were higher than those of Geopolymer concrete composites without steel fibers. As the volume fraction increases from 0.25 to 0.75%, split tensile strength increases with respect to the control mix. The increase in tensile strength was about 1%, 18% and 24% for GPCC1,
GPCC2 and GPCC3 respectively with reference to GPCC mix. Based on the test results of this investigation, using least square regression analysis the equation for predicting the 28 days split tensile strength of steel fibre reinforced Geopolymer Concrete Composites in terms of percentage volume fraction of fibers ($V_f$) is obtained and given in Equation 2.

$$f_{st} = f_{to} + 0.834 V_f$$  \hspace{1cm} (2)

where,

- $f_{st} =$ 28 days Split tensile strength of steel fibre reinforced Geopolymer Concrete Composites
- $f_{to} =$ 28 days Split tensile Strength of Geopolymer Concrete Composites
- $V_f =$ Percentage Volume fraction of steel fibres.

![Figure 3: Effect of addition of Steel fibres on Split Tensile Strength](image)

**3.4 Flexural Strength**

The Modulus of rupture of different mixes at 7 days and 28 days are represented in Figure 4. Replacement of 10% of fly ash by OPC in GPC mix resulted in an improved flexural strength. Flexural strength of GPCC increases by about 17% with reference to GPC mix. As the age of concrete increases from 7 days to 28 days, flexural strength also increases for all the mixes. From the test results it can be seen that, average flexural strengths of Geopolymer Concrete Composites containing steel fibers were higher than those of Geopolymer concrete composites without steel fibers. As the volume fraction increases from 0.25 to 0.75%, flexural strength increases with respect to the control mix. The increase in modulus of rupture was about 3%, 34% and 44% for GPCC1, GPCC2 and GPCC3 respectively with reference to GPCC mix. Based on the test results of this investigation, using least square regression analysis the equation for predicting the 28 days flexural strength of steel fiber reinforced Geopolymer Concrete Composites in terms of percentage volume fraction of fibers ($V_f$) is obtained and given in Equation 3.

$$f_{fs} = f_{fo} + 3.36 V_f$$  \hspace{1cm} (3)
where,

\( f_s = 28 \) days flexural strength of steel fibre reinforced Geopolymer Concrete Composites
\( f_o = 28 \) days flexural Strength of Geopolymer Concrete Composites
\( V_f = \) Percentage Volume fraction of steel fibres.

![Figure 4: Effect of addition of Steel fibres on Flexural Strength](image)

4. CONCLUSION

Geopolymer Concrete (GPC mix) has two limitations such as delay in setting time and necessity of heat curing to gain strength. These two limitations of GPC mix was eliminated by replacing 10% of fly ash by OPC which results in Geopolymer Concrete Composite (GPCC mix). Replacement of 10% of fly ash by OPC in GPC mix resulted in an enhanced compressive strength, split tensile strength and flexural strength by 73%, 128% and 17% respectively with reference to GPC mix. Addition of steel fibers in Geopolymer concrete composites enhanced its mechanical properties. Compressive strength, split tensile strength and flexural strength of steel fiber reinforced Geopolymer concrete composites increases with respect to the increase in the percentage volume fraction from 0.25 to 0.75. Addition of 0.25% volume fraction of steel fibers resulted in an enhanced compressive strength, split tensile strength and flexural strength by 11%, 1% and 3% respectively with reference to GPCC mix. For addition of 0.5% volume fraction of steel fibers the compressive strength, split tensile strength and flexural strength is increased by 13%, 18% and 34% respectively with reference to GPCC mix. Similarly addition of 0.75% volume fraction of steel fibers resulted in an enhanced compressive strength, split tensile strength and flexural strength by 24%, 24% and 44% respectively with reference to GPCC mix. Equations for predicting the 28 days compressive strength, split tensile strength and flexural strength of steel fiber reinforced Geopolymer Concrete Composites in terms of percentage volume fraction of fibers \( V_f \) are obtained by using least square regression analysis from the test results of these investigations.
5. REFERENCES
ANALYTICAL MODELS FOR FRP CONFINED CIRCULAR CONCRETE COLUMNS

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Abstract
Jacketing a reinforced concrete column by Fibre Reinforced Polymer (FRP) wraps primarily improves column performance, not because the jacket itself carries some fraction of the axial load applied to the column, but rather because, it provides lateral confining pressure to the column. This confining pressure places the concrete in a triaxial state of stress, altering the load-deformation characteristics of concrete. But contribution of wraps in improving the load carrying capacity of columns still remains controversial and there is need to develop suitable confining models for FRP wraps. Simple analytical equations based on confinement model developed by Richart et al. with modified value of confinement effectiveness co-efficient were proposed to predict the axial load carrying capacity of FRP confined circular columns under axial loading. The proposed equations were validated through the previous experimental database available in literature. A good correlation is obtained between the proposed equations and the existing experimental results. The confined concrete strength from tests was compared with the results from the developed empirical equations and the comparisons are favorable.

Keywords: confining pressure, fibre reinforced polymer, jacketing, wraps

1. INTRODUCTION
Strengthening of R.C. columns represent an engineering problem, which, like all engineering problems, involves several solutions, each having their own advantages and disadvantages and their own limits to applicability and practicality. For instance, there is a possibility to remove deficient columns and construct new columns in their place. Another solution is to place reinforcing steel and form work around an existing column and pour additional concrete. Yet another solution is to use a jacketing technique wherein the column is encased by some reinforcing material. Traditionally steel has been used to confine R.C. columns, but recently fiber reinforced polymer (FRP) has become a viable alternative to steel in some applications. The lateral pressure exerted by FRP will increase the compressive strength of concrete resulting in higher load carrying capacity. The lateral confinement provided by FRP will also provide additional support against buckling of the longitudinal bars. In the case of a circular cross-section, the jacket exerts a uniform confining pressure resulting in a uniform tri-axial stress field.

Amir Mirmiran and Mohsen Shahawy (1997) conducted series of uniaxial compression tests on concrete filled FRP tubes and the results were compared with the available confinement models in the literature. The study indicates that fibre composites are an effective means of confinement, as they significantly increase both strength and ductility of concrete. A comparison of test data with available confinement models indicates that while they produce acceptable results for steel-encased
concrete, they overestimate the strength of FRP encased concrete. The study also shows a unique characteristic of confinement with fibre composites in that, unlike steel, FRP curtails the dilation tendency of concrete, as it reverses the direction of volumetric strains.

The behavior of FRP wrapped concrete cylinders with different wrapping materials and bonding dimensions has been studied by Kin-Tak Lau and Li-min Zhouc(2001) using Finite Element (FEM) and analytical methods. It was found that, the load carrying capacity of the wrapped concrete structure is governed by the mechanical properties such as modulus and Poisson’s ratio, of the wrapping sheet. The deflection of the wrapped concrete cylinder in the load direction decreases with increasing the length thickness and modulus of the wrapping sheet. An analytical equation was provided to estimate the shear stress distribution of an adhesive material for different wrapping geometries. The results of the equation compared well with FEM solutions.

Shahawy et al (2000) verified a confinement model which was originally developed for concrete filled glass FRP tubes by conducting axial compression tests on a total of 45 carbon- wrapped concrete stubs of two batches of normal and high strength concrete and five different number of wraps. It was concluded that, the wrap significantly enhanced the strength and ductility of concrete by curtailing its lateral dilation and the adhesive bond between concrete and the wrap would not significantly affect the confinement behaviour.

The analytical compressive behaviour of concrete members reinforced with FRP was examined by Campione and Miraglia (2003). The variation in the shape of cross section was analysed. The bearing capacity and the increase in the maximum strain for members having a cross-section which was circular, square or square with round corners reinforced with FRP were determined. An analytical model is proposed to validate the confining pressure in ultimate conditions and to determine the ultimate strain corresponding to FRP failure. Analytical results show good agreement with experimental values available in literature.

A study on the compressive behaviour and strength of elliptical concrete specimens wrapped with CFRP has been described by Teng and Lam (2002). From the study it is found that, the axial compressive strength of FRP confined concrete in elliptical specimens is controlled by the amount of confining FRP and the major to minor axis length ratio a/b of the column section. The confining FRP becomes increasingly less effective as the section becomes more elliptical but substantial strength gains from FRP confinement can still be achieved even for strongly elliptical sections. The ultimate axial strain of the confined concrete is also shown to increase as the FRP confinement becomes larger. Based on the test results, a simple compressive strength model for FRP confined concrete in elliptical columns is proposed, in which the effect of the section shape is taken into account by a shape factor.

Hadi (2003) carried out experiments to evaluate the effectiveness of the various types of external reinforcement on the circular columns where eccentric loading was applied through especially designed loading mechanism. The experimental results clearly demonstrate that composite wrapping
can enhance the structural performance of concrete columns under eccentric loading to some extent. However, the enhancement is not as significant as that of columns under concentric loading as suggested by previous studies. The test results also indicated that the carbon fibres provided the greatest amount of confinement, and had significantly better results, if the external confinement was achieved by the application of FRP in tape. The external confinement with galvanised steel straps improved the strength of the column to a certain extent. The brittle, sudden, soundless failure of the galvanised steel strap wrapped columns showed that the galvanised steel straps had very little effect on improving the ductility of the columns.

Teng and Lam (2002) presented a large database assembled from an extensive survey of existing studies and employed the same to assess available axial strength models for FRP confined concrete. The test database is also deployed to examine the effect of various factors on the performance of FRP confined concrete. This study shows that the confinement effectiveness of FRP, based on reported test results depends little on unconfined concrete strength, size, and length to diameter ratio of test specimens and FRP type, but depends significantly on the accuracy of the reported tensile strength of the FRP.

Literatures indicated that attempts have been made by different authors to improve the strength and other engineering properties like energy absorption capacity, and ductility of plain concrete circular columns strengthened with FRP. In this paper, on the basis of experimental investigations carried out on Glass Fibre Reinforced Polymer (GFRP) confined circular columns and based on the model developed by Richart et al simple analytical equations with modified value of confinement effectiveness co-efficient are proposed to predict the strength of FRP confined concrete columns with circular cross-sections under axial loading.

2. ANALYTICAL INVESTIGATION

2.1 Confined Concrete Strength

According to Richart et al for circular concrete columns confined with FRP composite wraps, the confined core concrete strength can be given as

\[
fc_c = fc_o + k_1 f_l
\]  

where

- \(fc_o\) = Strength of unconfined concrete
- \(k_1\) = Confinement effectiveness co-efficient.
- \(f_l\) = Lateral confining pressure.

2.2 Evaluation of Lateral Pressure of Confinement

For circular specimens, \(f_l\) is uniformly distributed and the concrete in FRP wrapped specimens is uniformly confined. For the case of concentrically loaded cylindrical columns, the lateral pressure of confinement can be evaluated by simple considerations of equilibrium of forces. As the axial stress
increases, the corresponding lateral strain increases and the confining jacket develops a tensile hoop stress which is assumed to be equal to the ultimate tensile strength of FRP ($f_{frp}$), balanced by the radial pressure $f_l$, which reacts against the concrete lateral dilation as shown in Figure 1. By equilibrium considerations, the following equation can be derived:

$$f_t = \frac{2t}{D} f_{frp} = \frac{\rho_{frp} f_{frp}}{2}$$

(2)

where

$\begin{align*}
  t & = \text{thickness of FRP jacket} \\
  D & = \text{Diameter of the concrete core} \\
  f_{frp} & = \text{Tensile strength of FRP in hoop direction} \\
  \rho_{frp} & = \text{FRP volumetric ratio} = \frac{4t}{D}
\end{align*}$

2.3 Confinement Ratio (CR) and Stengthening Ratio (SR)

The confinement ratio of FRP confined concrete is defined as ratio of the maximum confining pressure to the unconfined concrete strength. It is given by

$$CR = \frac{f_t}{f_{co}}$$

(3)

Strengthening ratio or confinement effectiveness is defined as the ratio between the strength of confined concrete to that of unconfined concrete, that measures how effectively the concrete is confined in a given cross section. It is given by
2.4 Parameters for Confinement Effect

The main parameters that are likely to influence the confinement effect are the volumetric fibre reinforcement ratio, yield strength of fibre reinforcement, core concrete shape and the strength of unconfined concrete. The effect of confinement on these parameters was determined based on the test results. The test results of GFRP confined plain concrete cylinder specimens are given in Table 1. It can be seen that the peak stress of the confined concrete depends on the value of the lateral confinement pressure $f_l$. Figure 2 shows the relation between confinement ratio and the ratio of the peak stress to the strength of the unconfined concrete for the plain concrete circular specimens of the test series together with the respective linear regression.

The peak strength $f_{cc}$ of the confined specimens was normalized by the strength of unconfined concrete $f_{co}$. It can be seen that, the normalized confined compressive strength, approximately, increase linearly with the increase of the normalized confining lateral pressure. Therefore the relationship may be approximated by a linear function, with the slope depending on the cross-sectional shape. Making use of the experimental results, from the regression analysis, the relation between confinement ratio and strengthening ratio is written as

$$ \frac{f_{cc}}{f_{co}} = 1 + 3.35 \frac{f_l}{f_{co}} $$

(5)
Table 1 Test results of GFRP confined plain concrete circular specimens

| S.No. | D (mm) | L (mm) | Fibre type | \( f_{co} \) (N/mm\(^2\)) | t (mm) | \( f_{frp} \) (N/mm\(^2\)) | \( E_{frp} \) (N/mm\(^3\)) | \( f_l \) (N/mm\(^2\)) | \( f_l/f_{co} \) | \( f_{cc} \) (N/mm\(^2\)) | \( f_{cc}/f_{co} \) |
|-------|-------|-------|------------|-----------------|-------|-----------------|---------------|----------------|--------------|----------------|----------------|----------------|
| 1     | 150   | 300   | CSM        | 24.13           | 1.1   | 150             | 11000         | 2.2            | 0.09         | 35.10         | 1.45           |
| 2     | 150   | 300   | CSM        | 24.13           | 1.1   | 150             | 11000         | 2.2            | 0.09         | 36.01         | 1.49           |
| 3     | 150   | 300   | CSM        | 24.13           | 1.1   | 150             | 11000         | 2.2            | 0.09         | 34.57         | 1.43           |
| 4     | 150   | 300   | CSM        | 24.13           | 2.2   | 150             | 11000         | 4.4            | 0.18         | 47.44         | 1.97           |
| 5     | 150   | 300   | CSM        | 24.13           | 2.2   | 150             | 11000         | 4.4            | 0.18         | 40.57         | 1.68           |
| 6     | 150   | 300   | WRM        | 24.13           | 2.2   | 150             | 11000         | 4.4            | 0.18         | 44.88         | 1.86           |
| 7     | 150   | 300   | WRM        | 24.13           | 1.0   | 250             | 19500         | 3.34           | 0.14         | 34.34         | 1.42           |
| 8     | 150   | 300   | WRM        | 24.13           | 1.0   | 250             | 19500         | 3.34           | 0.14         | 35.60         | 1.48           |
| 9     | 150   | 300   | WRM        | 24.13           | 1.0   | 250             | 19500         | 3.34           | 0.14         | 36.47         | 1.51           |
| 10    | 150   | 300   | WRM        | 24.13           | 2.0   | 250             | 19500         | 6.68           | 0.28         | 39.63         | 1.64           |
| 11    | 150   | 300   | WRM        | 24.13           | 2.0   | 250             | 19500         | 6.68           | 0.28         | 40.25         | 1.67           |
| 12    | 150   | 300   | WRM        | 24.13           | 2.0   | 250             | 19500         | 6.68           | 0.28         | 45.98         | 1.91           |

2.5 Comparison of Confined Strength

The strength of the FRP confined concrete predicted from the proposed analytical equation (5) was compared with the experimental results as shown in Table 2. It was found that a good correlation was obtained between the experimental results and those got from the equation. It can be seen that the proposed equation predicts the behaviour of confined concrete with most accuracy. The same model can also be used to find the ultimate strength of concrete confined with all types of fibre sheets namely carbon, aramid etc.

Table 2 Comparison of experimental and analytical results

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<th>S.No</th>
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<th>( f_{co,cal} ) (N/mm(^2))</th>
<th>( f_{cc,cal}/f_{cc,exp} )</th>
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2.6 Validation of Proposed Equation with Existing Experimental Data Base in Literature


Only test results on circular specimens without steel reinforcement were considered. These data are all for fully confined plain concrete circular specimens with unconfined concrete strengths not greater than 60MPa. All these specimens failed by FRP rupture. Carbon Fibre Reinforced Plastics (CFRP) and Glass Fibre Reinforced Plastics (GFRP) have been used in these tests. The confinement ratio varies from 0.03 to 0.84.

The experimental results of confined concrete strength reported in the existing database found in the literature were compared with those of the confined strength computed from equation (5). The comparison is shown in Table 3 and is found to be favorable. Hence, equation (5) can be satisfactorily applied to determine the axial compressive strength of FRP confined concrete circular specimens.
Table 3: Validation of proposed equation with existing experimental results

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<td>36.3</td>
<td>0.13</td>
<td>56.4</td>
<td>52.1</td>
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</tr>
<tr>
<td>30</td>
<td>Nanni and Bradfold 1995</td>
<td>150 300</td>
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<td>583</td>
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<td>0.92</td>
</tr>
<tr>
<td>33</td>
<td>Soudki and Green 1996</td>
<td>152 305</td>
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<td>CFRP</td>
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<td>1481</td>
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<td>67.4</td>
<td>65.7</td>
<td>0.97</td>
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<tr>
<td>38</td>
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<td>Strain</td>
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<tr>
<td>42</td>
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<td>76</td>
<td>GFRP</td>
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<td>1518</td>
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</tr>
<tr>
<td>43</td>
<td>Toutanji and Balaguru 1998</td>
<td>76</td>
<td>CFRP</td>
<td>2.0</td>
<td>3485</td>
<td>228000</td>
<td>31.8</td>
<td>0.63</td>
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<td>98.9</td>
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</tr>
<tr>
<td>44</td>
<td>Miyauchi et al 1999</td>
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<td>230500</td>
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<td>0.22</td>
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<tr>
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<td>3481</td>
<td>230500</td>
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<td>0.58</td>
<td>70.9</td>
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<tr>
<td>47</td>
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<td>191</td>
<td>CFRP</td>
<td>4.1</td>
<td>3483</td>
<td>230535</td>
<td>27.1</td>
<td>0.30</td>
<td>53.9</td>
<td>54.3</td>
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<tr>
<td>48</td>
<td>Toutanji 1999</td>
<td>76</td>
<td>GFRP</td>
<td>4.0</td>
<td>1518</td>
<td>72600</td>
<td>31.0</td>
<td>0.30</td>
<td>60.8</td>
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<td>Toutanji 1999</td>
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<tr>
<td>50</td>
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<td>152</td>
<td>GFRP</td>
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<td>450</td>
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<td>Saafi et al 1999</td>
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<td>52</td>
<td>Saafi et al 1999</td>
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<td>3300</td>
<td>367000</td>
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<td>0.14</td>
<td>55.0</td>
<td>51.4</td>
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<td>53</td>
<td>Saafiet al 1999</td>
<td>152</td>
<td>CFRP</td>
<td>2.9</td>
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<td>390000</td>
<td>35.0</td>
<td>0.31</td>
<td>68.0</td>
<td>71.3</td>
<td></td>
<td></td>
</tr>
</tbody>
</table>
3. CONCLUSIONS
Simple analytical equations based on confinement model developed by Richart et al. were proposed to predict the axial load carrying capacity of FRP confined circular columns under axial loading. The proposed equations were validated through the previous experimental database available in literature. A good correlation is obtained between the proposed equations and the existing experimental results. The confined concrete strength from tests was compared with the results from the developed empirical equations and the comparisons are favorable.

