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FACTORS INFLUENCING REWORKS OCCURRENCE IN CONSTRUCTION: A STUDY OF SELECTED BUILDING PROJECTS IN NIGERIA

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Abstract

Rework has become a menace in Nigerian construction industry and it has not been given required attention, it contributes to time and cost overruns in project. Hence, to improve the performance of projects the research work evaluated rework in some selected building projects in Niger State. The work identified some factors contributing to rework which was categorized under three main headings; technical, quality and human resources factors to actually dig down into the casual of rework. A structure questionnaire was self administered on projects identified to have experienced rework amongst the selected projects and these were ranked according to their perceived degree of severity. Response was further condensed using factor analysis to group the variables into identifiable factors and thus analyzed. The study revealed that sub-standard services rendered by professionals and lack of commitment to quality in term of project delivery by stakeholders are the main source of rework. Therefore, it was recommended that an improvement and total commitment to quality of services render and assurance would lead to a reduction in the occurrence of reworks as revealed by the research.

Keywords: Building projects, Cost overruns, Nigeria, Rework.

Introduction

The construction industry is almost as old as nature itself and unlike many manufacturing industries, is concerned mostly with one-off project. The construction is a sector that is sensitive to change in both fiscal and monetary disturbance. The construction industry is very important in the economic development of any nation especially in an expanding economy like Nigeria (Ibironke, 2003). An efficient construction sector is a pre-requisite to effective national development since building, civil and industrial engineering works are usually a major contribution to Gross Fixed Capital Formation, Gross Domestic Product and National Employment. The growth of construction industry in Nigeria in the past two decades indicates its success in greatly contributing to the country's Gross National Product, which was 1.72 in Year 2007 (Federal bureau of statistics). This industry sector is the second most important for absorbing human resources after the food.

The importance of the construction industry is not limited to the different measures of economic development alone, slumps or upsurges in its activities, have a high multiplier effects on almost every phase in the social and economic structure of the nation. It has been concluded that the high cost of house ownership in Nigeria and other housing problems of the lower income groups are results of the defect in the construction industry (Ibironke, 2003). "There is no gainsaying that the twin problem of cost and time overruns may not yet be over as they still characterize construction projects in most parts of the world especially in developing countries like Nigeria" (Ogunsemi, 2002). In Nigeria, cost and time overruns are common occurrences in the construction industry and these have continued unabated (Odeyinka, 1993). This is no exception as in the case of rework, as rework contributes to time and cost overruns (Love, 2002a). Earlier studies have shown that rework costs vary between 3 and 15 per cent of project's contract value (Burati, Farrington and Ledbetter, 1992; Abdul-Rahman, 1997; Josephson and Hammurlund, 1999). In addition, Rethinking construction, 1998 in Aminudin (2006) stated that: up to 30% of construction is rework, labour is used at only 40-60% of potential efficiency and at least 10% of materials are wasted. It was posited that rework costs could be significantly higher than figures reported in the previous literature (Love and Smith 2006). Indeed, Barber, Sheath, Tomkins and Graves (2000) suggested that rework costs could be as

high as 23 per cent of the contract value. Typically, previous research efforts have focused on determining the performance of Nigerian construction industry with reference to time and cost overrun, of which rework is one of its causes and little or no attention has been directed towards this area whose effect is capable of increasing the contract sum and duration significantly. Love (2002) who sought to address this in Australia, found that indirect costs of rework could be as much as five times the cost of rectification.

Since rework has been seen as an ill wind that may blow no good to the construction industry because of its contributions to cost increases and time-delays couple with the facts that it cannot be totally avoided. Therefore, the evaluation of rework and identification of significant factors leading to the occurrence of rework with a view to determining its impact on building projects to enhance project delivery processes in Nigeria is essential.

Based on all this foregoing, this paper therefore intends:

1. to identify and evaluate the variables of the factors influencing the occurrence of reworks on building projects;
2. to identify the variables with specific group; and
3. to assess the relationship of the identified factors to enable fully appreciation of the study.

Previously Reviewed Literatures on Rework

Rework is Waste

To improve quality it is necessary to understand the root causes of rework, that is, the basic reason for its existence or set of conditions that stimulate its occurrence in a process. A process consists of a number of activities or operations which acting on inputs in a given sequence transforms them into outputs. A process may consist of both value adding or non-value adding activities. The former are activities that convert materials and/or information towards that which is required by the customer and the latter are activities that take time, resources or require storage and do not add value to the output. In other words, a non-value adding activity is waste and origin of waste is as contained in figure ii below. According to Koskela (1992), there has never been any systematic attempt to observe all wastes in the construction process. Koskela (1992) suggested that the figures that have been presented tend to be conservative in as much as the motivation to estimate and share these figures has been by leading companies that have been attempting to implement best practice. Rework, however, has become an accepted part of the construction process. Those involved in the procurement of buildings invariably do not realize the extent of rework that actually occurs. There is an increasing need to improve the quality of operations throughout the procurement process, and therefore reduce the incidence of rework. It has been suggested that the major cause of rework is uncertainty (Koskela,1992). This uncertainty is generated by poor information, which often is missing, unreliable, inaccurate, and conflicting (Koskela, 1992). The authors suggest that uncertainty is a consequence of numerous interrelated factors and not solely information. Therefore, to reduce rework we must identify what its causes are, then understand how these causes are interrelated (Rodriguez and Bowers, 1996).

The Causes of Rework as a Waste in the Design and Construction Process

Construction waste was classified into three main categories by Ekanayake and Ofori (2000) as materials, labour and machinery waste. However, any effort in terms of labour, materials and machinery which is directed towards the construction of a part or element of a building and which has to be done again due to non-conformity to the design constitutes a waste which is also seen as rework. Andy, Andrew and Simon (n.d) viewed causes of waste at the design and construction process as: building complexity, poor co-ordination, fast tracking, inadequate communication, inefficient management practices

and design process, poor quality management, lack of harmonious relationship among participants on the project and poor site management team. Many authors have different opinions as to the causes of rework as a waste. Koskela (1992) suggested that it ‘‘sometimes seems that the wastes caused by design are larger than the cost of design itself,’’ and he further stated that ‘‘even if there is a lack of data on internal waste in design, it can be inferred that a substantial share of design time is consumed by redoing or waiting for information and instructions.’’ Rounce (1998) has suggested that much of the design-related rework generated in projects is attributable to poor managerial practices of architectural firms.

Reducing Costs – Eliminating Waste

Rework costs are determined from the point where rework is identified to that time when rework is completed and the activity has returned to the condition or state it was in original. The duration of the cost tracking includes the length of the standby/relocation time once rework is identified, the time required to carry out the rework, and the time required to gear up to carry on with the original scope of the activity (Fayek, Dissanayake and Compero, 2003). The sequences of events that constitute rework are shown in Figure 2.

Waste in construction is prolific. The lead article of this issue refers to the report ‘Rethinking Construction which states that:
• up to 30% of construction is rework
• labour is used at only 40-60% of potential efficiency
• at least 10% of materials are wasted

Egan Report: Rethinking construction, 1998 in Aminudin (2006).

Following Latham in 1998, Sir John Egan presented report of the construction, Task Force on the scope for improving quality and efficiency in UK construction. Since Latham, the industry as a whole was underachieving even with the fundamental and radical change proposed by this report. With the economic meltdown the industry had experienced low profitability; low investments in research and development, low levels of training with too many clients were dissatisfied with the present performance of the industry.

In summary, the Egan report identified several shortcomings with the construction industry, and they includes;

- Underachievement of the industry as a whole
- Lack of predictability within the industry as a whole
- Unacceptable level of defects
- Lack of contractor profit
- Lack of investment in capital , research, and development and training
- Level of dissatisfaction amongst the industry’s clients.

Reflecting on Nigerian experience with similar occurrence where the industry as a whole were underachieving which is evident in the down turning nature of the industry’s contribution to the nation’s Gross Domestic Product (GDP).

Deviations in Construction

Deviations that are related to the construction phase of the project and consist of those activities and tasks that take place at the project site during the construction interface. A construction change could be seen as a change in the method of construction and construction changes are usually made to enhance the constructability of the project. Deviations in construction could be seen as a construction errors are the result of erroneous construction methods or procedures. Construction omissions are those deviations that occur due to the omission of some construction activity or task (Burati, Farrington and Ledbetter, 1992).

Concept of Quality Cost

Quality could be referred to as conformance to established requirement, therefore, any deviation from this requirement that affects with a severity sufficient enough to consider options on the projects to either accept or taken corrective action could also be seen as non-conformance (Burati, Farrington and Ledbetter, 1998).

Quality cost of construction work or design comprises of all costs incurred by client/contractor because the project refuses to meet the users' requirement (Davis, Ledbetter and Burati, 1989). Rounce (1998) captured quality cost in the design process "as the cost of writing procedures and obtaining quality assurance certification". In broad term, quality cost to a client is the total expenditure incurred in given client best value for money both in term of functionality of the design and aesthetic value of the project.
Thus, Rounce (1998) postulated that;
Quality cost = cost of conformance + cost of non-conformance

Rounce (1998) went further by positing that conformance cost is the minimum expenditure incurred or required to meet an established requirement of a client on a project. Non-conformance cost on the other hand contains all total sum incurred through redesigning and reworking construction work previously executed due to non-compliance is capable causing strain relationship among the participant due to loss of profit. It's important to note that error during design mostly lead to rework or fault during construction phase of projects blame is usually borne by the contractor because of the gap between the design and construction. Josephson and Hammarland (1999), asserted that averagely 32% of defect cost that either lead to rework or non-conformance emanated at the design stage where briefing are not well captured or interpreted by the designers, 45% of the cost originated on site while 20% is from defective materials or machine.

Research Method

Data Collection and Procedure

The review of the existing literature on reworks, cost and time performance of projects revealed factors responsible for the occurrence of rework which was categorised into technical, quality and human resources factor. The questionnaire was structured in way that variables regarded as contributor to each of the factor were separated and well captioned under the appropriate heading. 77 variables were identified in all for all the three factors aforementioned.

The questionnaire was prepared to take care of the data to be sourced and to provide the respondents the opportunity to score the factors or variables which is capable of contributing to the occurrence of rework in construction projects. The following five levels of scoring was adopted using Likert scale 'extremely severe' (5 points), 'very severe' (4 points), 'severe' (3 points), 'Least severe' (2 points) and 'not severe' (1 point). Respondents were required to score only the factor that influences the occurrence of rework costs as it affects such projects.

Method of Data Analysis

Severity Index

Considering each of the factors, relative importance index was determined which was then used to rank the variables according to their degree of importance. Having observed the most likely important rework causes based on frequencies, a test of severity will be carried out to establish this observation. The severity indices will be measured using the formula referenced by (Idrus and Newman, 2002).

$$S.I = \left(\sum_{i=1}^{i=n} \frac{[wifi)x100}{n} \right] \quad \text{.....(i)}$$

Where:
S.I. is the severity index, *f i* is the frequency of response, *wi* is the weight for each rating (= rating in scale/number of points in a scale), and *n* is the total number of responses. *n* is the valid number of respondents.

Factor Analysis

Factor analysis is employed to condense large number of variables with a view to identifying the underlying variables that really explains the pattern of correlation with a set of observed variables. The main essence of factor analysis is to describe the covariance relationship among large number of variables in terms of a few groups Johnson and Witchen (1992) in (Awakul and Ogunlana, 2002). Factor analysis model specifies that variables are determined by common factors (the factors estimated by the model) and unique factor which (do not overlap between observed variables); with the assumption that all the unique factors calculated correlate with each other and with the common factor

Results and Discussion

Ranking the Influencing Factors: Frequency and Severity Index Analysis

Data collected from the field survey were ordinal in that the distances between the numbers (ratings) assigned in the Likert scale are not known. The ratings in this scale indicate only a rank order of importance of the factors, rather than how much more important each rating is than the other. Using parametric statistics (means, standard deviations, etc.) to analyse such data would not produce meaningful results, and therefore nonparametric procedures was adopted (Idrus and Newman, 2002). The non-parametric procedures adopted for this study was frequency and severity index analysis.

Severity index analysis was conducted on the sample data to rank the factors according to their relative importance. Severity indices rather than mean scores were used since the data were ordinal in nature. In this procedure, frequency analysis was first carried out to obtain the percentage ratings of different selection factors. This was done with the help of the Microsoft excel. The percentage ratings were then used to calculate severity indices via the formula in the methodology.

Based on the magnitude of the extracted factor loading from the factor analysis, important factors were identified and the severity indices of the factors were arranged in descending order as shown in Table. There appears to be a relatively narrow gap separating the variables: sub-standard product and services rendered by professional rank most under technical factor and closely followed by defects. Quality factors have lack of support to site management as the most severe variables which may be induced by lack of teamwork, this followed by late involvement of users and lack of trust and commitment on the part of the participants within the industry. Severity indices for human resources factors indicated that disturbance of personnel planning are most responsible for rework occurrence; carelessness followed the variable which was rank second while lack of skill and usage of inexperienced personnel have the same rank a piece.

Causes of Reworks

Factors Extraction

In this research work, the principal component method was carried out due to its simplicity nature using SPSS software package. Kaming et al(1997), asserted that the total number of factor estimated by the model (common factor) is equal to or less than the number of variables involved which is shown by the result of the analysis as in the appendix. Tables 4,5 and 6 show the extracted number of factors from principal component analysis for technical, quality and human resources factors as they contribute to the occurrence of rework. The tables show, the initial eigenvalue in terms of total, percentage of variance and cumulative percentage of variance. It is essential to note that relevant factors rae those factors having eigenvalue greater than 1, this is simply because eigenvalue in principal component analysis denotes relative importance of each of the factors as they contribute, and only factor with eigenvalue >1 are retained in the factor extraction process.

The extraction of sums of squared loading and rotation of sums of squared loadings of factor analysis for technical factors indicate 15 factors, 9 factors for quality and 8 factors for human resources factor. Tables 4, 5 and 6, show extraction factor loading which is greater than 0.50 and their respective communalities (h2). The criteria for this was that any variable that has the highest loading with value >0.50 in one component belongs to that component. It is equally essential to note that many variables might contribute to a factor if the absolute value is greater than 0.50, this was supported by Kaming et al(1997) that the higher the absolute value of a factor loading, the higher the contribution of that variable to that factor. The factor loading (extracted) for technical factor of the determinant of quality failure is 0.514 and the communalities which explain the variables in the factor that the analysis accounted for by the extracted factor is 0.767(76.7%), 81.8% of variables in “defect” is accounted for technical factors estimated by the fifteen factors. In this vein, 82.4% of variance “in inadequate construction planning” is accounted for by the extracted factor for quality factor and 81.2% of variance in “inexperienced personnel” is accounted for human resources factor loading to rework by the extracted factors.

Factors Rotation

To simplify the interpretation of factors, varimax method of rotation with Kaiser Normalization was used to reproduce calculations generating the final solution to the problem, with an orthogonal rotation method that minimises the number of variables that has high loading on each factor. The criterion for grouping of the factors was also based on the principle that a variable that exhibits highest loading with value greater than 0.50 in one component belongs to that component.

Tables 7, 8 and 9 show the component that surfaced from the factor analysis factor loading (rotated) for each factor. The tables show that there are 3 components in TTF_1 for technical factors, 5 components in factor HMF_1 in quality factor. Under technical factors, the variables "conflicting information" that has the highest loading of 0.872 was found in TTF_8, in quality factors, "inadequate construction planning" has the highest loading 0.870 which came under the QFF_9 and finally, "inexperienced personnel" exhibits the highest factor loading 0.889 in human resources factor HMF_7. It becomes imperative to group the component contributing to a factor into a new heading to remove ambiguities surrounding the acronyms in the analysis.

Under Technical Factors:

Factor TF_1 as "documentation issues", Factor TF_2 as "precontract" ,Factors TF3 as "communication", Factor TF4 as "monitoring", Factor TF5 as "site possession", Factor TF6 as "alteration", Factor TF7 as "consultant initiated changes", Factor TF8 as "coordination", Factor TF9 as "design error", Factor TF10 as "quality", Factors TF11 as "design phase"Factor TF12 as employer's issue", Factor TF13 as poor information", Factor TF14 as "technology application", Factor TF15 as "evaluation"

Under Quality Factor:

QFF1 as "finance", QFF2 as "integration", QFF3 as "management of manpower", QFF5 as "team work", QFF6 as "untimely delivery", QFF7 as "tendering issue", QFF8 as "changes", QFF9 as "contract management"

Under Human Resources:

HMF1 as "resilience", HMF2 as "incentives", HMF3as "resources", HMF4 as "site environment", HMF5 as "training",HMF6 as "multichannel flow of information",HMF7 as "inexperienced personnel", HMF8 as "delay"

Rotated Factors for Rework Causes

Considering the component in each factor/ group that have the highest loading with value greater than 0.50 in any component of the factors, it is obvious that "inexperience personnel" exhibits the highest rotated loading factor 0.889, followed by "conflicting information" 0.872 and "inadequate construction planning" of 0.870 factor loading in human resources, technical and quality factor respectively.

The factors have different representation and determinant of rework cause. Thus, it is necessary to offer explanation on the identified components of different factors.

a. Conflicting information:

One major factor responsible for having building that will be rework free is lack of adequate information,buildability of many designs and the separation the contracts

interfaces (that is the design and construction interface) couple with the fact that our construction processes are still sequential in nature. Adejimi (2005) argued that construction are not well connected or integrated until at the terminal tail end of each other rather than overlapping and benefiting from one another . He also of the opinion that if design process is to be enhanced, the participants within the industry (i.e. architects, planners, engineers, contractors and including the initiator of the process) need to come together and be well coordinated if rework free construction is so desired. Josephson, Larsson and Li (2002) posited that lack of coordination is capable of increasing cost of project by 28%, so also unsuitable design (18%), faulty design(13%), incomplete design(10%)and others (33%). It has been reported that the genesis of the problems that the (construction) Industry and its clients experience lie in the division of the responsibilities between the design aspect and the construction aspect". A direct criticism of the organizational structure of the construction industry has been given by many researchers that the construction industry is different in the sense that the design process is separated from construction process.

b. Inexperience personnel:

Management of contract is as important as the contract itself, it involves adequate planning, coordinating, controlling and evaluation of every aspect of the construction programme and method that is capable of leading to reduction in the menace of reworks with the consequential effects such as time and cost overruns. Okpala and Aniekwu (1988), was of the opinion that most of the indigenous contractors operating within the nation's construction industry are small-scale outfit with fair level of ignorance in prevailing research breakthroughs that can improve their output and efficiency both in term of technical know-how (application of technology) and management techniques. Their inability to employ qualified and experienced personnel coupled with lack of ploughing back profit as way of investment.

Inexperience personnel involved in management of projects and contracts is a serious issue in construction since many other variables identified from the rotated factor loadings emerges from lapses noticed in management of contract by the participants in the industry. Mistake in planning could contribute (24%) and faulty contract preparation (18%) as asserted by Josephson, Larsson and Li (2002). The essence of contract management cannot be waved away if rework occurrence have to be reduced to a considerable level. This is simply because good contract management will increase efficiencies, minimize wastes, enhance cost control mechanism and improve overall management of construction site.

c. Inadequate construction planning:

It is certain that a project must be well conceived; start right for it to end well. At the outset of the planning stages, the building owner, the initiator of the contract and the designer must come together and properly plan the work to prevent occurrence of rework. Inadequate planning can doom a well conceived construction works which may leave all the participants; designers, client and contractors dissatisfied at the end of the project. Therefore, it's imperative to recognise the close interaction between the design and construction. Construction planning involves a process of identifying activities and resources required to make the design a physical reality. Thus, construction involves the execution of a design envisioned by the Architects and Engineers, ineffective execution of this design process will unavoidably lead into rework together with consequential time and cost overruns in both phase- design and construction. Change orders due to

improper planning contribute significantly to rework cost as opined by Josephson, Larsson and Li (2002) which could be as high as 34%, wrong information (15%) and bad planning method (15%).

Conclusion

Based on the findings from the projects considered sub-standard services rendered by professional rank most under technical factor and closely followed by defects. Quality factors have lack of support to site management as the most severe variables which was induced by lack of teamwork, this followed by late involvement of users and lack of trust and commitment on the part of the participants within the industry. In the case of human resources factors, disturbance of personnel planning are most responsible for rework occurrence; carelessness was rank second while lack of skill and usage of inexperienced personnel have the same rank a piece. From the condensed variables, the analysis only precipitated 32 variables that really explain the pattern of correlation with a set of observed variables. Meaning only 32 of the 77 observed variable contributed to rework occurrence of the studied projects.

Though, the findings relates Nigerian experience but corroborated the results of the previous studies in the UK, Australia and Indonesia. An improvement and total commitment to quality of services render and assurance would lead to a reduction in the occurrence of reworks. The panacea to this could be drawn from suggestion made by Josephson, Larsson and Li (2002) for Swedish Construction Industry, to put in place an agreed and feasible mechanism by the participants within the industry to minimise and control changes that can induce rework. Further research should be carried out in the other states of federation both on public and private projects to have a better understanding of the menace of rework and probably reduce if not total elimination.

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Appendix

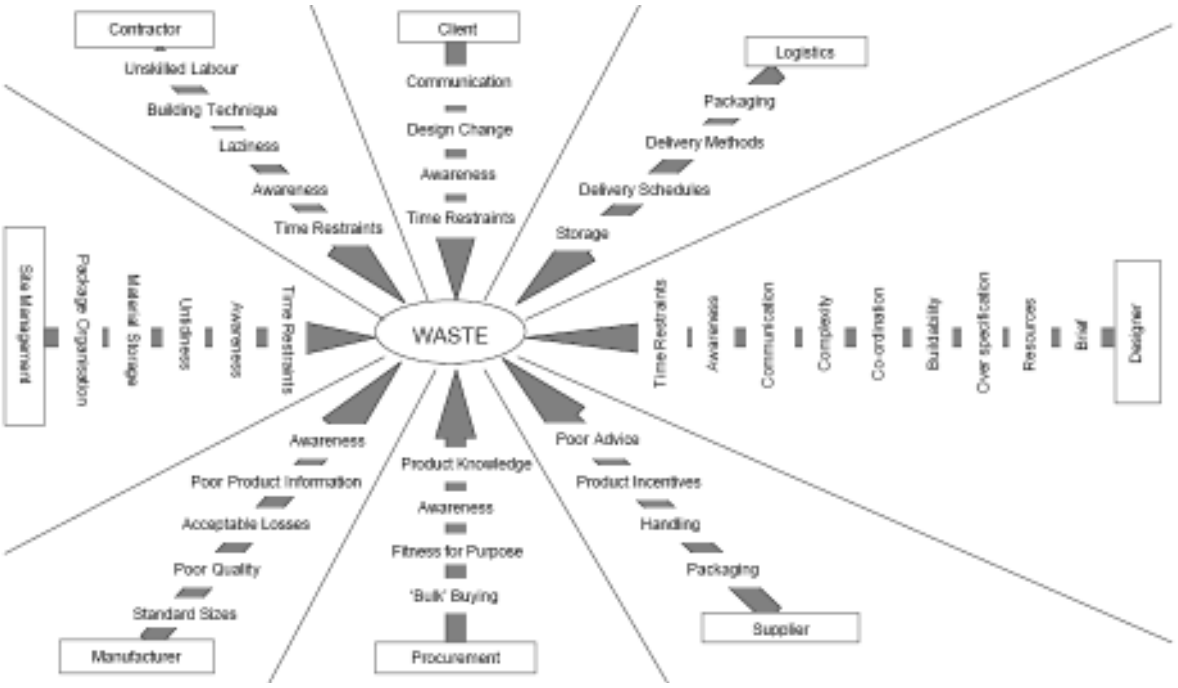

Figure 1: Origin of waste
Source: Andy Keys, Andrew Baldwin and Simon Austin (n.d)

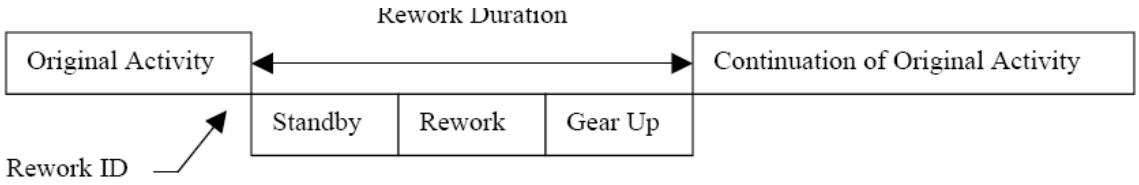

Figure 2: Components of reworks

Source: Fayek, Dissanayake and Compero (2003)

Table 1: Variables of technical factors leading to rework and their severity index and rank

Causes of rework	**severity index %**	**Rank**
Quality failure	45	8
Safety considerations	48	4
Lack of understanding and correct interpretation of client's requirement	47	5
Omission during design	38	14
Change in plan and scope by client	47	5
Error during design	40	13
Ineffective coordination and integration of components	49	3
Checking procedure	**47**	**5**
Inadequate resources	**43**	**10**
Conflicting information	44	9
Overlooked site condition	41	11
Sub-standard product and services	51	1
Defect	50	2
Complex details	**41**	11

Table 2: Variables of Quality factors leading to rework and their severity index and rank

Causes of rework	**severity index %**	**Rank**
Conflicting of opinions between participants	51	9
Lack of trust and commitment by participants	58	3
Lack of quality management system	54	6
Late user involvement	60	1
Poor management practice	49	11
Poor contractual relationship	47	13
Contractor selection method	51	9
Cost pressure	**55**	**5**
Poor communication	**47**	**13**
Poor team work/joint problem solving	57	4
Lack of support to site management	60	1
Inadequate construction planning	54	6
Untimely delivering	49	11
Poor information flow	54	6

Table 3: Human resource factors leading to rework and their severity index and rank

Variable/ Causes of rework	**severity index %**	**Rank**
Staff turnover	**47**	**12**
Ignorance and lack of knowledge	**55**	**7**
Disturbance in personnel planning	64	1
Uncertainty(weather, soil etc)	56	6
Lack of training	49	11
Alteration	51	9
Defective workmanship	52	8
Carelessness	60	2
Inadequate funding	58	5
Lack of skill development	59	3
Inexperienced personnel	59	3
Delays	51	9

Table 4: Factor loading extracted for technical factor

	Variables	TF_1	TF_2	TF_3	TF_4	TF_5	TF_6	TF_7	TF_8	TF_9	TF_{10}	TF_{11}	TF_{12}	TF_{13}	TF_{14}	TF_{15}	h^2
1	QF	0.514															0.767
2.	SC	-0.521															0.717
3.	LUCCICK		-0.517														0.620
4.	ODC			0.654													0.795
5.	CPSC			0.537													0.773
6.	EDC				0.516												0.673
7.	ICIC				0.541												0.841
8.	CP				-0.519												0.685
9.	IR					-	0.567										0.749
10.	COF							-0.508									0.824
11.	OSC								0.611								0.747
12.	SSPS								0.500								0.712
13.	DEF									-	-0.528						0.818
14.	COD											-	0.504				0.798

Table 5: Factor loading (extracted) for quality factor

	Variables of QF	QTF_1	QTF_2	QTF_3	QTF_4	QTF_5	QTF_6	QTF_7	QTF_8	QTF_9	h_2
1	CPBP	-0.567									0.821
2.	LTCP	0.578									0.680
3.	LQMS		0.537								0.790
4.	LUI		0.525								0.482
5	PMP			-0.529							0.613
6	PCR			0.542							0.576
7	CSM				0.429						0.611
8	CP				0.486						0.668
9	PC					0.467					0.534
10	PTW						0.500				0.885
11	LPSM						0.646				0.723
12	ICP							0.560			0.824
13	UD								-0.501		0.765
14	PIF									0.143	0.662

Table 6: Factor loading extracted (human and extracted factor)

	Variables	HMF_1	HMF_2	HMF_3	HMF_4	HMF_5	HMF_6	HMF_7	HMF_8	h^2
1.	ST	0.510								0.620
2.	ILK	0.505								0.715
3.	DPR	0.777								0.614
4.	UNC	0.603								0.622
5.	LOT		-0.516							0.671
6.	ALT		0.615							0.584
7.	DW			0.526						0.596
8.	CRS				0.561					0.645
9.	IF				0.533					0.546
10.	LSD					0.550				0.725
11.	IP						0.580			0.812
12.	DE							0.552		0.735

Table7: Factor loading rotated for technical factor

	Variables	TF 1	TF2	TF3	TF4	TF5	TF6	TF7	TF8	TF9	TF10	TF11	TF12	TF13	TF14	TF15
1	0MD	0.793														
2.	PQCD	-0.693														
3.	LUCICR	-0.607														
4.	ODC		0.691													
5	IAINF		-0.506													
6	UP		0.730													
7	DC			0.59												
8	LIT			0.729												
9	SSPS				0.82											
10	CP				-0.559											
11	PSP					0.635										
12	IDATA					-0.821										
13	ININF						0.545									
14	CPSC						0.802									
15	COMC							0.867								
16	ICIC								0.504							
17	COF								0872							
18	EDD									-0.83						
19	NPR										0.504					
20	DEF										0.845					
21	COD											0.847				
22	SC											0.594				
23	CISB												0.815			
24	LAQ												-0.541			
25.	PFU													0.815		
26.	PTA														0.569	
27.	LPME															0.853

Table 8: Factor loading (rotated) quality factor

	Variables	QFF1	QFF2	QFF3	QFF4	QFF5	QFF6	QFF7	QFF8	QFF9
1	PMP	-0.685								
2.	CP	0.753								
3.	PPSWL		0.635							
4.	PI		0.685							
5	LQMS		0.623							
6	LUI			0.535						
7	LPSM			0.801						
8	CPBP				-0.856					
9	WUHTP				0.663					
10	PCR					0.683				
11	PTW					0.740				
12	UD						0.840			
13	PM							0.584		
14	CSM							0.761		
15	UCC								-0.825	
16	PIF									0.557
17	ICP									-0.870

Table 9: Factor loading rotated for human factor

	Variables	HMF_1	HMF_2	HMF_3	HMF_4	HMF_5	HMF_6	HMF_7	HMF_8
1	DIPP	0.753							
2.	LOT	-0.788							
3.	LMC		0.559						
4.	ILK		0.795						
5	EOT		-0.605						
6	IPPS			0.688					
7	IF			-0.720					
8	ST				0.599				
9	UNC				0.537				
10	UFFDR				0.788				
11	LSD					0.834			
12	CRS					0.603			
13	DW						0.709		
14	AI						0.761		
15	IP							0.889	
16	DE								0.820

Table 4.5.4(a,bandc): Tables showing the coding of the variables used in factor loading extraction and rotation tables.

NO	FACTOR	
A	**TECHNICAL FACTORS**	
1	Error during design	EDD
2	Omission during design	OMD
3	Errors during construction	EDC
4	Omissions during construction	OMC
5	Quality failure	QF
6	Quality deviation	QD
7	Design changes	DC
8	Poor quality contract documentation	PQCD
9	Defective materials	DEM
10	Complex details	COD
11	Overlooked site condition	OSC
12	Poor site practices	PSP
13	Lack of proper monitoring and evaluation	LPME
14	Ineffective coordination and integration of components	ICIC

15	Inaccurate information	IAINF
16	Incomplete information	ININF
17	Conflicting information	COF
18	Unrealistic programme	UP
19	Inadequate resources	IR
20	Inadequate work separation	IWS
21	Constraint in carrying out activities	CICOA
22	Change in plan and scope by client	CPSC
23	Change in specification by client	CISBC
24	Contractor initiated changes	CIC
25	Consultant initiated changes	CONIC
26	Lack of attention to quality	LAQ
27	Lack of information technology use	LIT
28	Non-compliance to standards/ specification	NSS
29	Non-conformance to project requirements	NPR
30	Lack of understanding and correct interpretation of customer requirements	LUCICR
31	Sub-standard products and services	SSPS
32	Safety considerations	SC
33	Defect	DEF
34	Incomplete documentation at the time of award	IDATA
35	Poor information use	PFU
36	Poor technology application	PTA
37	Checking procedures	CP

NO	FACTOR	
B	**QUALITY MANAGEMENT FACTORS**	
1	Poor management practices	PMP
2	Poor contractual relationship	PCR
3	Conflict of opinions between participants	CPBP
4	Poor communication	PC
5	Lack of quality focus	LQF
6	Poor information flow	PIF
7	Poor planning and scheduling of work load	PPSWL
8	Poor team work/ joint problem solving	PTW
9	Poor instructions	PI
10	Ineffective coordination and integration of project participants	ICIPP
11	Procurement method	PM
12	Contractor selection method	CSM
13	Lack of Quality management system	LQMS
14	Lack of trust and commitment by participants	LTCP
15	Unanticipated consequences of change	UCC
16	Late user involvement	LUI
17	Lack of support to site management	LPSM
18	Working under high time pressure	WUHTP
19	Cost pressure	CP
20	Untimely delivering	UD
21	Inadequate construction planning	ICP

NO	FACTOR
C	**HUMAN RESOURCE FACTORS**

1	Staff turnover	ST
2	Inadequate personnel planning and supervision	IPPS
3	Disturbance in personnel planning	DIPP
4	Lack of training	LOT
5	Lack of motivation and care	LMC
6	Inexperienced personnel	IP
7	Insufficient skill level	ISL
8	Defective workmanship	DW
9	Ignorance and lack of knowledge	ILK
10	Disturbance in personnel planning	DPP
11	Delays	DE
12	Alteration	ALT
13	Lack of skill development	LSD
14	Carelessness	CRS
15	Excessive over time	EOT
16	Inadequate funding	IF
17	Ambiguous instruction	AI
18	Uncertainty (weather. Soil condition etc)	UNC
19	Unpredictable factors from different sources	UFFDS

PROJECT COST PREDICTION MODEL USING PRINCIPAL COMPONENT REGRESSION FOR PUBLIC BUILDING PROJECTS IN NIGERIA

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Abstract

Major problem in Nigeria construction industry is that building contracts are completed at sums much higher than estimated cost, hence the need to develop predictive cost model that capture factors affecting project cost using principal components regression, through set objectives: to identify factors contributing to project cost; examine the importance of the factors and develop cost predictive model. Literature review on the study indicated that nature of clients, professional involved in a project and their decision regarding design, function, duration, technology and implementation have significant effect on the overall project cost. Data for the study are obtained through random sampling of public building projects completed in Nigeria after 1995. The study identifies six most significant factors to project cost among the design related variables as: Level of design complexity; level of construction complexity; level of technological advancement; percentage of repetitive element; presence of special issues and scope of work. Three factors among time/cost related factors as Importance for project to be delivered; time allowed by the client and his representative for bid evaluation; need for the project to be completed. Client, consultant and contractor's experience on similar project; adequacy of contractor's plants and equipments are most significant among project parties experience related factors. The selected factors were used for cost predictive model.

Keywords: Building, Cost, Model, Prediction, Principal components.

Introduction

A successful project means that the project has accomplished its technical performance, maintained its schedule and remained within budgetary costs. However, there has been a greater awareness of cost prediction by prospective building clients because of the prevailing economic condition which has placed severe restrictions on the availability of capital and thus made it essential to ensure that whatever amount is available is judiciously utilised to secure best economic advantage.

In these days of ever increasing costs, the majority of promoters of building projects are insisting on jobs being designed and executed to give maximum value for money. Hence, Quantity Surveyors are employed to an increasing extent during the design stage to advice designers on the portable cost implications of their design decision. All these have geared building clients to demand for improved and refine cost control tools from their professional advisers, to provide a balanced cost in all parts of the building as well as an accurately forecast overall cost (Seeley 1993). In the same vein, Lowe, Emsley and Harding (2006) also explained that construction clients require early and accurate cost advice, prior to site acquisition and the commitment to build, to enable them to assess the feasibility of the proposed project, this is performed by construction contract price forecasters (usually Quantity Surveyor).

A client is very much concerned with quality, cost and time and wants the building to be soundly constructed at a reasonable cost and within a specified period of time. For these reasons, it is incumbent upon an Architect who may or may not be supported by Quantity Surveyor to exercise the greatest care and skill in the design of the project with constant checks on cost. Songer and Molenaar (1997) have identified a list of metrics that measure and compare the performance of construction projects. Other studies (Akintoye 2000; Chan, Ho and Tam (2001) identified the determining factors and assessed their

impacts on project cost. Therefore integrated efforts of the various parties and their decisions regarding the design, technology and implementation of the project can have significant effect on the overall project cost. Therefore, it can be seen that the need for a virile construction industry cannot be overemphasized. Thus, there is urgent need to address some of the fundamental problems plaguing its growth and viability, one of which is spate of uncertainties brought by the prevalent wide discrepancies between planned and actual construction cost due to lack of effective prediction cost models. However, this study seeks to replicate the research conducted by (Chan and Park 2005) in Singapore using Nigeria as case study. The research aims to (i) to identify the factors that contribute to project cost (ii) to examine the importance of the identified factors based on the significance of their contribution (iii) to develop a predictive project cost model from the selected components using principal components technique.

The subsequent sections review the previous work relating to the research title, present the data and discuss the results of the statistical analysis. Finally, conclusions were drawn from the results of the empirical study.

Previous Work

Cost modelling is described by Willis and Ashworth (1987) as a modern technique to be used for forecasting the estimated cost of a proposed construction project. Ferry and Brandon (1991) defined it as one symbolic representation of a system expressing the content of that system in terms of the factors which influence its cost.

Cost model based on space/functional unit is described by Dikko (2002), as the simplest types of cost models. They generally use information generated from past projects and such information are discounted into cost per unit of utility and used as a basis for estimating cost of future projects. These cost models have the obvious drawback of being too simplistic, extremely difficult to adjust for changes in any of the key variables and generally have low level of reliability. Elemental planning as opined by Khroswowhahi and Kaka (1996) is the most established logical approach to estimating. However, it demands considerable resources and it is not possible to develop solution at an early stage. According to Dikko (2002), elemental cost planning based model is based on BCIS (British Cost Information System) format. He explained further that, the approach was originally developed for application to building projects only, which are sub-divided into functional elements.

Skitmore, Strading, Tuohy and Mkwezalamba (1990) are of the opinion that cost modelling could be based on the following methods; in place quantities and descriptive models. According to Skitmore et al (1990) methods based on in-place quantities seem to have reached the limit of their development with accuracy insufficient for estimate or for cost advice at design stage.

Newton (1991) identified regression analysis and neural networks as two modelling techniques, which have been used to develop models to estimate the cost of buildings. However, predominantly, these models rely on the use of historic (but recent) cost data. Early example of the use of regression analysis as a forecasting tool are provided by McCaffer (1975) and McCaffer, McCaffrey and Thrope (1984), while a more recent application is provided by Trost and Oberlender (2003). A review of the application of regression analysis to construction price forecasting is presented by Skitmore and Patchel (1990). likewise, Elhag and Boussabaine (2001; 2002) modelled tender price estimation using artificial neural networks while Emsley, Lowe, Duff, Harding and Hickson (2002) applied a neural network approach to the prediction of total construction costs. The findings of their research showed that the major benefit of the neural network approach was the ability of neural networks to model the nonlinearity in the data. The model obtained gives a mean absolute percentage error (MAPE) of 16.6%, which includes a percentage (unknown) for client changes. Raftery (1993) proposed probabilistic form also referred to as the cumulative probability functions. Skitmore (2002)

describes an empirical method for the construction of model that presents in this form (which he referred to as 'Raftery Curves') for the tender price forecast.

Lowe et al (2006) asserted that the inappropriate nature of raw cost as a valid predictor of project cost can be demonstrated by comparing the results of a simple forward stepwise regression using raw cost with those obtained when using the other three variables.

Chan and Park (2005) asserted that project cost depends not only on a single factor but a cluster of variables related to the characteristics of the project and the construction team. Technological and project design requirements preset by the client's desired level of construction sophistication play an important role in determining the cost of the project.

Research Method

This study was designed to investigate into the factors that determine cost of construction project and to develop a predictive cost model. The target population for the study were the three main construction industry participants i.e. clients, consultants and contractors and construction projects that had already been completed formed the basis for data collection. And to ensure accuracy of predictive models, homogeneity is very important. Since construction projects fall into different categories such as building, civil, heavy engineering among others, the study focused on building works. The study adopts simple random sampling technique to capture the targeted population for the study.

From the existing literature on determinants of project cost estimation, a total of 15 determinants relating to the project, the construction team and the contractor were selected out of 38 determinants factors displayed on table 1 below.

Appropriate methods of data analysis were very necessary to be able to accurately process the data collected from field survey. Data analysis, where necessary could involve the use of multiple analytical techniques to facilitate the ease of communicating the results while at the same time improving its validity (Ajayi, 1990). Based on this assertion, two methods of analysis were employed for the study; Principal Component Regression for purposes of selecting a small number of principal components that contributes satisfactorily to variation in y and which could be used for estimation. Finally, multiple regression models (linear and non-linear) were employed for predictive purposes. Specifically, the regression models used in this study includes simple linear, semi-log and double-log.

$$Y = a_0 + a_1X_1 + a_2X_2 + \ldots\ldots\ldots\ldots\ldots a_nX_n + e \quad \text{---------- (i)}$$

$$Ln\ Y = a_0 + a_1X_1 + a_2X_2 + \ldots\ldots\ldots\ldots\ldots a_nX_n + e \quad \text{---------- (ii)Ln}$$

$$Y = a_0 + a_1LnX_1 + a_2LnX_2 + \ldots\ldots\ldots\ldots\ldots a_nLnX_n + e \quad \text{---------- (iii)}$$

Analysis and Result

Table 1 showed the descriptive statistics of data for the research, the respondents were required to score the identified factors that are been considered as determinants of cost of building project using a Likart scale of 5 – 1 that is '5 denoting very important and 1 denoting not important'. However, table 2 shows the aggregation of the respondent's responses as percentage of the total number of responses received on each of the questions asked on the questionnaire.

Extracting Components

This research adopts the use of PCA in analysing the raw data for the purposes of extracting the factors that contributed significantly to cost of building projects. Kaming et al (1997) explained that the total number of factor estimated by the model (common factor) is equal to or less than the total number of variables involved. Table 3, 4, and 5 shows the extracted number of factor from PCA for design related, time/cost related and experience

of project parties related factors based on their contribution to cost of building project. However, the most significant factors that contribute to project cost are those whose eigenvalues are greater than or equal to 1(eigenvalue ≥ 1), because eigenvalues is a measure of the contribution of a variable to the principal components. From table 2, 3 and 4, the extraction sum of square loading of the factor analysis for design related factors indicates six (6) factors out of thirteen (13) factors with eigenvalues of 3.068 for factor 1 to 1.001 for factor 6, Time/Cost related factor indicates three (3) factors out of eight (8) factors with eigenvalues of 2.394 for factor 1 to 1.074 for factor 3 and Experience of Parties to the Project factors indicates five (5) factors out of seventeen (17) factors with eigenvalues of 4.357 for factor 1 to 1.301 for factor 5. However, those factor with eigenvalues greater than or equal to 1 are considered in the extraction process.

The output in table 2, 3 and 4 shows the extraction factor loading greater than 0.500 and their respective communalities (h^2). The criterion for factor loading was that any variable with absolute value > 0.500 in the component matrix belong to the component. Factor loading are simply the correlation coefficient between an original variable/determinant and an extracted factor. Also, the average communalities (h^2) which explain the variance in the variables accounted for by the extracted factor is 75%, 64% and 69% for Design related, Time/cost related and Experience of Project Parties related factors respectively.

Selecting Principal Components for Cost Modelling

Further to extraction of principal components, those components that contributed significantly to the factors were selected for purposes of regression analysis which needs to be carried out on the selected components for model development otherwise it will be the same as regressing on all the variables/factors.

However, the study adopts the criterion of selection used in (Kaming et al. 1997, and Chan & Park 2005). This criterion include selecting the principal component whose eigenvalues and the percentage variance is more than the average eigenvalues and the percentage cumulative variance of the factor.

Based on the above criteria, from table 2, 3 and 4, six components are extracted from 13 variables pertaining to Project Design. The cumulative percentage variance explained by the six components is 75% and percentage variance explained by each of the components are displayed on table 5. Taking the significance of contribution of each variable into account (based on their respective percentage variance) and in comparison with the average eigenvalues (1.314), the first two components contributed significantly (accounted for 36% of the variance), thus those variables with eigenvalues higher than the average eigenvalues were selected to be included in the model. Hence, 6 out of 13 variables were selected.

Within the component of Time/Cost factors, three components was extracted, having a cumulative percentage variance of 64% the average eigenvalues (3.34), Thus 3 factors with relatively higher eigenvalues than the average eigenvalues was selected to be included in the model. Among the factors relating to experience of project parties, five components that amount to 69% of the variance are extracted and first two components whose eigenvalues are higher than average (1.748) account for 43% of the variance. Six out a total of seven variables are selected for the model estimation. All the variables selected are presented in table 5.

Cost Prediction Model

In pursuance of the research objectives, Final cost prediction model was developed using principal components regression method on the component presented in table 5. Table 6 reports the estimated effects of the individual variables on the project cost. From the result of the analysis, the Final Project Cost (FPC) prediction model comprises of fourteen significant variables and one variable was excluded from the model.

The result of the analysis presented on table 7 shows that the variables accounted for 20% and 24% of the total variance of project cost as indicated by R^2 and adjusted R^2 value respectively. The F. Ratio indicated that the variables are significant at 5% significant level.

The regression model can be represented as;

$$F.COST = 216.57 - 12.24 * FAC15 + 7.26 * FAC4 - 24.98 * FAC11 + 8.77 * FAC1 + 4.28 * FAC7 + 2.22 * FAC6 - 5.58 * FAC8 + 2.76 * FAC5 + 5.82 * FAC13 - 15.61 * FAC3 - 20.80 * FAC9 + 5.86 * FAC2 + 9,77 * FAC12 + 1.85 * FAC14 \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots (4.1)$$

The model implies that, adequacy of contractor's plant and equipment, contractor's experience on similar type of project, time allowed for project bid to be evaluated, level of technological advancement and client commitment to timely completion of the project have negative effect on the cost of project and can reduce project cost. But percentage of repetitive work, level of design complexity, importance for project to be delivered, project scope, percentage of special issues, communication among project team, level of construction complexity, contractor experience on similar size of project and contractors prior working relationship with clients increase cost of building projects.

Discussion of Result

Based on the information gathered from literature search, Thirty Eight factors were identified and used for the study. However, Chan and Park (2005) used fifty nine variables out of which nine were regarded as dummy variables and some others were related to contract conditions in the study area. Other studies on the research indicated that nature of clients and the professionals involved on a project and their collective decision regarding the design, function, duration, technology and implementation of the project have significant effect on the overall project cost (Akintoye, 2000: Chan et al. 2001: Lowe, et al 2006).

The study indicates six most significant factors among the design related variables as major contributor to cost of public building projects. And time/cost related factors indicated three factors. It also showed five factors contributed significantly to project cost among the project parties experience related factors. These amounts to fifteen factors and all these factors were used for the model estimation.

The model has an R^2 and adjusted R^2 value of approximately 20% and 24% respectively. These results compare favourably with past research on cost estimation/prediction model as evidenced by reported values of R^2 of 20.8% (Skitmore *et al*., 1990), 27.9% (Lowe, 1996) and 41% (Chan and Park, 2005). Also, similar model developed using Neural Network showed an R^2 value of 58.6% (Emsley, et al 2002).

Conclusion

This research centered on developing predictive cost model for public building projects using principal components regression. The technique is applicable for purposes of reducing large number of variables required for the estimation.

The research has shown that project cost depends largely on factors related to; adequacy of contractor's plant and equipment, contractor's experience on similar type of project, time allowed for project bid to be evaluated, level of technological advancement and client commitment to timely completion of the project, percentage of repetitive work, level of design complexity, importance for project to be delivered, project scope, percentage of special issues, communication among project team, level of construction complexity, contractor experience on similar size of project and contractors prior working relationship with clients.

The study has been able to develop a predictive cost model using the fifteen selected factors that exhibit a significant effect on project cost and these factors accounted for 23.8% of the model. Further research is required for the model to be fully appreciated.

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Table 1: Factors that determine cost of building project

Factors	Percentage				
	N.I	S.I	M.I	V.I	E.I
DESIGN RELATED					
X1-Level of design complexity	-	-	17	51	32
X2-Level of construction complexity	-	-	22	44	34
X3-Level of technological advancement	-	12	20	46	22
X4-Level of specialization required of contractors	2	-	27	44	27
X5-Percentage of repetitive elements	17	32	34	15	2
X6-Presence of special issues	10	22	29	32	7
X7-Type of specification	-	2	17	49	32
X8-Extent to which bid documents allow additions to scope	2	17	32	34	15
X9-Flexibility of scope of works when contractor is hired	-	10	42	39	10
X10-Project scope definition completion when bids are invited	5	7	34	39	15
X11-Design completion(by owner) when bids are invited	5	15	34	32	15
X12-Design Decision made (by owner) when bids are invited	2	24	20	34	20
X13-Design completion when budget is fixed	-	8	22	46	24
TIME/COST RELATED					
X14-Importance for project to be completed within budget	-	2	17	32	49
X15-Importance for project to be delivered	-	2	22	42	34
X16-Time given to consultant to evaluate bids	24	17	34	27	20
X17-Extent to which contract period is allowed to vary	-	17	44	24	15
X18-Importance for project to be completed on time	-	2	10	46	42
X19-Bidding environment	5	39	17	24	15
X20-Consultant's level of construction sophistication	-	24	27	46	24
X21-Owner's level of construction sophistication	5	10	27	44	15
PROJECT PARTIES EXPERIENCE RELATED					
X22-Consultant experience with similar project	-	2	22	42	34
X23-Owners experience with similar project.	7	15	29	24	24
X24-Consultant staffing level to attend to contractor	-	8	29	29	34
X25-Owners staffing level to attend to contractor	17	12	44	20	7
X26-Contractor's experience with similar type of projects	-	5	12	49	34
X27-Contractor's experience with similar size of project	2	7	17	49	24
X28-Contractors experience with project in Nigeria	2	5	29	44	20
X29-Subcontractor experience and capability	-	27	29	34	10
X30-Communication among project team	15	15	27	27	17
X31-Contractor's prior working relationship with the owners	12	17	37	32	2
X32-Contractor prior working relationship with consultant	7	15	39	24	17
X33-Contractor track record for completion on time	-	-	22	59	20
X34-Contractor track record for completion on budget	-	5	22	37	37
X35-Contractor track records for completion on quality	-	7	17	34	42
X36-Contractor staffing level	2	7	17	44	29
X37-Adequacy of contractor plant and equipment	-	-	36	32	32
X38-Magnitude of change orders in contractor past project	-	24	54	17	5

Key: N.I (Not Important), S.I (Slightly Important), M.I (Moderately Important), V.I (Very Important), E.I. (Extremely Important)

Table 2: Factor loading of design factors to cost of project - extracted

	Variable	Factors						
		DF1	DF2	DF3	DF4	DF5	DF6	h^2
1	Level of design complexity	0.540						0.813
2	Level of construction complexity	0.520						0.788
3	Level of technological advancement	0.714						0.742
4	Level of specialization required of contractors	0.500						0.581
5	Percentage of repetitive elements		0.742					0.722
6	Presence of special issues		-0.603					0.906
7	Type of specification		0.659					0.620
8	Extent to which bid documents allow additions to scope			0.597				0.719
9	Flexibility of scope of works when contractor is hired			-0.507				0.847
10	Project scope definition completion when bids are invited				0.709			0.812
11	Design completion(by owner) when bids are invited				0.600			0.642
12	Design Decision made (by owner) when bids are invited					0.626		0.741
13	Design completion when budget is fixed						-0.569	0.736

Table 3: Factor loading of time/cost factor - extracted

	Variables	Factors			
		TF1	TF2	TF3	h^2
1	Importance for project to be completed within budget	0.67			0.618
2	Importance for project to be delivered	0.757			0.752
3	Time given to consultant to evaluate bids	0.793			0.698
4	Extent to which contract period is allowed to vary	0.508			0.622
5	Importance for project to be completed on time	0.612			0.707
6	Bidding environment		0.719		0.53
7	Consultant's level of construction sophistication		0.719		0.459
8	Owner's level of construction sophistication			-0.659	0.697

Table 4: Factor loading for project parties experience factor - extracted

	Variables	Factors					
		EP1	EP2	EP3	EP4	EP5	h^3
1	Consultant experience with similar project	0.537					0.577
2	Owners experience with similar project	0.703					0.780
3	Consultant staffing level to attend to contractor	0.589					0.783
4	Owners staffing level to attend to contractor	0.600					0.825
5	Contractor's experience with similar type of projects	0.536					0.774
6	Contractor's experience with similar size of projects	0.690					0.761
7	Contractors experience with project in Nigeria	0.694					0.611
8	Subcontractor experience and capability	0.520					0.677
9	Communication among project team		-0.650				0.781
10	Contractor's prior working relationship with the owners		-0.593				0.738
11	Contractor prior working relationship with the consultant		0.662				0.651
12	Contractor track record for completion on time		0.585				0.612
13	Contractor track record for completion on budget			0.510			0.591
14	Contractor track records for completion on quality			0.628			0.634
15	Contractor staffing level						0.502
16	Adequacy of contractor plant and equipment						0.693
17	Magnitude of change orders in contractor past project						0.633

Table 5: List of selected components for model estimation

Factor 1 (FAC1)	Level of design complexity
Factor 2 (FAC2)	Level of construction complexity
Factor 3 (FAC3)	Level of technological advancement
Factor 4 (FAC4)	Percentage of repetitive element
Factor 5 (FAC5)	Percentage of special issues
Factor 6 (FAC6)	Project scope
Factor 7 (FAC7)	Importance for project to be delivered
Factor 8 (FAC8)	Time allowed for bid evaluation
Factor 9 (FAC9)	Importance for project to be completed on time
Factor 10 (FAC10)	Client experience in construction project
Factor 11 (FAC11)	Contractor's experience on similar type of project
Factor 12 (FAC12)	Contractor's experience on similar size of project
Factor 13 (FAC13)	Communication among project team
Factor 14 (FAC14)	Contractor's prior working relationship with client
Factor 15 (FAC15)	Adequacy of contractor plant and equipment

Table 6: Estimates of regression parameter from analysis of principal component variables

Variable	Coefficients	Std Error	t-statistics	Significant level
(Constant)	216.57	138.97	1.56	0.131
FAC1	8.77	22.49	0.39	0.700
FAC2	5.86	23.11	0.25	0.802
FAC3	-15.61	16.87	-0.93	0.363
FAC4	7.26	16.70	0.44	0.667
FAC5	2.76	16.80	0.16	0.871
FAC6	2.22	13.13	0.17	0.867
FAC7	4.28	15.90	0.27	0.790
FAC8	5.58	17.58	-0.32	0.753
FAC9	-20.80	16.09	-1.29	0.207
FAC11	-24.98	19.80	-1.26	0.218
FAC12	9.77	15.81	0.62	0.542
FAC13	5.82	20.72	0.28	0.781
FAC14	1.85	15.38	0.12	0.905
FAC15	-12.24	19.69	-0.62	0.540

Significant at 5% significant level

Table 7: Regression results of principal component variables

Model	R^2	Adjusted R^2	F.Cal	df1	df2	Sig
1	19.50%	23.80%	0.451	14	26	0.94

a. Predictors: (Constant), FAC15, FAC4, FAC11, FAC1, FAC7, FAC6, FAC8, FAC5, FAC13, FAC3, FAC9, FAC2, FAC14.
b. Dependent variable: FCOST

DOKUMENTASI, ANALISIS DAN PENGGUNAAN HADITH: SATU PENILAIAN KEATAS REKABENTUK MASJID MODEN DI MALAYSIA

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Abstract

Kertas kerja ini cuba untuk menyusun dan menganalisa hadith dalam memberi pendekatan pilihan untuk rekabentuk masjid moden di Malaysia. Kajian dilakukan dengan membuat pengumpulan Hadith-hadith himpunan Bukhari dan Muslim yang kemudian dihuraikan dan dijadikan kerangka rujukan bagi menangani pelbagai permasalahan dan kecelaruan rekabentuk masjid yang terjadi di Malaysia. Kajian ini terbahagi kepada dua bahagian utama. Bahagian pertama mengandungi kajian mengenai isu dan permasalahan rekabentuk masjid di Malaysia. Bahagian dua pula terdiri daripada dokumentasi dan analisis terhadap himpunan Hadith-hadith berkenaan dalam menyingkapi pelbagai isu dan permasalahan rekabentuk masjid di Malaysia dan dunia. Diharapkan melalui kajian ini kita dapat memahami penggunaan hadith sebagai salah satu pendekatan utama dan menjadi kerangka pertimbangan dalam penghasilan rekabentuk masjid moden di Malaysia untuk masa kini dan masa hadapan.

Kata Kunci: Hadith, Reka Bentuk Masjid Moden, Seni Bina Islam.

This paper tries to do a documentation and analysis based on the second source of Islam which is Prophetic Tradition in providing an alternative approach for the design of modern mosques in Malaysia. This research is done by gathering traditions from the compilation of al-Bukhari and Muslim which are then being interpreted and used as a framework to answer different type of problem, issue, crisis in mosque design in Malaysia. The study is divided into two main sections. The first section contains issue and problem in mosque design in Malaysia while the second section try to analyze the compilation of Hadith in attempt to view issue and problems in mosque design in Malaysia. It is expected that through this paper we can understand the use of Prophetic traditions as one of the main foundations and framework for the present modern mosque designs in Malaysia and in the future.

Keyword: Prophet's tradition, Modern mosque design, Islamic architecture.

Pendahuluan Dan Senario Pendekatan Reka Bentuk Masjid

Dalam kertas kerjanya yang berjudul Islam, *Architecture and Globalisation: Problematic and Prospects for Research in Indonesia*, Darwis Khudori membahagikan pelbagai pemikiran, diskusi dan penulisan tentang Seni Bina Islam dan Seni Bina Masjid kepada dua persepsi utama. Persepsi yang pertama disebutnya sebagai *Critical Perception* sementara yang kedua disebut sebagai *Ideological Perception. Critical perception* didefinisikan sebagai sebuah persepsi kritis berdasarkan pemikiran yang berasaskan pendekatan ilmiah, rasionali dan diskusi intelektual, sebagaimana pendapat beliau yang menyebut:

"We can call this perception "critical" because it is based on scientific methods, accumulation of knowledge and intellectual reflection (developed constantly and progressively in the west)".[1] Selanjutnya beliau mengkategorikan institusi seperti *Aga Khan Award for Architecture* atau ahli fikir Seni Bina Islam dan arkitek seperti Oleg Grabar dan Mohammed Arkoun dalam kategori ini. Untuk gerakan Aga Khan beliau

1 Lihat Darwis Khudori, Critical Perception sementara yang kedua disebut sebagai Ideological Perception, kertas kerja pada The Third International Symposium on Islamic Expression in Indonesian Architecture, "Tectonic Dimension in Islamic Architectural Tradition in Indonesia, hal 60.

membahagikannya kepada tiga buah karakter. Karakter yang pertama adalah keterbukaan gerakan ini terhadap ahli dan ahli fikir islam (Muslim) dan bukan Islam (Non Muslim) seperti Kenzo Tange, Charles Jencks, Robert Venturi disamping tokoh-tokoh Muslim seperti Seyyed Hossein Nasr dan Muhammad Fazlurrahman. Karakter yang kedua adalah bahawa gerakan ini berdasarkan pemikirannya pada sebuah penjelasan intelektual yang terperinci. Perkara ini terhasil melalui kajian daripada pelbagai disiplin ilmu. Karakter ketiga yang beliau sebutkan sebagai karakter yang ”pemalu”. Gerakan Aga Khan tidak berusaha menjadi sebuah sekolah pemikiran, namun ia secara tidak rasmi merupakan forum untuk melakukan refleksi, diskusi, pertukaran idea dan pengalaman serta penyelidikan bersama bagi pencarian penyelesaian terhadap pelbagai permasalahan kaum Muslimin.

Persepsi yang kedua iaitu *ideological Perception* atau dalam bahasa yang lain Darwis menyebutnya sebagai *Arabo-Islamist,* didefinisikan sebagai sebuah persepsi ideologis yang didasarkan kepada tiga alasan. Alasan yang pertama kerana persepsi ini mengakui dan meyakini keberadaan dari Seni Bina yang Islami dan perlunya pengembangan dan pembangunan untuk melawan dominasi Barat. Alasan yang kedua adalah kerana persepsi ini meyakini bahawa Seni Bina Islam berasal dari nilai-nilai dan prinsip dasar Islam yang diturunkan dari Al-Qur’an dan hadith, sementara alasan yang ketiga adalah kenyataan bahwa kelompok ini dibentuk dalam sebuah kerangka politik dan penajaan oleh Arab Saudi. Walaupun dalam pelbagai penjelasannya Darwis dilihat lebih memihak kepada persepsi yang pertama sekaligus mengkritik pendekatan yang kedua, namun klasifikasi yang beliau lakukan sangat penting bagi sebuah pemahaman dasar atau identifikasi terhadap pemikiran dan falsafah yang berkembang dalam Seni Bina Islam.