4. REFERENCES
SELECTION OF PROCUREMENT METHOD FOR BUILDING MAINTENANCE MANAGEMENT: A DECISION MAKING MODEL

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Abstract
A large number of different types of procurement methods have been developed to overcome the weaknesses of the existing procurement method. Thus, it is more challenging for the decision maker to select the most appropriate procurement method for a specific building as different type of procurement method suit different type of project. It is indeed very vital to develop a systematic approach that can assist the maintenance personnel in decision making on selecting the most appropriate procurement method for a particular building. This paper presents a study of the selection of procurement method for building maintenance management through the use of Multiple criteria decision making (MCDM) particularly Analytic Hierarchy Process (AHP). This research seeks to investigate current practice of available procurement method and identify criteria for selection of procurement methods through literature review. A theoretical framework for future research on the relationship between type of procurement method and procurement selection criteria will be presented.

Keywords: analytic hierarchy process, building maintenance management, procurement method, procurement selection criteria

1. INTRODUCTION
Building is an essential element which provides people of the nation with shelter and facilities to carry out daily task. However, buildings deteriorate and dilapidate during their service lives. It is indeed very critical that building need maintenance to be functional and perform efficiently. Yik and Lai (2005) claimed that a building that has proper operation and maintenance will only continue be valuable asset. Sheng (2012) stated that the implementation of an appropriate procurement method will benefit the good functionality of the building including the mechanical and electrical elements, achieving cost savings, better comfort level, generate higher economic rent of the building space and increase corporate image as well as sustainability of the building.

The task to select the most appropriate procurement method for a specific building becoming more challenging as the number of different types of procurement methods developed had increased. This study aims to identify the available procurement method for building maintenance and identify the criteria to be considered when selecting the procurement method. The finding of this study will act as a tool to guide the decision maker to select the most suitable and appropriate procurement method which will improve the maintenance management in Malaysia. Analytic Hierarchy Process (AHP) was employed in this study to develop a tool for assessing decision maker to choose the most appropriate procurement method.
2. PROCUREMENT METHOD

According to Love et al (2002) and Adekunle (2009), procurement is defined as “an organisational system that assigns specific responsibilities and authorities to people and organisations”. Meanwhile, maintenance procurement is defined as the process on how maintenance works are carried out (Wordsworth, 2001). The types of procurement method identified through literature review for building maintenance were listed as below (Wordsworth, 2001; Sheng, 2012; RICS, 2009; Hui and Tsang, 2004; Ancarani & Capaldo, 2005; Atkin & Brooks, 2005):

- Direct Labour or Inhouse
- Outsourcing

Outsourcing can trade of service under several types of contract which include:

(a) Lump Sum Contract
(b) Term Contract
(c) Repair and Maintenance Contract (RMC)
(d) Cost Reimbursement Contract
(e) Service Level Agreement

- Out-tasking
- Public Private Partnership (PPP)
- Total Facilities Management (TFM)
- Traditional
- Partnering

3. PROCUREMENT METHOD SELECTION CRITERIA

Through literature review, there are 26 criteria identified which were divided into four main categories that were client requirement, owner or client or decision maker characteristic, project characteristic and external environment or factor. The criteria identified from the literature review can be referred to Table 1 (Chen et al., 2003; Ng et al., 2002; Hibberd and Djebarni, 1996; Al Khalil, 2002; Alhazmi & McCaffer, 2000; Love et al., 1998; Luu et al., 2003; Cheung et al., 2001).

<table>
<thead>
<tr>
<th>Criteria</th>
<th>Client Requirement</th>
<th>Owner/ Client/ Decision Maker Characteristic</th>
<th>Project Characteristic</th>
<th>External environment/ factor</th>
</tr>
</thead>
<tbody>
<tr>
<td>C 1</td>
<td>Speed</td>
<td>C 1.6 Responsibility</td>
<td>C 3.1 Existing building condition</td>
<td>C 4.1 External environment/ factor</td>
</tr>
<tr>
<td>C 1.1</td>
<td>Time certainty</td>
<td>C 1.7 Risk allocation/avoidance</td>
<td>C 3.2 Project size</td>
<td>C 4.2 Client’s in house technical capability</td>
</tr>
<tr>
<td>C 1.2</td>
<td>Price/Cost certainty</td>
<td>C 1.8 Quality level</td>
<td>C 3.3 Client’s in house technical capability</td>
<td>C 4.3 Client’s financial capability</td>
</tr>
<tr>
<td>C 1.3</td>
<td>Degree of complexity</td>
<td>C 1.9 Working relationship</td>
<td>C 3.4 Client’s financial capability</td>
<td>C 4.4</td>
</tr>
<tr>
<td>C 1.4</td>
<td></td>
<td>C 1.10 Clarity of scope</td>
<td>C 3.5 Client’s financial capability</td>
<td></td>
</tr>
<tr>
<td>C 1.5</td>
<td></td>
<td></td>
<td>C 3.6</td>
<td></td>
</tr>
</tbody>
</table>

Table 1: Procurement Method Selection Criteria
4. ANALYTIC HIERARCHY PROCESS (AHP)

In this study, the selection of procurement method for building maintenance management adapted Multiple criteria decision making (MCDM) particularly Analytic Hierarchy Process (AHP). Pirdashiti et al. (2009) stated that Multiple criteria decision making (MCDM) is “an analytic method to evaluate the advantages and disadvantages of alternatives based on multiple criteria”. Satty (2008) explained that AHP is “a theory of measurement through pairwise comparisons and relies on the judgements of experts to derive priority scales”. The comparisons were made using a scale of absolute judgements that indicate how much more one element dominates another with respect to a given attribute (Saaty, 2008). There are three basic principles of the AHP which include (Saaty, 1982):

i. The principle of constructing hierarchies
   A complex system was structured hierarchically by decomposing the elements into constituent parts according to essential relationships towards a desired goal which can make the whole system well understood (Saaty, 1982).

ii. The principle of establishing priorities
   The first step in establishing the priorities of elements in a decision problem is to make pairwise comparison that is to compare the elements in pairs against a given criterion (Saaty, 1982). Table 2 shows the scale for pairwise comparison matrix. Saaty(1982) pointed out that experience has confirmed that a scale of nine units is reasonable and reflects the degree to which the intensity of relationships between elements can be discriminated.

Table 2: Scale for pairwise comparison matrix

<table>
<thead>
<tr>
<th>Intensity of importance</th>
<th>Definition</th>
<th>Explanation</th>
</tr>
</thead>
<tbody>
<tr>
<td>1</td>
<td>Equal importance of both elements</td>
<td>Two criteria are of equal importance and equally contribute to the property or objectives</td>
</tr>
<tr>
<td>3</td>
<td>Weak importance of one over another</td>
<td>Experience and judgment slightly favor one criterion or element over another</td>
</tr>
<tr>
<td>5</td>
<td>Essential or strong importance of one element over another</td>
<td>Experience and judgment strongly favor one criterion or element over another</td>
</tr>
<tr>
<td>7</td>
<td>Very strong and demonstrated importance of one element over another</td>
<td>A criterion or element is strongly more important or favored and its dominance is demonstrated in practice than the other</td>
</tr>
<tr>
<td>9</td>
<td>Absolute importance of one element over another</td>
<td>The evidence favoring one criterion over another is of the highest possible order of affirmation</td>
</tr>
<tr>
<td>2,4,6,8</td>
<td>Intermediate values between adjacent scale values</td>
<td>When compromise is needed between two judgements</td>
</tr>
</tbody>
</table>
Reciprocals of above nonzero numbers assigned to it when compared with activity \( j \), then \( j \) has the reciprocal value when compared with \( i \)

**A reasonable assumption**

### Rational

<table>
<thead>
<tr>
<th>Ratios arising from the scale</th>
<th>If consistency were to be forced by obtaining ( n ) numerical values to span the matrix</th>
</tr>
</thead>
</table>


iii. The principle of logical consistency

Logical consistency ensures that elements are grouped logically and ranked consistently according to a logical criterion (Saaty, 1982). The consistency of the comparison matrix is monitored by an inconsistency ratio (IR) or consistency ratio (CR) calculated by (Cheung et al., 2001 & Saaty, 1982):

### Consistency Ratio (CR) = Consistency index (II) / Random Index (RI)

where, \( \text{II} = (\lambda_{\text{max}} - n)/(n-1) \), with \( n \) the number of elements in the matrix

\( \lambda_{\text{max}} \) = the maximum eigenvalue of the comparison matrix.

Table 3 show Random Index (RI) for consistency index of a randomly generated reciprocal matrix within a scale of 1 to 9.

<table>
<thead>
<tr>
<th>Size of matrix</th>
<th>1</th>
<th>2</th>
<th>3</th>
<th>4</th>
<th>5</th>
<th>6</th>
<th>7</th>
<th>8</th>
<th>9</th>
<th>10</th>
</tr>
</thead>
<tbody>
<tr>
<td>Random consistency</td>
<td>0.00</td>
<td>0.00</td>
<td>0.58</td>
<td>0.90</td>
<td>1.12</td>
<td>1.24</td>
<td>1.32</td>
<td>1.41</td>
<td>1.45</td>
<td>1.49</td>
</tr>
</tbody>
</table>

Source: Saaty (1982)

### 5. RESEARCH METHODOLOGY

This research was conducted through literature review. The procurement strategy available, the current practice in selecting procurement method and the criteria for procurement methods selection in building maintenance management were identified by reviewing the journal articles and other reliable reference sources. In addition, Multiple criteria decision making (MCDM) particularly Analytic Hierarchy Process (AHP) was studied as well to be employed in this research in order to develop a tool for assessing decision maker to choose the most appropriate procurement method. A theoretical framework was produced to indicate the idea for future research.

The approach of the methodology that is implemented in the future research is mixed method. According to Osborne (2008), mixed method is “the combination of best aspects of both qualitative and quantitative methods or research that involving multiple methods”. A preliminary questionnaires survey was employed to get a general overview of the characteristics of building maintenance procurement strategy implemented in this country and short-list the type of procurement, criteria that maintenance personnel take into consideration when selecting procurement method and understand the process in selecting procurement method in building maintenance management in Malaysia. The second stage of the study involved semi-structured interview to clarify variables and test the decision.
making model for procurement method selection for building maintenance management produced from this study. The final stage of data collection was case study to analyze the effectiveness of the model created.

6. FINDING
A theoretical framework was produced through literature review as shown in Figure 1. The theoretical framework developed will be adapted in future research.

![Figure 1: Theoretical framework]

7. CONCLUSION
The maintenance personnel can determine the availability of maintenance procurement and the criteria to be considered before deciding which procurement strategy to be adopted through the finding of this research. In addition, the model produced in future research can assist the maintenance personnel in decision making on selecting procurement method for a particular building. The study expected to produce an Analytic Hierarchy Process (AHP) decision making model for the selection of procurement strategy in building maintenance management which can bring a lot of
benefits to the maintenance personnel, clients or owner of the buildings, building users and the academicians that are related to maintenance industry.

8. REFERENCES


A REVIEW OF PUBLIC HOUSING MAINTENANCE ISSUES AND ITS IMPACT ON BUILDING QUALITY AND TENANTS’ SATISFACTION

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Abstract
Being one of the developing countries in Asia, the resettling of squatters and providing housing for low income households are among the main efforts of Malaysian government through its Five Year Malaysia Plan. However, the maintenance of public housing by the government is often labelled as poor, especially the high-rise public housing maintenance. Many issues of public housing maintenance arise causing the impacts of poor maintenance, and subsequently affecting the building quality and the tenants’ living environment. Therefore, this paper discusses on the public housing maintenance issues and the impact of poor maintenance. A framework on the relationship between the public housing maintenance issues and the impact of poor maintenance will be presented. The weaknesses of the existing maintenance related laws and regulations will be discussed in future and the further outcome of this research will establish maintenance measures particularly for public housing.

Keywords: building quality, maintenance, public housing, tenant satisfaction

1. INTRODUCTION
The Malaysian government embarked on public housing programme through its Five Year Malaysia Plan (Sufian and Rahman, 2008). Sufian and Rahman (2008) emphasized that the function of the government to provide proper shelter to its lower income population is now progressively done through People’s Housing Programme or “Projek Perumahan Rakyat” (commonly known as PPR). In addition to PPR housing, around twenty-three thousands public housing for rental was constructed and maintained by City Hall of Kuala Lumpur (DBKL) as well (City Hall of Kuala Lumpur, 2009). Public housing can be defined as the rental housing which is owned and administered by the government authority for the low income households (Sengupta, 2006; Sousa and Quarter, 2004).

The enforcement of control during occupation stage is necessary in order to avoid the deterioration of building. Enforcement of housing control is governed by a series of regulation, for instance Street, Drainage and Building Act 1974 and Uniform Building By-Laws 1984, which should be administered through various governments and agencies (Zaidi and Davies, 2010). Zaidi and Davies (2010) further emphasized that the continuing quality over the life of a building depends on adequate maintenance. This paper provides a theoretical framework to indicate the relationship between the variables of current public housing maintenance issues and the impact of poor maintenance.

This paper is organised in the following way. The next station will discuss on the public housing maintenance issue and its variables. After that, the impact of poor maintenance will be described.
The following section will present a framework demonstrating the relationship between public housing maintenance issues and the impact of poor maintenance. Conclusion is drawn in the final section.

2. PUBLIC HOUSING MAINTENANCE ISSUES
According to Hashim et al. (2012), the repair and maintenance of public housing is a long-term task that must be performed consistently over time to ensure that buildings remain in good condition. Besides, repair and maintenance task is performed to avoid the risk of accidents caused by deteriorated infrastructure to preserve the capital value of the structure (Hashim et al., 2012). However, Salleh et al. (2011) pointed out that the management of public housing by the government in most countries is often labelled as poor. The variables that related to the public housing maintenance problems have been found out. The variables are:
- Rent arrear/ Budget constraints
- Delay and failure in responding problems
- Poor workmanship
- Tenants behaviour

2.1 Rent Arrear
Previous study done by Salleh et al. (2011) indicated that high rent arrears rates faced by public housing management lead to poor maintenance. This is also agreed by Hashim et al. (2012) in which asserted that the most glaringly root cause leading to public housing maintenance is the high rent arrear rated faced by public housing management. Table 1 shows the rent arrear of both of PPR housing and public housing in Federal Territory of Kuala Lumpur area, which critically hit until RM 27 million.

Table 1: Statistic of rent arrear until 30 September 2009

<table>
<thead>
<tr>
<th></th>
<th>PPR housing</th>
<th>Public housing</th>
<th>Total</th>
</tr>
</thead>
<tbody>
<tr>
<td>Rent arrear at 1 January, 2009</td>
<td>19,022,086.00</td>
<td>12,824,153.00</td>
<td>31,846,239.00</td>
</tr>
<tr>
<td>Payment for arrear till 30 September, 2009</td>
<td>(3,496,913.00)</td>
<td>(1,139,292.00)</td>
<td>(4,636,205.00)</td>
</tr>
<tr>
<td>Balance for rent arrear till 30 September, 2009</td>
<td>15,525,173.00</td>
<td>11,684,861.00</td>
<td>27,210,034.00</td>
</tr>
</tbody>
</table>

Source: City Hall of Kuala Lumpur, DBKL (2009)

2.2 Delay and Failure in Responding Problems
A study by Ali et al. (2010) claimed that there is a failure in reporting the problems by tenants on their units can consequently lead to the delay of response to the building defects and do affect in housing maintenance cost. From the study by Salleh et al. (2011) revealed that Majlis Bandaraya Ipoh (MBI) take so long to act on the tenants’ complaints caused tenants had to carry out the repairs themselves. This study is match with the findings of Ukoha and Beamish (1997) study which indicated that the public housing management delays the responses and feedback to necessary repair works.
2.3 Poor Workmanship
Another issue of public housing maintenance is poor workmanship, as highlighted by Ali et al. (2010) in which claimed that owing to poor workmanship, more defects will occur immediately or after the period of time the maintenance works are done. Besides, Tiun (2006) and Ali et al. (2010) indicated that poor workmanship is the predominant cause of defects emerging on the projects or maintenance works.

2.4 Tenant Behaviour
Since all the tenants are renters, tenants may have a neglectful attitude towards bearing some housing responsibilities and depend solely on the management for any kind of maintenance (Ukoha and Beamish, 1997). For example, the breakdown inside the tenant's unit should be maintained by themselves as stated in the DBKL tenancy agreement; however, tenants frequently make the complaints to DBKL about the breakdown and then DBKL will call the technicians to repair (City Hall of Kuala Lumpur, 2012).

3. IMPACT OF POOR MAINTENANCE
The public housing maintenance issues incur poor maintenance, which often cause a lot of impacts, including:
- Complaints received
- Tenants satisfaction
- Building condition/ building quality
- Additional cost for repair work

3.1 Complaints Received
Ali (2009) emphasized that inefficient maintenance works could invite complaints by the building users or tenants. He further highlighted that if buildings do not fulfil the user’s need, complaints with regards to maintenance performance would be made by the users. In the study of low cost and medium cost high rise residential buildings, Tiun (2006) pointed out that there were numerous complaints against incompetent security guards and the number was increasing over time. In addition, a study by Yau (2010) in Hong Kong indicated that from 1997 to 2008, the total number of complaints about building dangers received by the Building Department increased at an average rate of 8.5 per cent per annum.