Ismail Serageldin ketika membincangkan tentang perancangan masjid sebagai salah satu elemen utama dalam Seni Bina Islam telah mengklasifikasikan pendekatan yang digunakan kepada lima kategori iaitu pendekatan popular (vernacular), tradisional, populis, adaptif-moden dan yang terakhir adalah pendekatan moden.[2] Sementara dari segi ruang yang mencakupi perkhidmatannya, beliau membahagi perancangan masjid kepada empat bahagian iaitu *Major landmark structure, Community Center Complex, Small Local Mosque* dan *Zawiyas.* Melalui idea pembahagian dan klasifikasi tersebut, menurut beliau akan membantu secara lebih mudah mengenalpasti karakter dan cakupan dari sebuah masjid.

Sementara Mohammad Al-Asad dalam pandapatnya kemudian menyimpulkan klasifikasi tersebut kepada dua kategori saja, sebagaimana dijelaskan oleh beliau seperti berikut:

“…I suggest placing these categories within an even simpler system by dividing approaches to contemporary mosque into two groups: one that accept historical precedents as main source of inspiration for generation of form and one that does not.”[3]

Kemas Madani pada penulisan yang lain berusaha menterjemahkan kembali fungsi masjid dan membahagikan masjid kepada dua jenis iaitu masjid sebagai elemen lingkungan dan masjid sebagai pusat aktiviti dan tempat beribadat.[4]

Hasan-Uddin Khan dalam tulisannya tentang masjid membuat lima klasifikasi sebagai elemen utama masjid dalam Seni Bina Islam.[5] Klasifikasi tersebut dilakukan berdasarkan kategori pelanggan yang meminta masjid tersebut. Klasifikasi tersebut membahagi masjid kepada Pelanggan Negara (atau pemerintah negara), Penguasa Tempatan, Institusi - institusi, Masyarakat setempat dan masyarakat awam sebagai pelanggan mereka. Oleh kerana ianya melibatkan dokumentasi terhadap banyak masjid di pelbagai negara maka

2 Lihat kertas kerja beliau: Ismail Serageldin, *Contemporary Expressions of Islam in Buildings: The Religion and Secular,* pada Seminar Internasional, Aga Khan Awards for Architecture, Jakarta & Yogyakarta 15-19 Oktober 1990.
[3] Lihat prosiding Seminar Internasional, Aga Khan Awards for Architecture, Jakarta & Yogyakarta 15-19 Oktober 1990, hal 28.
[4] Lihat prosiding Seminar Internasional, Aga Khan Awards for Architecture, Jakarta & Yogyakarta 15-19 Oktober 1990, hal 34.
[5] Lihat kertas kerja beliau: Hassan-Uddin Khan,*“The Overview of the Mosque, an Overview and Design Direction”* pada Seminar Internasional, Aga Khan Awards for Architecture, Jakarta & Yogyakarta 15-19 Oktober 1990, hal 109-126, lihat juga pembahagian menurut karateristik kawasan pada buku beliau: *The Mosque: History, Architectural Development & Regional Diversity* (2002), New York: Thames & Hudson

klasifikasi ini menjadi sangat penting bagi perbendaharaan bahasa kita tentang reka bentuk masjid.

Kertas kerja ini cuba untuk menyusun semula dan menganalisis hadith dalam memberikan pendekatan pilihan untuk reka bentuk masjid moden di Malaysia. Kajian dilakukan dengan membuat pengumpulan Hadith-hadith, himpunan Bukhari dan Muslim yang kemudian dihuraikan dan dijadikan kerangka rujukan bagi menangani pelbagai permasalahan dan kecelaruan rekabentuk masjid yang terjadi di Malaysia. Kajian ini terbahagi kepada dua bahagian utama. Bahagian pertama mengandungi kajian mengenai isu dan permasalahan rekabentuk masjid di Malaysia. Bahagian dua pula terdiri daripada dokumentasi dan analisis terhadap himpunan hadith-hadith berkenaan dalam menyingkapi pelbagai isu dan permasalahan rekabentuk masjid di Malaysia dan dunia. Diharapkan melalui kajian dalam kertas kerja ini kita dapat memahami penggunaan hadith sebagai salah satu pendekatan utama dan kerangka pertimbangan dalam penghasilan rekabentuk masjid moden di Malaysia untuk masa kini dan masa hadapan.

Permasalahan Rekabentuk Masjid Moden Di Malaysia

Penulisan ini membincangkan permasalahan dalam rekabentuk masjid yang terdapat di Malaysia. Perbincangan ini terbahagi kepada enam bahagian iaitu permasalahan identiti dan rupa bentuk, permasalahan kedudukan dan lokasi masjid , permasalahan dalam pengkhususan dan perancangan ruang, permasalahan jemaah dan pengguna terutamanya bagi golongan wanita, kanak-kanak, remaja dan juga orang kurang upaya, permasalahan dalam keselamatan dan kawasan masjid, permasalahan dalam pengurusan dan akhir sekali berkaitan ekonomi masjid. Kajian ini diharap dapat mengenalpasti permasalahan yang terdapat di kebanyakan masjid di Malaysia.

Permasalahan Identiti Dan Rupa Bentuk Masjid Di Malaysia

Jika diamati dengan teliti pada kebanyakan masjid yang ada di Malaysia khususnya, kebanyakan daripadanya mempunyai rupa bentuk luaran yang hampir sama iaitu mempunyai kubah besar bercorak, menara, hiasan dalaman berukir dan sebagainya. Rupa bentuk sedemikian merupakan satu peniruan kepada reka bentuk masjid Islam terdahulu yang telah melalui zaman kegemilangannya suatu ketika dahulu. Umpamanya dapat dilihat pada rekabentuk Masjid Wilayah, Masjid Putra di Putrajaya, Masjid Sultan Salahuddin di Shah Alam dan Masjid UTM di Johor.

Peniruan reka bentuk masjid terdahulu dilihat sebagai satu krisis identiti yang berpunca daripada perasaan rendah diri terhadap kehebatan reka bentuk lampau yang gemilang. Hasil reka bentuk masjid terdahulu digunapakai dan dianggap mewakili satu bahasa seni bina Islam yang rasmi, terpilih dan piawai bagi mengambarkan seni bina Islam. Permasalahan tersebut dilihat oleh Muhammad Tajuddin (2003:2) sebagai satu kesilapan yang berpunca daripada sifat dalaman sesuatu bangsa yang dikatakan mengalami *'Middle Eastern Inferiority Complex'.* Pemikiran sedemikian telah menganggap bahawa binaan masjid haruslah mencontohi binaan tamadun masyarakat di Timur Tengah yang merupakan tempat lahirnya agama Islam. Kesilapan tersebut jelas diperkatakan oleh Muhammad Tajuddin (2003:2) seperti berikut:

> *The attitude thus prevailing seems to indicate that Muslims in Malaysia have an inferiority complex against the Middle East, the birthplace of Islam. I have no reservation for saying so because neither the Qur'an nor hadiths of the Prophet Muhammad (peace be upon him) make any mention as to the required expression of the mosque to be from its birth place.*

Masyarakat Malaysia sepatutnya berbangga dengan identiti dan penampilan seni bina yang telah diwarisi oleh generasi terdahulu seperti yang dapat dilihat pada masjid Tradisional Kampung Laut di Kelantan dan Masjid Negara di Kuala Lumpur. Masjid Tradisional Kampung Laut telah dibina ratusan tahun dahulu dengan teknologi zaman tersebut yang ditampil bersama dengan imej binaan setempat seperti penggunaan

bumbung berbentuk piramid, lantai yang tinggi dari aras tanah dan sebagainya. Begitu juga dengan rekabentuk Masjid Negara yang mempunyai ciri-ciri binaan setempat yang dapat dilihat pada penggunaan serambi, susun atur ruang yang menggalakkan pengaliran udara yang baik dibantu dengan penggunaan teknologi pada masa ia dibina. Kesan daripada peniruan-peniruan tersebut menyebabkan negara kita mengalami masalah kekeliruan identiti yang serius serta member kesan kepada perkembangan imej seni bina tempatan yang terbantut akibat kemasukan elemen-elemen seni bina luar yang asing di negara ini. Sehubungan dengan itu, penggunaan elemen seni bina tempatan perlu ditekankan dalam setiap pembinaan masjid.

Permasalahan Kedudukan Dan Lokasi Masjid Di Malaysia

Perkara utama yang dipertimbangkan oleh para jemaah untuk ke masjid adalah jarak diantara kedudukan masjid dengan lokasinya yang mudah dikunjungi. Kebanyakan masjid pada hari ini terutamanya yang terletak di bandar dibina di tempat yang jauh dari tempat tumpuan orang ramai atau kediaman. Masjid yang dibina jauh dari tempat kediaman memerlukan jemaah menaiki kenderaan untuk ke masjid. Situasi ini dilihat pada masjid Sultan Abdul Samad atau lebih dikenali dengan nama Masjid KLIA yang dibina jauh dari tumpuan masyarakat dan penduduk sekitar, sebaliknya ia dibina berhampiran dengan lebuh raya.

Bagi masjid yang terletak di dalam kawasan kampus umpamanya masjid Universiti Kebangsaan Malaysia, kedudukannya yang strategik berhampiran dengan fakulti dan juga jalan utama kampus memberi kelebihan apabila sentiasa menjadi tumpuan pelajar untuk berkunjung bagi mengulangkaji pelajaran dan juga beristirehat selain daripada untuk beribadat.

Selain pelajar dan kakitangan, Masjid UKM turut dihadiri oleh orang awam serta penduduk sekitar terutamanya pada hari Jumaat dan hari-hari perayaan. Lokasi masjid yang bersesuian memberi kelebihan daripada sudut penyertaan orang ramai dalam apa jua aktiviti yang dilakukan oleh pihak pengurusan masjid.

Permasalahan Dalam Pengkhususan Dan Perancangan Ruang

Perancangan ruang yang teliti dan teratur perlu ditekankan dalam pembinaan sesebuah masjid terutamanya berkaitan dengan pemisahan ruang diantara jemaah lelaki dan perempuan bagi semua aktiviti sama ada semasa solat, mengambil wudhuk ataupun penggunaan tandas. Muhammad Tajuddin (1999:138) menegaskan bahawa ruang solat khas bagi perempuan perlu disediakan serta direkabentuk khusus bagi perempuan mengikut keperluannya terutama bagi mereka yang kurang upaya, bersama anak kecil dan sebagainnya. Begitu juga dengan kedudukan tempat wudhuk bagi perempuan sewajarnya diletak bersama dengan ruang solat perempuan bagi memudahkan para wanita serta memberi kelonggaran kepada mereka untuk tidak berhijab di dalam kawasan tersebut bagi tujuan pelbagai aktiviti.

Bagi masjid Universiti Kebangsaan Malaysia di Bangi, isu ini jelas dilihat menyukarkan para wanita yang bersama anak kecil terutamanya apabila kedudukan tempat wudhuk yang terletak berasingan dengan tandas dan juga jauh dengan ruang solat. Jemaah wanita perlu melalui koridor dan melintasi bilik mandi jenazah untuk ke bilik wudhuk, begitu juga dengan tandas dimana jemaah wanita perlu melalui ruang koridor yang turut digunakan oleh jemaah lelaki terlebih dahulu untuk ke tandas.

Isu tandas turut menjadi perbahasan oleh Muhammad Tajuddin (1999:139) apabila terdapat pendapat yang menyatakan bahawa kedudukan tandas tidak boleh sebumbung dengan ruang solat. Permasalahan ini dilihat kemungkinan bagi mengelakkan timbulnya pelbagai bau yang tidak menyenangkan. Sehubungan dengan itu, kedudukan tandas perlu dirancang sebaiknya serta mengikut pengaliran udara yang betul bagi mengelakkan bau yang tidak diingini memasuki ruang solat.

Permasalahan Jemaah Dan Pengguna

Bahagian ini menceritakan pelbagai permasalahan yang berkaitan dengan jemaah dan pengguna masjid di Malaysia yang. Kajian ini tertumpu kepada tiga golongan yang kurang diberi perhatian dalam perancangan ruang di dalam masjid di Malaysia iaitu golongan orang kurang upaya, golongan remaja dan kanak-kanak. Kajian ini diharap dapat memberi kefahaman tentang kepentingan dalam menyediakan keperluan kepada ketiga-tiga golongan tersebut. Ini kerana rekabentuk sesebuah masjid dilihat sewajarnya memberi keselesaan dan keperluan kepada semua lapisan masyarakat tersebut tanpa wujudnya diskriminasi sejauh mana mereka itu masih digelar sebagai Muslim ataupun Muslimah.

Orang kurang upaya juga berhak untuk memakmurkan masjid lantas kemudahan-kemudahan untuk mereka hendaklah disediakan serta mereka juga perlu dibantu oleh orang ramai. Terdapat sebuah hadis yang menceritakan bahawa orang kurang upaya juga tidak terkecuali dalam menunaikan solat berjemaah di masjid selagi rumahnya itu dapat di dengari suara azan seperti hadis Shahih Muslim berikut (321:194):

> Diriwayatkan dari Abu Hurairah r.a.: Seorang laki-laki buta pernah datang kepada Rasulullah s.a.w. dan bertanya, “Wahai Rasulullah, saya tidak punya penuntun untuk pergi ke masjid.” Orang itu minta keringanan kepada Rasulullah s.a.w. untuk mengerjakan shalat di rumahnya saja. Beliau memperbolehkannya. Setelah pulang, orang tersebut dipanggil lagi dan beliau bertanya, “Apakah kamu mendengar seruan shalat (azan)?” Orang itu menjawab, “Ya.” Beliau bersabda, “Penuhilah panggilan itu (pergilah ke masjid)!”.

Hadis diatas jelas menyatakan kewajipan keatas orang yang buta untuk datang berjemaah di masjid. Sehubungan dengan itu Abu Saif (2009) berpendapat kemudahan yang terdapat di masjid haruslah mengambil kira golongan kurang upaya tersebut bagi memudahkan pergerakan mereka. Bagi masjid-masjid besar dan bertingkat, sudah tentu persoalan menyediakan lif, laluan kerusi roda dan yang seumpama dengannya diberi keutamaan seawal penyediaan pelan pembinaan.

Masjid Universiti Kebangsaan Malaysia juga didapati tiada pengkhususan untuk petak orang kurang upaya di tempat meletak kenderaan. Selain itu juga di dapati laluan masuk dari ruang meletak kenderaan ke dalam masjid juga tidak mesra untuk pengguna kurang upaya dimana tanjakan tidak disediakan pada semua tempat yang mempunyai anak tangga.

Remaja merupakan golongan pertengahan diantara kanak-kanak dan dewasa, kedudukan diantara dua golongan tersebut menjadikan mereka sentiasa aktif, bersifat ingin tahu serta agresif. Oleh itu pemerhatian dan didikan yang sempurna perlu diterapkan dalam diri mereka dengan menggalakkan mereka berjinak-jinak dengan masjid. Golongan ini juga merupakan pelapis kepada generasi akan datang dalam mencorak sesebuah masyarakat yang berciri keislaman dengan menjadikan masjid sebagai pengantara kepada misi tersebut.

Untuk mendekatkan golongan ini dengan masjid, perlu diwujudkan pelbagai kemudahan yang diperlukan untuk aktiviti yang menjadi kegemaran mereka sebagai satu umpan untuk menarik minat mereka terhadap masjid seperti yang dicadangkan oleh Abu Saif (2009) di dalam laman sesawangnya seperti berikut;

> …Seterusnya, adalah pada mengimbangkan di antara kuliah-kuliah yang dekat dengan selera orang tua, dengan kuliah-kuliah yang menawan hati anak muda. Sediakan juga perkhidmatan yang anak muda ‘mahu’, sebagai ‘umpan’ untuk mereka diberikan apa yang mereka ‘perlu’. Tuisyen, gelanggang sepakraga dan khidmat kaunseling adalah di antara perkhidmatan yang boleh dipertimbangkan…

Kewujudan pelbagai kemudahan yang diperlukan oleh golongan remaja untuk aktiviti-aktiviti kegemaran mereka seperti bersukan dan sebagainya menjadikan merekan terbuka hati untuk mendampingi masjid. Secara tidak langsung golongan ini akan berminat untuk menyertai pelbagai aktiviti lain yang bersifat keilmuan disebabkan telah wujudnya rasa kasih sayang dan cintakan masjid yang telah mula tersemai. Masjid juga sewajarnya bersifat mesra dan ramah dengan kewujudan golongan tua dan dewasa yang bersifat positif dan penyayang terhadap golongan remaja. Sifat dan pekerti sedemikian juga dilihat satu kuasa luar biasa yang mampu menarik mereka kepada masjid seperti yang diperkatakan oleh Abu Saif (2009) seperti berikut;

Permulaan kepada langkah ini, adalah pada membentuk sikap positif orang-orang tua yang berada di masjid untuk menyapa dan bertanya khabar kepada anak-anak muda yang berkunjung. Kuasa kasih sayang masih belum mampu ditandingi oleh mana-mana kuasa lain. Rasa empati yang diperolehi oleh anak muda daripada sapaan orang tua berpangkat abang, bapa dan datuk kepada mereka, adalah sesuatu yang mudah diperolehi di gereja, tetapi jarang di masjid. Suatu tamparan buat kita semua.

Jika di gereja, paderi akan berdiri di pintu mengucapkan penghargaan kepada satu demi satu ‘jemaah’nya yang hadir. Di masjid kita, bisa sahaja orang yang keluar masuk masjid tidak pernah disedari oleh warga tetap masjid itu bermula daripada imamnya hinggalah kepada jemaah di saf.

Masjid yang mesra golongan remaja bukan sahaja bermula dengan kemudahan yang disediakan tetapi juga sifat mesra dan ambil berat para jemaah yang lain terhadap mereka semasa bersua di masjid tersebut.

Di masjid Universiti Kebangsaan Malaysia di dapati tiada kemudahan khusus untuk aktiviti golongan remaja kecuali ruang meletak kenderaan yang luas dan mungkin bersesuaian dengan aktiviti bola keranjang dan juga permainan badminton untuk riadah pada waktu petang. Pada bahagian utara masjid ini juga disediakan beberapa buah pondok tempat berteduh dan juga bersesuaian untuk bersantai bersama keluarga di mana rimbunan pokok-pokok meneduhi kawasan sekitar yang menghijau ditumbuhi rumput.

Kanak-kanak merupakan pelapis kepada generasi akan datang yang menentukan corak kehidupan dan masa depan sesebuah masyarakat. Sehubungan dengan itu, masyarakat perlu mengubah pandangan mereka terhadap kanak-kanak daripada sesorang yang tidak mengerti apa sahaja kepada seseorang yang perlu diberi perhatian sewajarnya dan pendedahan yang seawal mungkin berkenaan isu keagamaan serta fungsi masjid khususnya. Untuk mengalakkan dan mendedahkan golongan kanak-kanak kepada masjid telah dicadangkan beberapa perkara oleh Abu Saif (2009) seperti berikut;

Ibu bapa harus diperingatkan tentang amalan sahabat yang tatkala membawa anak-anak mereka ke masjid, mereka juga membawa permainan agar anak-anak itu tadi boleh disibukkan dengan permainan tersebut tatkala solat atau kuliah pengajian berlangsung.”

> “Adalah tidak masuk akal untuk ibu bapa, AJK Masjid atau penceramah untuk meletakkan ‘expectation’ bahawa anak-anak boleh duduk diam mendengar ceramah seperti ibu bapa mereka. Justeru ibu bapa perlu mengambil inisiatif untuk membantu anak-anak duduk di dalam suasana masjid dengan ditemani oleh permainan-permainan yang sesuai (trompet semestinya tiada dalam senarai), atau buku-buku mewarna, bergantung kepada kecenderungan dan minat anak masing-masing.

“Manakala di pihak masjid pula, andai berkapasiti, boleh diusahakan bilik permainan yang sesuai dan selamat untuk anak-anak yang mempunyai pembesar suara untuk ibu-ibu yang meneman anak di bilik itu dapat mengikuti kuliah yang disampaikan. Padang permainan mini juga bukanlah suatu alternatif yang keterlaluan untuk dipertimbangkan.

Saranan dan cadangan yang dinyatakan oleh Abu Saif seperti diatas bukanlah sesuatu yang mustahil untuk diaplikasikan bagi menggalakkan penyertaan golongan kanak-kanak dalam sesuatu aktiviti di masjid, hanya sedikit perubahan dan pengorbanan yang perlu dilakukan bagi perubahan masa hadapan.

Permasalahan Keselamatan Dan Kawasan Masjid

Masjid yang berjaya dalam aktiviti kemasyarakatan dan ekonominya sudah pasti menggalakkan kehadiran orang ramai tanpa mengira waktu dan memerlukan masjid tersebut beroperasi setiap masa iaitu selama dua puluh empat jam. Masalah yang akan timbul di sini ini ialah berkaitan keselamatan masjid itu sendiri. Keselamatan tersebut termasuklah kecurian peralatan masjid, wang tabung hasil kutipan orang ramai dan sebagainya.

Berhubung dengan isu tersebut, masjid memerlukan pengawasan selama dua puluh empat jam daripada pihak pengurusan bagi mengawasi keselamatan masjid tersebut selain daripada bertugas sebagai 'penyambut tetamu' di masjid tersebut sebagaimana situasi kedatangan musafir bagi menumpang berteduh ataupun untuk menyewa bilik-bilik di masjid bagi tujuan bermalam dan sebagainya. Hal ini dilihat dapat menjaga hak masjid serta menggalakkan kehadiran tetamu ke masjid tersebut sekaligus menjana kepada pendapatan masjid tersebut. Terdapat juga situasi dimana masjid dipagar dan dikunci semasa bukan waktu solat. Kejadian ini dilihat berlaku pada banyak masjid-masjid di Malaysia disebabkan tiada perhatian yang serius terhadap masjid oleh ahli jawatankuasa masjid tersebut serta masyarakat disekitarnya. Oleh itu timbul juga persoalan akan keperluan menyediakan pagar bagi sesebuah masjid.

Persoalan ini dapat dijawab dengan melihat kepada fungsi masjid itu sendiri yang beroperasi bagi pembangunan masyarakat tanpa mengira usia dan juga waktu sebagaimana yang telah berlaku pada zaman Rasulullah s.a.w., sehubungan dengan itu dilihat keperluan pagar bagi sesebuah masjid tidak diperlukan kerana bimbang timbulnya rasa perbezaan ruang yang menyebabkan rasa ketidakselesaan kepada para pengunjung. Sehubungan dengan itu, pagar masjid boleh diganti dengan pelbagai rekabentuk simbolik lain yang lebih mesra seperti menanam pokok secara teratur dan kemas bagi menjelaskan kawasan-kawasan masjid.

Bagi harta-harta kepunyaan masjid yang berharga seharusnya disimpan di tempat khas setelah digunapakai. Oleh itu penyediaan bilik bagi simpanan barang-barang berharga perlu disediakan serta mencapai piawai keselamatan tertentu bagi menjamin keberkesanannya. Sehubungan dengan itu, hak masjid dapat dijaga sebaiknya bagi keperluan masyarakat terutamanya orang Islam.

Permasalahan Ekonomi Dan Pengurusan

Sesebuah masjid memerlukan penjagaan dan pengurusan yang sewajarnya bagi mengekalkan keberkesanan fungsinya, menjaga kebersihan, menguruskan harta masjid dan sebagainya. Pengurusan dan penjagaan tersebut memerlukan pembiayaan dan kewangan yang setimpal dengan pelaksanaan tugas-tugas tersebut. Sumber kewangan sesebuah masjid biasanya diperolehi setiap minggu iaitu dermaan daripada para jemaah di hari Jumaat. Namun begitu pendapatan yang diperolehi tidak mencukupi untuk pembiayaan kos pengurusan dan penjagaan masjid tersebut.

Sehubungan dengan itu, menurut Faizal Ridzuan (2009:10) Dato' Seri Mohd Najid Tun Razak telah melontarkan satu idea yang cukup bernas semasa menyandang jawatan Timbalan Perdana Menteri dengan mencadangkan agar masjid dijadikan pusat menjana ekonomi orang Islam melalui perlbagai program yang berorientasikan perniagaan daripada sekadar berfungsi sebagai tempat solat berjemaah dan mendengar ceramah. Diantara cadangan perniagaan oleh beliau ialah restoran, kelas tuisyen, kedai gunting rambut, pajak gadai Islam (Ar-Rahnu) dan mikro kredit.

Menurut Faizal Ridzuan (2009:10) lagi, idea Dato' Seri Mohd Najid Tun Razak suatu ketika dahulu telah disambut baik oleh sebilangan pengurusan masjid di Malaysia dengan menjalankan pelbagai aktiviti yang berorientasikan perniagaan bagi memantapkan kewangan masjid. Diantara masjid tersebut ialah, Masjid Al-Qhufran yang terletak di taman Tun Doktor Ismail di Kuala Lumpur. Sum Sumber pendapatan masjid ini diperolehi menerusi perniagaan yang diusahakan sejak dinaiktaraf pada tahun 2004. Diantara sumber pendapatan masjid tersebut ialah kamar musafir, dewan persidangan bilik Mesyuarat, Dewan Jamuan, Dewan Akad Nikah, Café Al-Ghufran, penyewaan tanah untuk antena komunikasi serta kelas Fardu Ain dan Agama.

Faizal Ridzuan (2009:14) juga mendapati untuk berada pada tahap tersebut, pengurusan masjid itu sendiri hendaklah terdiri daripada seseorang yang berpengalaman dalam pengurusan dan pentadbiran. Formula ini merupakan rahsia kepada kejayaan Masjid Al-Ghufran dalam pengurusan sumber pendapat seperti yang dikatakan oleh pengerusi masjid tersebut iaitu Haji Hassanuddin Ali .

Selain daripada aktiviti perniagaan yang dijalankan di masjid, terdapat juga cadangan dan saranan agar mendokumentasikan teks khutbah Jumaat yang disampaikan setiap minggu. Teks khutbah Jumaat tersebut didokumen lalu dibukukan menjadi beberapa jilid. Buku tersebut dijual kepada masyarakat bagi menyampaikan kandungan khutbah tersebut ke segenap pelusuk masyarakat Islam dan menyumbang pendapatan kepada masjid tersebut.

Menurut Salawati Haris, terdapat enam strategi yang boleh digunapakai oleh pihak pengurusan masjid bagi menjanakan pendapatan masjid. Diantaranya ialah dengan mengadakan Saham Wakaf. Strategi tersebut ialah dengan menyewakan harta yang dimiliki oleh masjid tersebut kepada orang awam bagi kegiatan-kegiatan tertentu seperti menjalankan premis perniagaan dan sebagainya. Bagi masjid yang tidak mempunyai harta wakaf tersebut boleh diusahakan dengan mengadakan permohonan sumbangan daripada orang ramai serta tujuannya dinyatakan secara jelas seperti contoh berikut oleh Salawati Haris (2009:16);

Sumbangan wakaf yang jelas maksudnya ialah dengan menyatakan pendapatan yang disasarkan dan untuk tujuan apa. Contohnya, di Bandar Baru Bangi mensasarkan sebanyak RM 10,000 juta hasil sewa dari dua lot kedai yang memerlukan dana sebanyak RM 1 juta . Dengan itu dilancarkan dana saham wakaf untuk membeli bangunan dengan tujuan supaya bangunan itu dapat disewa dan menjana pendapatan berterusan kepada masjid.

Menurut Salawati Haris (2009:18) lagi, cara bagi meningkatkan pendapatan masjid juga boleh diusahakan dengan mengadakan dana masjid yang mengandungi wang terkumpul daripada semua masjid-masjid di Malaysia lalu membentu sebuah dana dibawah satu entiti yang tidak terikat seperti Yayasan Pembangunan Ekonomi Islam (Yapeim). Wang dana tersebut dilaburkan lalu keuntungan tersebut dikembalikan semula kepada masjid-masjid tersebut.

Turut dicadangkan oleh Salawati Haris (2009:19) lagi ialah dengan membangunkan premis perniagaan di lokasi-lokasi strategik seperti di dalam kawasan masjid-masjid yang mempunyai ruang yang luas. Selain itu juga, pembinaan masjid memerlukan perancangan yang teliti dikawasan perbandaran baru bagi merancang kedudukannya yang strategik bagi mengerakkan ekonominya. Para ahli jawatankuasa masjid pula perlu diberi pendedahan terhadap isu ini dengan mengadakan lawatan ke mana-mana masjid yang telah berjaya sama ada di dalam atau luar negara.

Analisis Dan Penggunaan Hadis Dalam Rekabentuk Masjid

Penulisan bahagian ini bertujuan mengenalpasti nilai terkandung di dalam hadith yang boleh dijadikan panduan bagi merekabentuk sesebuah masjid. Pemilihan Hadith daripada Shahih Bukhari dan Shahih Muslim adalah kerana ketinggian taraf Hadith-hadith yang dikumpulkan berdasarkan kesahihannya. Hadith himpunan Shahih Bukhari merupakan

yang diakui paling tinggi kesahihannya diantara enam kitab-kitab Hadith yang termasyhur. Ia juga dianggap rujukan utama dalam Islam selepas kitab suci al-Qur'an. Manakala Hadith himpunan Shahih Muslim pula dianggap kedua termulia selepas Hadith himpunan Shahih Bukhari. Kesahihan sesuatu Hadith menjadi keutamaan kerana Hadith-hadith tersebut menjadi pegangan dan asas dalam menentukan fatwa, hukum dan sebagainya.

Selain itu, penulisan ini turut membincangkan masalah dalam penentuan identiti dan rupa penampilan masjid dan penyelesainnya menurut Hadith-hadith yang shahih sebagai rujukan dan mengukuhkan perbincangan. Penulisan di dalam bab ini juga akan membincangkan pemilihan lokasi dan kedudukan masjid yang bersesuian dengan keperluan masyarakat Islam semasa dengan merujuk kepada keperluan-keperluan masyarakat dahulu terhadap fungsi masjid dan fungsi sekitarnya yang membantu kepada perkembangan masyarakat kearah memakmurkan masjid serta memaksimumkan fungsi masjid itu sendiri. Turut menjadi tumpuan penulisan adalah isu pengguna merangkap jemaah di masjid serta keperluan-keperluan yang sewajarnyanya disediakan bagi memudahkan pergerakan dan kelancaran sesuatu aktiviti yang dijalankan serta keselesaan penggunanya. Penulisan ini juga turut membincangkan isu pengkhususan ruang tertentu yang diperlukan oleh pengguna berdasarkan beberapa aktiviti yang memerlukan pengkhususan tersebut.