3.2 Tenants Satisfaction
A study by Van Mossel and Jansen (2010) indicated that the delivery of high quality maintenance stimulates tenant satisfaction. Salleh (2008) and Hashim et al. (2012) argued that residential satisfaction is an important indicator of housing quality and condition. In the international context, Croal et al. (2003) stated that through the findings of Li and Siu (2001) it was found that 61 per cent of public sector tenants in Hong Kong were dissatisfied with the repair and maintenance services provided. Whereas in Malaysia context, based on the study done by Salleh et al. (2011), found that tenants were dissatisfied with the quality of external and internal building quality in MBI public housing.
3.3 Building Condition/ Building Quality
Incorrect identification of the true cause of defect and inappropriate remedial work, will not only do nothing to rectify the original defect but may substantially worsen the condition of building (Wordsworth, 2001). A research done by Govender et al. (2011) found out that infrastructure of the dwellings in the low-cost settlements was in a poor state of repair. In Malaysia context, a study done by Salleh et al. (2011) found that most lighting provided at building corridors for Majlis Bandaraya Ipoh (MBI) public housing were not functioning, this showed that MBI public housing was not well maintained.

3.4 Additional Cost for Repair Work
The maintenance is not planned well can incur higher maintenance fees (Tiun, 2006). As mentioned earlier, delay response to the building defect can lead to the extra cost needed to that repair work (Ali et al., 2010). High maintenance cost is required to repair or replace the existing building components because of wrong choices of materials and poor workmanship (Ali et al., 2010).

4. FINDINGS
After discussing the variables of public housing maintenance issues and the impact of poor maintenance, a framework demonstrating the relationship between those variables is shown as Figure 1. Based on the framework below, the high rent arrear faced by local authority incur a limited maintenance fund which could result in low quality of building component (Ali, 2009). Besides, delay response to the building defect do affect in housing maintenance cost (Ali et al., 2010). Numerous studies (Ukoha and Beamish, 1997; Tiun, 2006; Salleh et al., 2011) had been carried out which had highlighted that action taken by the local authorities on the complaints made by tenants were often slow and ineffective. Poor workmanship causes the defects emerging on the maintenance works (Tiun, 2006; Ali et al., 2006). In addition, the neglectful attitude of tenants burdens the City Hall of Kuala Lumpur (DBKL) and lots of breakdown complaints received by DBKL (City Hall of Kuala Lumpur, 2012).

PUBLIC HOUSING MAINTENANCE ISSUE
- Rent arrear/ Budget constraints
- Delay and failure in responding problems
- Poor workmanship
- Tenants behaviour/ Ignorance of tenants

IMPACT OF POOR MAINTENANCE
- Complaints received
- Tenants satisfaction
- Building condition/ Building quality
- Additional cost for repair works

Figure 1: Framework of public housing maintenance issue and the impact of poor maintenance
5. CONCLUSION

The issues of public housing maintenance and the impact of poor maintenance are discussed which highlight the public housing maintenance problems. The issues arise include the rent arrear, delay and failure in responding problems, poor workmanship and tenant behaviour. Whereas the consequent impacts include complaint received by local authorities, tenant satisfaction, building quality and additional cost for repair work. This study further provides the opportunity to review the existing maintenance related laws and regulations so as to seek the weaknesses of building laws and regulations in implementing maintenance management. The further outcome of the research will provide the appropriate maintenance measures to enhance the public housing maintenance so that the comfortable living environment allows people to conduct their daily activities.

6. REFERENCES


IDENTIFYING KEY RISKS IN BUILDING PERFORMANCE

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Abstract
Successful development project is crucial to all project stakeholders. Meeting the dateline to complete a project will be an added advantage for both the developer and the owner. As project management is a core capability in the construction industry, high-quality project planning processes are necessary for project success. Poor up-front definition and planning is the common cause of project failure which causes serious problems in many areas later in the project and also affecting building performance. Therefore, this paper aims to identify the key risks in planning stage. This paper provides a theoretical framework showing the relationship between eleven key risks in planning stage and four building performance indicators in operation stage which gained through literature study.

Keywords: project planning, risk, building performance

1. INTRODUCTION
The International Facilities Management Association (IFMA) defined Facility Management as “the practice of coordinating the people and the work of an organization into the physical workplace” and a more explicit definition as an integrated approach to operating, maintaining, improving and adapting the buildings and infrastructure of an organization in order to create an environment that supports the primary objectives of the organization. IFMA further illustrated the asset lifecycle model as below:

Figure 1: Asset lifecycle
Source: IFMA Glossary
A major part of activities performed in construction organizations deal with planning, executing, coordinating, and controlling projects. Planning is crucial in determining project success as many construction projects do not meet their targets due to poor quality of management practices (Brown et al., 2001 and World Bank, 1996). World Bank (1996) study of construction projects has found that of the 900 surveyed projects, an average cost overrun of 40 percent over the original cost and an average time overrun of 60 percent over the planned completion time were reported.

Dvir and Lechler (2004) mentioned that planning is a process with many different activities that cover a variety of issues, using numerous planning techniques and planning procedures such as analysis, design reviews, reports and interpersonal communication. Dvir et al. (1999) indicated in a study of 110 development projects that the origination and initiation phase, has the greatest influence on project success. During that phase major decisions are made such as deciding the project’s objectives and planning the project’s execution. They also found that although the preparation of formal design and planning documents has a strong positive effect on meeting time and budget objectives, it also contributes significantly to customer benefits deriving from the end-product. Thus, planning does not automatically lead to project success, but lack of planning is likely to lead to project failure.

In Malaysia like other countries construction industry is one of the major industries contributing significantly in the growth of socio-economic development. Achieving project completion on time and within budget at specified quality standards is major criterion of project success. Although in Malaysia a lot of money has been spent in construction, the industry is facing a lot of challenges such as the expenditure exceeding the budget, delay in completing the project on time, building defects and over dependent of foreign workers. MARA (Majlis Amanah Rakyat) has spent about RM 12 billion in its development since 1st Malaysian plan. A portion of this allocation was spent on construction. The major issue in MARA large construction project is the delay resulting from significant time overrun and cost overrun (Memon et al., 2011). He further analyzed and concluded that cash flow and financial difficulties faced by contractors, contractor's poor site management and supervision, inadequate contractor experience, shortage of site workers, incorrect planning and scheduling by contractors are most severe factors affecting construction cost.

2. RISK IN PLANNING

Compared with many other industries, the construction industry is subject to more risks due to the unique features of construction activities, such as long period, complicated processes, abominable environment, financial intensity and dynamic organization structures (Flanagan and Norman, 1993; Akintoye and MacLeod, 1997; Smith, 2003). Managing risks in construction projects has been recognized as a very important management process in order to achieve the project objectives in terms of time, cost, quality, safety and environmental sustainability (Zou et al., 2006).

More effective management of risks would be possible if these risks are managed from the perspective of a project life cycle. Many risks may arise in more than one phase of a construction project and hence they need to be considered in more than one phase. As much research suggested,
addressing project risks earlier rather than later in the project life cycle can minimize the negative consequence brought by the risks (Ward and Chapman, 1995; Smith, 2003). Identifying the possible occurrence of risks in each stage and making appropriate actions to cope with them are significant. On the other hand, as these risks are all project stakeholders orientated, how to effectively get different participants to manage them in the context of a project life cycle is decisive to the project success (Zou et al., 2006).

Zou et al. (2006) summarized the key risks of planning phase as below:

i. High performance/quality expectations
ii. Tight project schedule
iii. Incomplete approval and other documents
iv. Variations by the client
v. Inadequate program scheduling
vi. Design variations
vii. Inadequate or insufficient site information (soil test and survey report)
viii. Incomplete or inaccurate cost estimate
ix. Lack of coordination between project participants
x. Excessive approval procedures in administrative government departments
xi. Bureaucracy of government

3. BUILDING PERFORMANCE

Performance measurement plan is the identification and translation of the organization's objectives and requirements into the optimum firm to meet current and future needs. The critical observation of practice, allied to a careful reading of the literature, suggests the need to determine, verify and integrate the axioms of modern performance measurement (Dilanthi and David, 2001).

In the last decade, there has been growing critics of traditional performance measures as too narrowly focused on financial measures (Olve et al., 1999).

Every Performance Measurement System consists of a number of individual performance measures/performance indicators. Performance measures are the vital signs of the organization which quantify how well the organization achieves a specified goal (Seokjin and Behnam, 2008). Table 1 showed the multiple dimensions of the most important measures which are quality, time, cost and flexibility (Neely et al, 2005; Toni and Tonchia, 2001).

| Table 1: The most important individual performance measures |
|----------------------------------|-----------------|-----------------|-----------------|
| Quality | Time | Flexibility | Cost |
| Performance | Manufacturing lead time | Material quality | Manufacturing cost |
| Features | Rate of production | Output quality | Value added |
| Reliability | Deliver lead time | New product | Selling price |
| Conformance | Due-date performance | Modify product | Running cost |
| Technical durability | Frequency of delivery | Volume | Service cost |
| Perceived quality | Mix | |
| Humanity | Resource mix | |

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4. THEORETICAL FRAMEWORK
The theoretical framework establishing the relationship between the risk management variables and the performance measurement variables is shown in Figure 2 below.

![Theoretical Framework Diagram](image)

Source: Neely et al, 2005

5. CONCLUSION
The theoretical framework showed an overview and relationship between the variables that to be discussed in the research. The issue is the project failure to meet its objectives without proper planning. It is very crucial to identify the key risks at the earlier stage and minimize the negative consequence brought by the risks at the later stage. This research is to develop a framework for risk during planning stage lifecycle. The further outcome of the research will provide the appropriate risk mitigation plan and thus enhance the building performance.

6. REFERENCES


FACILITIES MANAGEMENT STRATEGIES A PRELIMINARY REVIEW

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²Building Performance and Diagnostic Group, Faculty of Built Environment, University of Malaya, Kuala Lumpur, Malaysia
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Abstract
Facilities Management (FM) is a management with various disciplines that had been broadly applied and increasingly popular in United Kingdom, United States and other developed countries whereby the FM field are very well focused and contributes to organizations’ core business in order to achieve the business objectives by producing quality product and services which is value for money, increase customer satisfaction, work productivity, stability of business environment and as well as increasing the profit margin of an organization. FM can be said as an important profession nowadays that highlights on the business strategy, innovation, financial, and people (human resource) in order to upgrade towards the recognition as well as identity and image of FM. This paper presents the significance of FM strategies to strengthen and improve the effectiveness and efficiencies of organizations to come up with good business decisions and to be innovative towards achieving the organizations’ business goals. Our review is derived from previous research studies that contributes towards the improvements of FM strategies in the future. Besides the concepts and models from previous research studies can be used as knowledge contribution and can be applied at every management level to provide the right services at the right time which is essential to the organizational business performances. It will also be the mantra of success of organizations towards competitive advantage in order to strategize the business positions and strengthens the FM business environment in the future.

Keywords: facilities management (FM), FM strategies, strategies

1. INTRODUCTION
Facilities Management (FM) is a management with various disciplines that contributes to organizations’ core business by providing quality services and maintain the support services of organizations to achieve continuous improvement in business. FM can be said as an important profession nowadays that highlights on the business strategy, innovation, financial, people (human resource) and etc in order to upgrade towards the recognition of identity and image of FM. BIFM (2010) defined FM as “the integration of process within an organization to maintain and develop the agreed services which supports and improve the effectiveness of its primary activities”. BIFM (2010) has pointed “that FM today require its practitioners skills and knowledge and to expand the management of an increasingly broad range of tangible assets, support services and people skills”. Meanwhile, the largest global association for FM professionals, IFMA (2010) defined FM “as a
profession that encompasses multi disciplines to ensure functionality of the built environment by integrating people, place, process, and technology”.

Figure 1 and figure 2 illustrates the integration of people, process and place that contributes to core business and non core business in an organization. As we can see there are many definitions of FM that are contributed by many researches in their research to upgrade and improve the FM organization for a better performance.

Table 1: The FM Definition (Noor and Pitt, 2008)

<table>
<thead>
<tr>
<th>Organization</th>
<th>The FM definitions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Chotipanich (2004)</td>
<td>The support function coordinating physical resources and workplace, and support services to user and process of works to support the core business of the organization</td>
</tr>
<tr>
<td>Pitt and Tucker (2008)</td>
<td>The integration and alignment of the non core services, including those relating to premises required to operate and maintain a business to fully support the core objectives of the organization</td>
</tr>
<tr>
<td>Noor and Pitt (2009)</td>
<td>Creating an environment that is cohesive to carry out an organization’s primary operations, taking and integrated view of the infrastructure services and use it to give customer satisfaction and value for money through support for an enhancement of the core business</td>
</tr>
<tr>
<td>RICS (2009)</td>
<td>A discipline that improves and support the productivity of an organization by delivering all needed appropriate services, infrastructures, etc that are needed to achieve business objectives</td>
</tr>
<tr>
<td>Kamaruzaman and Zawawi (2010)</td>
<td>A balance between technical, managerial and business acumen that may be related to operational, tactical and strategic decision making process</td>
</tr>
<tr>
<td>IFMA (2010)</td>
<td>Facility management is a profession that encompasses multiple disciplines</td>
</tr>
</tbody>
</table>

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2. FACILITIES MANAGEMENT : OPPORTUNITIES, SCOPE AND IMPACT

2.1 Facilities Management in Malaysia: An Overview

A survey by Moore and Finch (2004) mentioned that FM is establishing well in South-east Asia (SEA) countries such as Hong Kong and Singapore and this is followed by Malaysia whereby there is an evidence in the progress of FM Industry. The study was based on restricted sample range and it has been emphasized that further research and investigation towards the findings need to be done in order to enlighten the FM industry (Moore and Finch 2004). To identify the FM growth in SEA, Moore and Finch (2004), had focused on important factors such as general factors and regional factors. General factors consist of globalization, information technology, high cost of space, employee expectations and cost of mistakes. Meanwhile, regional factors consist of regional economy, property market, market maturity, procurement system and general business environment. From the survey result of the study done by Moore and Finch(2004), was identified that the majority respondents were from Hong Kong, Singapore and followed by Malaysia. Prior to this, it is shown that, FM in Malaysia is measured to be in the infancy level and need to have a quality provision to upgrade the FM field in the future. In the other hand, Pillay (2002) which was adapted from (Kamaruzaman and Zawawi 2010) had briefly discussed the history of FM in Malaysia. FM in Malaysia started in the 1990’s with the support from the government sector. It is known that, earlier, FM has less collaboration with the real estate, architecture, and construction profession but now FM has a new level of thinking and collaborates with all this fields in order to strengthen the efficiencies of organization that focuses on people and process as well as the FM indicators that comprise of time, cost and quality (Kamaruzaman and Zawawi 2010). In addition, in 1990’s, FM was recognized as outsourcing organization till today and it is implemented in government buildings whereby FM is the “one-stop centre” that will focus on service level and customer requirement respectively (CIDB, 2010).

The Prime Minister of Malaysia (2001) adapted from (Kamaruzaman and Zawawi 2010) had emphasized that, “unless Malaysian change their mentality to become more aware of the need to provide good services and improve upkeep of buildings, we will forever be a Third World country with First World Infrastructure”. This statement mainly focused on the asset and FM in Malaysia in order to create the awareness on FM towards providing quality facilities, services, and best practices. The current situation of FM in Malaysia can be said to be at an infant stage with less knowledge in practicing it broadly and lacking its importance and recognition of the industry (Noor, 2009). Thus, FM field in Malaysia should be upgraded and focus on the skills and knowledge to maintain the identity and image of FM industry that lead to continuous improvement by increasing the level of satisfaction of customers that will articulate the success of every organizations. Therefore, the importance of strategies for FM need to be widely spread in every FM organization in Malaysia that
will help the organization to focus at each management level that comprise of strategic, tactical and operational.

2.1.2 Problem Statement

The present situation:
- FM is still in the infant stage
- Lack of awareness and knowledge contribution
- FM is focused more at the operational level and strategic level is neglected

What is wrong with the present situation:
- Misperception in FM practice and poor link between FM managers and top level managers
- Overlapping of activities or task between Facilities Management, Property Management, Asset Management, and Maintenance Management
- Overlook in the best practices, people, skills, knowledge and other aspects that contribute towards organization’s core business

What need to be done:
- There is a need for FM at the strategic level to have a closer relationship within clients, facilities support and facilitation (Price & Akhlaghi, 1999)
- FM as a whole need to be strategic about its business future, FM has to be establish its strategic effectiveness by demonstrating its potential relevance to overall business (Hinks, 1998, adapted from Paul et al, 2000)
- There is a need or collaborative strategy in developing systems and people to strengthen the best practices (Keith, 2003)
- FM is not only about operation and maintenance, other non technical aspects are equally important to ensure proper functioning of the built environment (Ong, 2009)

Therefore, FM in Malaysia need to have a productive strategic framework that can achieve organizations’ core business and lead towards the continuous improvement. In this paper, we will exclusively discuss on the preliminary review that has the significant of developing FM strategies which had been derived from various researches.

3. WHAT IS STRATEGY ?

The significant of strategy is to create a systematic organization that lead to continuous improvement and as well as to achieve the objectives for a longer term. Pugh (2011) mentioned that, strategy is a way of thinking to monitor the strength and weakness in order to have the ongoing growth of achievement of business. Pugh (2011) also highlighted that, strategy is about learning, discovering and inventing that supports the organizations best practice towards competitive advantage. Meanwhile, Johnson et al (1999) define strategy as the “direction and scope of an organization over the long term which achieves advantage for organization through its configuration of resources within challenging environment, to meet the needs of mark and to fulfill expectations”.

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Strategic Analysis

Figure 3: The basic model of the strategic management process (Johnson and Scholes, 1999)

Figure 3 shows the three main areas of strategic planning that had been created by Johnson and Scholes (1999) to form strategic approach. Strategy is needed to come up with good decision making, upgrade the best practices which will influence the quality, time and cost. It is also a way that helps managers to come up with good business decisions for the long term basis and as well as managing activities and best practices that contributes to the organizations and business performances (Adcroft et al., 2008). Thus, strategy and operational effectiveness is towards superior performance that can contribute to the achievement of primary goals whereby it is based on customers’ needs, accessibility and the variety of products and services and strategy can be said as about being different and choosing the perform activities which is the basic units of competitive advantage (Porter, 2008). Besides, strategy is the management’s core in order to understand the significant of organization’s positions to achieve the goals, mission and vision globally (Porter, 2008). Prior to this, it can be seen that, strategic planning is very significant in an organization to produce quality environment, reduction of cost, focusing on psychology and behavior of people in making decision to upgrade the organizational performance.