Identiti Dan Rupa Bentuk

Malaysia dilihat telah mengalami permasalahan identiti dalam rekabentuk masjid disebabkan kegagalan para pemikir Islam untuk menterjemahkan pendekatan yang bersesuaian dengan era moden pada hari ini ke dalam rekabentuk masjid menurut pandangan Mohamad Tajuddin (1998:17). Jika diteliti di dalam Hadith Rasulullah s.a.w. terdapat beberapa elemen yang mempunyai persamaan dalam pengertian isu berkaitan identiti ini yang boleh dijadikan panduan berguna untuk merekabentuk masjid.

Untuk menentukan imej dan gaya rupa masjid pada sesuatu tempat ianya haruslah mencermindan menonjolkan elemen kebudayaan masyarakat tempatan tersebut. Langkah tersebut dilihat perlu diambil berat oleh semua yang terlibat dalam pembinaan sesebuah masjid dan adalah diingat bahawa membanggakan sesuatu yang bukan hak dan kepunyaan adalah sesuatu penipuan seperti yang telah dinyatakan di dalam Hadith berikut;

عن أسماء رضي الله عنها قالت: جاءت امرأة الى النبي صلى الله عليه وسلم فقالت: إن لى ضرة فهل علي جناح أن اتشبع من مال زوجى بما لم يعطنى؟ فقال رسول الله صلى الله عليه وسلم: "المتشبع بما لم يعط كلابس ثوبي زور".[6]

Yang bermaksud: *Diriwayatkan dari Asma´ r.a.: Seorang perempuan pernah menghadap Nabi s.a.w. seraya berkata, "Saya seorang perempuan yang dimadu, berdosakah saya berpura-pura menampakkan kepuasan dengan harta suami yang tidak diberikan kepada saya?" Rasulullah s.a.w. bersabda, "**Orang yang merasa puas dengan harta yang tidak diberikan kepadanya, sama halnya dengan orang yang memakai dua lembar kain palsu (tipuan)."***

Dalam pembinaan sesebuah masjid, isu penting yang turut dibincangkan adalah kos pembinaan yang tinggi sehingga kadang kala mencecah angka yang boleh dikategorikan sebagai satu pembaziran. Pembaziran sedemikian rupa mampu dielak sekiranya elemen-elemen tambahan yang berunsurkan ornomen semata-mata dan tidak berfungsi pada binaan masjid dibuang dan sebagai gantinya kesederhanaan diamalkan. Perbuatan ini bersesuaian dengan gaya hidup Islam seperti yang diamalkan oleh Rasulullah s.a.w. seperti yang telah dinyatakan di dalam Hadith-hadith berikut:

عن محمد بن زياد قال: سمعت ابا هريرة رضي الله عنه، ورأى رجلا يجر ازاره فجعل يضرب الارض برجله، وهو امير على البحرين، وهو يقول: جاؤ الامير قال رسول الله صلى الله عليه وسلم: "ان الله لا ينظر الى من يجر ازاره بطرا".[7]

[6] Shahih Muslim, Hadith ke- 1387, hlm. 784.
[7] Shahih Muslim, Hadith ke- 1359, hlm. 772.

Yang bermaksud: *Diriwayatkan dari Muhammad bin Ziyad: Aku pernah mendengar Abu Hurairah berkata, "Ketika melihat seorang laki-laki, pembesar Bahrin, mengulurkan kainnya sampai menyapu tanah, aku berkata, 'pembesar datang, pembesar datang.'" Rasulullah s.a.w. bersabda,* ***"Sesungguhnya, Allah tidak akan memandang (merahmati) orang yang mengulurkan kainnya (menyapu tanah) dengan sombong."***

عن أنس رضي الله عنه، قال: بينما نحن جلوس مع النّبي صلى الله عليه وسلم في المسجد، دخل رجل على جمل، فأناخه في المسجد ثم عقله، ثم قال: أيكم محمد؟ والنّبـي صلى الله عليه وسلم متّكـئ بين ظهرانيهم، فقلنا: هذا الرجل الأبيض المتكـئ. فقال له الرجل: ابن عبد المطّلب؟ فقال له النّبي صلى الله عليه وسلم: (قد أجبتك). فقال: إني سائـلك فمشدد عليك في المسألة، فلا تجد عليّ في نفسك. قال: (سل عمّا بدا لك). فقال: أسألك بربك وربّ من قبلك، آلله أرسلك إلى الناس كلهم؟ فقال: (اللّهم نعم). قال: أنشدك بالله، آلله أمرك أن تصلي الصّلوات الخمس في اليوم واللّيلة؟ قال: (اللّهم نعم). قال أنشدك بالله، آلله أمرك أن تصوم هذا الشّهر من السّنة؟ قال: (اللّهم نعم). قال أنشدك بالله، آلله أمرك أن تأخذ هذه الصّدقة من أغنيائـنا فتقسمها على فقرائـنا؟ فقال النّبي صلّى الله عليه وسلم: (اللّهم نعم). فقال الرجل: آمنت بما جـئـت به، وأنا رسول من ورائـي من قومي، وأنا ضمام ابن ثعلبة، أخو بني سعد بن بكر.[8]

Yang bermaksud: *Diriwayatkan Anas (bin Malik) r.a.: Ketika kami sedang duduk-duduk bersama Nabi s.a.w. di dalam sebuah masjid, datang seseorang yang mengenderai seekor unta. Ia menyuruh unta itu berlutut di halaman masjid, mengikat kaki depannya lalu bertanya,* ***"Siapa di antara kalian yang bernama Muhammad?"****Pada waktu itu Nabi s.a.w. sedang duduk diantara kami (para sahabatnya) dengan bersandar pada kedua tangannya. Kami menjawab, "Lelaki berkulit putih yang duduk bersandar dengan tangannya." Orang itu melihat ke arah Nabi s.a.w., "Hai, anak ÑAbdul Muththalib."Nabi s.a.w. bersabda, "Aku ke sini untuk menjawab pertanyaan-pertanyaanmu."Orang itu bertanya kepda Nabi s.a.w., "Aku ingin menanyakan sesuatu dan tampaknya akan sulit engkau jawab. Jadi jangan marah." Nabi s.a.w. bersabda, "Tanyakan apa pun yang ingin kau tanyakan." Orang itu berkata, "Aku bertanya dengan nama Tuhanmu, Tuhan orang-orang sebelumu, Apakah Allah mengutusmu sebagai Rasul untuk seluruh manusia?" Nabi s.a.w. menjawab, "Demi Allah, benar." Lebih jauh orang itu bertanya, "Dengan nama Allah aku bertanya. Apakah Allah menyuruhmu mendirikan shalat lima waktu dalam sehari semalam?" Nabi s.a.w. menjawab, "Demi Allah, benar." Orang itu kemudian bertanya, "Demi Allah! Apakah Allah memerintahkan kepadamu untuk berpuasa pada bulan Ramadhan?" Nabi s.a.w. menjawab, "Benar, demi Allah." Orang itu bertanya lagi, "Demi Allah! Apakah Allah menyuruhmu mengambil zakat dari orang-orang kaya untuk diberikan kepada*
orang-orang miskin?" Nabi s.a.w. menjawab, "Demi Allah, benar." Lalu orang itu berkata, "Aku beriman atas semua yang diturunkan (Allah) kepadamu, aku dikirim sukuku sebagai seorang utusan, namaku DhimÉm bin TsaÑlabah keluarga dari Bani SaÑd bin Bakar."

Berdasarkan Hadith diatas, keadaan Rasulullah s.a.w. semasa berada di kalangan para sahabatnya di dalam masjid dilihat tiada perbezaan yang menunjukkan beliau sebagai seorang insan penting yang diutuskan oleh Allah, sebaliknya dilihat semuanya satu taraf. Penampilan baginda yang sederhana tanpa pemakaian yang melambangkan keistimewaan serta baginda yang duduk bersama dikelilingi oleh pengikut-pengikutnya tanpa berada di singgahsana menunjukkan bahawa kesederhanaan adalah satu nilai penting dalam setiap aspek kehidupan, begitu juga dengan pembinaan sesebuah masjid.

Dalam mengelakkan pembaziran dan mengamalkan kesederhanaan dalam pembinaan masjid, elemen-elemen yang bersifat perhiasan semata-mata tanpa adanya fungsi khas perlu dielakkan. Contohnya adalah elemen menara yang biasa wujud di kebanyakan masjid di Malaysia secara khusus dan di seluruh dunia secara umumnya. Fungsi menara kononnya adalah sebagai satu tempat yang digunakan oleh Muazzin untuk melaungkan azan. Akan tetapi pada zaman Rasulullah itu azan dilaung bukan diatas menara sebaliknya di atas bumbung tertinggi di kawasan tersebut menurut K.A.C. Creswell (1958:5). Dengan kemodenan yang dimiliki oleh masyarakat hari ini tidak diperlukan lagi penggunaan menara untuk melaungkan azan kerana diganti dengan penggunaan pembesar suara. Oleh itu penggunaan menara sebagai satu elemen dalam rekabentuk masjid adalah tidak lagi bersesuaian menurut Oleg Grabar (1973:120). Namun begitu ia

[8] Shahih Bukhari, Hadith ke- 1387, hlm. 784.

dilihat praktikal digunakan sebagai mercu tanda untuk menyatakan kewujudan masjid pada sesuatu tempat menurut Mohamad Tajuddin (1998:275).

Asal usul azan dilaungkan adalah bagi menyampaikan seruan agar solat dilaksanakan pada waktu tersebut iaitu bagi menandakan masuknya waktu solat. Bermulanya azan adalah seperti yang dinyatakan oleh Hadith berikut;

عن ابن عمر رضي الله عنهما كان يقول: كان المسلمون حين قدموا المدينة، يجتمعون فيتحّينون الصّلاة، ليس ينادى لها، فتكلّموا يوماً فى ذلك، فقال بعضهم: اتّخذوا ناقوساً مثل ناقوس النّصارى، وقال بعضهم: بل بوقاً مثل قرن اليهود، فقال عمر: أولا تبعثون رجلاً ينادي بالصّلاة؟ فقال رسول الله صلى الله عليه وسلم: (يا بلال، قم فناد بالصّلاة).[9]

Yang bermaksud: *Diriwayatkan dari Ibn Umar r.a.: Ketika orang-orang Muslim tiba di Madinah, mereka berkumpul untuk mengerjakan shalat, dan menggunakan perhitungan waktu untuk melaksanakannya. Pada waktu itu azan sebagai panggilan untuk mengerjakan shalat belum lagi diperkenalkan. Pada suatu hari mereke mendiskusikan masalah ini. Sebagian orang mengusulkan menggunakan loceng, sebagaimana dilakukan umat Kristiani, sebagian lain mengusulkan menggunakan terompet mirip tanduk, seperti digunakan umat Yahudi.* ***Adalah Umar yang pertama kali mengusulkan dengan memanggil (orang-orang) untuk mengerjakan shalat; maka Rasulullah s.a.w. memerintahkan Bilal berdiri dan mengumandangkan azan (sebagai panggilan kepada orang-orang untuk mengerjakan shalat).***

Dalam pembinaan masjid juga memerlukan bahasa seni bina yang bersesuian untuk menarik minat dan menjemput orang ramai untuk memakmurkannya. Hal ini dilihat memerlukan pemerhatian pada rekabentuk pagar dan imej keseluruhan masjid tersebut. Reka bentuk pagar perlu memberi maksud ke arah menjemput orang ramai memasuki perkarangan masjid. Hal ini sama ada dilakukan dengan penggunaan pagar yang rendah ataupun sekadar memisahkannya dengan pokok-pokok yang tertentu berserta landskap yang menarik. Berbeza dengan kebanyakan masjid-masjid di negara ini yang mempunyai pagar yang tinggi dan menimbulkan kegerunan kepada orang ramai untuk mendekatinya. Hal ini perlu dielak dan sewajarnya diambil iktibar daripada Hadith Rasulullah s.a.w. dimana masjid pada zamannya tidak memiliki pagar dan memberi kebebasan untuk orang ramai keluar dan masuk pada setiap masa tanpa mengira status, kedudukan dan usia. Hadith tersebut adalah seperti berikut;

عن ابن عبّاس رضي الله عنه قال: أقبلت راكبا على حمار أتان، وأنا يومئذ قد ناهزت الاحتلام، ورسول الله صلّى الله عليه وسلّم يصلي بمنى إلى غير جدار، فمررت بين يدي بعض الصّف، وأرسلت الأتان ترتع، فدخلت في الصّف، فلم ينكر ذلك عليّ.[10]

Yang bermaksud: *Diriwayatkan dari Ibn 'Abbas r.a.: Pada suatu hari aku datang dengan menunggang seekor keledai betina, ketika itu aku telah mulai menginjak dewasa. Rasulullah s.a.w. tengah mengerjakan shalat di Mina.* ***Tak ada dinding di hadapannya dan aku lewat di depan barisan beberapa orang tengah melakukan shalat. Aku membiarkan keledai lepas dan menerobos ke dalam barisan itu dan tidak ada seorang pun yang keberatan.*** *Muslim tiba di Madinah, mereka berkumpul untuk mengerjakan shalat, dan menggunakan perhitungan waktu untuk melaksanakannya. Pada waktu itu azan sebagai panggilan untuk mengerjakan shalat belum lagi diperkenalkan. Pada suatu hari mereke mendiskusikan masalah ini. Sebagian orang mengusulkan menggunakan loceng, sebagaimana dilakukan umat Kristiani, sebagian lain mengusulkan menggunakan terompet mirip tanduk, seperti digunakan umat Yahudi.* ***Adalah Umar yang pertama kali mengusulkan dengan memanggil (orang-orang) untuk mengerjakan shalat; maka Rasulullah s.a.w. memerintahkan Bilal berdiri dan mengumandangkan azan (sebagai panggilan kepada orang-orang untuk mengerjakan shalat).***

Dalam pembinaan masjid juga memerlukan bahasa seni bina yang bersesuian untuk menarik minat dan menjemput orang ramai untuk memakmurkannya. Hal ini dilihat

[9] Shahih Bukhari, Hadith ke- 370, hlm. 159.
[10] Shahih Bukhari, Hadith ke- 68, hlm. 35.

memerlukan pemerhatian pada rekabentuk pagar dan imej keseluruhan masjid tersebut. Reka bentuk pagar perlu memberi maksud ke arah menjemput orang ramai memasuki perkarangan masjid. Hal ini sama ada dilakukan dengan penggunaan pagar yang rendah ataupun sekadar memisahkannya dengan pokok-pokok yang tertentu berserta landskap yang menarik. Berbeza dengan kebanyakan masjid-masjid di negara ini yang mempunyai pagar yang tinggi dan menimbulkan kegerunan kepada orang ramai untuk mendekatinya. Hal ini perlu dielak dan sewajarnya diambil iktibar daripada Hadith Rasulullah s.a.w. dimana masjid pada zamannya tidak memiliki pagar dan memberi kebebasan untuk orang ramai keluar dan masuk pada setiap masa tanpa mengira status, kedudukan dan usia. Hadith tersebut adalah seperti berikut;

عن ابن عبّاس رضي الله عنه قال: أقبلت راكبا على حمار أتان، وأنا يومئذ قد ناهزت الاحتلام، ورسول الله صلّى الله عليه وسلّم يصلي بمنى إلى غير جدار، فمررت بين يدي بعض الصّف، وأرسلت الأتان ترتع، فدخلت في الصّف، فلم ينكر ذلك عليّ.[11]

Yang bermaksud: *Diriwayatkan dari Ibn 'Abbas r.a.: Pada suatu hari aku datang dengan menunggang seekor keledai betina, ketika itu aku telah mulai menginjak dewasa. Rasulullah s.a.w. tengah mengerjakan shalat di Mina.* ***Tak ada dinding di hadapannya dan aku lewat di depan barisan beberapa orang tengah melakukan shalat. Aku membiarkan keledai lepas dan menerobos ke dalam barisan itu dan tidak ada seorang pun yang keberatan.***

Berdasarkan Hadith diatas di dapati kesukaran manusia dalam melakukan sesuatu boleh menyebabkan mereka menjauhi perkara tersebut. Sehubungan dengan itu dapat disimpulkan bahawa kedudukan masjid perlu diambil berat agar tidak menyukarkan orang ramai untuk datang berkunjung.

Kedudukan Dan Lokasi

Dalam isu kedudukan dan lokasi masjid ini dapat dilihat kebanyakan masjid di Malaysia kurang menitikberatkan persoalan ini terutamanya di kawasan-kawasan bandar serta tidak ketinggalan di kawasan pedalaman. Sewajarnya kedudukan masjid berada di kawasan lingkungan tumpuan orang ramai dan tidak terpencil dari kawasan persekitaran masyarakat bagi menggalakkan penggunaan masjid dalam setiap aktiviti yang bukan sahaja berunsur kepada kerohanian sebaliknya juga pelbagai kegiatan kemasyarakatan yang diperlukan pada masa sekarang. Pada zaman Rasulullah s.a.w., masjid tidak pernah dibina di tempat yang sukar untuk dikunjungi dan terpencil seperti yang dinyatakan di dalam Hadith berikut;

عن عبد الله بن عمر رضي الله عنهما: أن رسول الله صلى الله عليه وسلم، كان ينـزل بذي الحليفة حين يعتمر، وفي حجته حين حج، تحت سمرة، في موضع المسجد الذي بذي الحليفة، وكان إذا رجع من غزو، كان في تلك الطريق، أو حج أو عمرة، هبط من بطن واد، أناخ بالبطحاء التي على شفير الوادي الشرقية، فعرس ثم حتى يصبح، ليس عند المسجد الذي بحجارة، ولا على الأكمة التي عليها المسجد، كان ثم خليج يصلي عبد الله عنده، في بطنه كثب، كان رسول الله صلى الله عليه وسلم ثم يصلي، فدحا فيه السيل بالبطحاء، حتى دفن ذلك المكان،الذي كان عبد الله يصلي فيه.[12]

Yang bermaksud: *Diriwayatkan dari Abdullah bin Umar : "Sesungguhnya Rasulullah s.a.w. pernah singgah di Dzulhulaifah ketika umrah. Ketika haji pun beliau singgah di bawah pohon Samurah di sekitar tempat masjid yang berada di Dzulhulaifah. Apabila kembali dari peperangan, haji, atau umrah, beliau menuruni lembah yang berada di jalan itu. Apabila telah sampai di lembah itu, beliau menurunkan untanya di saluran air sungai yang berada di pinggir lembah bahagian timur, kemudian beristirehat di tempat itu hingga waktu subuh." Di tempat itu, tidak ada masjid yang dibangun dari batu dan tidak ada pula masjid yang berdiri diatas bukit.* ***Di sana ada sebidang tanah yang menjorok ke sungai yang dipakai shalat oleh Ibnu Umar, di lembahnya terdapat tumpukan pasir. Rasulullah s.a.w. pernah sholat di tempat tersebut. Tiba-tiba tumpukan pasir itu terbawa hanyut oleh air sungai tersebut, hingga tempat yang dipakai shalat oleh Ibnu Umar tertimbun air.***

[11] Shahih Bukhari, Hadith ke- 68, hlm. 35.

[12] Shahih Bukhari, Hadith ke- 303, hlm. 133, 134.

Daripada Hadith diatas dapat difahami bahawa pada zaman Rasulullah s.a.w., masjid tidak dibina di tempat-tempat terpencil yang menyukarkan orang ramai untuk berkunjung meskipun kedudukan tersebut mempunyai sumber air yang sangat diperlukan oleh musafir dan juga ternakan. Kedudukan dan lokasi masjid sangat dititikberatkan sejak zaman Rasulullah s.a.w. dan Baginda bersama para sahabatnya akan berusaha untuk mendapatkan lokasi-lokasi yang terbaik dan bersesuaian bagi pembinaan masjid dan tidak akan teragak-agak untuk mengorbankan sesuatu yang hak milik mereka dan sebaliknya seperti Hadith berikut di mana mereka telah menggali kubur-kubur orang Musyrik, meratakan tanah dan menebang pohon-pohon kurma bagi menyediakan tapak masjid tersebut;

عن أنس رضي الله عنه قال: قدم النبي صلى الله عليه وسلم المدينة فنزل أعلى المدينة في حي يقال لهم بنو عمرو بن عوف، فأقام النبي صلى الله عليه وسلم فيهم أربع عشرة ليلة، ثم أرسل إلى بني النجار، فجاؤوا متقلدين السيوف، كأني أنظر إلى النبي صلى الله عليه وسلم على راحلته، وأبو بكر ردفه، وملأ بني النجار حوله، حتى القى رحله بفناء أبي أيوب، وكان يحب أن يصلي حيث أدركته الصلاة، ويصلي في مرابض الغنم، وأنه أمر ببنأ المسجد، فأرسل إلى ملأ من بني النجار، فقال: (يا بني النجار ثامنوني بحائطكم هذا). قالوا: لا والله، لا نطلب ثمنة إلا إلى الله، فقال أنس: فكان فيه ما أقول لكم، قبور المشركين، وفيه خرب، وفيه نخل، فأمر النبي صلى الله عليه وسلم بقبور المشركين فنبشت، ثم بالخرب فسويت، وبالنخل فقطع، فصفوا النخل قبلة المسجد، وجعلوا عضادته الحجارة، وجعلوا ينقلون الصخر وهم يرتجزون، والنبي صلى الله عليه وسلم معهم، وهو يقول:

اللهم لا خير إلا خير الآخره

فاغفر للأنصار والمهاجرة[13]

Yang bermaksud: *Diriwayatkan dari Anas r.a.: Ketika Nabi Muhammad s.a.w.tiba di Madinah, Nabi Muhammad s.a.w. turun dari untanya di bagian atas kota Madinah di tengah-tengah suku yang disebut Bani Amr bin Auf. Nabi s.a.w. tinggal di sana selama empat belas malam. Kemudian suku An-Najjar dikirim (untuk mengawal) Nabi s.a.w. dan mereka datang dengan bersenjatakan pedang-pedang mereka. Seakan-akan (baru saja) aku melihat Nabi s.a.w. duduk di atas rahilah (unta) beriringan dengan Abu Bakar yang berada di belakangnya dan semua (anggota) suku an-Najjar mengelilingi Nabi s.a.w. hingga Nabi s.a.w turun di halaman rumah Abu Ayub.* ***Nabi Muhammad sangat mencintai shalat dan kapan pun waktu shalat tiba Nabi s.a.w. segera mengerjakannya, bahkan di kandang domba. Di kemudian hari Nabi s.a.w. memerintahkan untuk membangun sebuah masjid dan menemui sebahagian oran-orang suku An-Najjar dan berkata kepada mereka, "Wahai suku Najjar! Berapa harga tanahmu ini?" Mereka menjawab, "Tidak! Demi Allah! Kami tidak mengharapkan imbalan untuk tanah ini kecuali dari Allah s.w.t." Anas menambahkan: Di sana terdapat kuburan orang-orang musyrik, sebagian tanah tidak rata, dan terdapat pohon-pohon kurma. Nabi memerintahkan membongkar kuburan orang-orang musyrik itu dan meratakan sebagian tanah yang tidak rata dan menebang pohon-pohon kurma. (Kami semua mengerjakan apa yang diperintahkan Nabi s.a.w.). Mereka menggunakan batang-batang pohon kurma yang telah ditebang untuk kiblat masjid (sebagai dinding) dan mereka menggunakan dua buah batu sebagai dinding samping (masjid).*** *Para sahabat Nabi s.a.w. membawa batu-batu itu sambil membaca beberapa baris puisi (syair). Nabi s.a.w. ikut bekerja bersama mereka dan berkata, "Tak ada kebaikan selain hari kiamat-Mu ya Allah! Maka berilah maaf kaum Anshar (orang-orang yang menolong) dan kaum Muhajir (orang-orang yang berhijrah)."*

Hadith diatas menceritakan usaha yang dilakukan oleh Nabi Muhammad s.a.w. bersama para sahabatnya untuk mendirikan Masjid Quba. Lokasi masjid tersebut dilihat bersesuian oleh Baginda setelah berada di tempat tersebut selama dua minggu meskipun tapak tersebut adalah perkuburan lama. Namun begitu niat Baginda diteruskan kerana dilihat lokasinya adalah bersesuian sekali.

Berhampiran Dengan Penempatan Dan Kegiatan Penduduk

[13] Shahih Bukhari, Hadith ke- 272, hlm. 120, 121.

Kedudukan masjid yang digalakkan adalah yang hampir dengan kediaman dan penempatan penduduk di kawasan tersebut. Hal ini bagi memudahkan orang ramai untuk berkunjung ke masjid terutama pada waktu solat lima waktu serta untuk pelbagai kegiatan lain yang sesuai. Apabila suara azan yang berkumandang mengajak penduduk untuk menunaikan solat kedengaran di kawasan kediaman memberi kesedaran kepada mereka agar menyegerakan tuntutan solat tersebut dengan menunaikannya di masjid. Adalah menjadi kewajipan juga bagi sesorang Muslim yang mendengar azan dari kediaman atau mana-mana tempat dia berada untuk berkunjung ke masjid dan berjemaah menunaikan panggilan solat tersebut tanpa mengira keuzuran yang dialami selagi dia berkemampuan sebagaimana yang dijelaskan di dalam Hadith di bawah seperti berikut;

عن ابي هريرة رضي الله عنه قال: اتى النبي صلى الله عليه وسلم رجل أعمى فقال: يا رسول الله انه ليس لى قائد يقودنى الى المسجد، فسأل رسول الله صلى الله عليه وسلم ان يرخص له، فيصلى في بيته، فرخص له. فلما ولى دعاه فقال: "هل تسمع النداء الصلاة؟" فقال: نعم. قال: "اجب".[14]

Yang bermaksud: *Diriwayatkan dari Abu Hurairah r.a.: Seorang laki-laki buta pernah datang kepada Rasulullah s.a.w. dan bertanya, "Wahai Rasulullah, saya tidak punya penuntun untuk pergi ke masjid." Orang itu minta keringanan kepada Rasulullah s.a.w. untuk mengerjakan shalat di rumahnya saja.* ***Beliau memperbolehkannya. Setelah pulang, orang tersebut dipanggil lagi dan beliau bertanya, "Apakah kamu mendengar seruan shalat (azan)?" Orang itu menjawab, "Ya." Beliau bersabda, "Penuhilah panggilan itu (pergilah ke masjid)!".***

Jarak yang dekat diantara masjid dengan kediaman dan juga pelbagai aktiviti seharian masyarakat memberi peluang kepada mereka untuk berkunjung dan berjemaah dalam menunaikan solat tanpa perlu tergesa-gesa kerana jaraknya yang jauh atau sukar untuk dikunjungi. Perbuatan tergesa-gesa dan gopoh semasa mengejar waktu solat juga ditegur oleh Rasulullah s.a.w. seperti yang dinyatakan di dalam Hadith berikut;

عن أبي قتادة رضي الله عنه، قال: بينما نحن نصلي مع النبي صلى الله عليه وسلم، إذ سمع جلبة الرجال، فلما صلى قال: (ما شأنكم). قالوا استعجلنا إلى الصلاة. قال: (فلا تفعلوا إذا أتيتم الصلاة فعليكم بالسكينة، فما أدركتم فصلوا، وما فاتكم فأتموا).

Yang bermaksud: Diriwayatkan dari Abu Qatadah r.a.: Ketika kami sedang mengerjakan shalat bersama Rasulullah s.a.w., beliau mendengar suara gaduh sebagian orang. Setelah shalat usai Nabi s.a.w. bersabda, "Apa yang terjadi?" Mereka menjawab, "Kami tergesa-gesa mengerjakan shalat." Nabi s.a.w. bersabda, "Janganlah mengerjakan shalat dengan terburu-buru, dan kapan pun kalian datang (terlambat) untuk mengerjakan shalat, maka datanglah dengan tenang, ikuti shalat (orang-orang) yang lebih dahulu (dari kalian) dan lengkapkan shalatmu yang tertinggal."

Apabila masjid terletak di kawasan lingkungan tumpuan kegiatan masyarakat umpamanya bangunan pejabat dan juga kediaman, ini akan menggalakkan mereka untuk berkunjung ke masjid untuk berjemaah. Oleh itu tidak perlu lagi wujudnya surau-surau kecil yang tidak selesa dan sempit di bangunan-bangunan perniagaan dan pejabat. Hal ini kerana telah disebut oleh Rasulullah s.a.w. akan kelebihan menunaikan solat di masjid berjemaah berbanding di secara perseorangan di rumah kediaman atau surau-surau di pusat perniagaan, pejabat dan sebagainya seperti yang telah dinyatakan di dalam Hadith berikut;

على تزيد الجميع صلاة) :قال وسلم عليه الله صلى النبي عن :عنه الله رضي هريرة ابى عن
،الوضوء فأحسن توضأ إذا أحدكم فإن ،درجة وعشرين خمسا ،سوقه في وصلاته ،بيته في صلاته
يدخل حتى ،خطيئة عنه وحط ،درجة بها الله رفعه إلا خطوة يخط لم ،الصلاة إلا يريد لا ،المسجد وأتى
في دام ما ،كةالملائ عليه-يعني-وتصلي ،تحبسه كانت ما صلاة في كان ،المسجد دخل فإذا ،المسجد
(به يحدث لم ما ،ارحمه اللهم ،له اغفر اللهم :فيه يصلي الذي مجلسه.

[14] Shahih Muslim, Hadith ke- 321, hlm. 194.

Yang bermaksud: Diriwayatkan dari Abu Hurairah r.a.: Nabi Muhammad s.a.w. pernah bersabda, “Mengerjakan shalat berjemaah (berpahala) dua puluh lima kali lipat dibandingkan mengerjakan shalat sendiri di dalam rumah atau mengerjakan shalat di pusat perdagangan (pusat perbelanjaan), karena jika seseorang berwdhuk dengan sempurna kemudian pergi menuju masjid dengan niat mengerjakan shalat, untuk setiap langkah yang di ayunkan dalam perjalanannya ke masjid, Allah akan memberinya pahala dan memaafkan dosanya hingga ia masuk ke dalam masjid. Ketika ia sudah berada di dalam masjid ia mengerjakan shalat dan pada saat ia duduk menunggu untuk mengerjakan shalat (berjemaah), para malaikat akan memohonkan keampunan Allah dan mereka (para malaikat) berkata, “Ya Allah! Kasihilah ia. Ampunilah ia. Selama ia menunggu mengerjakan shalatnya dan (selama ia) tidak ber-hadats.”

Bagi masjid yang terletak berhampiran dengan pusat perniagaan, bangunan-bangunan pejabat dan juga pasar pasti menjadi tumpuan untuk menunaikan solat dan juga pelbagai aktiviti lain yang diperlukan oleh masyarakat moden pada hari ini dalam urusan seharian mengikut saranan Mohammad Tajuddin (1998:24) . Untuk keperluan tersebut adalah perlu diwujudkan pelbagai kemudahan-kemudahan yang mampu menarik masyarakat menjadikan masjid sebagai lokasi utama semasa waktu solat terutamanya. Begitu juga pada zaman Rasulullah di mana terdapat masjid di sekitar pasar-pasar dan pusat perniagaan yang menjadi tumpuan masyarakat seperti yang dinyatakan di dalam Hadith berikut;

والـزوراء :قـال) بـــالزوراء واصـــحابه وســلم عليـــه الله صـــلى النـــبي أن عنـه الله رضـي مالـك بـن أنـس عن بيـــن من ينبـــع جعل فيـــه كفـــه فوضـــع ماء فيـــه بقـــدح دعا (ثمـه فيمـــا والمســـجد الســـوق عنـد بالمدينـــة .ةثالثالثمـــــازهاء كـانوا كـم :قلـت :قـال اصـــحابه جميـع فتوضـــأ ،أصـــابعه

Yang bermaksud: Diriwayatkan dari Anas bin Malik r.a.: Ketika Nabi s.a.w. bersama para sahabat beliau berada di Zaura´ (sebuah tempat di Madinah dekat pasar dan masjid), beliau meminta satu gelas air. Lalu beliau meletakkan telapak tangannya ke dalamnya, maka memancarlah air dari celah jemari beliau sehingga semua sahabat berwudhu (dengannya). Kata Qatadah (perawi hadis ini), “Aku bertanya kepada Anas, ‘Berapa orang yang berwudhu saat itu wahai Abu Hamzah (Anas bin Malik)?’” Jawabnya, “Mereka kurang lebih berjumlah tiga ratus orang.”

Hadith diatas menceritakan peristiwa yang menonjolkan mukjizat Nabi Muhammad s.a.w. yang berlatarbelakang tempat di sebuah masjid yang berhampiran dengan pasar. Didapati terdapat masjid dibina berhampiran pasar pada zaman tersebut bagi memudahkan urusan ibadat pengunjung dan juga penjual di pasar tersebut. Kedudukan masjid yang berhampiran dengan pasar, pusat perniagaan dan juga kediaman memerlukannya mempunyai banyak pintu masuk bagi memudahkan pergerakan orang ramai masuk dari setiap arah. Saranan bagi ukuran jalan awam mengikut Hadith (Shahih Muslim, Hadith ke-971, 525) adalah seperti berikut;

عن ابى هريرة رضي الله عنه أن النبي صلى الله عليه وسلم قال: **"**اذا اختلفتم فى الطريق جعل عرضه سبع اذرع**"**[15]

Yang bermaksud: *Diriwayatkan dari Abu Hurairah r.a.: Nabi s.a.w. bersabda, “Apabila kalian bersengketa tentang jalan, perlebarlah jalan itu tujuh hasta.”*[16]

Ukuran tujuh hasta adalah bersamaan dengan sepuluh kaki setengah. Lebar tersebut dicadangkan sekiranya berlaku pertengkaran terhadap laluan yang digunakan oleh orang awam, namun tidak dinyatakan secara jelas untuk kediaman atau masjid.

Pengkhususan Dan Perancangan Ruang

Bahagian ini mengandungi Hadith-hadith yang menceritakan pelbagai aktivti yang terdapat di dalam dan perkarangan masjid serta kemungkinan ruang-ruang khusus yang

[15] Shahih Muslim, Hadith ke- 971, hlm. 525.

[16] 1 hasta=1.5 ft, 7 hasta=10.5 ft=3150 mm.

diperlukan untuk aktiviti-aktiviti tersebut. Diantaranya adalah akitviti-aktiviti perniagaan, rawatan penyakit, riadah dan bacaan

Diantara ruang-ruang yang dilihat bersesuian untuk disediakan di masjid ialah lot-lot kedai bersaiz sederhana untuk disewakan kepada peniaga-peniaga yang berminat untuk menjalankan perniagaanya di dalam kawasan masjid. Jenis perniagaan tersebut hendaklah berunsurkan keperluan asas masyarakat yang beragama Islam seperti alat bersuci, kelengkapan pakaian solat, Al-Qur'an dan sebagainya. Selain itu diperlukan juga kedai yang menjual bahan makanan seperti café dan sebagainya. Perlu juga diwujudkan kemudahan masyarakat moden pada hari ini seperti bank, pejabat pos, kaunter tiket dan sebagainya. Pada zaman Rasulullah s.a.w. turut tidak ketinggalan dengan kegiatan perniagaan di perkarangan masjid seperti yang dinyatakan di dalam Hadith berikut;

عن عمر بن الخطاب رضي الله عنه أنه وجد حلة سيراء عند باب المسجد، فقال: يا رسول الله، لو اشتريت هذه، فلبستها يوم الجمعة، وللوفد إذا قدموا عليك. فقال رسول الله صلّى الله عليه وسلّم: (إنما يلبس هذه من لا خلاق له في الآخرة). ثم جاءت رسول الله صلّى الله عليه وسلّم منها حالل، فأعطى عمر بن الخطاب رضي الله عنه منها حلة، فقال عمر: يا رسول الله، كسوتنيها وقد قلت فيه حلة حطارد ما قلت؟ قال رسول الله صلّى الله عليه وسلّم: (إني لم أكسكها لتلبسها). فكساها عمر بن الخطاب رضي الله عنه أخا له بمكة مشركا.[17]

Yang bermaksud: *Diriwayatkan (dari Abdullah bin Umar):* ***Umar bin Al-Khattab r.a. melihat jubah (jas panjang) sutra (dijual) di depan pintu masjid dan berkata kepada Rasulullah s.a.w., "Aku ingin Anda membeli pakaian ini untuk dikenakan pada hari Jumaat dan ketika menerima para duta yang menemui Anda.****" Rasulullah s.a.w. menjawab, "Pakaian ini hanya dikenakan oleh orang yang tidak memperoleh bagian (pahala) di hari kiamat." Di kemudian hari pakaian-pakaian serupa dihadiahkan kepada Rasulullah s.a.w. dan Nabi s.a.w. memberikan salah satunya kepada Umar bin Al-Khattab yang berkata, "Ya Rasulullah! Kau memberikan pakain ini kepadaku meskipun pakaian Utharid (pakaian seorang saudagaryang menjual pakaian sutra di depan pintu masjid) padahal kau pernah menegurku untuk tidak mengenakan pakaian itu." Rasulullah s.a.w. menjawab, "Aku memberikannya kepadamu bukan untuk dipakai olehmu." Dan Umar pun memberikan itu kepada saudara laki-lakinya yang Musyrik di Makkah untuk dipakai olehnya.*

Selain aktiviti berunsur perniagaan diwujudkan di sekitar masjid perlu juga diadakan klinik bagi rawatan untuk wanita dan kanak-kanak. Kewujudan klinik tersebut secara tidak langsung memberi kesedaran kesihatan terhadap orang ramai. Pada zaman Rasulullah s.a.w. juga terdapat ruang untuk merawat orang tercedera semasa peperangan seperti yang dinyatakan di dalam Hadith berikut;

عن عائشة رضي الله عنها قالت: أصيب سعد يوم الخندق في الأكحل، فضرب النبي الله صلّى الله عليه وسلّم خيمة في المسجد، ليعوده من قريب، فلم يرعهم، وفي المسجد خيمة من بني غفار، إلا الدم يسيل إليهم، فقالوا: يا أهل الخيمة، ما هذا الذي يأتينا من قبلكم؟ فإذا سعد يغذو جرحه دما، فمات فيها.[18]

Yang bermaksud: ***Diriwayatkan dari Aisyah r.a.: Pada suatu hari saat berlangsungnya Perang Khandaq (Perang Parit) arteri atau urat halus lengan Saad (bin Muadz) terluka dan Nabi***

Muhammad s.a.w. mendirikan tenda di dalam masjid untuk merawatnya. *Di sana ada tenda lain milik suku Ghiffar dan darah mengalir dari tenda Saad ke arah tenda milik suku Ghaffar. Mereka berteriak, "Wahai pemilik tenda! Apa yang datang dari tenda anda ini?" Mereka Saad mengalami pendarahan serius dan ia pun meninggal di dalam tenda itu.*

Bilik untuk memandi jenazah juga perlu disediakan di masjid, kedudukannya hendaklah tidak jauh dari tempat mengambil wudhuk agar orang ramai merasa insaf dan mengingati mati apabila memandang bilik tersebut. Jenazah juga digalakkan untuk disembahyangkan di masjid bagi memberi peringatan kepada orang ramai dan juga keluarga si mati. Terdapat juga Hadith yang membincangkan perkara ini seperti berikut;

[17] Shahih Bukhari, Hadith ke-497 , hlm. 205, 206.
[18] Shahih Bukhari, Hadith ke-291 , hlm. 128, 129.

عن عائشة رضي الله عنها: أنها لما توفي سعد بن أبي وقاص رضي الله عنه ارسل ازواج النبي صلّى الله عليه وسلّم أن يمروا بجنازته في المسجد فيصلين عليه ففعلوا. فوقف به على حجرهن يصلين عليه، اخرج به من باب الجنائز الذي كان الى المقاعد، فبلغهن ان الناس عابوا ذلك وقالوا: ما كانت الجنائز يدخل بها المسجد فبلغ ذلك عائشة، فقالت: ما اسرع الناس الى ان يعيبوا ما لا علم لهم به؟ عابوا علينا ان يمربجنازة في المسجد وما صلى رسول الله صلّى الله عليه وسلّم على سهيل بن بيضاء إلا في جوف المسجد.[19]

Yang bermaksud: *"Diriwayatkan dari Aisyah r.a.: Sewaktu Saad bin Abi Waqash r.a. wafat, istri-istri Nabi s.a.w. mengutus agar jenazah Saad bin Abi Waqash ini dibawa ke masjid (Nabawi) agar mereka dapat menshalatkannya juga, lalu sahabat-sahabat melaksanakannya. Jenazah Saad lalu diletakkan di dekat kamar mereka, lalu dishalatkannya. Jenazah itu dibawa keluar melalui pintu jenazah menuju tempat-tempat duduk.* ***Kemudian sampailah berita kepada mereka bahawa orang-orang mencela perbuatan yang demikian ini. Mereka berkata bahawa tidak sepantasnya jenazah dimasukkan ke dalam masjid. Hal ini didengar oleh Aisyah, maka dia berkata, "Cepat sekali orang-orang ini mencela hal yang yang tidak mereka ketahui? Mereka mencela kami kerana memasukkan jenazah ke dalam masjid, padahal Rasulullah s.a.w. menshalatkan Suhail bin Baidha di dalam masjid."***

Hadith diatas menceritakan peristiwa dimana isteri-isteri Rasulullah s.a.w. meminta untuk melakukan solat jenazah ke atas Saad bin Abi Waqqash di dalam masjid Baginda tetapi dicela oleh sesetengah pihak. Daripada peristiwa tersebut dapat di ambil iktibar akan kedudukan bilik jenazah yang bersesuian dengan ruang solat wanita. Kedudukan bilik jenazah tersebut tidak melalui ruang yang sama ke dewan solat wanita, sebaliknya tempat sembahyang jenazah terletak berhampiran dengan dewan solat wanita.

Jemaah Dan Pengguna

Fungsi utama bagi sebuah masjid pada zaman Rasulullah s.a.w. bukan sahaja sebagai tempat beribadat tetapi turut dijadikan pusat menuntut ilmu, penyampaian isu agama, perbincangan isu-isu semasa serta perancangan dalam peperangan. Oleh itu pelbagai jenis aktiviti dapat dilihat berdasarkan fungsi-fungsi masjid tersebut serta pelbagai lapisan masyarakat juga yang terlibat termasuklah golongan yang kurang upaya, orang tua, remaja, kanak-kanak, lelaki, wanita dan sebagainnya. Sehubungan dengan itu, rekabentuk sesebuah masjid dilihat sewajarnya memberi keselesaan dan keperluan kepada semua lapisan masyarakat tersebut tanpa wujudnya diskriminasi dalam soal umur, taraf dan juga kesihatan.

Perkara ini perlu diambil berat kerana para jemaah terdiri daripada pelbagai jenis lapisan masyarakat iaitu lelaki dewasa, orang muda, golongan tua, orang kurang upaya, kanak-kanak, wanita, musafir dan sebagainya. Hal ini dapat dilihat daripada Hadith Baginda Rasulullah s.a.w. yang memperkatakan tuntutan seseorang untuk ke masjid apabila terdengarnya azan dari tempat tinggalnya meskipun dia seorang yang buta seperti hadith yang telah dinyatakan sebelum ini. Sehubungan dengan itu, keperluan khas bagi golongan ini perlu disediakan di dalam masjid tersebut seperti tandas khas, laluan yang tidak menyukarkan pergerakannya seperti kewujudan anak tangga yang banyak untuk bergerak dari satu ruang ke satu ruang.

Golongan kedua yang perlu diambil berat dari segi keperluan mereka di masjid adalah remaja. Remaja merupakan golongan pertengahan diantara kanak-kanak dan dewasa, kedudukan diantara dua golongan tersebut menjadikan mereka sentiasa aktif, bersifat ingin tahu serta bersifat agresif. Oleh itu pemerhatian dan didikan yang sempurna perlu diterapkan dalam diri mereka dengan menggalakkan mereka berjinak-jinak dengan masjid. Golongan ini juga merupakan pelapis kepada generasi akan datang dalam mencorak sesebuah masyarakat Islam dengan menjadikan masjid sebagai pengantara kepada misi tersebut. Kegemaran mereka kepada aktiviti bersifat lasak seperti bersukan dan sebagainya boleh dijadikan satu tarikan untuk menarik golongan ini ke masjid. Kewujudan ruang dan kemudahan sedemikian secara tidak langsung menarik minat mereka untuk memasuki perkarangan masjid serta menjadikan masjid sebagai tempat mengisi masa lapang mereka. Apabila masjid hanya tertumpu kepada aktiviti kerohanian

[19] Shahih Bukhari, Hadith ke-478 , hlm. 271.

setiap masa akan menimbulkan kebosanan terutamanya pada golongan remaja. Rasulullah s.a.w. juga memilih waktu-waktu tertentu untuk memberi peringatan dan nasihat kepada para sahabatnya bagi mengelakkan mereka kebosanan seperti yang dinyatakn di dalam Hadith berikut;

عن ابن مسعود رضي الله عنه قال: كان النبي الله صلّى الله عليه وسلّم يتخولنا بالموعظة في الأيام، كراهية السآمة علينا.[20]

Yang bermaksud: *Diriwayatkan dari Ibn Mas'ud r.a.:* ***Nabi Muḥammad s.a.w. memilih waktu yang tepat untuk berkhutbah sehingga kami tidak merasa bosan.*** *(Nabi s.a.w. tidak mengganggu kami dengan melibatkan kami dalam pembicaraan agama dan ilmu pengetahuan terus-menerus sepanjang waktu).*

Kewujudan pelbagai aktiviti bersifat permainan di masjid turut terdapat pada zaman Rasulullah s.a.w. seperti yang dianyatakan di dalam Hadith-hadith berikut;

عن عائشة رضي الله عنها قالت: دخل رسول الله صلّى الله عليه وسلّم وعندي جاريتان تغنيان بغناء بعاث فاضطجع على الفراش وحول وجهه، فدخل الو بكر رضي الله عنه فانتهرنى، وقال: مزمار الشيطان عند رسول الله صلّى الله عليه وسلّم؟ فاقبل عليه رسول الله صلّى الله عليه وسلّم فقال: "دعهما" فلما غفل غمزتهما فخرجتا وكان يوم عيد يلعب السودان بالدرق والحراب فاما سألت رسول الله صلّى الله عليه وسلّم واما قال: "تشتهين تنظرين؟" فقلت: نعم، فاقامنى وراءه ، خدى على جده، وهو يقول: "دونكم يا بني ارفدة" حتى اذا مللت قال: "حسبك" قلت: نعم، قال: "فاذهبى".[21]

Yang bermaksud: *Diriwayatkan dari Aisyah r.a.: Rasulullah s.a.w. pernah memasuki rumah saya, sedangkan di dekat saya ada dua orang budak perempuan yang sedang menyanyikan lagu Bu'ats. Lalu beliau berbaring diatas tikar sambil memalingkan wajah. Tiba-tiba, Abu Bakar r.a. masuk dan membentak saya sambil berkata, "Ada seruling setan di rumah Rasulullah s.a.w.?"* ***Rasulullah s.a.w. menoleh kepadanya seraya bersabda, "Biarkanlah mereka berdua itu." Setelah beliau lengah, saya mengerdipkan mata (memberi isyarat) kepada kedua budak perempuan itu, lalu mereka keluar. Pernah pada suatu hari raya, ketika orang-orang hitam sedang bermain dengan perisai dari kulit (perang-perangan), saya meminta izin Rasulullah s.a.w. untuk menontonnya, atau beliau bertanya, "Apakah engkau tertarik untuk menontonnya?"*** *Saya menjawab, "Ya" Lalu beliau menempatkan saya untuk berdiri di belakang beliau. Pipi saya menempel pada pipi beliau, beliau bersabda, "Teruskan permainan kalian, wahai Bani Arfidah!" Setelah saya merasa bosan, beliau bertanya, "Apakah engkau sudah merasa bosan?" saya menjawab, "Ya." Beliau bersabda, "Pergilah!"*

عن عائشة رضي الله عنها قالت: لقد رأيت رسول الله صلّى الله عليه وسلّم يوما على باب حجرتي والحبشة في المسجد، ورسول الله صلّى الله عليه وسلّم يسترني بردائـه، أنظر إلى لعبهم. وفي رواية: يلعبون بحرابهم.[22]

Yang bermaksud: ***Diriwayatkan dari Aisyah r.a.: Pada suatu hari aku melihat Rasulullah s.a.w. di depan pintu rumahku ketika pada waktu yang bersamaan orang-orang Etiopia bermain-main di dalam masjid (memamerkan keahlian mereka melempar tombak).*** *Rasulullah s.a.w. menyelubungiku dengan rida-nya (kain penutup bagian atas tubuh) sehingga aku dapat menyaksikan permainan mereka. Di dalam kutipan yang lain disebutkan, "Bermain-main dengan tombak mereka."*

Kewujudan pelbagai kemudahan berunsur riadah bukan sahaja akan menarik golongan remaja tetapi juga menggalakkan mereka yang berkeluarga untuk turut serta meluangkan masa bersama anak-anak mereka. Penyediaan padang permainan kanak-kanak yang sederhana juga wajar disediakan memandangkan golongan ini juga memerlukan ruang khusus untuk pelbagai aktiviti mereka di masjid Kanak-kanak perlu digalakkan untuk ke masjid bagi memupuk rasa cinta mereka terhadap masjid seperti yang dilakukan oleh Rasulullah s.a.w. seperti yang dinyatakan di dalam hadith-hadith berikut;

عن أبي قتادة الأنصاري رضي الله عنه: أنّ رسول الله صلّى الله عليه وسلّم كان يصلّي، وهو حامل أمامة بنت زينب، بنت رسول الله صلّى الله عليه وسلّم، وهي لأبي العاص بن الربيع بن عبد شمس، فإذا سجد وضعها، وإذا قاما حملها.[23]

[20] Shahih Bukhari, Hadith ke-62 , hlm. 33.
[21] Shahih Muslim, Hadith ke-432 , hlm. 248. Terdapat juga di dalam Hadith Bukhari pada Hadith ke-286, hlm. 126, 127)
[22] Shahih Bukhari, Hadith ke-286 , hlm. 126, 127.
[23] Shahih Bukhari, Hadith ke- 323, hlm. 141, 142.

Yang bermaksud: *Diriwayatkan dari Abu Qatadah Al-Anshari r.a.:* ***Rasulullah s.a.w. pernah mengerjakan shalat sambil menggendong Umamah, anak perempuan Zainab ra.a.*** *(putri Nabi s.a.w.) dengan Abu Al-'Ash bin Rabi' bin ;Abdusy-Syams. Ketika Nabi s.a.w. sujud, Nabi s.a.w. menurunkan Umamah dari gendongannya, dan ketika Nabi s.a.w. berdiri, Nabi s.a.w. menggendongnya.*

عن محمود بن الرّبيع رضي الله عنه قال: عقلت من النّبيّ صلّى الله عليه وسلّم مجّةً مجّها في وجهي، وأنا ابن خمس سنين، من دلوٍ.[24]

Yang bermaksud: *Diriwayatkan dari Mahmud bin Rabi' r.a.:* ***ketika umurku lima tahun, aku ingat, Nabi Muhammad s.a.w. mengambil air dari ember (yang biasa digunakan mengambil air dari sebuah sumur) dengan mulutnya dan menyemburkannya ke wajahku.***

Kehadiran kanak-kanak ke masjid biasanya akan ditemani oleh ibunya, oleh itu para wanita juga memerlukan ruang-ruang tertentu bagi menjalankan aktiviti mereka dengan anak-anak .Rasulullah turut bertimbang rasa terhadap wanita dan kanak-kanak yang datang ke masjid seperti yang dinyatakan di dalam Hadith seprti berikut;

عن أبي قتادة الأنصاري رضي الله عنه عن النّبيّ صلّى الله عليه وسلّم قال: (إني لأقوم في الصّلاة أريد أن أطوّل فيها، فأسمع بكاء الصَّبي، فأتجوّز في صلاتي، كراهية أن أشقّ على أمه).[25]

Yang bermaksud: *Diriwayatkan dari Abu Qatadah r.a.: Nabi Muhammad s.a.w. pernah bersabda,* ***"Ketika aku berdiri untuk mengerjakan shalat, aku berniat untuk memperpenjangkannya tetapi ketika aku mendengar tangis seorang anak, aku memperpendeknya, aku tidak mau merepotkan ibu anak itu."***

Kehadiran wanita-wanita ke masjid sepatutnya bukan sahaja semasa menunaikan solat Tarawikh ataupun untuk menunaikan solat sunat hari raya sebaliknya perlu juga digalakkan untuk bersolat fardhu dengan diiringi pasangan dan anak-anak. Kedatangan wanita ke masjid tidak pernah dihalang oleh Rasulullah s.a.w. selagi mereka tidak melakukan perkara yang dilarang bahkan Rasulullah s.a.w. turut memperuntukkan satu hari khas untuk golongan wanita bersama Baginda bagi menyampaikan peringatan dan teladan seperti yang dinyatakan di dalam Hadith-hadith berikut;

عن أبي سعيد الخدري-رضي الله عنه-قال: قالت النّساء للنّبي صلّى الله عليه وسلّم: غلبنا عليك الرِّجال، فاجعل لنا يوما من نفسك، فوعدهنَّ يوما لقيهنّ فيه، فوعظهنّ وأمرهنّ، فكان فيما قال لهن: (ما منكنّ امرأةٌ تقدم ثلاثة من ولدها، إلاّ كان لها حجاب من النّار). فقالت امرأةٌ: واثنين؟ فقال: (واثنين). وفي رواية عن أبي هريرة رضي الله عنه: (لم يبلغوا الخنث).[26]

Yang bermaksud: *Diriwayatkan dari Abu Sa'id Al-Khudri r.a.: Beberapa orang perempuan memohon kepada Nabi Muhammad s.a.w. untuk memberi mereka waktu secara terpisah selama sehari sebab kaum pria telah mengambil seluruh waktunya.* ***Mendengar permintaan itu Nabi Muhammad s.a.w.menjanjikan kepada mereka satu hari untuk memberikan pelajaran dan perintah-perintah agama. Pada hari yang dijanjikan Rasulullah s.a.w. bersabda, "Seorang perempuan yang melahirkan tiga orang anak yang meninggal akan dilindungi mereka dari api neraka." Seorang perempuan bertanya, "Bagaimana kalau dua?" Nabi Muhammad s.a.w. menjawab, "Ia pun akan dilindungi dari api neraka."***

عن ابن عمر رضي الله عنهما، عن النّبي صلّى الله عليه وسلّم قال: (إذا استأذنكم نساؤكم باللّيل إلى المسجد فأذنوا لهنّ).[27]

Yang bermaksud: *Diriwayatkan dari Ibnu Umar r.a.: Nabi Muhammad s.a.w. bersabda,* ***"Jika istri-istrimu meminta izin untuk pergi ke masjid pada malam hari, beri mereka izin."***

عن زينب الثّقفية رضي الله عنها قالت: قال لنل رسول الله صلّى الله عليه وسلّم: "اذا شهدت احداكنّ المسجد فلا تمسّا طيبا".[28]

[24] Shahih Bukhari, Hadith ke- 69, hlm. 35.
25 Shahih Bukhari, Hadith ke- 420, hlm. 176.
26 Shahih Bukhari, Hadith ke-87 , hlm. 43.
27 Shahih Bukhari, Hadith ke-492 , hlm. 203.
28 Shahih Bukhari, Hadith ke-4245 , hlm. 152.

Yang bermaksud: *Diriwayatkan dari Zainab Al-Tsaqafiyyah r.a.: Rasulullah s.a.w. pernah bersabda kepada kami , **"Apabila salah seorang daripada kamu pergi ke masjid (wahai kaum wanita), janganlah memakai wewangian."***

عن أم عطيّة رضي الله عنها قالت: سمعت رسول الله صلّى الله عليه وسلّم يقول: (تخرج العواتق، وذوات الخدور، والحيّض، وليشهدن الخير، ودعوة الموءمنين، ويعتزل الحيّض المصلّى). قيل لها: الحيّض؟ فقالت: أليس يشهدن عرفة، وكذا وكذا.[29]

Yang bermaksud: *Diriwayatkan dari Ummu Atiyah r.a.: Aku mendengar dari Rasulullah s.a.w. bahawa gadis-gadis perawan yang belum kawin, perempuan-perempuan dewasa, dan kaum perempuan yang sedang haid hendaknya keluar dan ikut serta melakukan perbuatan-perbuatan baik sebaik keyakinan orang-orang yang beriman, tetapi orang-orang yang sedang haid harus menjauh dari tempat shalat. **Sesorang bertanya (kepada Ummu Athiyah) (dengan terkejut), "Apakah anda bilang kaum perempuan yang sedang haid?" Ia menjawab, "Bukankah perempuan yang sedang haid hadir (di) Arafah dan mengerjakan berbagai perbuatan baik?"***

Terdapat juga kehadiran para wanita dan keluarga ke masjid sebagai musafir dan beristirehat. Sehubungan dengan itu adalah wajar disediakan bilik-bilik yang privasi untuk beristirehat dan disewakan bagi kegunaan keluarga musafir tersebut. Pada zaman Rasulullah s.a.w., masjid juga menjadi tempat perlindungan bagi seorang budak perempuan, budak tersebut telah mendirikan khemahnya di dalam masjid seperti yang dinyatakan di dalam Hadith tersebut;

عن عائشة رضي الله عنها: أن وليدة كانت سوداء، لحي من العرب، فأعتقوها فكانت معهم، قالت: فخرجت صبيّة لهم، عليها وشاح أحمر من سيور، قالت: فوضعته، أو وقع منها، فمرّت به حديّاةٌ وهو ملقى، فحسبته لحماً فخطفته، قالت: فالتمسوه فلم يجدوه، قالت: فاتّهموني به، قالت: فطفقوا يفتشون، حتّى فتّشوا قبلها، قالت: والله إني لقائمة معهم، إذ مرّت الحديّاة فألقته، قالت: فوقع بينهم، قالت: فقلت: هذا الّذي اتهمتموني به، زعمتم وأنا منه بريئة، وهو ذا هو، قالت: فجاءت إلى رسول الله صلّى الله عليه وسلّم فأسلمت، قالت عائشة: فكان لها خباءٌ في المسجد أو خفشٌ، قالت: فكانت تأتيني فتحدّث عندي، قالت فلا تجلس عندي مجلساً، إلا قالت: ويوم الوشاح من أعاجيب ربّنا ألا إنّه من بلدة الكفر أنجاني قالت عائشة: فقلت لها: ما شأنكِ، لا تقعدين معي مقعداً إلا قلت هذا؟ قالت: فحدّثتني بهذا الحديث.[30]

Yang bermaksud: *Diriwayatkan dari Aisyah r.a: Ada seorang budak perempuan berkulit hitam milik sebuah suku Arab dan mereka memerdekakan budak perempuan itu tetapi ia tetap tinggal bersama mereka. Pada suatu hari salah seorang gadis dari suku mereka datang dengan mengenakan selendang kulit berwarna merah berhias batu-batu mulia. Batu itu jatuh, atau ia menyimpannya entah di mana. Seekor burung walet lewat, melihatnya tergeletek dan menyangkanya sebagai sekerat daging lalu membawanya terbang. Orang-orang mencari batu mulia itu namun tidak berhasil menemukannya. Mereka pun menuduhku mencurinya dan menggeledah tubuhku bahkan menggeledah bagian tubuhku yang terlarang." Lebih jauh budak perempuan itu berkata, "Demi Allah! Ketika aku berdiri dalam keadaan (teraniaya) itu, burung walet yang sama merenggutkan selendang merah si gadis lewat dan menjatuhkannya di depan mereka. Aku berkata kepada mereka, 'Inilah yang kau tuduhkan padaku, sesugguhnya aku tidak bersalah.'"*

*(Aisyah) menambahkan: **Budak perempuan itu menemui Rasulullah s.a.w. dan memeluk Islam. Ia memiliki sebuah khemah atau sebuah kamar kecil di dalam masjid.** Kapan pun ia memanggilku, ia akan berbicara denganku dan kapan pun ia duduk bersamaku, ia akan mengatakan hal ini: "Kasus selendang itu, satu dari sekian keajaiban Tuhanku. Sungguh ia telah menyelamatkan aku dari orang-orang kafir itu."Aisyah menambahkan: Sekali waktu aku bertanya kepadanya, "Apa yang (sesungguhnya yang pernah) terjadi padamu? Setiap kali kau duduk bersamaku, kau selalu mengucapkan syair itu." (Mendengar pertanyaanku) ia pun menceritakan seluruh kemalangan yang telah menimpanya itu.*

Bagi golongan lelaki dewasa pula, kedatangan mereka ke masjid selain daripada menunaikan solat adalah untuk aktiviti kerohanian lain seperti mendengar kuliah, membaca buku, belajar Tajwid dan Al-Qur'an, bermesyuarat dan sebagainya. Bilik mesyuarat diperlukan di masjid bagi membincangkan hal ehwal pentadbiran masjid serta

29 Shahih Bukhari, Hadith ke-218 , hlm. 93.
30 Shahih Bukhari, Hadith ke- 277, hlm. 122, 123.

sebagai tempat imam berbincang dan memberi kaunseling bagi mereka yang memerlukannya. Situasi ini turut terdapat pada zaman Rasulullah s.a.w. dimana perlunya ruang yang privasi untuk membincangkan sesuatu seperti yang dinyatakan di dalam Hadith berikut;

عن أنسٍ رضي الله عنه قال: أن ناسا من الأنصار، قالوا لرسول الله صلّى الله عليه وسلّم، حين أفأ الله على رسوله صلّى الله عليه وسلّم من أموال هوازن ما أفاء، فطفق يعطي رجالا من قريش المائـة من الأبل، فقالوا: يغفر الله لرسول الله صلّى الله عليه وسلّم، يعطي قريشا ويدعنا، وسيوفنا تقطر من دمائـهم، قال أنس: فحدث رسول الله صلّى الله عليه وسلّم بمقالتهم، فأرسل إلى الأنصار فجمعهم في قبة من أدم، ولم يدع معهمأحدا غيرهم، فلما اجتمعوا جاءهم رسول الله صلّى الله عليه وسلّم فقال: (ما كان حديث بلغني عنكم؟). قال له فقهاؤهم : أما ذوو آرائـنا يا رسول الله فلم يقولوا شيئـا، وقد تقدم الحديث بطوله.[31]

Yang bermaksud: *Diriwayatkan dari (Anas bin Malik) r.a.:* ***Ketika Allah memberikan Rasul-Nya harta kekayaan suku Hawazin sebagai faai (rampasan perang), Nabi s.a.w. memberi sejumlah orang Quraisy seratus unta lebih. Melihat hal itu sejumlah orang Anshar berkata kepada Rasulullah s.a.w.,*** *"Semoga Allah mengampuni Rasul-Nya! Ia memberi sedemikian banyak kepada orang Quraisy dan meninggalkan kita, padahal pedang-pedang kami masih basah dengan darah mereka (orang-orang kafir)."* ***Kata Anas, ketika persoalan itu diberitahukan kepadanya, Rasulullaah s.a.w. memanggil orang-orang Anshar berkumpul di sebuah tenda kulit. Orang lain (selain suku Anshar) tidak diperbolehkan masuk.*** *Setelah semuanya berkumpul, Rasulullaah s.a.w. bersabda kepada mereka, "Apakah perkataan yang telah kalian ucapkan perihalku?" Orang-orang terpelajar dari kalangan mereka menjawab. "Ya Rasulullah! Orang-orang bijak diantara kami tidak mengatakan apa pun."*

Daripada Hadith diatas dapat dilihat bagaimana cara Rasulullah menyampaikan sesuatu yang sulit dan rahsia kepada golongan Anshar dengan cara memanggil mereka ke tempat yang selamat dari pendengaran orang ramai. Oleh itu dilihat wajar sekiranya disediakan bilik-bilik khas untuk aktiviti-aktiviti tertentu seperti kaunseling, mesyuarat dan sebagainya.