3.1 Strategic Framework and Models Created by Various Researches

Kincaid (1994), explores on his research regarding the role of FM, purpose and the potential of FM. He have mentioned that, in the early stage, FM is a management that belongs to manage the infrastructure of an organization to support the core business. Moreover, it integrates with Property Management (real estate), Property Operations and Maintenance and Office Administration. This three fields have the basic contribution to support the core business and the diversity of this is the financial impacts and skill requirements towards strategic atmosphere (Kincaid, 1994). This is where, FM is given attention to guide the organization for a long term basis and to have the expected requirements such as leadership, skills, knowledge, and other management aspects that will lead to support the organization at every level of management that has been illustrated in figure 4.

Kincaid (1994), created a framework to show the integrated facilities management in a simplify manner which divided into four major aspects that are consist of management roles, operational activities, management knowledge and facility knowledge. From this framework Kincaid (1994) had summarized FM as “a support role within an organization, must link strategically, tactically and operationally, and finally managers should equipped with knowledge of FM to carry out their
integrated support role”. In the other hand, two types of management level had been analyzed by Barrett (1995) which are the operational level and strategic level that is listed below:

a) Operational level basically focus on:
- FM department interacts with operatives
- FM department communicates with core business to identify requirements
- FM department benchmarks the existing facilities

b) The significant of strategic level are:
- FM interacts with core to ascertain future trends
- FM interacts with FM arena to study future changes within FM
- Interaction between strategic and operational facilities

From this two management level, Barrett (2000) had upgraded a research on achieving strategic facilities management through strong relationship that has been originally created by Barrett in year 1995 with the interaction of industry partners and also between the theoretical modeling. In this model, Barrett (2000) had focused on Ashby (1963) and Beer (1985) as a knowledge contribution towards the generic model. The ideas that has been given by Beer (1985) with the collaboration of Ashby (1963) that has been adapted from Barrett (2000) are as below:

- An organization’s environment can be divided up depending on time scale, ranging from immediate to very long term and the organization has to respond appropriately to inputs from each zone. These inputs will vary quite considerably in their characteristic with very broad conceptual data related to the long term contrasted about many short term issues.
- Each interaction between the organization and its environment will be in balance through the use of “attenuators” for example summary reports, and “amplifier” for example photocopiers. The same applies to be interaction between different parts of the organization.

![Figure 5: A Generic FM Model (Barrett 1995, Adapted from Barrett 2000)](image)

In addition, the linkages between FM and the organization is very significant to lead the organization towards quality business environment. This is by providing a quality services and increase the customer satisfaction that will enlarge the route to success and to have the continuous improvement in an organization. Besides, Barrett (2000) emphasize that FM need to have a proper interaction within the organization and of course the differences between operational FM and strategic FM and the responsibility of strategy in balancing this two level appropriately. Barrett (2000) said that the current and future business environment was shown in the generic model that can be a knowledge contribution to the FM organization in the future and this scales focuses on organization’s core business and FM is a key to the organization’s success. As an overall, the generic model is a knowledge contribution by Barrett (1995) to upgrade the FM organization to be more effective and efficient in the future. Barrett (2000) emphasize that the FM need to be continuously providing high level operational support towards core business and a significant development that links the core business and FM strategies for organization to balance the long term and short term perspectives. Barrett (2000) also highlighted that, FM managers is the main character that need to be active in the strategic consciousness and to think strategically in order to achieve organizations’ mission and vision as well as creating a quality FM image and identity that will be focused globally.

Meanwhile, Nutt (2000), focused FM as a strategic view that will add value to increase and achieve the potential outcomes. He have also mentioned that the strategic objective of FM “is to provide better infrastructure and logistic support to business and public endeavors of all kinds and across all
sectors”. Nutt (2000) had introduced a model entitled the generic trails to future that consist of four competing futures for FM which are business, people, property and information. Figure below shows the generic trails that contributes to productivity, human effectiveness and facilitating business success (Nutt, 2000).

Figure 6: Generic trails to the future (Nutt, 2000)

Figure 7 was created by Nutt (2000) which is the resources model of strategic FM. In this model we can see that there is a collaboration within this four trails that is very significant for the success of FM companies. Besides, this model will be a guideline for the FM field to measure their performance and upgrade their business perspective to achieve the continuous improvement as well as being productive in their business arena.

Figure 7 also emphasized on the professional interface, business information interface, property information interface and task interface that has been created by Grimshaw (2003) in order to have a better perspective for the FM profession in the future. Besides, this interfaces are significant to guide the FM managers to be quality professionals and focuses on the characteristic such as interpersonal, informational and decisional that supports the business objectives.
4. TECHNIQUES USED IN DEVELOPING STRATEGIES FOR FACILITIES MANAGEMENT

FM is an important profession which is not only focusing on the economic capabilities, but also shares its importance towards social and environment benefits (Alexander et al., 2006). Focusing FM at strategic level is basically on the excellence of leadership that drives towards strategic path and at the same time effective learning and innovation will help to add value to the FM organization (Alexander, 2003). Furthermore, Alexander (2003) highlighted that FM need to be seen in an extensive manner and revise the strategies to develop new process that contributes to community, purpose and environment. According to (Atkin and Brooks, 2005), developing strategies for FM plays an important role in contributing to organizations business objectives and needs. It is mentioned that, there are three levels need to be focused in developing the FM strategies which comprise of analysis stage, solution stage and implementation stage as shown in Table 2.
Table 2: The Stages in Developing FM Strategies (Atkin and Brooks, 2005)

<table>
<thead>
<tr>
<th>Stages</th>
<th>Actions</th>
</tr>
</thead>
<tbody>
<tr>
<td>Analysis stage</td>
<td>Relevant facts including the organization’s objectives, need and policies, a review of resources, process, system and the physical assets together with the attributes in terms of space, function and utilization</td>
</tr>
<tr>
<td>Solution stage</td>
<td>The criteria for judging options, evaluating these against the objectives of the organization, and develops the facilities management strategy</td>
</tr>
<tr>
<td>Implementation stage</td>
<td>Completes the strategy development process through the establishment of an implementation plan that incorporates the key elements of procurement, training and communication</td>
</tr>
</tbody>
</table>

Table 2 shows the stages involve in developing FM strategies that will be very much relevant for the organizations’ strategic and operation plan that contributes to organizations’ core business. Atkin et al, 2005 had introduced a framework (Table 3) on the process of developing FM strategies in order to have a better understanding on the current situation and the approach between core business and FM. Meanwhile, (Nutt, 2000) highlighted that developing strategies for FM comprise of four competing trails comprise of business, people, process and technology that act as a support business that contributes directly to productivity and human effectiveness that lead to continuous improvement, success and opportunities globally.

Table 3: Techniques and Tools to Support Development of FM Strategy (Atkin and Brooks, 2005)

<table>
<thead>
<tr>
<th>Development stage</th>
<th>Phase</th>
<th>Technique or Tool</th>
</tr>
</thead>
<tbody>
<tr>
<td>Strategic Analysis</td>
<td>Services audit/ review</td>
<td>• Benchmarking</td>
</tr>
<tr>
<td></td>
<td>Assessment of expectations and objectives</td>
<td>• SWOT analysis</td>
</tr>
<tr>
<td></td>
<td>Portfolio audit</td>
<td>• Space analysis, Maintenance plan, risk audit</td>
</tr>
<tr>
<td></td>
<td>Resource Audit</td>
<td>• People/skills audit</td>
</tr>
<tr>
<td></td>
<td>Market Audit</td>
<td>• Service provider audit</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Service providers (external)</td>
</tr>
<tr>
<td></td>
<td></td>
<td>• Supply of real estate &amp; etc</td>
</tr>
</tbody>
</table>
Developing Solutions

<table>
<thead>
<tr>
<th>Generations of options</th>
</tr>
</thead>
<tbody>
<tr>
<td>Evaluation of options</td>
</tr>
<tr>
<td>Selection of strategy</td>
</tr>
</tbody>
</table>

- Outsource modeling
- BPR
- Maintenance plan
- Risk analysis
- Cost benefit analysis
- Optimizing model

Strategic implementations

<table>
<thead>
<tr>
<th>People and systems</th>
</tr>
</thead>
</table>

- Change management through the application of rigorous project management (plan, monitor and control)
- Training and development BPR

Strategies play an important role in every organization’s whereby this will influence the profit margin, customer satisfaction as well as the recognition of FM organization. In addition, this will provide good delivery on quality, cost and time that meet the customers’ expectations towards products and services (Alexander, 2003). Alexander (2003), mentioned that “strategic planners need to predict future business conditions in order to make the appropriate decisions about the balance facilities needed, the way in which to organize their operation and management and the best way of providing them”. Prior to this, FM organizations’ need to improve the quality of FM by producing good business strategies and increase the professionalism in this field towards innovation and business environment that lead to the successfulness of core business. According to Timm (2010) FM managers plays an important role to develop strategies that contributes to business productivity by understanding the business, structuring the operations by new way of thinking, and to support the customers’ needs in order to achieve the corporate recognition. Table 7 shows several literatures and research that contributes in developing FM strategies.

Table 4: Several researches done and its contribution in developing FM strategies

<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Topic/ Contributions</th>
</tr>
</thead>
</table>
| Nutt              | 1993 | Topic: The Strategic Brief
Contribution: The Total Briefing Cycle, contributes to productivity, decision making, greater adaptability, manageable and support the management. |
| Barret, P         | 2000 | Topic: Achieving Strategic FM Through Strong Relationship
Contribution: Generic FM Model, contributes to knowledge and skills for FM managers to think and act strategically |
Contribution: Strategic Characteristic of the UK public sector organizations. To control the formation of facilities |
<table>
<thead>
<tr>
<th>Author</th>
<th>Year</th>
<th>Topic:</th>
<th>Contributions:</th>
</tr>
</thead>
<tbody>
<tr>
<td>Alexander, K</td>
<td>2003</td>
<td>A strategy for FM</td>
<td>Collaborative strategy involves in developing business, systems and people</td>
</tr>
<tr>
<td>King, B</td>
<td>2006</td>
<td>Why do you need to strategize the FM role</td>
<td>Leadership role that contributes to support organizational goals and corporate culture that maximize company’s overall performance</td>
</tr>
<tr>
<td>IFMA</td>
<td>2009</td>
<td>Strategic facility planning, A white paper</td>
<td>Strategic Facility Planning (SFP), Strategic Layout Planning (SLP) contributes to be more proactive delivery of services from FM organization to stakeholders</td>
</tr>
<tr>
<td>Timm</td>
<td>2011</td>
<td>Facilities Management- Earning the right to drive strategy</td>
<td>Re-positioning of brand, whereby the FM managers need to demonstrate their strategic importance to achieve the corporate recognition</td>
</tr>
<tr>
<td>Chotipanich, S.,</td>
<td>2011</td>
<td>A Study of FM Strategy: The Case of commercial Banks in Thailand</td>
<td>Four types of FM strategies was identified. Basically contributes to FM practices and core operations</td>
</tr>
<tr>
<td>Lertariyanun, V.</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

5. **WAY FORWARD**

FM is known globally and the awareness of FM need to be focus in order to understand its significant whereby, it contributes to the successfulness of an organization technically and non-technically. FM can be applied at every level of organization and the strategies are important towards guiding the organizations to the right path and to achieve the objectives of core business as well as to increase the profit margin by increasing the customer satisfaction index (CSI). More characteristic and typology of FM strategy need to be introduced within the theoretical ground and method of studying the FM strategies that will be a guidance for the FM organizations in the future. As a conclusion, FM strategies are significant in creating value and add value for business and upgrading the performance at each level of management that will guide to innovation and business success towards the transformational environment.

6. **CONCLUSION**

To create FM strategies, organizations need to have a strong leadership that covers the interpersonal, informational and decisional characteristic that will sustain the FM industry. From the review it is identified that strategies are significant in every organization to improve the effectiveness and efficiencies in providing quality services and amplify the profit margin by satisfying the customers’ requirements as well as contributing the right functions and services that will delight the customers. Besides, It is also hope that the FM strategies can help to collaborate with the strategic, tactical and operational level respectively to achieve an optimum organizational performance. Meanwhile, other non technical aspects need to be given priority to improve the soft skill and hard skills of every FM organizations that will benefit the FM industry in upgrading their level of performance in the future.
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Journal
Ong, C. L., (2009), Facilities Management in Malaysia, *JURUTERA*, ISSN 0128-4347, Volume 41, pp. 11-15

**Website**
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1) Household Energy Consumption and Carbon Foot Print in Ibadan City, Nigeria
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   *Seyed Mehdi Mirisaei Faizah Ahmad, Ibrahim Mohd @ Ahmad*
HOUSEHOLD ENERGY CONSUMPTION AND CARBON FOOT PRINT IN IBADAN CITY, NIGERIA

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Abstract
This study adopts the three dimensional energy model in quantifying the direct impact of household energy consumption of the following fuels: kerosene, electricity, LPG, premium motor spirit (PMS) and their related carbon dioxide (CO$_2$) emissions in Ibadan city, Nigeria. 144 household heads were randomly chosen in the three residential areas (high, medium and low density) of the city. In Nigeria, the household sector accounts for about 40% of the total energy consumed annually. Household energy consumption and CO$_2$ emission has unique characteristics which makes it complex to assess and analyse compared to other sectors. Findings from the study showed that household characteristics are strongly related to CO$_2$ emissions. Also, CO$_2$ emissions from the various fuels considered in the study varied. The present study recommends a change in behavioural attitude, adoption of efficient and renewable energy technologies in order to reduce the household carbon foot print and its impact on climate change.

Keywords: carbon foot print, Ibadan city, energy consumption

1. INTRODUCTION
The issue of global warming is one of the most environmental challenges facing the world today. The ever increasing amount of carbon dioxide (CO$_2$), the dominant contributor to the greenhouse effect, seems to be aggravating this problem (Zhang and Cheng, 2009). Hence, a lot of research has been going on the current energy consumption pattern vis-à-vis CO$_2$ at the industrial, transport, and household sector of the economy. While studies on the industrial and transport sector could be said to be receiving attention due to the availability of time series data at the macro level, studies at the micro level (household) has not really been focused on. Households, especially in the developing countries, contribute significantly to the total energy consumption of a nation. Several factors, such as, socio-economic, demographic, geographic and dwelling characteristics of the households determine the house-holds’ energy requirements (Pachauri, 2004; Rao and Reddy, 2007). In Jordan, 22% of total energy consumption is by residential sector and 35% of total electricity consumption by residential consumers (Al-Ghandoor et al., 2009). In New Zealand, residential energy use is 13% of the total annual energy demands (Howden-Chapman et al., 2009). Residential sector in Bhutan contributed 48.7% of the total energy consumed in the country in 2005 (Garud and Gurung, 2007). In Nigeria, household sector consumes 40% of the annual energy demand ( Oladosu and Adegbulugbe, 1994 ). The increasing concern about household energy consumption and environment has become a topical issue among energy pundits and researchers. This concern is borne out of the fact that changing lifestyles due to increase in wealth generation and high urbanization rate experienced in the last three decades has increased energy use. The ability of households to monitor their energy
consumption is very important in the context of climate change adaptation. The household sector accounts for about one fifth of the global CO\textsubscript{2} emissions in 2008 (OCED/IEA, 2010). This is even higher when other greenhouse gases like methane and short lived pollutants (black carbon) are included. These non CO\textsubscript{2} pollutants that result from incomplete combustion of household energy use have more effect on climate and human health (OCED&IEA, 2010). There has been an increase in total world energy consumption and emission of CO\textsubscript{2} over the years. For instance, from 1990 to 2004, the global energy consumption increased to about 30\% and CO\textsubscript{2} emission 26\% (EIA, 2007). Household energy consumption takes various forms such as lighting, cooking, and operation of appliances, space heating and cooling. In the United States for instance, the use of commercial energy sources in the household accounts for about 12\% of the total national energy supply and when the primary energy used in the generation of electricity for is incorporated, the household share of total energy supplies increases to 22\% (EIA,2007). The CO\textsubscript{2} emissions from the household energy consumption is dependent not only on the quantity of energy consumed but equally on the energy source. It has been observed that household electricity generated from renewable sources (solar, hydro) or from nuclear energy may produce no CO\textsubscript{2} emissions. What this means in essence is that the impact of household electricity consumption on climate change will be different across countries due to differences in sources of energy generation. In those countries where electricity is generated from fossil fuels there will be more CO\textsubscript{2} emissions in to the atmosphere compared to those that generate most of their electricity from renewable sources. Even among the fossil fuels, there is variation in the rate of emission. For instance, natural gas emits less CO\textsubscript{2} per unit of energy than oil, which emits less than coal (UNDESA, 2007). The variation that exists in generation of electricity and other household fuels makes research on household energy carbon footprint somewhat difficult as different regions or nations have different carbon emission factors they use in calculating carbon footprint.

The present study aims at calculating the carbon footprint of three neighbourhoods (low, medium,high) in Ibadan city Nigeria using three dimensional energy ladder model as the basis.

2. LITERATURE REVIEW
Carbon footprints, measured in tons of carbon emissions per year, contribute to climate change. Although some emissions are tied to factors beyond consumers' control for example, the emissions created by a manufacturer when it produces fuel-efficient cars, the average household can still take significant action to shrink its carbon footprint (Crawford, 2012). Sustaining the lifestyles of the teeming urban population in this 21\textsuperscript{st} century needs a vast quantity of resources – water, energy, roads etc. However, meeting these challenges result to environmental pressure such as greenhouse gas emission, water and air pollution, traffic congestion etc. Energy serves as the power house of modern cities, virtually everything that humans do in this age is tied to direct or indirect energy consumption. Using an input- output analysis and a comprehensive household expenditure data from Sydney statistical division in Australia, Lenzen et al (2004) found that household size was strongly correlated to energy use. Over the years, issues relating to household size and energy consumption are shifting from the traditional hypothesis that larger households consume more energy than smaller households. Sustaining the lifestyles of the teeming urban population in this 21\textsuperscript{st} century needs a vast
quantity of resources – water, energy, roads etc. However, meeting these challenges result to environmental pressure such as greenhouse gas emission, water and air pollution, traffic congestion etc. Energy serves as the power house of modern cities, virtually everything that humans do in this age is tied to direct or indirect energy consumption. Households use energy for a wide range of activities. Two different domains of household activities can be distinguished: indoors and outdoors. According to Van Diepen (2000), this distinction reflects the difference between sojourning in space (indoors) and the bridging of space (outdoors). However, activities in both domains require energy. The indoor activities such as heating, lighting, cooking, and use of appliances are the various ways through households emit CO₂. Using an input-output analysis and a comprehensive household expenditure data from Sydney statistical division in Australia, Lenzen et al (2004) found that household size was strongly correlated to energy use. Over the years, issues relating to household size and energy consumption are shifting from the traditional hypothesis that larger households consume more energy than smaller households. Higher income households tend to consume more energy than lower income households (Abrahamse and Steg , 2011, Boxall et al 2011) . Household energy intensity in terms of the ratio of consumption to floor area decreases with higher household income (Lenzen et al. 2006). House type has an impact on the household energy consumption, Boxall et al (2011) in their study on the factors that influence energy and water consumption by households in Sydney, Australia found that those households residing in detached houses consume more energy due to the number of bed rooms and facilities that are fitted in them. In their study on residential energy use and demographics among 300,000 Dutch homes, Brounen et al (2012) found that electricity consumption of those families with children was one-fifth more than those without children and that the trend becomes even stronger when the age of the children increases.