Permasalahan Keselamatan dan Ruang Peribadi di Masjid

Bahagian ini menjelaskan permasalahan yang berkaitan dengan keselamatan dan ruang peribadi di masjid. Perbincangan ini terbahagi kepada permasalahan keselamatan harta benda masjid serta isu penggunaan pagar. Keselamatan dan ruang peribadi merupakan perkara penting dalam setiap lapisan masyarakat bergantung kepada aktiviti yang dilakukan .Dalam masalah keselamatan dan ruang peribadi di masjid terutamanya bagi golongan wanita memerlukan perhatian yang sewajarnya sebagaimana Rasulullah s.a.w. sangat benci apabila ruang peribadinya diceroboh seperti mengintai dan sebagainya sebagaimana yang telah dinyatakan di dalam Hadith berikut:

حديث سهل بن سعد الساعدى، أن رجلا اطلع فى جحر فى باب رسول الله عليه وسلم، ومع رسول الله عليه وسلم مدرى يحك به رأسه. فلما رآه رسول الله صلى الله عليه وسلم، قال، لو أعلم أن تنتظرنى لطعنت به فى عينيك. قال رسول الله صلى الله عليه وسلم: إنما جعل الاءذن من قبل البصر.[32]

Yang bermaksud: "*Sahl bin as-Sa'idi r.a. berkata: "Ada seseorang mengintai dari lubang dipintu rumah Rasulullah s.a.w. sedang di tangan Rasulullah s.a.w. ada sisir besi digunakan untuk menggaru kepalanya, dan ketika Nabi s.a.w. melihatnya lalu baginda bersabda:* ***"Kalau aku mengetahui bahawa anda mengintai aku, pasti aku cucukkan besi ini di di kedua matamu." Nabi s.a.w. bersabda lagi: "Sesungguhnya diadakan peraturan minta izin hanya kerana mata." (Bukhari, Muslim).***

Hadis diatas menunjukkan betapa hinanya perbuatan tersebut sehingga Baginda tidak teragak-agak untuk mencucuk kedua-dua mata pengintai tersebut. Oleh itu isu ini wajar diambil berat dalam merekabentuk sesebuah masjid.

[31] Shahih Bukhari, Hadith ke-1332 , hlm. 547.
[32] Hadis ke-1393, Himpunan Hadis Shahih oleh Bukhari dan Muslim, hlm. 819 dan 820.

Dalam isu penggunaan pagar bagi memelihara keselamatan harta benda masjid dilihat tidak begitu praktik untuk digunakan kerana bakal menimbulkan rasa gerun orang ramai untuk mendekati kawasan tersebut, sekiranya hanya dipisahkan dengan landskap tumbuhan pasti seakan menggalakkan kehadiran orang ramai tanpa mengira darjat keturunan dan had umur.

" *Diriwayatkan dari Ibn Abbas r.a.: Pada suatu hari aku datang dengan menunggang seekor keledai betina, ketika itu aku telah mulai menginjak dewasa. Rasulullah s.a.w. tengah mengerjakan shalat di Mina.* ***Tak ada dinding di hadapannya dan aku lewat di depan barisan beberapa orang tengah melakukan shalat. Aku membiarkan keledai lepas dan menerobos ke dalam barisan itu dan tidak ada seorang pun yang keberatan."***[33]

Dalam hadith diatas juga boleh diintepretasikan sebagai galakkan untuk menarik kedatangan orang ramai adalah dengan tidak mewujudkan pagar yang bersifat pemisah. Ini kerana Rasulullah s.a.w. tidak pernah membuat sebarang pagar atau melarang apa sahaja yang masuk ke dalam masjidnya sekalipun seekor keledai seperti maksud hadith diatas.

Ekonomi dan Pengurusan

Bahagian ini membincangkan tentang ekonomi masjid dan pengurusannya iaitu dalam hal ehwal pengurusan kewangan. Didapati kebanyakan masjid pada hari ini tidak mempunyai sumber kewangannya yang tersendiri bagi kegunaan penyelenggaraan, aktiviti keraian dan sebagainya. Masjid sewajarnya mempunyai sumber kewangannya sendiri untuk kepentingan institusi tersebut serta mereka yang memerlukan sebagaimana yang dapat dipelajari daripada Hadith (Sahih Muslim, Vol. II, p. 48) berikut:

> *Mundhir b. Jarir reported on the authority of his father. While we were in the company of the Messenger of Allah (may peace be upon him) in the early hours of the morning, some people came there (who) were barefooted, naked, wearing striped woollen clothes, or cloaks, with their swords hung (around their necks). Most of them, nay, all of them, belonged to the tribe of Mudar. The colour of the face of the Messenger of Allah (may peace be upon him) underwent a change when he saw them in poverty. He then entered (his house) and came out and commanded Bilal (to pronounce Adhan). He pronounced Adhan and Iqama, and he (the Holy Prophet) observed prayer (along with his Companion) and then addressed (them reciting verses of the Holy Qur'an): "O people, fera your Lord, Who created you from a single being" to the end of the verse, "Allah is ever a Watcher over you" (iv.1). (He then recited) a verse of sura Hashr: "Fear Allah, and let every soul consider that which it sends forth for the morrow and fear Allah" (ix. 18). (Then the audience began to vie with one another in giving charity).* ***Some donated a dinar, others a dirham, still others clothes, some donated a sa'of wheat, some a sa' of dates; till he (the Holy Prophet) said: (Bring) even if it is half a date. Then a person from among the Ansar came therewith a money bag which his hands could scarcely loft; in fact, they could not (lift). Then the people followed continuously, till I saw two heaps of eatables and clothes, and I saw the face of the Messenger (May peace be upon him) glistening like gold (on account of joy). The Messenger of Allah (May peace be upon him) said: He who sets a good precedent in Islam, there is a reward for him for this (act of goodness) and reward of that also who acted according to subsequently, without any deduction from their rewards; and he who sets in Islam an evil precedent, there is upon him the burden of that and the burden of him also who acted upon it subsequently, without any deduction from their burden.***

[33] Shahih Bukhari, Hadith ke- 68, hlm. 35.

Hadith diatas menceritakan bagaimana seseorang yang dalam keadaan memerlukan sesuatu mendapatkannya daripada masjid melalui pertolongan Baginda dan para sahabatnya. Situasi itu dilihat institusi masjid Baginda berfungsi dari sudut ekonominya dimana mereka dapat membekalkan sesuatu yang diperlukan oleh mereka yang memerlukan bantuan. Fungsi tersebut perlu diwujudkan dalam rekabentuk masjid pada masa kini dengan mewujudkan sesuatu yang membolehkan ekonomi masjid tersebut sentiasa stabil.

Kesimpulan

Berdasarkan penilaian dan intepretasi yang dilakukan ke atas Hadith-hadith Rasulullah s.a.w. telah mendapati bahawa masjid pada zaman tersebut bukan sahaja terhad kepada kegiatan berunsurkan kerohanian dan ibadat semata-mata, tetapi ia juga berfungsi sebagai penggerak kepada perkembangan masyarakat Islam dan agama Islam itu sendiri. Keberkesanan fungsinya pada zaman tersebut dapat dilihat pada penyebaran agama Islam ke seluruh pelusuk dunia meskipun pada masa itu masjid baginda hanya dibina daripada batang pohon kurma dan berbumbungkan daun-daun. Disebalik kejayaan Rasulullah pada zaman tersebut menjadi teladan bagi masyrakat Islam pada hari ini untuk membangun dan memakmurkan masjid mereka bagi memaksimumkan fungsinya sebagai satu pusat penggerak masyarakat Islam terkini dengan memenuhi pelbagai keperluan kerohanian dan juga fizikal.

Dengan wujudnya masjid yang memainkan peranan penting tersebut diharap dapat membentuk dan menyatupadukan masyarakat Islam menjadi masyarakat yang disegani dan dipandang mulia di sisi masyarakat dan diredhai Pencipta-Nya.

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Lampiran

Gambar 2: Masjid Sultan Abdul Samad (www.google.com)

Gambar 3: Masjid UKM, Bangi (Kajian Lapangan)

Gambar 4: Koridor utama yang menghubungkan ruang solat Muslimat dengan tandas, bilik wudhuk dan juga bilik mandi jenazah di Masjid Universiti Kebangsaan Malaysia.

Gambar 5: Laluan ke dalam Masjid UKM didapati tidak mesra OKU
(Kajian Lapangan)

Gambar 6: Masjid Al-Ghufran di Taman Tuan Dr. Ismail (Kajian Lapangan)

Gambar 7: Masjid Tengku Sulaiman, Bentong, Pahang (Kajian Lapangan)

Gambar 8: Masjid Tuanku Mizan, Putrajaya (www.google.com)

Gambar 9: Masjid kampong Air Mati, Perak (www.google.com)

Gambar 10: Masjid Kristal, Pulau Wan Man, Terengganu (www.google.com)

AN EXAMINATION OF PROJECT MANAGEMENT LEADERSHIP STYLES OF NIGERIAN QUANTITY SURVEYORS

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ABSTRACT

Nigerian clients have been appointing Nigerian quantity surveyors with differs leadership styles and experience as project managers on construction projects in Nigeria over the years and this is expected to have positive or negative effect on construction works. This study examines different project management leadership styles been exhibited by Nigerian quantity surveyors using different factors as criteria. 57 questionnaires were used for the analysis out of which 15 of the respondents are quantity surveyors. Jerrell/Slevin management instrument was used in the analysis based on the identified questions on the noted 4 leadership styles and construction professionals were also involved in ranking the Nigerian quantity surveyors based on the 10 identified leadership styles using mean internal score. On the general note, Nigerian quantity surveyors were found to be autocratic using Jerrell/Slevin measuring instrument while in the opinion of Nigerian construction professionals; they are more of task oriented in discharging their duties as construction project managers. The study finally recommends democratic and transformational leadership styles for Nigerian quantity surveyors in discharging their duties as construction projects managers.

Keywords: Competencies, Construction professionals, Nigeria, Perception, Quantity surveyors.

Introduction

The realization of construction projects brings together a diversity of individuals and organizations, variously forged into groups and teams, in which power is important in shaping leader/follower behaviour. Fellow, Liu, and Miu Fong (2003) observed that Quantity surveyors, being primarily project cost consultants and procurement/contractual advisers, are employed both by the clients' and the contractors' organizations in their quest for value for their money and this undermine the reason for their choice as construction project managers.

Benator (2003[a]) observed that the project manager's responsibility is to manage the financial, technical and schedule requirements of the project in such a manner as to bring the project in on-time, within budget and with a technical quality that meets or exceeds the contractual performance specifications. The project manager is ultimately responsible for the productivity of the people in the project team; it is therefore the project manager's job to maintain cohesion in the project. Hence, the project manager must be a leader; one who can inspire and motivate people who have ties both to the project as well as to the functional organisation. Benator and Thumann (2003) observed that the project manager plays an important role in development of the overall estimate of the total costs of the project. In addition the project manager develops checkpoints to ensure the overall project is completed within budget. The project manager usually develops the budget in conjunction with a cost estimating department.

A project manager is often a client representative and has to determine and implement the exact needs of the client, based on knowledge of the firm they are representing. The ability to adapt to the various internal procedures of the contracting party, and to form close links with the nominated representatives, is essential in ensuring that the key issues of cost, time, quality and above all, client satisfaction, can be realized. Odusami, Iyagba, and Omirin (2003) observed that project management practice is still at infancy stage in Nigeria. Virtually all the Nigerian construction professionals— architects, builders, civil

engineers, estate surveyors and quantity surveyors—practise project management as consultancy services along with their primary profession.

Leadership style as observed by Goleman (2002) is crucial to success of a project and construction project delivery. Leadership according to Benator (2003[b]) is a process and not a one-time, fire and forget evolution. To be an effective leader, there is a need for one to continually exercise good leadership skills. You don't need to be perfect, but you should always strive to apply sound leadership principles to your leadership efforts. Leadership involves influencing individuals or groups and good leaders are effective influencers of others because they know leaders can't do everything. Good leadership is designed to accomplish an organizational goal or mission, i.e. leading a project team and managing project to a high quality, on time and within budget conclusion with a customer who is happy with that conclusion.

Giritli and Oraz (2003) opined that different approaches to the subject have led to various classifications of leadership styles. Although behaviour categories may be labelled similarly, their conceptualization and operationalization may be totally different in most cases. Leadership style is in general of two types: the first one is the employee-centred type, described as democratic or participative, and the second one is the task-centred type, described as autocratic or authoritarian

Organizations have paid attention to leadership styles of their people who occupy managerial positions, holding the belief that leadership is an important factor in achieving business success (Giritli and Oraz 2003).

Literature Review

Project Management

Chartered Institute of Building (2008) defined project management as "the overall planning, control, co-ordination from inception to completion aimed at meeting a client's requirements and ensuring completion on time within cost and required quality and standard. In another opinion, Project Management Institute (2008) defines it as the application of knowledge, skills, tools and techniques to project activities in order to meet or exceed stakeholder needs and expectations which involves balancing competing demands among scope, time, cost and quality.

The management of a construction project has unique features such as the relationship with the client and the inter-organization nature of the process. The project manager is usually in the position of leading contributors over whom he has limited authority. A significant outcome of this is that each contributor will be subject to leadership form of both the project manager and the manager of his employer's organization. Project managers will be leading a group of mature, experienced professionals, consequently, his leadership will tend to be democratic and rely on impulse and persuasion rather than authority.

In a broader form, project management is the planning, control and co-ordination of a project from conception to completion (include commissioning) on behalf of a client; the identification of the clients objectives in terms of utility, function, quality, time and cost and the establishment of relationship between resources it is also concerned with the integration, monitoring and control of the contributors to the project and their output, and the evaluation and selection of alternatives in pursuit of the client satisfaction with the project outcome.

Quantity Surveyors

Quantity surveyor according to Wikipedia (2008) is "a professional trained, qualified, and experienced in handling construction cost, construction management and construction communication on behalf of the client".

Nigerian Institute of Quantity Surveyors (2004) defined a quantity surveyor as the expert professionally trained and experienced in dealing with construction cost, construction management and construction communication. This he exhibit in various types of projects including building construction, civil and structural engineering, mechanical building and engineering services, petrochemicals, mineral extraction, cost and production engineering, environmental economics, planning and urban development, landscaping, interior design and all other relevant areas.

Project Management Leadership Styles

In considering leadership styles in construction industry, the first thing that needs to be determined is whether the construction industry is a special case (Giritli and Oraz, 2003). According to Harvey and Ashworth (1993), the construction industry has characteristics that separate it from all other industries. These characteristics that can have an impact on leadership styles in construction are: (a) project characteristics, (b) contractual arrangements, (c) project life-cycle and (d) environmental factors. A construction project is composed of a multitude of organizations. Individuals or groups from several parent organizations are all drawn together for a short time related to a specific task. The project-based organization is disbanded upon the completion of that task. This project-based nature of construction industry with its temporary multi-organizations will almost certainly have an important influence on the managerial leadership styles of professionals working in the industry. Lee-Kelley and Loong (2003) observed that there is no definitive skill and style mix that is appropriate for handling different types of projects.

Liu, Fellows and Fang (2003) believed that styles of leadership emerged from the behavioural studies as analysis of the ways in which leaders execute the functions. Researchers have identified the major leadership styles as, laissez-faire, democratic, and autocratic (Halepota, 2005). It was further affirmed that democratic leadership style has achieved higher productivity and effectiveness from the perception of behavioural scientists.

Chan and Chan (2005) adopted transformational and transactional leadership styles in a study. It was stated that Bass's transformational leadership theory, comprising transactional and transformational leadership styles, described the leader as one who helps to develop and maintain a sense of commitment, and raises aspirations and motivation among colleagues and followers. Transformational leadership occurs when one or more persons engage with others in such a way that leaders and followers raise one another to higher levels of motivation and morality while transactional leadership was described as simply contingent reinforcement.

In Love, Davis and Lopez (2007) opinion, two leadership styles dominate the construction management literature and they are charismatic and transformational. The former provide a vision that followers accept and believe in while the later tend to obtain followers compliance

Furthermore, construction professionals need different leadership styles in different phases of the project life cycle (Giritli and Oraz 2003). The style of leadership changes as the project progresses through its life cycle. During the different phases of the design process, styles may need to allow for more debates, fine-tuning and deliberation. Yet, during the construction phases, they may be more structured and dominant

Four leadership styles were identified by Slevin and Pinto (1998) using Jerrell/Slevin measuring instrument and they are:

1. The Shareholder manager (D, I) (0–50, 0–50). This position means literally ''poor manager''. There is little or no information input and exchange between the leader and the group. The group has authority in the final decision
2. The Autocrat (D, I) (50–100, 0–50). Such managers solicit little or no information Input from their group. They make managerial decisions solely by themselves.

3. The Consensus manager (D, 1) (0–50, 50–100). This is purely consensus manager. He throws the problem opens to the group for discussion and also allows or encourages the group to make a relevant decision.
4. The Consultative autocrat (D, I) (50–100, 50–100). In this managerial style intensive information input is elicited from the members, but such formal leaders keep all substantive decision making authority to themselves.

Research Methodology

Leadership styles of leaders as perceived by their employees can be assessed according to Chan and Chan (2005) through the use of the Multifactor Leadership Questionnaire (MLQ) and Jerrell/Slevin management instrument which was claimed by Slevin and Pinto (1988) to have been used effectively with thousands of managers both in explaining the theory and providing them with a diagnostic on their particular style can also be employed. The employees are to assess their leaders using the MLQ while individuals were to assess themselves when Jerrell/Slevin instrument is to be employed.

Jerrell/Slevin management instrument and Mean internal Score were employed in the analysis for this study. Jerrell/Slevin instrument is such that respondents were asked 20 questions using 5 Likert scales rating of strongly disagree, disagree, neutral, agree and strongly agree (Slevin and Pinto, 1998). The first 10 questions were to determine the “D” (decision authority) value while the other 10 were meant for “I” (subordinate group’s information input to decision) value. The mean for each category of respondents were determined and the raw score “D” and “I” were identified on a Jerrell/slevin management instrument table in order to determine their corresponding percentile score. These percentiles were plotted on the Bonoma-Slevin leadership model in order to determine the leadership style of Nigerian quantity surveyors using various criteria. The Bonoma-Slevin model identified 4 leadership styles i.e. Autocratic, consensus, shareholder and consultative autocratic and it is presented in form of a graph in which “D” is plotted on the X-axis and “I” on the Y-axis.

52 construction professionals that are eligible and competent to act as construction project managers were also involved in ranking Nigerian quantity surveyors with respect to identified 10 leadership styles. These professionals are architects, quantity surveyors, builders and engineers.

Findings and Discussion

Using Jerrell/Slevin management instrument, table 1 shows that Nigerian quantity surveyors do exhibit autocratic leadership style on the general note while only 2 of the identified categories exhibits shareholder and consensus styles. Based on the survey, the respondents were of the opinion that Nigerian quantity surveyors do exhibit more of task-oriented leadership style than other identified styles. Giritli and Oraz (2003) classified leadership styles into democratic and autocratic. The former was described as employee-centred and the latter was described as task-centred depicting a relationship between the result of the management instrument and the perception of construction professionals. As expected, laissez-faire leadership style – described as “hands-off¨ or “leave it be” style - was ranked least in term of execution by Nigerian quantity surveyors.

Conclusion and Further Research

Professionals acting as project managers should posses the ability to adapt different leadership styles depending on situation at hand. Nigerian quantity surveyors are more autocratic in their project management leadership. They were also found to be task oriented, bureaucratic and transactional in exhibiting their leadership role. Halepota (2005) affirmed that democratic leadership style has achieved higher productivity and effectiveness from the perception of behavioural scientists. None of the identified categories of quantity surveyors exhibit this leadership style and it was ranked 4th in term

of exhibition by Nigerian quantity surveyors when acting as construction projects manager.

More so, quantity surveyors were found to be more transactional than transformational and this study recommend a need for improved transformational style since the style is more participatory and allowed suggestions from followers without fear.
This research has made use of Jerrell/Slevin management measuring instrument. Other study can make use of Multifactor Leadership Questionnaire or both and compare the results. Project management leadership styles of other construction professionals can also be assessed since the study only assess Nigerian quantity surveyors and more professionals can also be involved for future studies.

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Appendix

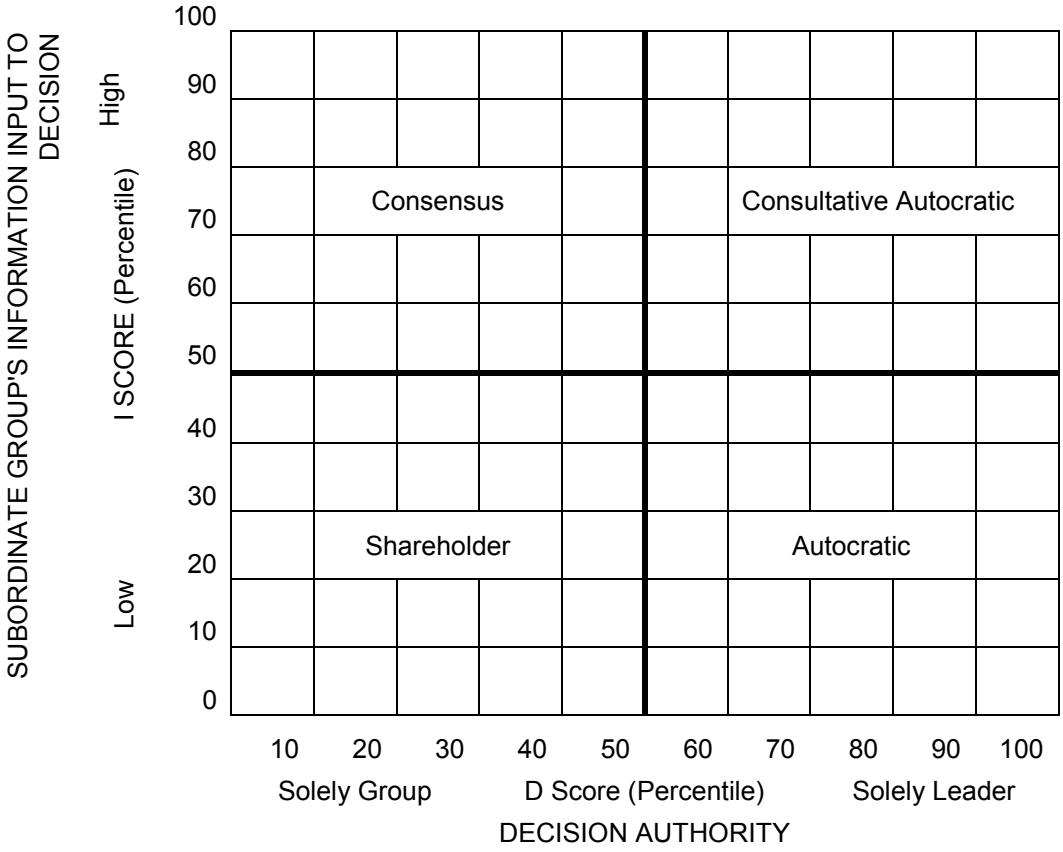

Figure 1: Jerrell/Slevin Management instrument
Source: Slevin and Pinto (1988)

Table 1: Leadership styles of Nigerian quantity surveyors using Jerrell/Slevin instrument

Categorization	Quantity Surveyor
Overall	Autocratic
Type of organisation	
Consulting	Autocratic
Contracting	Autocratic
Government establishment	Autocratic
Years of experience	
1 - 5	Autocratic
6 - 10	Autocratic
11 - 15	Autocratic
16 - 20	Shareholder
21 - 30	Autocratic
31 & above	
Membership type	
Probationer	Shareholder
Graduate	
Associate	Autocratic
Fellow	Autocratic
No of projects handled	

1 - 5	Autocratic
6 - 10	Autocratic
11 - 15	Autocratic
16 - 20	
21 - 30	Consensus
31 & above	Autocratic

Table 2: Perception of construction professionals to quantity surveyors' leadership styles

Styles	Mean	Rank
Task oriented	3.84	1
Bureaucratic	3.72	2
Transactional	3.67	3
Autocratic	3.58	4
Democratic	3.58	4
Charismatic	3.53	6
Transformational	3.41	7
People oriented	3.33	8
Servant leadership	2.80	9
Laissez-Faire	2.56	10

PERCEPTION OF CONSTRUCTION PROFESSIONALS TO THE PERFORMANCE OF NIGERIAN QUANTITY SURVEYORS

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ABSTRACT

The dynamism of the construction industry throughout the world call for no other skill of a professional quantity surveyor than the need for stringent cost control and effective cost management in providing value for money for construction clients. The aim of this research work is to examine the performance of Nigerian quantity surveyors with a view to ascertaining areas that need improvement. Primary data were collected via well-structured close-ended questionnaire using the areas of competencies of quantity surveyors as identified by RICS. Percentile, mean internal score and Cronbach's alpha test were employed in the analysis and testing of the hypotheses generated. The study revealed that Nigerian quantity surveyors are performing above average in all the identified areas of competencies of quantity surveyors from the perception of all the considered construction professionals. The study finally recommended a need for personal improvement by quantity surveyors in Nigeria – especially the older ones- in order to keep them abreast with the current trend in the construction industry.

Keywords: Competencies, Construction professionals, Nigeria, Perception, Quantity surveyors.

Introduction

Olusoga (2006) observed that Nigerian quantity surveyors of older generation were more of experts in the costing, cost monitoring and control as it relates to building projects which they were respected for by their sisters' professionals. Although, it is true that today's quantity surveyors want to expand the horizon of their practice as observed by Seppanen (2002), it is to be noted that most of these expansion in Nigeria as the case may be is into costing of engineering projects which is still within the traditional role of the older generation of quantity surveyors especially in the developed world. The quantity surveyor according to Aje and Awodele (2007) is "a professional trained, qualified and experienced in dealing with problems relating to construction cost, management and communication in the construction industry". The problem lies neither in the cost nor communication but in the management of construction projects since proper and effective overall management entails every other function i.e. cost and communication. This should be an area of concern to Nigerian quantity surveyors in discharging their duties since a well managed project is always a well delivered project.

The challenge to the Nigerian quantity surveyors can be linked to an assertion by Anago (1997) that, "when a professional man holds himself out as qualified in a particular professional discipline, he thereby indicates that he is competent to render the services associated with such a profession to the required degree of skill and expertise". This is supported by a report of Royal Institute of Chartered Surveyors (1991) where it was stated that "quantity surveying is very much a client led profession in that the professional quantity surveyors respond to client needs and must continue to develop more on their own initiatives. Concerns in the coming decade will be dominated by the need to anticipate and satisfy changing client requirements". This called for a need to examine the present performance of Nigerian quantity surveyors in their quest for better service delivery.