3. THEORETICAL FRAMEWORK

3.1 Three Dimensional Energy Model

The three dimension energy model proposed by Kowasari and Zerriffi (2011), has its premise on the relationship between energy services, carriers and devices. Around these relationships are the various factors influencing energy consumption of a household. The three dimensional frame works looks at energy use from the disaggregated level-household and can be used with qualitative and quantitative data. Hence, micro-trends are captured based on the information from objective qualitative data as well as quantitative data. Also the three dimensional energy models provide the template for capturing the causal relations between different aspects of household energy use. Household energy use patterns is influenced by simultaneous decisions on the type of fuels/carrier, energy service requirements and the conversion technologies which all together forms the household energy system. The interrelations and dynamics between the three dimensions are addressed simultaneously. Unlike the other models of household energy consumption that place more emphasis on energy quantity, the three dimensional model focuses more attention to energy services thereby shedding more light on the human aspect of energy use in a realistic view.
Looking at the three dimensional energy profile (fig 1,) at the centre, an array of factors influencing these three dimensions can be assessed and enumerated. An array of drivers through complex, reciprocal linkages and interactions affect household energy. For example, meeting the cooking service requirement of a household depends on the affordability and availability of energy carriers, household demographic profile (e.g., education, age, household size, income, gender etc), and preferences of the various fuels and so on. Though income is considered as a major factor under the category of capabilities, an attempt is made not to overemphasize on income by equally giving attention to other sets of variables and factors. The model incorporates different dimensions of human behaviour in order to have a full understanding of the relationship that exist between the human agency and energy consumption (Kowasari and Zerriffi 2011). The factors influencing households decision with respect to energy consumption in the circle (Fig 1) are strongly linked together and simultaneously affect the three dimensions of household energy use pattern. The failure of some of the existing models on household energy to address the attitude and behaviour of people when it comes to energy consumption has been challenged (Van Raaij et al, 1983, Wilk and Richard, 2002, Stern and Paul, 2000). In the three dimensional model, the influence of human behaviour and attitude is incorporated under two main domains: Personal domain (habits, attitudes, experiences) and contextual domain (external conditions, personal capabilities). Attitudinal factors comprise of values, norms, and specific beliefs. Experiences and habits are the major determinant in human behaviour. Personal capabilities include technical skills, socioeconomic profile and available resources needed for an action. Socio-demographic characteristics (gender, age, income, educational...

Figure 1: Three dimensional model diagram modified from Kowasari and Zerriffi (2011)
level, ) are regarded as personal capabilities. External conditions include regulations, market forces, technologies, informal and formal institutions, prevailing economic condition, social interactions, government policies etc (Stern and Paul, 2000; Wilson and Dowlatabadi 2007) . Kowasari and Zerriffi (2011) noted that a proper understanding of these drivers and interactions between and their causal relationship with energy systems needs a multi-scale technique in order to comprehend how variations at various scales (international, national, community, and household) affect household energy consumption. This study is focused on direct energy consumption of households in an indigenous African city, Ibadan Nigeria with the aim of predicting the carbon dioxide (CO2) emissions from various fuels used by households in meeting their energy needs.

4. MODEL SPECIFICATION

Household CO2 emission is defined as:

\[
\text{End use } \text{CO2} = \sum m(E_a \times \text{CO2Coefficient}_a + K_b \times \text{CO2Coefficient}_b + L_c \times \text{CO2Coefficient}_c + G_f \times \text{CO2Coefficient}_f)
\]

Where:
\[E_a = \text{quantity of electricity consumed per month}\]
\[K_b = \text{quantity of kerosene consumed per month}\]
\[L_c = \text{quantity of LPG consumed per month}\]
\[G_f = \text{quantity of gasoline oil or petrol consumed per month}\]

CO2 emission factors for various fuels according IPCC Standard emission factors 2007 = CO2Coefficientabcdefg

Carbon emission factors for the various fuels

<table>
<thead>
<tr>
<th>Fuel</th>
<th>CO2Kg/GJ</th>
</tr>
</thead>
<tbody>
<tr>
<td>Electricity</td>
<td>416 gCo2 /Kwh</td>
</tr>
<tr>
<td>Kerosene</td>
<td>19.6</td>
</tr>
<tr>
<td>Liquefied petroleum gas (LPG)</td>
<td>17.2</td>
</tr>
<tr>
<td>Gasoline oil ( petrol )</td>
<td>18.2</td>
</tr>
</tbody>
</table>

(Sources: IPC 2007, OECD/IEA, 2011 CO2 emissions)

Predicting the household carbon foot print drivers

In this study household carbon foot print (CO2 emissions) is derived from

\[
Y = \beta_0 + \beta_1 x_1 + \beta_2 x_2 + \beta_p x_p + \varepsilon
\]

(1)

In which, 'Y' is a dependent variable and 'p' denotes the number of explanatory variables. \(x_1, x_2, x_3, \ldots x_p\) are explanatory variables, \(\beta_0, \beta_1, \beta_2, \ldots \beta_p\) are the parameters, and \(\varepsilon\) is a random variable (error term)
Y = $\beta_1 X_1 + \beta_2 X_2 + \beta_3 X_3 + \beta_4 X_4 + \beta_5 X_5 + e$ \hspace{1cm} (2)

\[ Y = \text{End use CO}_2 \]

X1 = Number of rooms occupied by household
X2 = Number of appliances owned
X3 = Monthly income of household head
X4 = Age
X5 = Household size

5. STUDY AREA
Ibadan is the capital of Oyo State and the third largest metropolitan city in Nigeria after Lagos and Kano. According to 2006 population census estimate, the city has a population of 2,550,593. However, UN World Urbanization Prospectus (2010) projects the population of Ibadan to be 2.84 million. The city is located on several hills ranging from 150 to 275 metres above sea level. The location advantage of the city and its accessibility to the capital city of Lagos played an important role in its choice as the headquarters of the Western Provinces in 1939 which later metamorphosed to western region of Nigeria in 1952 (Mabogunje, 1968 :200). In terms of energy supply, the Nigerian National Petroleum Corporation (NNPC) depot in the city supplies petroleum products such as kerosene, gasoline oil (petro), and diesel to various independent marketers of petroleum products in the city. These products are transported to various filling stations in the city where final consumers come and purchase them. The liquefied petroleum gas (LPG) plant is located in the city which supplies LPG to various retailers. These retailers sell to various households and other users in cylinders of various sizes ranging from 12 kg. The current electricity supply problem facing the nation also manifests in the city as most households could hardly have an uninterrupted power supply for twenty four hours. Soneye and Daramola (2011) found in their study that about 60 per cent of households in Ibadan city receive less than 4 hours of electricity supply from the Power Holding Company of Nigeria (PHCN). Most households in the city rely on the use of diesel or petrol generating sets for electricity generation. The 1KVA generator popularly known as “I better pas my neighbour” is commonly used by households. As at 2012 about 1649MW of electricity was supplied to the city by the Power Holding Company (PHC) PLC. Large quantity of woodfuel used by households in the city are harvested from surrounding farming villages such as Ipoki, Alabata and Ijaye which are situated 20 kilometres from the city centre. The fuelwood is transported to the urban centre by traders who in turn sell to potential buyers at various locations in the city (Adelekan and Jerome, 2006)

6. DATA/ ANALYTICAL TECHNIQUE
This paper employs household pilot survey from three (low, medium, high density) neighbourhoods in Ibadan city, Nigeria. In each of the three neighbourhoods, 48 household heads were randomly chosen, making a total of 144. A well designed questionnaire that captured household attributes of respondents and the various fuels they use in meeting their daily needs was used to gather information on energy consumption. The choice on variables explaining household energy consumption was guided by two factors. First, previous studies on household fuel consumption were
consulted. Second was that those variables that were seen to be relevant in the context of the study were considered. Context here implies the socio-economic setting in Nigeria. The Multiple linear regression analysis (MLR) technique was used in analyzing the data. The strength of this technique lies on its predictive power and ability to show some relationships between two or more variables. Considering the nature of the data for the study, this technique serves as the best for a study of this nature.

7. RESULTS

7.1 Demographic Characteristics of Respondents
A total of 103 (71.5%) of the respondents that participated in the survey were males while the rest 41 (28.5%) were females. Majority (51%) of the respondents’ age ranged from 31-40, 29.2% age ranged from 20-30, 10% ranged from 41-50 and 9.9% were above 50 years. In terms of marital status, 61.4% were married while 38.6% were still single.

![Figure 2: Occupation](image)

Results from Fig. 2 show that 35% of the household heads were civil servants, 19% engaged in other occupations, 16% respectively were engaged in private business and other hand crafts while the rest (19%) engaged in other occupations. That most of the respondents sampled were engaged in civil service is borne out of the fact that Ibadan is known in Nigeria as a “civil servant city”, the number of industries that are located in the city is very small compared to cities like Lagos or Kano. Hence, most people working in the city are either state civil servants or those working at different federal agencies in the state.

Results in Fig 3 show that 21% of the respondents monthly income ranged from 20- 40,000 Naira, 19% earned between 41-60, 000, 14.4% earned between 61-100,000, 13.8% earned <20,000 and 101-200,000 respectively, 10% earned between 201-300,000 and 8% earned above 300,000.
7.2 CO2 Emissions across the Three Neighbourhoods

A discriminant analysis test was carried out to determine the group statistics and test of equality of group means of CO2 emissions from various fuels used by households. Before carrying out the discriminant test, Box's $M$ test was conducted to test the equality of covariance across groups. For sufficiently large samples, a no significant p value means there is insufficient evidence that the matrices differ. The dichotomous variables, which very often contradict the hypothesis of multivariate normal distribution, do not affect the discriminant analysis conclusions (Klecka,, 1980). Hence, with large samples, a significant result is not regarded as too importance, the discriminant analysis could be conducted.

Table 1: household CO2 emission across the neighbourhoods

<table>
<thead>
<tr>
<th>Household carbon footprint (CO2 emission)</th>
<th>Low density neighbourhood</th>
<th>Medium density Neighbourhood</th>
<th>High density Neighbourhood</th>
<th>Wilks' Lambda</th>
<th>F</th>
<th>Sig.</th>
</tr>
</thead>
<tbody>
<tr>
<td>Group means</td>
<td>4,170,661 CO2Kg/GJ</td>
<td>4,145,673 CO2Kg/GJ</td>
<td>3,974,582 CO2Kg/GJ</td>
<td>0.998</td>
<td>0.244</td>
<td>0.885</td>
</tr>
<tr>
<td>Std deviation</td>
<td>(2167927.90)</td>
<td>(2126663.06)</td>
<td>(2054950.98)</td>
<td></td>
<td></td>
<td></td>
</tr>
</tbody>
</table>

The results in table 1 revealed that there is no significant difference in emission of CO2 across the three neighbourhoods ($\lambda$ 0.998, $F$=0.244, $P$> 0.05). What this suggests therefore is that there is no much variation in household CO2 emissions across the neighbourhood.
7.3 CO₂ Emissions from Various Fuels

The CO₂ emissions of the four major dominant fuel sources used by households in the study area was calculated based on their carbon emission values from IPC 2007, and OECD/IEA, 2011 CO₂ emissions default values. Results in fig 4 show that generating set (2,551,003 CO₂ kg/GJ) accounted for about 62% of the total emission followed by Kerosene (831,094 CO₂ kg/GJ) which accounted for about 20%, LPG 18% (714,875 CO₂ kg/GJ) and electricity less than 1% (491 CO₂ kg/GJ). The high contribution of generating to the CO₂ emission in the city is not surprising because of the epileptic grid electricity supply in Nigeria. Out of the 144 respondents sampled, 122 (84.7%) owned one generating set while 21 (14.6%) owned two (2) generating sets while less than 1% did not own generating set. The high ownership of generating set by households in most urban centres and the carbon emission accompanying the use of these generating sets is one of the environmental challenges facing Nigeria currently.

![Figure 4: CO₂ emission per fuel source](image)

8. HOUSEHOLD CARBON FOOT PRINT DRIVERS

As earlier stated in the study, the choice of variables used in predicting household CO₂ emission was based on past studies relating to household energy consumption. In this study, we hypothesized that a significant relationship exists between CO₂ emissions and household characteristics. The results in table 2 show that a significant relationship exists between CO₂ and household characteristics (number of appliances owned, age, monthly income, household size, house type, and number of rooms) \( F = 825.785, \ P < 0.05 \). With an \( R^2 \) value of 0.973, the model’s predicting power is adjudged good. Meaning that about 97% or 0.973 variance in CO₂ is accounted for by the household characteristics of respondents sampled in the study. Further, the contribution of the variables used to measure household characteristics in the model was examined. Number of rooms (\( \beta = 4.739, \ P < 0.05 \)) contributed most among the independent variables followed by age (\( \beta = 4.404, \ P < 0.05 \)), monthly income (\( \beta = 3.710, \ P < 0.05 \)), household size (\( \beta = 1.642, \ P < 0.05 \)), house and number of appliances owned (\( \beta = 0.731, \ P < 0.05 \)). These findings is in tandem with earlier works (Abrahamse and Steg, 2011, Lenzen et al 2004).
Table 2: CO₂ emissions VS household characteristics

<table>
<thead>
<tr>
<th>Co² emissions</th>
<th>±β 0.731 *Appliance</th>
<th>±β 4.404 * Age</th>
</tr>
</thead>
<tbody>
<tr>
<td>Standerr t-values</td>
<td>17263.292</td>
<td>488403.360</td>
</tr>
<tr>
<td>P-values</td>
<td>24.821</td>
<td>29.306</td>
</tr>
</tbody>
</table>

| | ±β 1.642 *HHD size | -β 4.739 *No rooms |
| | 12406.281 | 158320.679 |
| | 50.678 | -28.418 |
| P-values | .000 | .000 |

R² = 0.973,  F = 825.785, P=.000

9. CONCLUSIONS
A reduction in energy consumption will decrease CO₂ emissions. For a developing country like Nigeria whose energy sector is grappling with a lot of challenges, reducing household CO₂ emissions may seem a herculean task considering the challenges being faced in the area of power generation. The findings of the study showed that the use of generating sets by households accounted for about 60% of the CO₂ in the three neighbourhoods covered by the study. Even though all the respondents were connected to electricity from the grid, most of them stated that they merely have stable electricity for 6 hours a day. The implication is that most residents rely on petrol and diesel powered generating sets for their electricity supply. Also LPG is equally not within the reach of most households, so they rely on kerosene which has a higher emission factor for cooking their meals. Adopting alternative policies such as increasing the utilization of cleaner energy sources (wind, solar, natural gas) may mitigate the pressure on the environment and gain some time until technological development enable a full switch from fossil fuels to cleaner energy sources.

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MAKING THE SWITCH: FACTORS AFFECTING CONSUMER PREFERENCES FOR HOME ECO-DESIGN FEATURES

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Abstract
The word sustainability is prevalent in all 21st century development. However, making the switch from our conventional building traditions has proven to be difficult. High density housing, such as apartments and condominiums, make up the largest proportion of incoming new housing units. The aim of this paper is to introduce an undergoing study which seeks to discover the level of knowledge about eco-design in housing among middle cost consumers of apartments/condominiums in Kuala Lumpur, Malaysia as well as reveal which sustainable home features they most prefer. In order to study the current stance of consumers on this issue, an online questionnaire is being administered through real estate websites, comprising of questions addressing consumer knowledge and preferences for eco-design features currently available to developers of homes in and around KL. Consumer knowledge will be measured through multiple choice questions, while preference will be measured using rank-ordering. A predictive model will aim to measure the influence of knowledge on preference. The results of the survey are not yet available, but its implications are considered in the discussion.

Keywords: consumer preference, eco-design, green homes, Kuala Lumpur, sustainable development

1. INTRODUCTION
With sustainability ruling the lexicon of all development in the 21st century, one wonders how, and how quickly, we will be capable of making the switch from our conventional building traditions to, ultimately, carbon-neutral sustainable communities of the future. As Everett Rogers discovered in his theory of Diffusion of Innovations (1995), the mainstream individual can only adapt to so much new technology at once. And the fastest way of converting a whole population to adopting new and unknown systems is by introducing the technology to them in small, slightly complex pieces at a time. Naturally, much consumer research must precede the launching of new products into the very picky and volatile market to ensure the uptake and success of the overall progress towards modernity.

This paper outlines an ongoing study on consumer knowledge and preferences for eco-design features in middle cost apartments and condominiums in and around Kuala Lumpur, Malaysia. If we look at the sector of housing in the green building industry, one may think of it quite the same way. We currently have many options for making conventional housing design and construction more sustainable. There are eco-design features to address ecology, pollution, resource and waste management, indoor environmental quality, maintenance, and social justice. However, it may be wise to ask, “How much are the people ready for and what green-home features should be launched first?”
For example, the most common green features that people mention when they think of sustainable homes are solar panels and green spaces. But experience has shown that the Malaysian market was not ready when developers installed solar water heaters and panel cells on many roofs of new homes around KL under government incentives, which quickly fell into disrepair and were never used again (UN Development Programme, 2007). Their carcasses now rest on thousands of homes as a reminder of the blunder. There are other cities, though, like Port Elizabeth, South Africa, which adopted solar panels successfully at the very same time that KL’s attempt failed. In several subsidized housing areas, the Nelson Mandela Bay Municipality installed solar water heaters on every single house. As you drive past these large areas you can see them on every roof, and as the locals confirm, they are gratefully maintained and used. The communities there were ready for the technology; they needed it and quickly built up the necessary industry around it to keep the panels in working condition (www.nelsonmandelabay.gov.za/Content.aspx?abjD=425).

Consumers in Kuala Lumpur took to new technologies like iPhones and tablets with incredible speed and ease compared to other major cities, but why? Perhaps the transition was thanks to the industry previously set up for these gadgets and the familiarity that consumers had with this type of product. Maybe it was just related to the needs that citizens had for mobile internet and multi-purpose phones, or simply the intervals of time between one product and the next, more advanced one. In the process of weaning consumers out of conventional homes and into environmentally friendly ones, in order to make a successful and lasting transition, questions such as these must be taken into account. Where do consumers stand with respect to needs, awareness, preferences and current availability of eco-homes?

In order to study the current stance of housing consumers in KL on this issue, a questionnaire was designed. The survey, to be administered online through real estate websites, comprises of questions addressing consumer knowledge, attitude, and preferences for eco-design features currently available to housing developers in and around Kuala Lumpur. Consumer knowledge will be measured through multiple choice questions, while preference will be measured using rank-ordering. A predictive model will aim to measure the influence of knowledge on preference. The results of the survey are not yet available, but its implications are considered in the discussion.

2. LITERATURE REVIEW

Academic literature on the sustainable housing industry in Kuala Lumpur is extremely thin and limited. Mostly, research in this field is centered on architectural design, technological improvements, sustainable construction and green building materials, but little has been published with respect to consumer research. Previously, several studies on housing satisfaction were completed around KL, but none focused on consumer preferences for green homes.

Many influences have been identified in the phenomenon of consumer preferences. According to market research, brand attachment, attractiveness, and availability affect consumers’ purchasing
preferences. In psychology there are several behavior theories pointing toward the roles of factors such as valued attributes, attitude, social norms, and even altruism (Jackson, 2005). For instance, the Theory of Planned Behavior explores the role of attitude in people’s decision making. According to TPB individuals’ attitudes influence their preferences (Chun-Der Chen, 2007). A branch of TPB, the theory of Perceived Behavior Control, observes how social norms, knowledge, attitude and market limitations may affect this process. Studies using the ABC Model found that when knowledge of contextual factors is weak, the role of attitude is strong, and vice versa, if contextual factors are strong, attitude has almost no relevance in decision making (Jackson, 2005). Rational Choice Theory says an individual makes choices based on a rationalization of the perceived values that an option may contain (Jackson, 2005). However, this model breaks down when it is proposed that individuals do not always have full knowledge about the choices they must make. On the other hand, information from school, the media, personal experience or the experiences of others helps to form an attitude regarding the issue.

An individual’s perceived locus of control, his/her perceived ability to have control over the outcome of a behavior, has been included in the Theories of Reasoned Action and Planned Behavior as a variable affecting choice (Chun-Der Chen, 2007). Because a potential home buyer’s perception of control could impede him from behaving as desired, the goal of this study is to inform developers of consumer’s preferences so that they may incorporate them into their designs, facilitating the consumer’s choice. The interest lies only in learning which attributes of eco-design consumers would give priority to over others if the options were to be easily available for the same price (if it was the norm in housing of this price range). In this way, there is a control on such limitations in behavior as price, ease of accessibility or perceived behavioral control and social norm. As opposed to observing the actual overt choices made by housing consumers, in this study, a stated preference model is used, where an individual’s ability of actually getting what they want is removed (Macoloo, 1989). From the perspective of sociology, the mechanism by which the diffusion of innovations occurs is a five-step process beginning with knowledge. A consumer is first exposed to an innovation and has limited information of the product. It is only after an increased awareness of the object that the individual actively seeks to attain it, or prefers it over other options (Rogers, 1995).

It is apparent from these theories that among the variables affecting preference and choice is information and knowledge of a particular item. Therefore, the moment immediately preceding the formation of an attitude and then a preference of one thing over another, lies in the consumer’s knowledge. Knowledge, then, about sustainable design features may boost consumer preferences for homes containing them. The level of knowledge exhibited by respondents and their stated preferred features will shed light into why choices for or against green home features are being made. Preference is of particular interest here because it can help developers tailor homes more closely to people’s perceived needs and desires, before constructing them, so that they may create a lasting transition into sustainable development with higher effectiveness and fewer instances of failure. However, there lacks literature on the level of knowledge Malaysian consumers have regarding sustainable housing features, as well as literature on housing preferences specifically in the field of home eco-design.
2.1 Knowledge
Though objective knowledge, attitudes and social norms have been found to have significant influence on environmental behavior, findings continue to be mixed regarding the relationships among these and sustainable behaviors such as those produced by or necessary for living in more eco-friendly homes. The Ministry of Education of Malaysia has embarked on a national environmental education program which provides a guidebook on environmental education to all schools. Unfortunately, the implementation has been limited and uneven. Furthermore, a study of environmental awareness among secondary school students in Malaysia, reported that almost all respondents were aware of the environmental problems faced by the nation, but the concept of sustainable development was alien to most of them. With respect to other aspects of environmental knowledge, the findings showed that the majority were unable to correctly identify the principles of resource consumption and causes of water pollution, flash floods, and acid rain. The students identified their main source of environmental knowledge as television (84%), while other minor ones included internet (6%), newspapers (5%) and radio (4%). Similar studies in Malaysia confirm that the most influential source of information on sustainability is the television (Aini, Nurizan & Ahmadun, 2007). A study by Hostetler and Noiseux (2010) discovered that residents of sustainable communities in Florida, U.S.A. had only slightly higher levels of knowledge than residents living in a conventional community. Congruently, they only exhibited slightly higher levels of environmental behavior.

From the research it is clear that in many behavior models, knowledge is one of the prerequisites for informed decision making. The Rational Choice Theory, for instance, states that behavior is the outcome of rational choices in which individuals weigh the values of their choices. Its basis makes up the most widely used economic theory of consumer preference. Rational Choice Theory investigates consumer preferences based on four elements: the price of the product, the consumer’s income, the consumer’s tastes or preferences and the ‘utility maximization’.

“Given a limited income, a specific range of goods to choose from, and a potentially infinite set of (exogenous) tastes or preferences, the consumer chooses goods from those available in such a way as to maximize his or her subjective expected utility within the constraints of his or her available income.” (Jackson, 2005)

To achieve this, consumers must have a certain set of information and must know the possible choices among goods and their prices. Information, therefore, is at the center of the actual behavior of consumers. If the individual lacks correct information on a product, then the subjective expected utility of his or her choice will invariably be mistaken (Macoloo, 1989). There is a well-established tradition of extending rational choice beyond purchase decisions; often behavior involves both purchasing behavior and non-purchasing behavior. However, the theory “does not aim to explain what a rational person will do in a particular situation… That question lies firmly in the domain of decision theory.” (Hechter& Kanazawa, 1997)
In this study we are distinguishing between the evaluative and affective components of preference formation. The evaluative aspect tests the familiarity with or knowledge about the studied object, which in our survey is being measured through multiple choice questions. The affective approach involves preference analysis and is observed via the ranking of a set of eco-design features according to preference (Macoloo, 1989). Figure 1, from Macoloo’s work on housing preference (1989), aims to show how an individual utilizes cognitive structures, information, value systems and perceptual receptors to create a cognitive map through which a decision will be made and a behavior produced. The focus of this research is to observe the influence of information as well as socio-economic and demographic characteristics on preference, while ignoring the influence of attitude and physical perception. It halts with the creation of a perception and the formation of a stated preference, and does not seek to explain the actual decision making process leading to an overt choice, see Figure 1.

Figure 1: A conceptual schema of a spatial-behavior process developed by Macoloo (1989), illustrates how information, cognition and demographics influence the cognitive map leading to preference

2.2 Housing Preferences
Studies on consumer preferences particularly for green home features are few and far between worldwide. According to this study done in the U.S. by Robert Charles Lesser and Co. (2008), most home buyers in their sample rated insulation and whole-house air filtering as their biggest priorities, followed by water conserving fixtures, energy reduction, improved air quality and, finally, renewable energy and resource conservation. Furthermore, they did not believe that their home had a significant impact on the environment, but at least a quarter of them would have liked to have more green features in their homes. Results on the consumer’s willingness to pay showed that if their investment would pay them back over time they’d be willing to spend more money on energy efficiency. However, if the investment would not give them returns, then they’d rather spend more on features that would provide health benefits. The methodology used here was one of rank ordering, more specifically conjoint analysis. In this model, pairs of potential options were shown to respondents in an online survey and by analyzing how they made choices between them, the implicit valuations of the features were determined. Although the aforementioned study by Hostetler & Noiseux (2010) showed that residents who chose to purchase eco-homes in the U.S. did not behave much more
sustainably than a control group, the above study shows that consumers want more sustainability from their homes.

Macoloo (1989) used a similar technique as Robert Charles Lesser and Co. to observe residents’ preferences for neighborhoods in Kenya. His research utilized the rank ordering method that has been chosen for this study, Thurstone’s Law of Comparative Judgment Case V. In this study, a list of local residential neighborhoods was presented to respondents who were asked to simply put them in order of desirability. The results showed that almost all respondents wanted exactly the same thing: high-end, tree-lined, quiet neighborhoods. In concordance with this, preference studies in Ireland showed that residents of Dublin’s high density centers, considered as more sustainable because they prevent urban sprawl, preferred to move to lower density suburban areas at a later time, showing that densification may not sit well with housing consumers in the long run (Howley et al., 2009). A study on the value of green spaces in the Randstad, The Netherlands found that house price varied with landscape type. The largest increases in house prices were due to the presence of green spaces. They were also able to demonstrate that a pleasant view led to a considerable increase in house price, particularly if the house overlooked water or open space (Luttik, 2000).

To study consumer preferences for variations in housing design, Hofman and Halman chose to observe how customers prioritize the different parts of a house design using Sataay’s Vignettes. A set of vignettes were proposed to potential home buyers posing different purchasing situations where the consumers had to choose in which aspects of their home design they’d most be interested in being a part of, keeping in mind the price differences. Customers evaluated the interior finish as the most important level of housing decomposition with a weight of 30%. The floor plan, volume and exterior of the home together had weights around 25%. The environment and technical systems were the least important levels with a weight of about 10%.

A study of housing preference by Wang (2006), found that for inhabitants of Guangzhou, China, neighborhood and location-related attributes were more important in home purchase decisions than dwelling-related attributes. Furthermore, factors such as family income, age, education, employment, etc., to various degrees affected housing preference. Meanwhile in Malaysia, livability studies have shown that residents of suburbs of KL prefer safe, clean environments with complete amenities, such as parks, markets and public transport (Jasmine Lau Leby & Ahmad Hariza Hashim, 2010). Complaints came primarily from low-cost housing residents who fear their high density homes are not safe or clean and lack quality. A study on housing satisfaction of middle income households in Bandar Baru Bangi, revealed that while residents were highly satisfied with the space and price of the house they owned, they were not satisfied with the size of the kitchen, its plumbing and public facilities, such as recreational areas, playgrounds, and public transport services (Oh, 2000).

In Guangzhou, China, another study of the housing context in 2007 found that the main home-buying motives were to improve living quarters and floor area, have better security in high-rise buildings, a good outdoor environment with green spaces, proximity to parks, and views of green space and water, reflecting the results found in Kenya, Malaysia and Holland. A look at the differences
between old and new towns there found that “new town households expected apartments in high-rise blocks, exclusive residential land use, and views of green space, while old town households preferred proximity to shopping areas and workplaces, green space within the development and proximity to nearby parks.” (Jim & Chen, 2007) This resonates with that found in the Dublin study above.

3. METHODOLOGY

The data collection for this study will be conducted using an online survey on local real estate websites. Due to the limitations in acquiring a list of potential buyers, a convenience sampling method was selected; the online survey option solves many of the limitations at once. This survey will become available as a pop up window for potential home buyers who enter search criteria for new apartments/condominiums with a price range between RM200,000 and 650,000 within Greater KL.

The estimated population, considered to be made up of the total number of new incoming apartment/condominium units in WP Kuala Lumpur at Q4 of 2010 is 17,922 (there were 142,059 total existing units in KL at this time). According to Krejcie’s sample size tables (1970), the sample size for this population with a standard error of .05 should be of 375 respondents. The survey should remain on the real estate website for an estimated 3 months based on the number of hits the site receives per month.

The two part survey will consist of one section of multiple choice questions about the respondents’ knowledge of the terms used in housing eco-design and one section comprised of a list of sustainable attributes that are to be ranked according to preference from most to least desirable. The data will be analyzed using descriptive statistics and a regression model will be built to attempt to predict the effect of knowledge on consumer preferences for sustainable housing features.

Thurstone’s law of comparative judgement case V is a technique which ranks or rates a set of data (e.g. eco-design features in housing) along a given dimension (e.g. preference) and outputs a value for each input on an interval scale. The values are estimated either from one individual’s repeated judgments or from the data of a group of individuals with few or no replications per person (Macoloo,
1989). What Thurstone calls the discriminial process is not fixed, it fluctuates. The same individual may give different comparative judgments about the same pair of phenomena at different times. However, there is a process of judgment that occurs most often and is called the modal discriminial process. This forms a normal distribution among the frequencies of discriminial processes. The more ambiguous the phenomenon, the larger the standard deviation of the distribution of the discriminial processes on the scale.

4. CONCLUSION
A study of consumer preferences for sustainable housing features has not been published about Malaysia before. The purpose of this study is to determine knowledge’s effect on preference for eco-design features among prospective middle-income home buyers in and around Kuala Lumpur, Malaysia. With middle-cost apartments and condominiums being among the most in-demand housing types in KL and also among the least sustainable building types, potential buyers in this tier are of highest interest.

Due to the many variables influencing consumer preference, one strong, objectively measurable and preceding variable was chosen, knowledge. Knowledge plays a function at the most basic level of attitude and preference formation and the determination of choice and behavior. In the case of sustainable housing, many of the technologies and design ideas are not well ingrained in the current building traditions and they are, therefore, yet unknown by a large part of Malaysian consumers.

Understanding consumer’s preferences in this industry is of crucial importance for the long term sustainable development of this rapidly growing nation. Should results show that knowledge of eco-homes is low in this area, developers and housing officials will have a map of information gaps within the population. With the ability to affect people’s knowledge comes the ability to affect social norms, people’s attitudes and their preferences. Developers can then design, build and allocate funds to suit the needs of consumers, who will more willingly spend their money on better quality homes. The outcome of this study will give developers information about their consumers’ design preferences so that they may build accordingly. Developers can be better informed regarding the stance of the market with respect to different aspects of eco-design. In this way they will invest in appropriate home features and balance costs and gains. Developers can then afford consumers with better choices by adjusting private costs and benefits (Jackson, 2005).

The results will also shed light on the amount, quality and channels of information by which people are receiving their knowledge. Hence, this will help public and private sectors to target their publicity and awareness efforts. Policymakers seeking to achieve social change can ensure that consumers are given the information necessary to make rational choices and utilize subsidized goods and services to their maximum potential as shown by many social projects around the world in compliance with international environmental efforts. Furthermore, hints to new industrial niches for the necessary longevity of new products and services may be opened from these results. The process of transitioning the housing industry from conventional homes into environmentally friendly ones should be successful and lasting.
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THE EFFECT OF THE PROJECT SUSTAINABILITY MANAGEMENT IN CONSTRUCTION INDUSTRY DEVELOPMENT

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Abstract
Project Sustainability Management as a new subject in project management is one of the powerful techniques in problem solving, reducing cost, improving quality and function and production of different fields of industry, services, and development. Project's sustainability management enables the owners and consulting engineers of the project to invent indicators suitable for the need in order to fulfill demands and take concerns of beneficiary parties into account and at the same time, show that such measures enjoy a strong and causal connection with the concerns and fundamental goals of sustainable development. Achieving such a goal brings up a question to the owners of the projects: A Doe plans and implementation processes of their projects lead to sustainable development? And how a project can be implemented in a way to assist sustainable development and can measure that? Goals of sustainable development look into the problems of the whole community such as global warming, species diversity, availability of clean water, natural resources and energy. Naturally, answering such important questions is related to the whole society. In this article, a concise discussion about Project Sustainability Management and its importance as project management in development emerges that with the new view in its place in technical and development projects regarding the importance of the subject and increasing functionality of it and finally applying objectives of Project Sustainability Management in a big development project state and the effects of right management of the project on speeding progress of long-term development projects and sorting will be a study accurately.

Keywords: project sustainability management, construction industry, development, consulting engineers

1. INTRODUCTION
Given distinct industries getting increasingly complicated and with regard to the formation of broad interfaces between different industry sectors and probably most importantly, with regard to close connection between economics, culture, politics, industry and sustainable development, the requirement of purposive and systematically usage of cross-functional teams within projects and along with that within projects interface and its beneficiary is enhanced.

Undoubtedly, one of the worthwhile discussions by which worthy assistance to efficiency and effectiveness of project management becomes possible is status of such teams within the life cycle of the project. Misunderstanding that says secondary projects can play such a role to project team, firstly, urged me to dedicate subject matter of this paper to such teams within project
and within the framework of project management. However, preliminary studies brought up a more important and probably more essential matter. In fact, these studies at macro levels assist project sustainability management (PSM).

In other words, the reason for existence of such teams within the structure of the project management is to enhance clear conversation about effectiveness and responsiveness of different professional sectors and to choose documented approaches of decision making.

Such role is not at all playable by secondary project teams within the structure of project management. At the macro level, as development and construction projects turn into developmental, national or international projects, dimensions of such an inter sectional effectiveness and responsiveness also expand from one class to a nation, from one decade to several decades and from one billion to tens of billions. They can in spite of create such issues as marginal settlement, immigration, and unemployment, damage to natural resources, environmental pollution and health threat to a region. This is done in a way that owners of different developmental, economic or notwithstanding cultural projects are attempting to make usage of resources more effective through establishment or renovation of suitable facilities and infrastructures. However, the owners of the projects in their developmental and economic activities have options, which directly influence such matters. In other words, the owners of the projects can and should specify requirements related to sustainable development.

Among features of the process of project's sustainability management is that the opinions of beneficiary parties of the project are studied and considered as other goals of the project are dealt with in the plan of project's quality management. Such methods provide a methodology to measure performance of the sustainable development project along with showing commitment of employers and consulting engineers to sustainable development. Finally, this provides assurance as to the point that progress in one of the aspects of sustainable development is not to the cost of ignoring another aspect.

Background: Changes in project management style and the way capitals are used to develop and implement infrastructure, which provides more efficient usage of resources and energy, manifest the commitment of parties to developmental activities. Protecting ecological systems and taking local community needs related to establishment and development of facilities and infrastructures into account is one of the most important matters.

Disturbance which exists in perception of sustainable development as well as its indicators and measures, requires considering points which in the project's sustainability management reasonably are accepted as an adjustment of project's goals to goals and priorities recognized as a whole by society. Such process can coordinate goals with local conditions and priorities too.