Literature Review

Quantity Surveyors

Quantity surveyors are called by so many names all over the world such as cost engineers, building economists, cost managers, construction accountants, etc and different authors have adopted these different names in different studies (RICS, 1991; Seeley, 1997; Seeley and Winfield, 1999; AACE, 2000; Kelly and Male, 2006) and in Nigeria such as (Ajanlekoko, 2004; NIQS, 2004; Ogunsemi, 2004; Babalola, 2006; Odeyinka, 2006; Ogunsemi, 2006; Oke, 2006). It is to be noted that the most common name for this professional in Nigeria is "quantity surveyors". Quantity surveyor according to Wikipedia (2008) is "a professional trained, qualified, and experienced in handling construction cost, construction management and construction communication on behalf of the client".

Nigerian Institute of Quantity Surveyors (2004) defined a quantity surveyor as the expert professionally trained and experienced in dealing with construction cost, construction management and construction communication. This he exhibit in various types of projects including building construction, civil and structural engineering, mechanical building and engineering services, petrochemicals, mineral extraction, cost and production engineering, environmental economics, planning and urban development, landscaping, interior design and all other relevant areas.

Competent quantity surveyors must have a range of skills, knowledge and understanding which can be applied in a range of contexts and organisations (Hassall, Dunlop and Lewis, 1996). Yet pressing issues which confront the quantity surveying profession today include increasing the relevance and level of awareness of the profession's services in the built environment and increasing the range of business opportunities for continued growth.

History of Quantity Surveying in Nigeria

Quantity surveying according to Odeyinka (2006) was pioneered by Britain. The Nigerian Institute of Quantity Surveyors (NIQS) was founded in 1969 by a group of Nigerians who trained and practiced in the United Kingdom (NIQS, 2004). Upon returning to Nigeria, these people sensed an urgent need to develop the profession of quantity surveying in Nigeria by establishing a parallel body to the Royal Institution of Chartered surveyors of United Kingdom

The regulated and other professions (Miscellaneous Provision) Act 1978 recognised quantity surveying profession as one of the scheduled professions in Nigeria while the decree No 31 of 1986 gave legal backing and recognition to quantity surveying profession and also set up the Quantity Surveyors Registration Board of Nigeria (QSRBN) to regulate the profession (NIQS, 2004)

Competency Areas for Quantity Surveyors

Stewart and Hamlin (1992) define competency as something which a person who works in a given occupational area should be able to do. Holmes and Joyce (1993) view competency as a description of an action, behaviour or outcome which a person should be able to demonstrate, or the ability to transfer skills and knowledge to new situations within the occupational area.

Male (1999) emphasizes that the distinctive competencies of the quantity surveyor are associated with measurement and calculation which provides the basis for the proper cost management of forecasting, analysing, planning, controlling and accounting. However, the Royal Institute of Chartered Surveyors (1991), Nkado (2000); Ogunsemi (2004); Akosile (2006); Idowu and Odusami (2006); Oyediran (2006) and Awodele,

Akosile, Ogunsemi and Owoeye (2007) identified and classified areas of competencies required of quantity surveyors into three categories and they are basic, core and optional. The RICS (1998) set out the requirements and competencies for the assessment of professional competence by listing the competencies required of quantity surveyors in three categories: basic competencies, core competencies and optional competencies, as shown in Table 1. The basic competencies are widespread to all construction professions under the RICS structure and they are: personal and interpersonal skills; business skills; data management; information technology; professional practices; law; measurement; and mapping. The core competencies are exclusively vital to the profession of quantity surveying and this entails construction contract practice, construction technology and environmental services, economics of construction and procurement and financial management.

The optional competencies reveal areas of specialty or future career diversification and these include arbitration and other dispute resolution procedures, development appraisal, facilities management, insolvency, insurance, project management, property investment funding, research methodology and techniques, taxation allowance and grants and valuation.

Research Methodology

Primary source of data collection through a well-structured questionnaire was administered to relevant and appropriate professionals in the construction industry. The population were the Nigerian construction professionals that are eligible to participate in the research and they are: Architects; Quantity surveyors; Builders; Engineers; and Estate Surveyors and Valuers.

Due to a large population as identified above, the sampling frame was delimited to Lagos state of Nigeria where research questionnaires were distributed. The choice is on the premise that Lagos is the commercial capital city of Nigeria and most of the construction professionals in this state handle projects in other states of the federation. Fagbemi (2008) observed that 75% of quantity surveying firms in Nigeria are either based in Lagos state or have their branches located there. The result of the study is expected to represent the whole population. More so, the list of professionals were obtained from relevant professional bodies and the sample size in respect of the various categories of respondents was determined from the following formulae as used by Kish (1965) in Shash and Abdul-hadi (1993)

$$n = \frac{n^l}{1 + \frac{n^l}{N}} \quad \ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots\ldots 1$$

Where n = sample size: $n^l = \frac{S^2}{V^2}$ ……2

N = Total population, V = Standard error of sampling distribution = 0.05,
S = the maximum standard deviation in the population elements

Using the formulae, the sample sizes for each of the respondents were calculated and the result is as shown in table 2. Out of the 265 questionnaires administered, 94 were returned and filled, this represent 35.5% of the total questionnaire sent out which is considered sufficient for the study base on the assertion of Moser and Kalton (1999) that the result of a survey could be considered as biased and of little significant if the return rate was lower than 20-30%. More so, 12 construction professionals cutting across all the professional bodies were also interviewed.

Tables were employed in this research for data presentations and analysis of the collected data was carried out using the following descriptive and inferential statistical methods: frequencies; percentiles; cronbach's alpha test; and mean internal score (MIS).

Cronbach's alpha test was used in testing the reliability and viability of the research. Cronbach's α value for scale of measures of the research instruments is 0.501. Since the degree of reliability of the instrument is more perfect as the value tends towards 1.0 (Moser and Kalton, 1999), it can then be concluded that the instruments used for this research are significantly reliable.

Findings and Discussion

Characteristics of the Respondents

Table 3 shows the general characteristics of respondents for the questionnaire distribution. It is observed that about 23%, 18% and 14% of the respondents were quantity surveyors, builders and estate valuer respectively while engineers and architects that responded to the questions were about 22%. The mean year of working experience of these respondents was calculated to be 9.83 which could be considered appropriate for the study.

As expected, all the professionals were members of their professional bodies in that the frequencies of the professionals correspond with that of the professional bodies. However, majority of these professionals are corporate (Associate or members) members (about 46%) followed by graduate members with about 37% while probationers and fellows were about 14% and 3% respectively. On the geographical zones that the respondents have executed one or more projects, all the respondents have been involved in project located in the South-West region as expected and this is followed by South-South and South-East respectively. It could be concluded that about 41% of construction professionals in Lagos state i.e. the respondents have participated in other projects located in other geographical zones of the country.

Performance of Nigerian Quantity Surveyors

Hypothesis was generated in order to test if there is a variance in the ranking of performance of Nigerian quantity surveyors by various groups of professionals as follow:

Null Hypothesis (H_0): There is no significant agreement between quantity surveyors, architect, estate valuer, builder and engineers in ranking the performance of Nigerian quantity surveyors based on the areas of competencies of quantity surveyors.

Alternate Hypothesis (H_1): There is significant agreement between quantity surveyors, architect, estate valuer, builder and engineers in ranking the performance of Nigerian quantity surveyors based on the areas of competencies of quantity surveyors.

The result as presented in table 4 revealed that there is no significant agreement between the ranking of quantity surveyors, architect, estate valuer and builders while there is agreement between quantity surveyors and engineers in the ranking.

Table 5 revealed that Nigerian quantity surveyors perform better in valuation, project management and measurement from the view of quantity surveyors. At the lower end is insolvency and mapping and this may be as a result of little or no understanding of the term "mapping".

The architects ranked personal and interpersonal skill and valuation 1st and 2nd while estate surveyors believed that Nigerian QS performs better in measurement and economics of construction. Professional practice and data, information and information technology were tied in the 1st position by the builders while engineers were of the opinion that QS perform better in valuation and construction contract practice.

On the general opinion, valuation, project management, construction contract practice and measurement were ranked 1st, 2nd, 3rd and 4th respectively while property investment

funding, facilities management and taxation allowances and grant were ranked at the lower end as 18th, 19th and 20th.

Discussion of Findings

In ranking the performance of Nigerian quantity surveyors based on their areas of competencies, the study revealed that there is no agreement in the ranking of performance of Nigerian quantity surveyors between quantity surveyors and other professionals except the engineers and this could be justified since an individual will always want to rate himself above normal while others will either rate normal or below normal. Diversities in experience, knowledge, training and working relationship of these construction professionals with quantity surveyors could also be reasons for the difference.

Valuation, construction contract practice, project management, measurement and procurement management are areas of competencies where quantity surveyors perform better. The traditional role of Nigerian quantity surveyors are centred on these areas and this is supported by Babalola (2006) where it was stated that the quantity surveyors can be said to be the client's building economist, a role incorporating all the earlier mentioned areas of competencies. Selinger and Stamler (1983) believed that bill of quantities is an essential part of the financial system of many construction projects and its preparation is the major role of the quantity surveyors. In Jagun (2006) opinion, many quantity surveyors are mostly involved with measuring and valuing of construction work being carried out under a traditional building contract. Nkado (2000) stated that three of the traditional core competencies of quantity surveyors, namely: procurement and financial management, economics of construction and construction contract practice are among the five most important competencies currently required of quantity surveyors and Nigerian quantity surveyors are found to be performing above average in these areas. Taxation and grant allowance and facilities management are areas of neglect by Nigerian quantity surveyors and this underscore the reason for their performance.
Data, information and information technology is ranked 12th and this is supported by Oyediran (2005) where it was stated that majority of quantity surveyors in Nigeria have limited knowledge of information communication technology (ICT).

Conclusion and Further Research

The study has been able to explored areas of competencies of quantity surveyors and it was discovered that Nigerian quantity surveyors are performing above average from the perception of all the construction professionals that participated in the study. The study also suggests the need for Nigerian quantity surveyors to improve in the areas of insolvency, taxation, property investment funding and mapping.

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Table 1: Headings of competencies required by quantity surveyors for APC

Basic competencies	Core competencies	Optional Competencies
*Personal and interpersonal skills	*Construction contract practice	*Arbitration and other dispute resolution procedures
*Business skills	*Construction technology and environmental services	*Development appraisal
*Data management; information technology	*Economics of construction	*Facilities management
*Professional practices	*Procurement and financial management	*Insolvency
*Law		*Insurance
*Measurement		*Project management
*Mapping		*Property investment funding
		*Research methodology & techniques
		*Taxation allowance &grants
		*Valuation

Source: The Royal Institution of Chartered Surveyors (1998)

Table 2: Sample size and returned questionnaires

Ref. No.	Respondent	Population	Sample size	Returned/Filled
A	Architect	233	66	22
B	Quantity Surveyors	148	49	21
E	Estate valuers	194	52	13
C	Professional Builders	107	43	17
D	Structural Engineers	214	55	21
	Total	896	265	94

Table 3: Summary of characteristics of respondents for questionnaire administration

Category	Classification	Frequency	Percent
Profession	Quantity Surveying	22	23.40
Of	Architecture	21	22.34
Respondents	Estate Surveying and valuing	13	13.83
	Building	17	18.09
	Engineering	21	22.34
	Total	***94***	***100.00***
Years	0 – 5	36	38.30
Of	6 – 10	20	21.28
Working	11 – 15	20	21.28
Experience	16 – 20	9	9.57
	21 – 30	9	9.57
	Mean	***9.83***	
Professional	NIQS	22	23.40
Qualification	NIA	21	22.34
	NIESV	13	13.83
	NIOB	17	18.09

	NSE	21	22.34
	Total	***94***	***100.00***
Professional	Graduate	35	37.23
Membership	Probationer	13	13.83
Type	Corporate	43	45.74
	Fellow	3	3.19
	Total	***94***	***100.00***
Geographical	North-East	6	4.51
Zones of	North-Central	8	6.02
Project	North-West	4	3.01
Execution	South-East	9	6.77
	South-South	12	9.02
	South-west	94	70.68
	Total	***133***	***100.00***

Table 4: Test of variance for ranking of performance of Nigerian QS

Respondents	F-Value	P-Value	Reject H_o	Remark
Architects and quantity surveyors	1.684	0.250	No	Sig> 0.05
Estate valuers and quantity surveyors	1.621	0.267	No	Sig> 0.05
Builders and quantity surveyors	1.336	0.362	No	Sig> 0.05
Engineers and quantity surveyors	3.967	0.038	Yes	Sig<0.05

Table 5: Performance of Nigerian quantity surveyors based on their areas of competencies

Criteria	QS		Architects		Valuers		Builders		Engineers		General	
	Mean	R	Mean	R	Mean	R	Mean	R	Mean	R	Mean	Rank
Personal and interpersonal skill	4.41	6	4.65	1	4	11	3.29	13	4.30	11	4.17	6
Business skill	4.09	12	3.85	16	3.82	13	3.20	15	4.41	7	3.91	14
Data, information and information technology	3.91	17	3.90	15	4.09	3	3.80	1	4.15	14	3.97	12
Professional practice	4.41	6	4.05	12	4.09	3	3.80	1	4.4	8	4.18	5
Law	4.09	12	4.05	12	3.82	13	3.60	3	3.85	19	3.91	14
Measurement	4.62	2	4.00	14	4.45	1	3.53	5	4.42	6	4.22	4
Mapping	3.55	20	4.35	3	3.73	16	3.27	14	4.05	16	3.82	17
Construction contract practice	4.52	4	4.30	5	4.09	4	3.40	8	4.68	2	4.26	3
Economics of construction	4.32	9	4.24	8	4.18	2	3.33	12	4.55	4	4.16	7
Procurement and financial management	4.52	4	3.75	18	4.09	3	3.40	8	4.37	10	4.06	10
Construction technology and environmental services	4.32	9	4.12	9	4.09	3	3.40	8	4.40	8	4.11	8
Arbitration and other dispute resolution procedures	4.32	9	4.35	3	3.82	13	3.20	15	4.45	5	4.10	9
Developmental appraisal	3.91	17	3.75	18	3.64	21	3.53	5	4.30	11	3.86	16

Facilities management	4.00	16	3.50	21	4.09	3	3.20	15	3.95	18	3.75	19
Insolvency	3.45	21	3.85	16	3.55	21	3.20	15	3.58	21	3.54	21
Insurance	4.05	14	4.3	6	3.73	16	3.07	20	4.2	13	3.93	13
Project management	4.59	3	4.1	10	4.09	3	3.6	3	4.65	3	4.26	2
Property investment funding	4.18	11	3.75	18	3.73	16	2.87	21	4	17	3.76	18
Research methodologies and techniques	4.05	14	4.25	7	4.09	3	3.4	8	4.15	14	4.01	11
Taxation allowances and grant	3.64	19	4.1	10	3.73	16	3.07	19	3.75	20	3.68	20
Valuation	4.82	1	4.5	2	3.91	12	3.53	5	4.79	1	4.4	1

Note: QS-Quantity surveyors, R-rank

INVESTIGATION ON THE CAUSES OF VARIATION ORDERS IN THE CONSTRUCTION OF BUILDING PROJECT – A STUDY IN THE STATE OF SELANGOR, MALAYSIA

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Abstract

This paper investigates the most significant causes contribute to the variation orders in the construction of building projects in the States of Selangor Malaysia. Data was collected from questionnaires survey which is based on the literature reviews and also provisions in the 'Persatuan Akitek Malaysia" (PAM 1998) standard form of building contract that are associated with the variation orders. The data were analyzed by using mean score method and rank to formulate the findings. The result from questionnaires survey revealed three most significant causes variation orders which are: 'Change of plan by owner', 'Substitution of materials by owner ', and 'Changes of design by consultant'. The finding concludes that owner is the major source of the variation orders in construction of building projects and suggested that owner should have adequate planning and recourses before initiating a project in order to avoid variation order during the construction stage.

Keywords: Standard form of building contract, Owner, PAM 1998, Variation Orders.

Introduction

The Malaysian construction industry plays an instrumental role in the country development. The construction industry is a strong growth push to the nation economy because of its excessive linkage with other sector such as manufacturing and electrical, unfortunately the industry did not prepare for the related project management problem. One of the major problems facing the construction project is issue of variation order by during the construction phase. (Ibb,2001). These changes are inevitable in any construction project. The problem could become worse when there is a series of variations, when the programme is affected and when the time spent by the contractor's head office staff becomes totally disproportionate to the value of the contract.

There are many reasons why variations occur. They may be due to extra work caused by subsurface conditions, errors in contract documents, additional quantities of works or materials, reduction of work, or lack of proper communication between the parties. Needs of the owner may change in the course of design or construction, market conditions may impose changes to the parameters of the project, and technological developments may alter the design and the choice of the engineer. The architects review of the design may bring about changes to improve or optimize the design and hence the operation of the project. All these factors and many others necessitate changes that are costly and generally unwelcomed by all parties.

Definition

There is no single definition of what constitutes a variation. Usually, any standard form of building contract will contain a definition of a variation in terms of specific actions and activities. Persatuan Akitek Malaysia standard form of contract (PAM 98) in clause 11, define variation as an alteration or modification of the design, quality or quantity of the works as shown in the contract drawings and described by or referred to in the contract bills.

Classification of Variation Orders

Variation orders can be classified in many different ways depending on the basis and the purpose of classifications. In this review, the most common classifications are presented. Changes in a construction project can be classified based on the cause that forced them. Burati et al. (1992) stated that changes in constructions are caused by design, construction, fabrication, transportation or operability. Design changes, were found to constitute 52.5% of total changes, fall mainly into three categories:

- Design changes caused by improvement through design process (DCI). Examples are changes resulting from design reviews, technological advances or constructability reviews.
- Design changes originated by Owner (DCO). Examples are scope changes.
- Design changes initiated by Engineer or Consultant familiar with the process (DCP).Examples are additions of pumps, valve or instrumentation that affect the operation of the facility.

Nature of Variation Order

The nature of a variation order can be determined by referring to both the reasons for their occurrence and subsequent effects. Arain and Pheng (2005) distinguished two types of variation orders namely: beneficial and detrimental variation order which is shown in Figure 1.

Beneficial variation orders

A beneficial variation order is one issued to improve the quality standard, reduce cost, schedule, or degree of difficulty in a project. A beneficial variation order eliminates unnecessary costs from a project as a result; it optimizes the client's benefits against the resource input by eliminating unnecessary costs.

Detrimental variation orders

A detrimental variation order is one that negatively impacts the client's value or project performance (Arain and Pheng, (2005). For example a client who is experiencing financial problems may require the substitution of quality standard expensive materials to sub-standard cheap materials.

Causes of Variation Order

Variations order arises for a variety of reasons. Some are foreseeable, others are not. Some result from a genuine change of circumstances and others from the design team’s own inadequacies. Arain and Pheng (2006) identified four origin agents of variation orders. These included client, consultant, contractor and other changes. This is shown in Figure 2.

Client related changes

Client related changes the causes of variations that were initiated by the owner. In some cases, the owner directly initiates variations or the variations are required because the owner fails to fulfil certain requirements for carrying out the project. The changes initiate by client are:

- Change of scope
- Change of project schedule
- Owner's financial problems
- Inadequate project objectives
- Replacement of materials

- Change in specifications

Consultant related changes

In some cases, the consultant directly initiates variations or the variations are required because the consultant fails to fulfil certain requirements for carrying out the project. The changes initiate by consultant are as follows:

- Change in design
- Errors and omissions in design
- Conflicts between contract documents
- Inadequate scope of work for contractor
- Design complexity
- Inadequate shop drawing details
- Lack of consultant's knowledge of available materials and equipment

Contractor related changes

In some cases, the contractor may suggest variations to the project or the variations may be required because the contractor fails to fulfil certain requirements for carrying out the project. The contractor related changes are as follows:

- Lack of contractor's involvement in design
- Unavailability of equipment
- Unavailability of skills manpower
- Contractor's financial difficulties
- Defective workmanship

Other changes

Other changes refer to the causes of variations that were not directly related to the participants. These changes are as follows:

- Change in government regulations
- Weather changes
- Change in economic conditions
- Unforeseen problems

Provision of Variation Order According to The "Persatuan Akitek Malaysia" (PAM1998) Condition of Contract.

Generally construction contracts require the contractor to notify the owner within a specific period of time of the occurrence event for which the contractor will seek additional reimbursement in the form of a variation order. Many contracts have stipulate the various methods by which the contractor will be reimbursed either by pre established unit prices, negotiated lump sum, or by time and material. Every contract has a specific procedure covering the process of handling change to the work. Similarly, there is also a provision of variation orders stated in the PAM 1998 general conditions of contract in clause 11, and also clause 2. Figure 3 summarizes the clauses related to the variation order as stated in the PAM 1998 standard for of building contract.

Many contracts have stipulate the various methods by which the contractor will be reimbursed either by pre established unit prices, negotiated lump sum, or by time and material. Every contract has a specific procedure covering the process of handling change to the work. Similarly, there is also a provision of variation orders stated in the PAM 1998 general conditions of contract in clause 11, and also clause 2. Figure 3 summarizes the clauses related to the variation order as stated in the PAM 1998 standard for of building contract.

Rajoo (1998) summarizes the related clauses as adapted from PAM 98 form of contract, Clause 11.0 which is briefly as explain as followings:

- Clause 11: Generally explain on the definition of the term of variation order, instruction regarding the provisional sum, valuation of variations, rules of variation and also valuation of variation order claim by the contractor.

- Clause 11.1 (i) - 11.1(vi): Explain in details the definition of variations which intend a tangible change in the works and also excludes any default and/or breach of contract by the from contractor being a variation.

- Clause 11.2: Stated the power of architect to issue instruction in regards with the variation orders. This provision is only applicable as when the employer gives direct instruction to contractor. It's also stated that the instruction must be in written and also signed by the architect.

- Clause 11.3: This clause required the architect to issue instruction for the expenditure of any prime cost and provisional sum included in the contract bill.

- Clause 11.4: Provides for the measurement and valuations of variations.

- Clause 11.5: Explain the rules for valuation. It set out several method of valuation based on types of the variations order.

- Clause 11.6: This clause deals with the issue of direct loss and /or expense arising from variations.

- Clause 11.7: Stated the requirement for the contractor to submit necessary detail for the claim made by the contractor.

Research Objectives

The objectives of this study are to: (i) to carry out an in-depth investigation on the factors that contribute to the causes of variation orders in the construction building project in the States of Selangor (ii) to relate these academic studies for an effective solution to minimize the mentioned variation orders

Research Methodology

This research was carried out in two stages. In the first stage the causes of the excusable and compensable delays were established through existing literature on variation orders .These causes of variation orders were used as the basis of questionnaire. In the second stage, a questionnaire set was developed. The questionnaire was divided into two sections. Section A is to obtain demographic information of the respondent. Section B was focused on the identified causes of variation orders based on the existing literature on variation orders .The respondent were ask to rank the significant causes of variation orders based on their working experience in the construction industry for completed project between year 2000 to 2005. The author adopted five point scale of 1-5 for ranking purposes. To facilitate the analysis the following numerical values were assigned to the respondents ranking: 'Extremely significant' – 5, 'Very significant' – 4, 'Moderately significant'- 3, 'Slightly significant' – 2, 'Not significant' – 1.

The questionnaires were sent to one hundred engineering consultant namely architect, civil/ structural engineering consultant, mechanical and electrical consultant and also quantity surveyors within the States of Selangor. Random sample was chosen from a listing approximately 600 consultant companies from data registration selected based on information obtained from Persatuan Akitek Malaysia (PAM), Board of Engineers Malaysia (BEM), and Public Work Department (PWD) and also through personal networking and contacts.

Method of Data Analysis

The data was analysed by using mean score method that had been adopted from Assaf et al (1995) In this method weighting scale of 1 to 5 was adopted in the view of its simplicity and suitability for evaluating each factor, significant based on the respondent own judgment and working experience in the construction industry. This five point scale is used to calculate the mean score for each factor and element, which is then used to determine the relative ranking of each factor by assigning ranking to mean score, with low mean score assigned low ranks and high scores allocated high ranks. The mean score (MS) for each factor is computed by using the following formula:

Where s is the score given to each factor by respondents and ranges from 1 to 5 in which "1" is not significant and "5" is extremely significant; □ is frequency of responses to each rating (1 - 5), for each factor; and N is the total number of responses concerning that factor.

Analysis of Survey Result

One hundred questionnaire were distributed to the engineering consultant namely architect, civil/ structural engineering consultant, mechanical and electrical consultant and also quantity surveyors within the States of Selangor. The total organisation that has returned the survey questionnaire form was 46.

This gives a response rate of 43 %. Table 2 shows the respondent response rate.

Respondent experience has to be taken into account in analyzing the data as this information is the root source of the reliability of the data. The profile of the respondents' working experience in the construction industry is illustrated in Figure

From the data collected it was found that 65 % of the respondent has been working for more than 10 years and has been experience working for the project cost more than 10 million ringgit. Therefore the information regarding the causes of variation orders is reasonably reliable and falls within the scope of this research.

Respondents profession were also been taken into account in analysing the data. From the survey results 60 % of the respondents are architect followed by the Civil and Structural Engineers (18%), Quantity Surveyors (13%) and Mechanical and Electrical Engineers (9%). Figure 4 shows the distribution of the respondent various job functions.

Respondents experience, contract value and also job function factor have to be taken Table 3 tabulates the mean scores and ranks the most significant factors of variation orders

Discussion of the Results

It was observed that it was observed that most of the causes of variation orders were initiated by the client in which 65% of the respondents ranked that change of plan by client are the most significant factor. This followed by substitution of materials by the client in which 47 % of the respondent ranked this factor as the second most significant factor of the causes of variation order. Meanwhile changed in design by the consultant were ranked the third most significant causes of variation orders in which 30% of the respondent have rank this factor as a significant causes for the variation orders. The following is a brief discussion of the causes of variation orders as deducted from Table 3.

Change of Plan by Owner

The changes of plan by owner were ranked the most significant causes of variation in which 65 % of the respondents ranked this as the most significant factor. This changes result may be because of insufficient planning and also lack of involvement of client during design stage. The example of these changes is the increase of building area, additional fittings, changes in building facade design and also omission of part of the works.

Substitution of Materials by the Owner

Substitution of materials by the owner was rank the second most significant causes of variation in which 65 % of the respondents ranked this as the most significant factor. The Substitution of materials by the owner could be due to inability of client to make decision on the selection the appropriate type of materials to be used for construction. The common type of substitution of materials by the owner is change of wall and flooring finishes, ironmongery, and also painting works. This type of changes normally results in additional time and claims by the contractor the respondents ranked this as the most significant factor. The Substitution of materials by the owner could be due to inability of client to make decision on the selection the appropriate type of materials to be used for construction. The common type of substitution of materials by the owner is change of wall and flooring finishes, ironmongery, and also painting works. This type of changes normally result in additional time and claim by the contractor.

The respondents ranked this as the most significant factor. The Substitution of materials by the owner could be due to inability of client to make decision on the selection the appropriate type of materials to be used for construction. The common type of substitution of materials by the owner is change of wall and flooring finishes, ironmongery, and also painting works. This type of changes normally result in additional time and claim by the contractor.

Change in Design by Consultant

This factor was ranked the third most significant factor causing variation to the contract by the respondents with 30% has rank this factor as the most significant factor. This may happen when the design is reviewed by the consultant who may have different opinion on the design or also it happen due to postponement or suspension of work which normally occurs during the piling stage or laying of the utility services such as sewerage and drainage works in which consulting engineers are required to redesign the foundation to suit the existing ground conditions.

Errors and Omissions in Design

This factor was also ranked low by the respondent in which 37 % of the respondents have ranked this factor as the non - significant factor.

Owner's Financial Problems

This factor was also ranked low by the respondent in which 30% of the respondents have ranked this factor as the non - significant factor.

Weather Conditions

This factor was rank lowest by the respondents in which 93% of the respondent has ranked it a non-significant factor. These factor of delays were ranked low by all the respondent as shown Table 3.This is may be because of the moderate weather in Malaysia thus the factor has no great effect on the construction project.

Conclusion

Based on the results carried out within the scope stated, several conclusions can be drawn, which may help to improve the time performance and provide a better understanding on the actual causes of variation orders in construction of building projects. Based on the survey results it was noted that the client related changes is the most significant causes of the variation orders in the construction of building projects in the State of Selangor. Generally this finding is similar to several finding from developing countries which have confirm that most of the project abroad face similar problems as the changes initiated by the client as the most significant causes of the variation orders in the construction of building projects. As such by foreseeing the common problems identified in this paper the author hope that the construction participant can avoid this problem.

Acknowledgements

The authors would like to thank the many engineers, architects, and building contractors for their cooperation in completing the questionnaire used in the survey.