Achieving sustainable development means that existing systems, technologies and infrastructures should be reviewed and replaced with examples, which consume less energy and fewer toxic
materials and protect environment and society more. Such matter for developing countries having two special features has a high importance. On the one hand, these countries are the target of transmission of pollutant technologies. On the other hand, increasing need of such countries to enhanced employment within non-professional levels gives priority to technology development of generally mechanical and fewer knowledge takings. Both can be of serious danger to developmental and industrial projects.

One of the biggest challenges and opportunities which have yet been confronted by the carrier of consulting engineering is equipping systems, technologies and infrastructures with new means in order to bring about sustainable development. Undoubtedly, the owners of projects request professional and experts of project management to assist them in such transformation and provide them with essential guidance and services to evaluate projects. Among prerequisites of success is an appropriate environment for innovation.

That is, working place, which nourishes learning and creativity? Certainly, a place in which consulting engineers are persuaded to try new methods, test new technologies and replace old technologies with new and more sustainable ones. Clarity, honesty and transparency are of main elements of such an environment. Conversation and discussion among all parties involved in the whole project development, project design and implementation of the project cycle provides an efficient and effective process to achieve methods compatible with sustainable development. According to the way people think about development and its effect on the environment and society, definition of sustainable development varies. Such notion defines a forward path in a way that society will be able to maintain and improve the quality of its life without putting ability of future generation to do so in danger.

Role of Project Indicators: While the project objective determines it direction, project indicators provide means of measuring the level of progress. Such indicators allow project owners, engineers and beneficiary parties to measure progress toward sustainable development through comparison of the obtained performance in a project and the expected performance.

At the same time, inclusive series of project indicators is a fundamental tool to measure progresses and achievements, to show the amount of transparency for beneficiary parties and to provide a knowledge base for experts. In the following part, objective and usage of indicators as to sustainable developments are shortly described:

In order that the indicators can enjoy an appropriate function they must:
- Have roots in principles, goals and inclusive priorities of sustainable development.
- Enjoy enough inclusiveness to include all aspects related to sustainable development.
- Be at an amount which is controllable and effective with regard to informing.
- Enjoy the ability of adjustment to different items and by a clear and clarified process can be adjusted to the local needs and conditions.

Figure below shows that project an objective can be demonstrated on a variable scale.
Sustainability conditions are achievable in an environment of higher range. That is, it will change as to an objective which based on local conditions, evidence related to sources and bearing capacity and any other technological evolutions can change the definition of sustainable development to this special end. For example, modern knowledge on limitations of ecological bearing capacity can move such as goal to upper levels. Conversely, invention of low-cost and low consumption technology of desalinating water can dramatically change availability of fresh water and thereby, move the desired goals to lower levels.

Project Sustainability Management:
- How to include the goals of the project owner on sustainable development in the project
- How to show connection between achievements of specific project and goals and priorities of the whole society
- How to create and maintain goals and needs of a broad range of beneficiary groups
- To show how goals and indicators of the project affect goals and design of that project.

Process of Project Sustainability Management:
Stage 1: Determining special goals and indicators of the project for sustainable development, determining the domain of project and hypotheses, determining perspective, ideal, short and long-term objectives of the project, identifying and forcing main beneficiary parties to involve.

Stage 2: Reconciling goals and indicators of the project with local conditions, using practical protective measures on policy and identifying other activities of regional indicator development.

Stage 3: Testing and correcting goals and indicators of the project, testing effectiveness of indexing of the project, correcting goals based on considerations of systemic integration, correcting indicators to adjust them to current rules and formalities.

Adjusting Goals and Indicators of Project to Local Conditions: Goals and indicators which have been determined at first stage, become corrected and changed to reflect local conditions and interests, especially, interests of a medium to low-income countries.

Appropriate Support Policies: If the given project is placed in a medium to the low income country which has been defined as so by the database of development indicators within World Bank, then additional indicators must be determined for it to reflect social interests and support policies appropriate for developing countries. Such interests include natural habitats, pest management,foresting, dam safety, local people, change in the compulsory immigration, cultural assets, child and forced labor and international waterways.

Testing and Correcting Goals and Indicators of Project: The owner of project and consulting engineer have drafted an isomorphic series of project indicators as well as project goals regarding sustainable development, which reflects the owner's point of view and has been regulated to adjust to local conditions and reflect them and goals of sustainable development. Project owner and engineer in the third stage of the process offer three other modifications on goals and indicators.

Operational Test of Project Indicators: When series of indicators is finalized, the owner of the project and engineer must review that and test each of those indicators to see if PSM process has become a reasonable and practical series or not.

System Integration: While designing and implementing a project which achieves practical progresses in all aspects of sustainable development, consulting engineer makes use of various processes, systems and technologies. Consulting engineer must find that how such separate elements become coordinated to achieve desired results. These elements are reciprocally controlled to be sure that interference is minimum. It may be necessary to change the predetermined goals related to sustainable development to be coordinated with the considerations of system integration.

Making Indicators Compatible with Rules and Regulations: In some cases, entrepreneurial organizations, societies, local accountable entities and other institutions may oblige projects to apply existing series of project indicators related to sustainable development. Moreover,
the project owner may with regard to image management or company's fame, competitiveness or as part of the whole activity strategy of the organization, want to use reporting system or a special evaluation protocol.

Utilizing Project Indicators: Plan related to implementation of special project indicators includes methods and the required timing to measure and evaluate numerical quantities for indicators and reporting the results of evaluation to a defined center.

Timings of reporting must be compatible with other reports related to sustainable development provided by the project owner. Furthermore, more effort is required to regularly and periodically review the results in order that the owner of the project and consulting engineer can identify unannounced problems related to the indicators or values produced. Unpredicted results or values going far beyond the predetermined thresholds must be considered and reported to the owner of the project.

2. CONCLUSION

According to what mentioned above, we can frankly say that the domain of the project is no more the thing written in the project statute. Reciprocal effect of project and the environment near to or far from that is so essential that ignoring it is not tolerated. In other words, with regard to lack of intercontinental collaborations of single objectives to exploit natural resources and possibility of instrumental and permanent usage of the Earth, projects provide their owners and engineers with means and suitable opportunities to involve various beneficiaries in making decision about project options in order to change their project into a project which helps sustainable development. The things available here are valid international documents committed to or applied by 100 countries. Furthermore, expert organizations related to consulting engineers provide beneficial guidance and methods in such cases. Even in some cases, leading companies and organizations to teach and promote such cases. It should be considered that developing economic or even cultural activity directs conditions toward accommodation of some of the requirements as compulsory parts of the project to project-based activities.

Therefore, activists and experts of areas which lead their activities a project should be informed that currently knowledge of PSM as a complementary part shows that project owners and engineers must use such opportunity and work as those experts who seriously fulfill their social responsibilities in their carriers.

Through application of value engineering within every developmental project, it will become clear that "there is a better idea than current idea to perform any plan."

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CHALLENGES AND CONFLICTS IN POST-DISASTER RECONSTRUCTION IN HISTORIC CITY OF BAM, IRAN

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Abstract
In 2003, a destructive earthquake with a 6.5 magnitude earthquake devastated the historic city of Bam, located in the south-eastern part of Iran. According to the official reports, more than 30,000 people were killed and left 75,000 homeless. Also the Bam Catastrophe led to the destruction of a number of historical buildings and cultural landscapes. After the earthquake, reconstruction management process was faced with a lot of challenges, related social issues and broad destruction of the historical town. The lack of good experience in the reconstruction of a city made the reconstruction project of Bam more complicated. Also the previous earthquakes which mainly affected rural areas, the bulk of damages in Bam occurred in the center of an urban area, and this urban area had considerable historical significance. The purpose of this article is to investigate the success and challenges of the post-earthquake reconstruction in Bam to improve the future plans. This research examines the recent reconstruction experience and discusses the qualities and shortcomings. It concludes that there has been the inevitable delays in the reconstruction process, mainly due to the lack of an “in-advance reconstruction plan”. Therefore, it is highly recommended that reconstruction plans for cities, particularly the older cities located in highly seismic zones, should be prepared long in advance; this would represent a very important step in the sustainable development of the country. Finally, more attention should be given to social reconstruction and rehabilitation instead of focusing most (or all) of the attention on physical reconstruction.

Keywords: Bam, challenges, post-earthquake, reconstruction

1. INTRODUCTION
Iran is a disaster-prone country, which experiences many disasters such as earthquakes every year during recorded history earthquakes have frequently struck the Iran plateau, characterized by active faulting, active folding, and considerable elevation contrasts along the Alpine-Himalayan belt, and have taken a heavy toll. The worst earthquake in the last decade in Iran, hit the ancient city of Bam on 26th December 2003, resulting in 30,000 dead, 20,000 injured and over 75,000 homeless. The catastrophe razed more than 80% of the buildings and most of the urban facilities, including water, sewage, water, and telecommunication systems, as well as irrigation and agricultural systems, gardens, streets and roads were badly damaged.

The city of Bam is located in the southeast of Kerman province in Iran. Bam has an area of 19,374 km². People make a living mainly through farming and gardening as the city has large orchards of...
palm groves. According to the Statistical Centre of Iran, Bam had a population of 70,000 in 1996 and its population in the rural and urban areas reached 142,376 in January 2003 (SCI, 2004).

In addition, Bam had a rich cultural heritage which included Bam citadel a symbol of cultural identity for the population of Bam with 2500 years background. Bam citadel (Arg-e-Bam) is the largest architectural earthen complex in the world with international recognition. Also, the Bam city has been founded between the 4th and 6th centuries and other registered architectural complexes and buildings scattered throughout the city. The 2003 Bam Catastrophe led to the destruction of the great 2,000-year-old historical citadel, Arg-e-Bam, and a number of historical buildings.

Reconstruction, as one of the four phases of disaster management (Tierney, 1993), is described as the full restoration of all the services and local infrastructure, replacement of damaged physical structures, the revitalization of the economy, and the restoration of social and cultural life (Aysan and Davis, 1993). Emergency relief, restoration, replacement reconstruction, and developmental reconstruction are mentioned as the four phases of the recovery process (Kates and Pijawka, 1977). It should be mentioned that the phases in the Kates and Pijawka model are something of an oversimplification of reality, which is complicated by different forms of vulnerability, the political and geographical connectedness of damaged communities, and evolving modern approaches to disaster relief (Alexander, 2006).

Although the Bam earthquake has resulted in great loss of life, and had a devastating effect on the country’s economy etc., it has contributed useful experience and lessons about post-disaster reconstruction programs. Therefore, it is very important to investigate the success and challenges of the post-earthquake reconstruction in Bam to improve the future plans because the reconstruction of Bam was the first experience for Iran in the reconstruction of an extensively damaged middle-sized city with a high rate of human loss and destruction. The valuable experiences of Bam reconstruction program can be used in other post-disaster reconstructions in Iran.

2. METHODOLOGY
The reconstruction of Bam was the most important post-disaster reconstruction project among recent reconstructions in Iran. Many factors, such as concern over the government and international agencies, the new managerial approaches, and the application of appropriate reconstruction methods, made it different from the other reconstruction programs. Therefore, this research examines the recent reconstruction experience in Bam and discusses the qualities and shortcomings.

To obtain information for analysis and examination, the following methods were used:
- A review of bibliographical sources and documents;
- The undertaking of unstructured interviews with policy makers and researchers;
- Conduct of a field survey; and
- Direct personal observation and informal communication.
3. POST-EARTHQUAKE MANAGEMENT POLICIES IN BAM

Based on the Ministry’s Administration proposal and the order of the President, 23 days after the earthquake the decisions listed below were made:

- Establishment of the Bam Reconstruction Supreme Supervisory and Policymaking Association (BRSSPA).
- Creating the provincial reconstruction association the responsibilities of which were assigned by the BRSSPA.
- Assigning the implementation of reconstruction, renovation, and retrofitting program for residential and commercial buildings to the HFIR.

3.1 Bam’s Reconstruction Supreme Supervisory and Policymaking Association

Bam’s reconstruction supreme supervisory and policymaking association (BRSSPA) was established as the singular leading and policymaking association in charge of adopting policies and steering the reconstruction of Bam. BRSSPA was responsible for the planning, provision of financial resources, policymaking, executive operations, and supervision.

The Housing Foundation of Iran (HFIR) as the reconstruction executor arranged Bam’s reconstruction charter, which was approved by BRSSPA. ‘‘Reconstruction and renovation of the residential and commercial buildings, compatible with the regional development plan, considering the region and national abilities, capacities and capabilities to revive Bam city and villages’’ has been mentioned as the aim of the reconstruction (HFIR, 2003).

In this charter, after introducing the aim, housing and reconstruction basis and policies have been described as follows (HFIR, 2003):

- Reconstruction management and community participation policies.
- Financial policies.
- Construction technology policies.
- Policies related to construction materials and their production.
- Architectural planning and design policies.
- Reconstruction organization and administrative policies.

In the reconstruction and community participation management policies, the residential buildings reconstruction management is up to the owner. It consists of consulting with designers to choose a plan, supplying the needed materials, inspecting the construction, optimizing the construction materials usage, and cooperating with the inspection authorities through the reconstruction phases.

The government’s role was to strengthen the affected people. In other words, when the affected people were financially weak, the government tried to support the people of Bam by granting loans. The government’s aim was to decrease the governmental investment in the private sector.

Finally, the emphasis on construction quality with a suggestion of sustainable development and self-reliance is notable in the construction technology policies. In order to achieve this goal, the
educational methods, use of new construction methods, construction material quality control, and supervision were considered in the charter. In the reconstruction charter, it is mentioned that consideration must be given to the selection and use of construction materials, which must be economical and compatible with the environment and the production capabilities in the country or in the affected areas.

4. THE RECONSTRUCTION POLICIES

4.1 Bam Sustainable Development Manifesto

Bam Sustainable Development Manifesto, which is a local-regional program, was codified by the Council of Architecture and Urban Development (CAUD) consisted of eight distinguished members, including businessmen, academics, architects, engineers and members of the Housing Foundation. This Council outlined the measures and guidelines for rebuilding of Bam city. One of the policies proposed by the CAUD was the Bam Sustainable Development Manifesto. A Committee on Sustainable Development consisting of academics and experts in reconstruction was set up to develop the manifesto. Bam Sustainable Development Manifesto concerns with the following necessities:

a) Setting about a long-term, symmetric and comprehensive vision in the process of organization, reconstruction and renovation after national disasters.

b) Establishing agreement among interdisciplinary and intellectual views in order to reach a joint approach.

c) Taking action aiming at providing coordination between various governmental, public and private organizations and the society.

4.2 Comprehensive Management Plan for Bam its Cultural Landscape World Heritage Property

The Comprehensive Management Plan is a requirement of the World Heritage Convention. It provides a framework for those working towards the revitalization and development of the Bam region.

The Comprehensive Management Plan builds on documents including the Reconstruction, Structural and Strategic Master Plan of Bam City, the 2004 UNESCO-ICHHTO-ICOMOS Concluding Recommendations for Bam’s Cultural Heritage, the Iranian National Development Plan application for the Region, and other documents within the legal framework for Iran.

The Comprehensive Management Plan has been elaborated to be an instrument to be owed by the people of Bam County, to guide development within the territory in sound manner. The aims of the Comprehensive Management Plan for Bam and its Cultural Landscape are (CMP, 2008):

a) To build solidarity among all the stakeholders to ensure mutual ownership of the processes for safeguarding and promoting the World Heritage Property while enabling the sustainable development of the local communities.
b) To outline sustainable to the management of the whole World Heritage Property that balances the
cconservation of cultural and natural heritage.

c) To give emphasis to culture, in all its tangible and intangible forms, and the natural heritage and
environmental setting of Bam, together which define the identity of Bam, recognizing these heritage assets as vectors for sustainable development.

d) To manage the World Heritage Property so that its integrity, authenticity and outstanding
universal values are conserved in a multidisciplinary manner over time.

e) To increase public awareness of an interest in the World Heritage Property at local, national
and international levels.

5. EXECUTION OF THE BAM RECONSTRUCTION POLICIES

After the earthquake the government of Iran was faced with a daunting challenge to implement and integrate the reconstruction programs. The government adopted previous post-earthquake reconstruction experience at the national level, to reconstruct the Bam, which are mentioned in the follow:

5.1 Reconstruction of residential and commercial units

The reconstruction plans for residential and commercial units in Bam were implemented in June 2005 and still ongoing. For preparing the land for the reconstruction of the residential and commercial units, the IHF and other executive organizations in the region were assigned the tasks of removing the debris of destroyed buildings following the confirmation of the unit’s ownership. The government has provided low interest (4% for rural area and 5% for urban housing and commercial units) and 15-year loans as well as a grant through the banking system for the reconstruction and repair of residential and commercial buildings in Bam. In spite of receiving the loan from the banks, with the amount being decided on by the FHIR based on the progress being made in construction. There have been many complaints, primarily due to a lack of clear understanding of the procedures and the demand for a more flexible usage of the loan (Ghafory-Ashtiany and Hosseini, 2007).

In addition, while providing permanent houses took a great amount of the reconstruction budget, a number of people lived in their temporary shelters for more than two years. It seems that the amount of investment on temporary units was too high.

The overall assessment of the constructed units is good, more serious and rigorous supervision was needed to avoid some of the problems observed in the nonstructural sector of the reconstruction program.

5.2 Reconstruction of public buildings

5.2.1 Schools

The Bam earthquake caused the physical destruction of many schools; within the context of the school safety program in Iran, the reconstruction of 131 new schools and repair of 33 schools were given high priority, with construction beginning in the summer of 2004 under the supervision of the “School Reconstruction Organization”. The preliminary assessment indicates that the quality of the
school reconstruction has been very good. Relative to the old schools in Bam that were destroyed, the newly constructed schools are safer and better equipped.

5.2.2 hospitals and health centers
The two operational hospitals in Bam, private clinics, health centers, pharmacies and orthopedic centers became un-operational due to the collapse of roofs and walls and damage to equipment. To cover this loss and to be able to respond the post-earthquake increasing demand for medical services, several temporary hospitals were established by the Iranian Red Crescent Society, International Red Cross and nongovernmental organizations (NGOs) to provide services. To date, two new General hospitals and 64 new clinics and health centers are constructed; and now the residents of Bam and its surrounding have better and safer medical facilities than they did prior to the earthquake.

5.2.3 government buildings
In line with the ‘new’ Bam city being service-oriented, all government and local offices will be housed in several building complexes rather than being spread throughout the city as before. Thirty-one projects, including the (re)construction of police stations, courthouses, post offices, banks and colleges, have been completed by 2008.

It should be pointed out that despite the full attention of the government to the reconstruction of Bam and the implementation, there has been the inevitable delays in the reconstruction process, mainly due to the lack of an ‘in-advance reconstruction plan’.

5.3 Reconstruction and rehabilitation of cultural properties and Historical areas
Cultural Properties and Historical areas possess irreplaceable cultural and social significance. Also, cultural heritage is very important in fostering a quality of life with value and pride in all civilizations. The 2003 Bam Catastrophe led to the destruction of a number of historical buildings and cultural landscapes. The UNESCO World Heritage Committee was held in China six months after the Bam disaster in July 2004. Here, Bam was registered as a World Heritage site and also inscribed on the World Heritage in Danger List.

Despite the fact that Iranian authorities had extensive experience in post-disaster reconstruction, they faced a new major challenge in the urban area which had considerable historical significance. Indeed, cultural heritage vulnerability in seismic prone regions remains the most significant issue in which countries are faced with. Historic buildings and monuments in Bam do not only represent the community’s culture, values, traditions, and overall identity, but are also important in regards to social, economic and political aspects.

In addition, after the earthquake, green palm groves began to appear as one of the important aspect of cultural landscape of Bam. Due to financially gain some residents of Bam burned and avoided to irrigating the palm groves in an attempt to alter the land from agricultural to residential, which is still continues. If the destruction of palm groves continues, Bam will lose the unique aspect of its landscape in near future.
6. SURVEY RESULTS
Below reveals the findings derived from interviews and field work in Bam:

- The overall assessment shows indicates that the quality of state and public building reconstruction has been very good. Relative to the old buildings in Bam that were destroyed, the newly hospital, school and government buildings constructed are safer and better than before.

- In Bam, while providing permanent houses took a great amount of the reconstruction budget, a number of people lived in their temporary shelters for more than two years. In fact, a number of families found the temporary units much better than their damaged units and thus were not very interested in building a ‘permanent’ house. It seems that the amount of investment on temporary units was too high. Lessons learned from this are that the authorities should consider the pre-earthquake housing situation and spend less for intermediate units, as they are only temporary shelters. Yet despite the fact, the constructed housing units are good and who rebuilt their houses on their own land were more satisfied than those who were relocated.

- The reconstruction and/or restoration of Arg-e-Bam (Bam Citadel) and other damaged buildings with a cultural heritage have been started with the cooperation of UNESCO but the process is slow and there is no expected time for their completion.

- After the earthquake, increasing numbers of outsiders (migrants) resulted in both, a decrease of local interest in cultural heritage preservation, and a decrease in social relations. These outcomes negatively affected the community's sense of belonging and Bam's heritage.

- Many gardens are being changed into buildings with small flats/apartments. Continuity of this problem can destroy the historical landscape heritage of Bam.

7. CONCLUSION
The reconstruction of Bam, which has essentially been the construction of an entire city in the shortest time possible, was planned and implemented using all of this newly acquired knowledge. As a result of the Bam earthquake, a number of old buildings were destroyed. Although the earthquake was the immediate cause, this destruction instigated a process of urban renovation. This occurred as during the process of reconstruction, many elderly buildings and structures were demolished in order to allow for the construction of stronger and sturdier structures. However, due to lack of a comprehensive urban design guideline, this destruction did not have a positive and harmonized impact upon the traditional architecture and community infrastructure. Therefore, it is highly recommended that reconstruction plans for cities, particularly the older cities located in highly seismic zones, should be prepared long in advance; this would represent a very important step in the sustainable development of the country.

In addition, the most attention of national organizations should be attracted for reconstruction of Bam citadel and many historical houses and architectural complexes throughout the city which are still needed to be repaired or restoration. This has had effected on the cultural heritage landscape of Bam.
Finally, it should be noted that the process of construction management must be monitored carefully in order to mitigate any damage to the existing cultural heritage.

8. REFERENCES


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RECONSTRUCTION OF POST WAR CITIES THROUGH TOURISM DEVELOPMENT

CASE STUDY KHORRAM-SHAHR

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Abstract
The overall aim of this paper is to develop evaluation criteria of reconstruction for tourism strategies in post-war cities. Houses, buildings and infrastructure are the main destructive issues in urban warfare; therefore, post-war reconstruction is the first step of rising from ruin after each war. In some post-war reconstruction plans, due to the policy which is based on physical action, some urban defects remain after completion of reconstruction era. In this circumstance, it is requiring comprehensive strategies in the urban reconstruction. Moreover, tourism has been used as a development promoter which affects local people with prosperous social and built environmental aspects. The objectives in this paper are to critically review tourism approaches in reconstruction of post-war cities and to assess the existing policy in reconstruction as well as tourism potentials in the post-war city of khorraram-shar. In-depth semi-structured interviews with experts and policy makers as well as physical observation for primary data and documents as the secondary source of data were conducted and analyzed in the paper. The findings of this paper suggest some pragmatic approach for stakeholders, urban designers and policy makers in the reconstruction of post-war cities and contribute to the literature by considering reconstruction through tourism development strategies.

Keywords: post war reconstruction, tourism development, urban reconstruction, nostalgic tourism

1-INTRODUCTION

Each war creates despair and hopelessness on the opposite side by destroying housing, and infrastructure in the cities, hence; this issue led to a phrase called urban warfare in urban areas such as towns and cities. In recent decades, many studies in built environment explore the factors of failures in urban function as well as buildings and reasons of depopulation in the city. However, there are relatively lesser studies on post-war reconstruction. Reconstruction is not just making building, but rather public participation in the reconstruction to restore stability in social aspects of reconstruction. Pedersen (2003) discussed about people participation throughout the process of post-war reconstruction in the way that returning to a post-war city is returning to a society that is still
under reconstruction. World-wide experiences of reconstruction after disaster, have demonstrated the failure of conventional top down approaches, which concentrate largely on speed, standardization and technologically oriented solutions (El-Masri & Kellett, 2001).

2- LITERATURE REVIEW
The linkage between post-war buildings and tourism attraction can be established on the way that, the war was a part of city’s history and one of the tourism goals, especially in cultural tourism is related to what has happened in the past event, whether it was good or dreadful. Wilson (2002) argued that buildings are the best left reminiscence to tell the history about what happened during the past and demonstrate that first image as a city for visitors is based on physical assets like buildings, and a series of experiences, which are built around those assets. Architectural tourism is as old as architecture itself and many literatures have highlighted the effect of buildings as tourism attractions in regeneration of the cities. They demonstrate that tourism has been used as a strategy to promote regional development in urban and heritage (Jansen-Verbeke, 1995; Opperman, Chon, & Cai, 1998; Sharpley, Telfer, & David, 2002; R. Sharpley, 2011).

One of the most famous tourist attractions in post-war cities is, war monument, which is generally a topic in the urban reconstruction of post war cities. These monuments always have the role of keeping alive the memories and history of a city in the war era. It seems that the first background of tourism to the war region is related to marathon war between Iran and Greece 500 B.C. Grecian began their propaganda after victory by assigning this victory to their individualism and democracy system in their society. The Grecian described this war in different ways such as poems, paintings and busts. The tomb of 192 slain was visited as a tourism place. Nowadays, some cities like Berlin and Hiroshima use some remaining buildings and site of Second World War 2 to describe the event for tourist attraction.

2-1 Tourism as the Peace Promoter in the Post War Regions
Robinson (1998) and Minho (2007) recognizes tourism as a promoter of peace, and argues that tourism industry has been seen as playing an integral role in the world’s quest for peace. Yassin (2011) argues that the neo-liberal peace model radically affected on the reconstruction plan of Beirut in 1990s led to economic growth and recreation of linkages to the liberal world system would sustain peace and bring prosperity. Moreover, in the subject of how tourism causes to promote peace, Gelbman & Maoz (2011) argued that the peace factor is a significant and central component for the development of border regions, When bilateral relations between two neighboring countries are good, crossing the border in either direction is relatively easy, and the issues help both sides to gain sustainable peace led to long-term development plan. In summary, any positive change in post-war regions needs stability and tourism can play the rule as a provider of peace toward social stability in development and regeneration in the new era of post-war condition.

2-2 The Variables
Reconstruction, is an opportunity to improve urban defects and it is defined as the process of improvement of pre-disaster defects (Amaratunga, Baldry, Sarshar, & Newton, 2002; Calame, 2005;
Lizarralde, Johanson, & Davidson, 2010). On the other hand, studies devoted to the rebuilding of cities after both natural, and man-made events have focused primarily on urban planning and architecture (Cheng & McBride, 2006). Carmon (1999) argued about the relation between war devastation and urban reconstruction in the European urban renewal which are related to similarities in the socioeconomic and sociopolitical development's condition, after World War II.

I. Based on related literature and these two main attitudes: tourism development and characteristics of post-war reconstruction, the variables are selected, which have three specifications:

II. They are discussed in both subjects of research: tourism development and urban reconstruction.

III. The impact of selected variables should be significant and influential in both issues: reconstruction and tourism development.

IV. They should be comprehensive enough to cover other sub-variables.

A) **Government policy:** Mass destruction in the war-damaged areas, strengthen the roles of central government during the reconstruction of postwar cities. Kumar (1997) enlightens the politic as one of the triple factors of reconstruction. Calame (2005) discussed that reconstruction tied to political incentives and discernible political priorities. This role is more significant in countries, without federal government. In post-war areas, because of mass-destruction, some reconstruction aspects are implemented with financial assistance from foreign countries and international relief institutions. In these cases, governments play the main role for the distribution and managements of these funds. Moreover, in the most post-war cities, due to immigration and unreturned population; local council has not been strong enough to contribute effectively in the master planning of reconstruction; hence these plans are being prepared in the capital city and sent to states and postwar cities for implementation.

As a second aspect of research, government policies play a main role in tourism development. Authors such as Hall (2009) and Hall (2000), Jenkins & Harvey (1982) and Brohman (1996) explored the issue of government involvement in tourism development. Hall (2000) outlines seven roles of government in tourism: coordination, planning, legislation and regulation, entrepreneurship, providing stimulation, social tourism and interest protection. Ioannides (1995) defined two extensive roles of governments in the sustainable tourism development. The first is establishing a forum enabling the tourism industry suppliers to coordinate their activities, and the second one is a major role for government as a tourism promoter. World Tourism Organization (WTO) (1998) defines the guidelines for tourism development for local authorities. The guideline stipulated that the governments should take a lead role in establishing tourism policy and tourism policy should reflect the overall development policy to the country or region. Elliot (1983) claimed that tourism industry could not survive without governments as the provider for political stability, security, and legislature as well as the financial framework which tourism requires. Leask & Rihova (2010) demonstrate the role of government in both revitalization and tourism development through the central government's role to the provision of the fund to support the development in tourism public policy. On the other hand, the main political decision-makers are governments in which decisions such as visa policy and
requirement will affect the relations between nations, and these relations between nations have important effect on tourism development plans.

The above discussion highlighted the role of government policy in tourism development and post-war reconstruction as one of the main variables into the research that affects both tourism and regeneration plans. Government policy also can cover other sub-related variables like orientation and priorities of master plans for reconstruction.

B) Architecture and landmarks: first perceptions of a tourist from the city’s attractions are through buildings and social spaces. The cities built environment and tourism as the first image of a city are based on both physical assets such as buildings, and a series of experiences built around those assets. These assets and experiences as tourism attraction are generally extending to the living culture and the atmosphere of places (Wilson, 2002).

In new tourism development plans, landmarks and buildings are one of the most significant destinations for tourists. Many new cities which embark on tourism development plans, seek to make new landmarks as a symbol of the city. According to Schwarzer (2002), using buildings to stimulate tourism and solidify urban identity is hardly a new phenomenon. Sharpley, et al (2002) demonstrate that often in a development project, the creation of a landmark, for example, the Sydney Opera House or the CN Tower in Toronto, can be valuable attractions and giving a city a world class recognizable icon.

Similarly, war monuments become the tourist attraction in post-war cities and always have the role of keeping alive the memories and history of a city in war era. They are built at major intersections and urban squares, as tourist attractions. Other shared value of reconstruction and architecture in postwar cities are landmarks, through preservation on the war effect to some building as part of city history during the war (Pearce, 2001).

As a result, the reason for focusing on the architecture and landmarks have to be understood from the point of view that the reconstruction and tourism are tied to the variable in two aspects, firstly; reconstruction of some specific destroyed buildings with aims of keeping war destruction effects and secondly, built landmarks and memorial of war era, both as tourism attractions.

C) Urban fabric - urban space: destroyed district and scattered destruction in post-war cities are one of the main problems during the reconstruction process. Tourism in regional development can also take place in urban areas as governments attempt to revitalize sections of a city. Richard & Wilson (2006) argue that cities create new narratives of revitalization based on urban culture and heritage to improve their decline, as well as making a transition towards economic conditions. Tourism has been used as a strategy to promote regional development in urban and heritage tourism in urban areas has received increased attention (Jansen-Verbeke, 1995; Opperman, Chon, & Cai, 1998; Sharpley, Telfer, & David, 2002; R. Sharpley, 2011). The creation of urban development corporations and enterprise boards is tied with urban and regional redevelopment programmers.
seeking to rejuvenate inner-city and industrial lands (Sharpley, Telfer, & David, 2002). Moreover, the historical and post-war urban fabric as a tourist attraction is an important factor in tourism development.

3-RESEARCH METHODOLOGY:

To examine tourism development approach, the researcher chose Khorram-Shahr which is located in southwest of Iran and damaged in the war between Iran and Iraq from 1980 to 1988. Two main factors are considered in the selection of the study area. Firstly, is considering to the core characteristics of tourism such as attractions, activities and facilities, which are the main potentials for tourism development (Wöber, 2002). Furthermore, the city had a prosperous tourism background before the war and it has kept its secondary elements for tourism development after the war like airport, railway and harbor. In addition, Khorram-Shahr is the largest city which was damaged and occupied by Iraqi army during the war for two years.

Primary data was gathered through two phases of face to face interviews with ten experts. In the first phase, the researcher investigated reconstruction priorities and approaches after the war then attempted to discover potentials and obstacles in tourism development with interviews to local and provincial authorities. Moreover, some interviews and observations were conducted to discover urban problems after the reconstruction period. The next phase is interviews with architects, urban designers and government authorities in tourism and reconstruction departments to evaluate the variables in the research area. Finally, observation to investigate the factors which are acceptable in the reconstructed post-war buildings as tourist attractions was conducted.

4-RESULTS

After coding and analyzing of interview transcriptions the sub-variables and related issues were established, this is shown in the table 1.
Table 1: Variables of research and related finding

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<th>Government Policy</th>
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<tr>
<td></td>
<td>Orientation: Epical aspects of tourism development</td>
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<td>Economic: Low-cost tourism</td>
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<td>First wave: in the first years of reconstruction most groups of visitors were experts or students with related majors</td>
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<td>Second wave: recently most of the visitors are ordinary people from all groups of people</td>
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<th>Government Policy</th>
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<td></td>
<td>Infrasstructures</td>
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<td>Commercial</td>
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<td>To manage reconstruction in housing and basic need commercial shops to provide rehabilitation aspects</td>
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<td>Repatriation</td>
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<td>Socio-demographic priorities</td>
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<td>Avoid empty border lands</td>
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<td></td>
<td>Lack of exclusive vision for each city in reconstruction process</td>
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<td>Problems encountered</td>
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<td>Security caveat</td>
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Variable 2
Architecture and Landmark

Using historical and indigenous symbol and forms of Iranian architecture

Architectural attitude in post-war reconstruction plans and policies

Heroic symbol to illustrating story of the city

Theme

Cultural Mosque of Khorram

Location

New Riverside land

Cause Historical repute in 8 years between prewar and post-

Deformation and replacement of indigenous materials by the non-relevant new materials after the war

Identity

Materials

Problems in new made buildings after the war

Connection

Pattern

Lack of appropriate architectural pattern after the war

Variable 3
Urban Fabric and Social Space

Ownership of abandoned houses and lands

Problems

Diversity of destructed

Scattered destruction

Public

As history of the city: Symbol of heroic and illustrating story of the city

Tourism orientation
Based on analyzing data in these three variables, researcher discovers main limitation and obstacle in tourism development as well as two contexts for tourism development in the city. Analyzing first variable in the reconstruction plans and regarding to second and third variables in tourism development aspects, demonstrate that the first problem in tourism is seasonal and interrupted tourism in the short period during a year. Resident as a host cominuity, recreational and accommodation facilities' encounter to these high tourist service demands in two months. In contrast in the rest of the year these demands dramatically decrease. The next limitation for post-war tourism development is ownership problems and government policy. Some of the main damage buildings are managed by the sectors other than tourism stakeholders like army and oil company. Moreover, lack of private sector contribution and tour activities are other problems, which are related to government policies.

5-CONCLUSION: TOURISM DEVELOPMENT ASPECTS AND CRITERIA
This study attempts to develop evaluation criteria of post-war urban reconstruction through tourism development. Critical review of the reconstruction and tourism development approaches to the research area emerges after the war, demonstrates that reconstruction was an emergency or replacement activity that focused largely on housing and progressively evolved to include upgrading of building quality, infrastructure, and economic productivity. Most post-war cities were reconstructed on their previous sites and with an eye toward modernization. While mixed land uses are maintained in most cases, industrial and commercial zones are separated from residential areas. The effort required to carry out such painstaking reconstruction was judged to be warranted by the psychological, social, and economic benefits that accrued working closely with local residents.

The urban problems and incomplete reconstruction in Khorram-shahr highlight that strategies for reconstruction plans should consider the city’s pre-war background identity. The finding on-site and buildings' observation as well as tourists’ behavior, shows that the criteria for establishing post-war tourism in the urban reconstruction of Khorram-Shahr has two main aspects including socio-cultural and environmental issues. Riverside land is the most important potential of eco-leisure tourism where
most activity in natural landscape and outlooks occur in that place. Moreover, some memorial symbols of war still remain in the water which can be used as post-war tourism attractions.

Second aspects of post-war tourism development are socio-cultural aspect which is related to main damaged buildings within the city. War museum and mosque of Khorram-shahr are two perfect attraction point of post-war tourism reconstruction. These buildings were damaged during the war but keep their structure (fig 1 & 2). The criteria of reconstruction some buildings with preserving the aspect of war damage and turn it to post-war attraction is effective in reconstruction strategy has performed just in the war museum. Finally, this research claim that using the post-war potential of the city to preserve peace and prosperity is an important factor in reconstruction which can be implemented with tourism development.

![Figure 1 War-museum of Khorram-Shahr](image1.png)

![Figure 2 Masque of Khorram-Shahr](image2.png)

6-REFERENCES