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Appendix

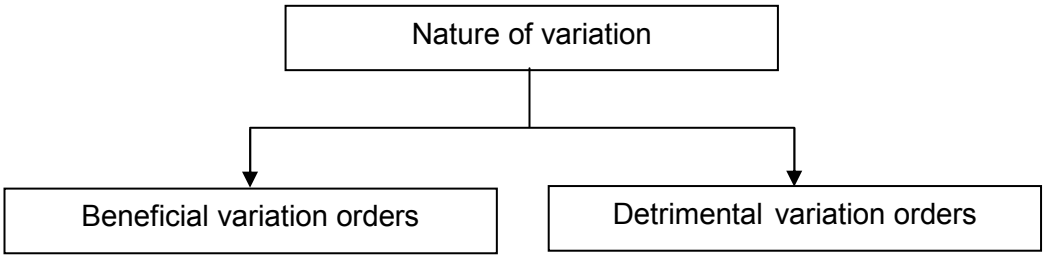

Figure 1: Nature of variation order

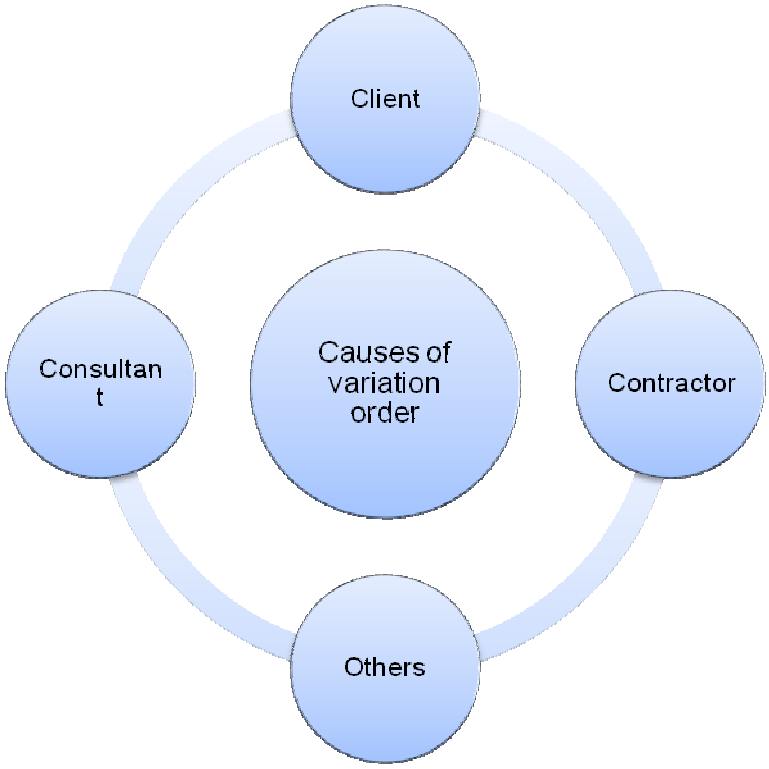

Figure 2: Causes of variation order

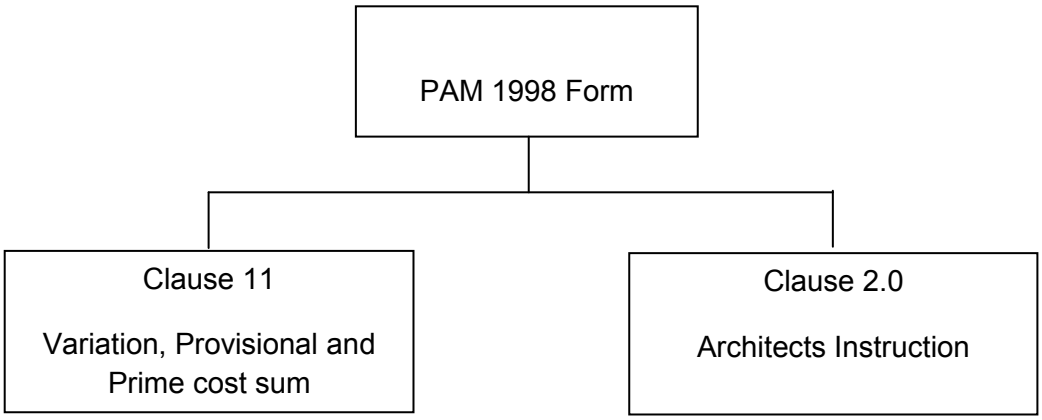

Figure 3: Summary of the clauses related to the variation order as stated in the PAM 1998 standard for of building contract

Table 2: Respondent response rate.

Number of questionnaires sent	100
Number of questionnaires replied	43
Response rate (%)	43%

$$MS = \frac{\sum (f \times s)}{N} \qquad \text{---------- (1)}$$

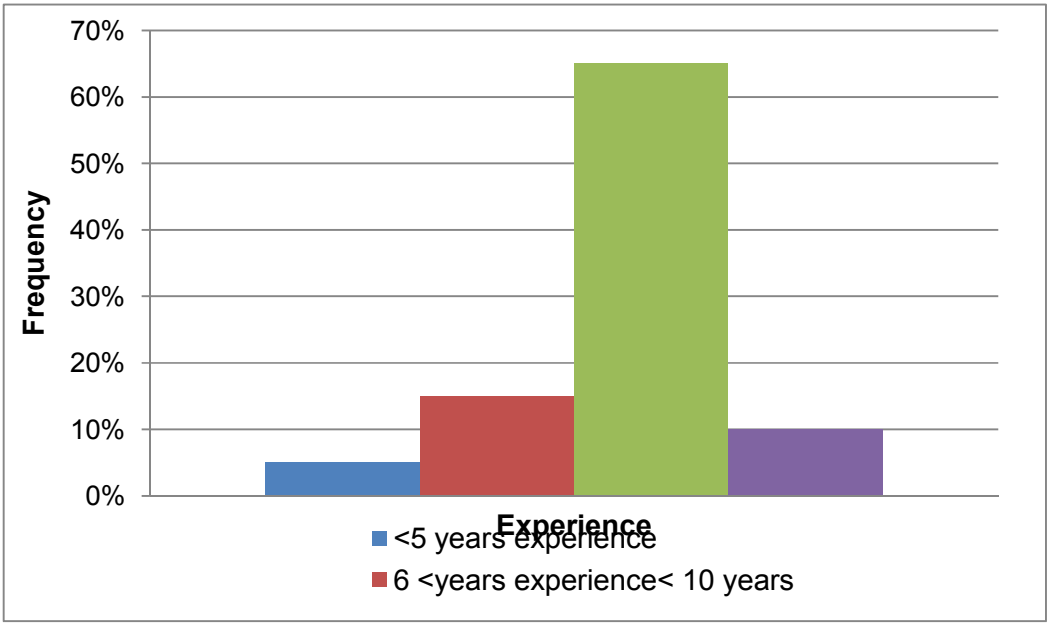

Figure 3: Respondents working experience

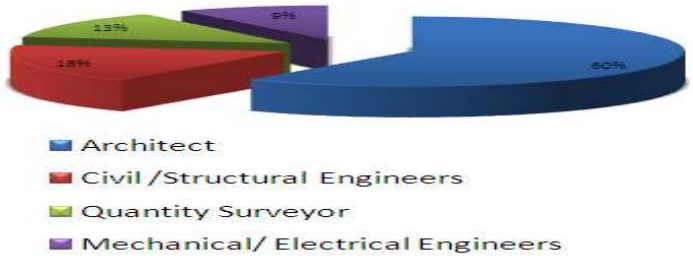

Figure 4: Respondents profession

Table 3: Result for significance causes of variation order

Variation order factors	Number of respondent scoring (N= 43)					Mean	Rank
	5	4	3	2	1		
Change of plan by owner	28 (65%)	9 (20.9%)	6 (13.9%)			4.41	1
Substitution of materials	20 (47%)	14 (32.5%)	9 (20.9)			4.24	2
Change in design by consultant	13 (30%)	19 (44%)	10 (24%)			4.14	3
Errors and omissions in design	3 (5%)	9 (20%)	9 (20%)	7 (16.2%)	16 (37.2%)	2.16	4
The scope of work for the contractor is not well defined		3 (7%)	13 (30%)	12 (27%)	15 (35%)	2.06	5
Conflict between contract documents			12 (28%)	15 (35%)	18 (42%)	1.93	6
Differing site conditions	5 (12%)	6 (14%)	10 (23%)	12 (28%)	19 (44%)	1.88	7
Change of plan by client			8 (18.6%)	20 (46.5%	15 (34.8%)	1.82	8
The lack of coordination between contractor and consultant				35 (82%)	8 (19%)	1.80	9
The contractor's financial difficulties				30 (70%)	13 (30%)	1.70	10
Owner's financial problems				30 (69.7%)	13 (30%)	1.69	11
Workmanship or material not meeting the specifications			5 (12%)	20 (47%)	18 (42%)	1.68	12
Contractor's desire to improve his financial situation				18 (42%)	25 (58%)	1.41	13
The required labour skills are not available				8 (19%)	35 (82%)	1.25	14
The required equipment and tools are not available				5 (12%)	38 (88%)	1.1	15
New government regulations				3 (6%)	40 (93%)	0.99	16
Weather conditions				6 (14%)	37 (86%)	0.8	17

LABOUR COMPOSITION FOR MAINTENANCE WORKS IN PUBLIC HOSPITAL BUILT ENVIRONMENT IN SOUTH-WEST, NIGERIA

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Abstract

The study examined the labour composition for maintenance works in the public hospital buildings in South-West, Nigeria, and in the process identified if there are any significant differences in the execution of maintenance works using outsourcing and in-house labour. In achieving the objective, the study adopted research survey technique with a total of 552 questionnaires comprising 206 for maintenance staff and 346 for users of public hospital collected and used for the study. The survey covered 46 public hospitals representing 40% of the total number of public hospitals existing in South-West, Nigeria. It comprises all the 11 federal owned hospitals and 35 selected states owned based on stratified random sampling technique. Data collected were analysed using descriptive and inferential statistics.

The findings of the study revealed that there is no variation in the work performed by the use of in-source and outsourced labour. However, maintenance staff rated the use of in-source better than outsource in that it is found to produce higher quality and better quality control of services, reduction in cost while outsourced gives an understanding of latest technologies with better access to special skills.

Based on the above findings, the study recommends that maintenance staff should be well motivated. For optimum results, maintenance departments need to adopt sound policies, as this will provide appropriate basis for preparing budgets that will meet the actual maintenance needs of the hospital buildings and services. Maintenance managers are to do their best to prepare realistic need-based budgets while the government should make efforts to improve funding for hospital maintenance. Inefficiencies and inflexibility through the imposition of bureaucratic impediments to operational effectiveness should be avoided in hospital environment due to the sensitivity of the services being rendered. Maintenance staff and users of hospital buildings should be given opportunities for further training on their jobs also on effective use of hospital facilities.

Keywords: : Maintenance, Hospital Building, Public Hospital, Outsourcing and in-house labour.

Introduction

Government-owned hospitals are confronted with unique challenges that threaten their existence. Through an examination of the history, characteristics, and structure of public hospitals, it is found that they lack the capacity to compete in a market-driven economy (Iyagba, 2005). This deficiency is further found to originate from the institution's inherent government structure, which promotes inefficiencies and inflexibility through the imposition of bureaucratic impediments to operational effectiveness.

What makes an hospital a special facility is the 24 hours a day and 7 days a week facility they provide. Furthermore, a mistake in a hospital building management can cost the lives of many human beings at a time. These characteristics represent unique operating conditions and a bottom-line that involves much greater stakes than the profit-only vision of most business ventures. According to Nous Hospital Consultants (2002), a hospital is not a mere building, but a complex social institution that handles the dynamics of life and death situations during the process of rendering health care. There is need to evaluate the existing maintenance of public hospital buildings and services in order to improve their standard if need be, for effective health care delivery in South West, Nigeria.

According to Onifade (2003), in Nigeria, installed health facilities are as old as the hospitals themselves. Some of the medical equipment are unserviceable and need outright replacement. The colonial architecture in some of the older hospitals, which were hitherto famous for their sturdiness and functionality, has now become less attractive because of the general neglect of the buildings maintenance. Overcrowding has also led to deterioration of these facilities. The state of maintenance and the physical surroundings in public hospital buildings have resulted into health problems in public health care delivery. Patients in government healthcare facility are often fearful, uncertain about their health and safety. All these call for investigation into the state of maintenance management of public hospital buildings in South West, Nigeria. The measure is to improve the methods of managing and executing maintenance works on them for effective delivery of health care. Most of the public hospital maintenance organizations lack the rationale for prioritising their work. Most often, maintenance works are not carried out according to actual need, but they are dictated by financial priorities. Inadequate funding of maintenance all over the world has made the prioritisation of maintenance demands a critical issue. Maintenance works in public hospitals are often complex in nature. Most managers are often confronted with the problem of deciding which particular method of executing maintenance works to adopt- either out-sourcing or the use of in-house staff. Management of any process also involves assessment of performance and in order for any maintenance manager to measure performance and set priorities, the function and performance of buildings and their appropriate standards will be dependent on the users' perception and their primary needs. It calls for assessment of user's perception of their satisfaction with work done by the hospital maintenance department.

All these also call for the formulation of appropriate maintenance programmes especially in health related buildings. Healthcare systems are costly and inpatient treatment in hospitals is a major part of these costs. The major issue is on how greater efficiency be achieved without compromising the core business of the hospital, which is to take care of patients. It is based on this background that this aim study assesses i the delivery methods used in executing maintenance work programme in public hospital buildings in South West, Nigeria.

To achieve this the study objective was set to find out if there are any significant differences in the quality of outsourced maintenance work and that of the in –house work in the maintenance of public hospital buildings in South West, Nigeria.

The study also set an hypothesis that there is no variation in the maintenance efficiency between work performed by out-sourced labour and in-house labour in public hospitals in South West, Nigeria.

An Overview of Manpower Source for Maintenance Works Execution.

The execution of maintenance works is the practical realisation of all the management decisions, designs and dreams for maximizing the results of maintenance efforts. According to Adebayo, (1991), maintenance works are complex in nature and therefore are carried out by directly employed labour while some are carried out by contractors. According to the author, the mode of execution of maintenance works is a matter of policy. It is the maintenance policy of the establishment that dictates whether directly employed labour, or contractors, or both will be most advantageous. Lee (1987) states that the major problems confronting the maintenance manager are the decision on a particular method of executing maintenance works. According to him, contractors and

therefore the choice between should handle some maintenance works direct and contract labour must be made.

Seeley (1976) stipulated that in reaching a decision, the maintenance manager should compare the costs and services provided by the contractors with his own directly employed labour force, taking into account the availability of labour, the type and location of the building to be maintained. Lee (1987), contends that the choice should be according to which offers the greater advantage in terms of cost, quality and convenience. It is also noted that there are certain specialist maintenance works that should normally be handled by contractors. To the author, direct labour organizations will only function well where necessary facilities are provided. The Chartered Institute of Building (1975) reiterates that the sizes, types and number of buildings to be maintained will invariably determine the source of manpower either in service or outsourcing. Seeley (1975) re-affirms that successful execution of maintenance work, be it direct labour or by contract depends on well-detailed specifications, good planning and supervision.

Arditi (1997), in his own contribution exclusively states the reasons for using in-house personnel to deliver maintenance services. According to the author, using in-house staff will give a better control of the services. Along with service control, it reduces the costs, getting a higher quality of work and achieving more flexibility in staffing. There is a better adjustment to workload fluctuations. To the author, he believes that if they have better control of the maintenance operations by using in house staff, then they will also be able to keep costs down, ensure high quality works and respond to maintenance calls in a timely fashion by adjusting the size and the work schedules of their staff. Stone et al (1984), Holland (1987), Lee (1987), Chanter and Swallow (1996), and the findings of (Gregerson,1994) support this result. According to Arditi (1997), firms that outsource maintenance services use exclusively competitive bidding (61%) when selecting their contractors whereas 23% exclusively use negotiation, and 16% use both. To the author, competitive bidding is expected in principle to result in the most economical offer from a competent contractor, but the paper work involved in the process is sometimes overwhelming. According to him, negotiation appears to be a viable alternative, particularly for short term and low budget works.

Iyagba (2005), in his own contribution states that outsourcing holds the promise of flexibility and profitability, and that there may be disadvantages that are not all that obvious. Another major attraction, as noted by the author is that it allows the business to focus on its core business and competencies, leaving peripheral and support functions to be serviced by outside experts. To the author, for smaller employers, outsourcing also has the advantage of a reduction in numbers, possibly removing the business from the statutory thresholds of increased obligations, including submission of employment equity plans. Iyagba (2005) further states that before a business embark upon outsourcing there are a few potentials downsides to consider; firstly he states that the employers must contract only with reputable service providers with a proven track record of compliance and good human relation capability. Secondly, , where outsourcing involves dismissal of staff that become redundant, it may contribute to the country's chronic unemployment problem. Thirdly, there is still uncertainty in legal circles over whether, and under what circumstances, outsourcing constitutes a transfer of a business as a going concern, therefore in using the method, good legal advice should be obtained. Fourthly, employers sometimes outsource non-core functions to existing staff with the idea that they would become entrepreneurs by supplying expertise back to the old employer as independent contractors. A fifth problem is that the introduction of a service provider in the form of a labour broker may upset established relations and create friction between the employer's

own employees and those of the service provider. Another less obvious problem is the fact that long-term exclusive outsourcing arrangements create a dependency that might isolate the organization from the market. According to the author, by giving the vendor the exclusive right to understand one's business, one may be making it harder in the longer term to terminate the relationship. The vendor, may in turn, build up relationships with the business peers and partners and become a surrogate in dealing with them. To the author, unless the rules are clearly spelt out and the business makes an effort to maintain its visibility, there is a real risk of its relationships with them disappearing? Conclusively, while outsourcing offers potential benefits in terms of cost, service levels and access to talent, it is a strategic decision requiring careful thought about risks, benefits and governance. The compendium of Estates Good practice (2005) in their research believe that the unique nature of an institutions estates, its location, availability of craftsmen and the preference of the estate director will all feature in the choice between direct or contract workers. According to them, the success of the operation will rely on management, adequate supervision and quality control. To the authors, it is unlikely it will prove desirable to dispense with in service labour organization as there are many benefits to employing a small group of craftsmen directly, particularly if they are multi-skilled that include: Familiarity with the assets; Understanding how the assets operate; Awareness of the maintenance requirements; Quick response time in the case of emergencies are also of significant importance; Aiding security role and there can be personal commitment and loyalty to the institution. However according to the authors, there are disadvantages of employing an in-house labour team as well which will require consideration in that:

- They are full-time appointments, and therefore sufficient work must be available to fully utilise them or they drain resources and full training is required.
- They can lack the simulation of other work and differing environments.

Shohet (2003), in his examination of the proportion of maintenance works performed by outsourcing versus in-house provision in hospital buildings re-affirm that the choice of either of the method will depend on the occupancy rate. To the author, he divides hospital into high occupancy hospitals (over ten patient beds per 1000 sq. m.) and hospitals with standard or low levels of occupancy (up to ten patient beds per 1000sq. m). In his regression analysis, it shows that, when a hospital occupancy level is standard or low, outsourcing results in a saving of approximately 8 percent (8%) in maintenance expenditure. On the other hand when hospital occupancy levels are higher than planned, the use of in-house provision leads to a 6 percent (6%) saving in maintenance expenditures. This is due to the fact that the deterioration of some of the building systems under high occupancy conditions is accelerated, and a high availability of maintenance personnel is required for breakdown maintenance. Therefore, under such conditions, in-house provision offers opportunity for savings. This conclusion differs from that of previous studies on the subject (Australian Industry Commission, 1996). At standard or low occupancy levels, there is indeed an advantage as well as savings in the employment of a manpower composition in which the majority of the maintenance workers are external personnel. On the other hand, at high occupancy levels, there is a clear benefit from manpower compositions in which the majority of personnel are in-house maintenance workers.

Conclusively, it can be observed that the choice of either in-house services or outsourcing for maintenance operations will depend on some parameters that the author will observe while the investigation is in progress.

Methodology

The study covers all federal government university teaching hospitals, Orthopaedic, Psychiatric Hospitals and selected state hospitals randomly sampled in South-West, Nigeria. A total of 46 public hospitals were used for the study out of 114 public hospitals (Health-Centres exclusive) existing in the South-West, Nigeria. The study adopted survey research techniques. The simple random sampling method was chosen so as to give equal chances to all the state hospitals. Two categories of questionnaires were designed for this study directed to the maintenance staff and the users of these selected public hospital buildings respectively.

A total of 690 questionnaires were sent out to the selected public hospitals, out of which 230 were directed to the maintenance staff and 460 were directed to the users of the selected public hospital buildings respectively. Thus, a total 552 questionnaires were completed and used for the analysis.

Presentation of Results

The Hospitals Studied

South-West, Nigeria consists of six states namely Lagos, Ogun, Ondo, Ekiti, Osun and Oyo. They are located within the same geographical zone, having similar social-cultural backgrounds. In all, the region has a total of 114 public hospitals (Health – Centres exclusives). From the population, forty-six (46) hospitals including all the federal owned hospitals and selected state hospitals were examined for the study. This represents about 40% of government owned hospitals.

The length of service distributions in table 3 indicates that majority of the respondents have a working experience less than 10 years (57.1%) while maintenance staff with better experience through the length of service are less than 15% altogether (respondents with 20 – 30 years and above). This is an indicator that the maintenance work execution may be lacking maintenance technical expertise in the execution of maintenance programme especially in the public hospitals in South-west, Nigeria.

Table 4 indicates that most of the maintenance departments in the public hospitals have an employee ranging between 1 and 20 with 48% of them having not less than 11 to 20 employees in their organization. This is an indication that there is inadequate staff strength in maintenance departments more so that much is needed especially in a sector that handles the dynamics of life and death during the delivery of health services.

Table 5 shows the number of buildings available for maintenance in public hospitals in South-west, Nigeria. From the table, only 15% of the hospitals examined have more than 30 and above buildings for their health care delivery system. This is an indication that majority of the public hospitals in Southwest, Nigeria have inadequate building stock for effective healthcare delivery. The complex nature of hospitals, with various medical treatments coupled with large population of attendance indicates that the existing building stock is not adequate for a healing environment needed for patients and staff.

Users of Hospitals Building Survey.

Table 6 indicates the department of the users of public hospital buildings sampled in the South West, Nigeria. 40% of the total population sampled was allocated to medical staff. The justification for this was that they constitute the highest percentage of workers in a hospital environment. This is followed by the administrative staff (30%) with a proportion of about 10% of total management level. Response from the patient was found to be very low. This is actually expected from the respondents.

Provisions of Training Programme for Users On How To Effectively Manage the Facilities Within the Hospital Building.

Figure 2 indicates that majority of the users are only provided with user's guide with less than 40% of them being considered for in-service training.

Table 7: indicates that the management of public hospitals in South West, Nigeria only provide seminars and workshop training in most case for their maintenance staff. 29.5% of the respondents claimed to have in-service training while only 5% have access to higher education.

Level of Motivation of Maintenance Staff by the Management

From Fig.3, the level of motivation by the management to ensure better performance of the maintenance staff is rated average. This is an indication that much are not expected from the maintenance staff.

From table 8, the response to causes of low motivation is found to be very low (75 respondents). Half of the respondents (50.7%) rated lack of working tools/equipment/materials as a cause of low motivation in executing the desired maintenance programmes in public hospitals. Other demotivating factors are; the irregular payment of salaries (16.0%), delay in promotion (10.7%), poor pay (8%) etc.

Labour Source for the Maintenance Works Execution in Public Hospitals Buildings in South West, Nigeria

Figure 4 shows that half of the maintenance work execution (50.8%) are executed through selective outsourcing while about 37.3% maintenance work are carried out using in-house staff in the maintenance department. This is an indication that the two predominant labour sources are the in-source and outsourcing. The use of outsourcing more than in-source may be as a result of the complex nature of hospital building with delicate mechanical and electrical systems.

Mode of Selection of Contractors for Maintenance Work.

Figure 5 shows that the three modes of selection are usually considered for selecting contracting for executing maintenance work. Although, selective tendering method takes the highest percentage (45.3) and this may be due to the complex nature of hospital services. The sensitivity of the environment is also of paramount important since they handle the dynamics of life and death during the delivery of health care services. Expertise is needed for handling some projects.

Table 9, shows that the predominant bases of award of contract for maintenance works execution are through the use of Bill of Quantities (39.8%) and Cost Reimbursement (37.4%). Less than a quarter (22.8%) of the respondent award their contract using schedules of rates. This is an indication that the 3 methods are often used by the public hospitals when awarding contract for maintenance work.

From table 10, majority of the decisions on the implementation of maintenance works by either outsourced or in-house crew are made by the maintenance manager (38.6%). There are indications from the analysis that consideration would be given to the volume of work (15.2%) the nature of work (13.0%) and maintenance policy (13.6%) guiding the organisation for executing maintenance programme. The management being the final decision maker generally on all the policies guiding the organisation may have to take advice from the maintenance manager especially on work related to maintenance operations.

Hypothesis: There is no variation in the maintenance efficiency between work performed by out-sourced labour and in-sourced labour in public hospitals in South West, Nigeria.

From table11, executing maintenance programmes using outsourcing gives latest innovations/technologies to work done and special skills better than implementing in-source. In-source method, gives a better quality of services, reduction in cost of operation, better control of services with minimum equipment downtime and reduction in equipment expenditure than outsourced method. Both methods claimed to produce specialized expertise to their labour, better adjustment to workload fluctuation and security to work done. All these efficiencies are better rated in in- source method than outsourcing.

Paired Samples Correlations

		N	Correlation	Sig.
Pair 1	OUTSOURC & INSOURC	12	.688	.000

The correlation coefficient, r, is 0.688 which shows that the relationship between both is strong and positive. T-test analysis shows that t-cal is –1.996 and $p > 0.01$ we therefore accept the null hypothesis that there is no variation in the maintenance efficiency between work performed by out-sourced labour and in-sourced labour in public hospitals in South West, Nigeria. Also, Kendall's Coefficient of Concordance Chi-Square has a value of 1.660 and $p> 0.01$, an indication that there is no significant difference between the in-source and outsource when compared in terms of their efficiency.

Summary of findings

The study revealed that more than half of the maintenance staff (57.1%) in public hospitals in South-West, Nigeria has a working experience less than 10 years within the maintenance organisation. This is a factor that may affect job performance of the maintenance operatives. The staff strength of the maintenance department in public hospitals is found to be inadequate more so that it is a sector that handles the dynamics of life and death especially during the delivery of healthcare services. Majority of the users (61.8%) have no access to any training programme especially on the effective management of facilities within the hospital environment. The few percentage claimed to have got access to training was by reading the maintenance users' guide distributed by

the management. Workshops and seminars are the major training (65.5%) given to the maintenance operatives. The maintenance operatives are found not to be well motivated. The low motivation was attributed to lack of tools /equipment /materials in executing the desired maintenance programmes in hospitals. Other reasons are irregular payment of salaries, delay in promotion etc. Half of the maintenance work execution (50.8%) are executed through selective outsourcing while about 37.3% maintenance work are carried out using in-house staff in the maintenance department. The use of outsourcing more than in-source may be as a result of the complex nature of hospital building with delicate mechanical and electrical systems. The modes of selection usually considered for selecting contractors for executing maintenance work are; open tendering, negotiating and selective tendering method. The selective tendering takes the highest percentage (45.3) and this may be due to the complex nature of hospital services. The predominant bases of award of contract for maintenance works execution are through the use of Bill of Quantities (39.8%) and Cost Reimbursement (37.4%). Less than a quarter (22.8%) of the respondent award their contract using schedules of rates. The maintenance manager makes decisions on the implementation of maintenance works by either outsourced or in-house crew. There are indications from the analysis that consideration is always given to the volume of work; the nature of work; and maintenance policy guiding the organisation when decisions are to be made in respect of works execution. From the study, using outsourcing gives latest innovations/technologies to work done and special skills better than implementing in- source. In-source method, gives a better quality of services, reduction in cost of operation, better control of services with minimum equipment downtime and reduction in equipment expenditure than outsourced method. Both methods claimed to produce specialized expertise to their labour, better adjustment to workload fluctuation and security to work done. All these efficiencies are better rated in in-source method than outsourcing.

Conclusion

From the results obtained in this study, the following conclusions are made. The staff strength of the maintenance department in public hospitals in South West, Nigeria is inadequate. They do not have much experience on hospital maintenance management. Majority of the users of public hospital buildings do not have access to any formal training programme on effective use of hospital facilities. There is an existing maintenance policy guiding the maintenance work execution, however, the major training found to be given to maintenance operatives are workshops and seminars, which are very inadequate for effective performance especially in a sensitive environment like hospitals. The study also revealed that maintenance operatives are not well motivated and this was attributed to lack of tools/equipment/materials in executing the desired maintenance programmes in hospitals. Others are irregular payment of salaries, delay in promotion. Considering maintenance work execution, the test of the hypothesis revealed that there is no variation in the work performed by the use of in-source and outsourced labour. However, maintenance staff rated the use of in-source better than outsource in that it is found to produce higher quality and better quality control of services, reduction in cost while outsourced gives an understanding of latest technologies with better access to special skills.

Recommendations

In the light of the research findings, and conclusions, the following recommendations are made in order to improve on the practice of maintenance management of our public hospital buildings including services in South West. Nigeria.

- Maintenance staffs are to be well motivated in order to deliver their best during the maintenance work execution. Progress report of work done is to be submitted to the management through the head of maintenance department.
- For optimum results, maintenance departments need to adopt sound policies with respect to building elements/services replacement. This will provide appropriate basis for preparing budgets that meet the actual maintenance needs of the hospital buildings and services included. Maintenance managers are to do their best to prepare realistic need-based budgets while the government should make efforts to increase the funding for hospital maintenance.
- Inefficiencies and inflexibility through the imposition of bureaucratic impediments to operational effectiveness should be avoided in hospital environment due to the sensitivity of the services being rendered.
- Maintenance staff and users of hospital buildings should be given opportunities for further training on their jobs also on effective use of hospital facilities. This is necessary to reduce the occurrence of defects, which will consequently bring about better physical and functional hospital building elements and services.
- Maintenance planning based on more realistic assessment of needs and priotized forward maintenance programme, on a rolling In the light of the research findings, and conclusions, the following recommendations are made in order to improve on the practice of maintenance management of our public hospital buildings including services in South West. Nigeria.
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Appendix

Table 1: Sample frame selected for the study

State	No of Federal owned hospitals	No selected for the study	No of State owned hospitals	No selected for the study	Total No selected for the study	%
Ekiti	1	1	14	5	6	13.0
Osun	1	1	11	4	5	10.9
Ondo	2	2	13	4	6	13.0
Oyo	1	1	21	8	9	19.6
Lagos	4	4	18	5	9	19.6
Ogun	2	2	26	9	11	23.9
Total	11	11	103	35	46	100

Table 2: The survey returns

	Maintenance staff response			Users		
State	Sample size	Number returned	Response rate %	Sample size	Number returned	Response Rate %
Ekiti	30	25	83.3	60	48	80
Osun	25	20	80.0	50	34	68
Ondo	30	24	80.0	60	58	96.7
Oyo	45	40	88.9	90	49	54.4
Lagos	45	45	100.0	90	75	83.3
Ogun	55	52	94.5	110	82	74.5
Total	230	206	89.6	460	346	75.2

Table 3: Analysis of Maintenance staff length of service.

Length of service	Frequency	Valid percent	Cumulative percent
Less than 10 years	109	57.1	57.1
10 – 19 years	59	30.8	87.9
20 – 29 years	20	10.5	98.4
30 and above	3	1.6	100.0
Total	191	100.0	

Source: Field survey (2007).

Table 4: Analysis of Full-time employees in the Maintenance Department.

No of employees	Frequency	Valid percent	Cumulative percent
1 – 10	66	35.7	35.7
11 – 20	89	48.1	83.5
21. – 49	21	11.3	95.1
50 and above	9	4.9	100.00
Total	185	100.0	

Sources: Survey (2007).

Table 5: Analysis of number of buildings the maintenance departments are managing.

Number of buildings	Frequency	Valid percent	Cumulative percent
Fewer than 5 buildings	47	24.7	24.7
6-10 buildings	21	11.1	35.8
11-15 building	39	20.5	56.3
21-30 buildings	40	21.1	84.7
31-40 buildings	10	5.3	90
41-50 buildings	5	2.6	92.6
More than 50	14	7.4	100
Total	190	100.0	

Sources: Field Survey (2007).

Table 6: Analysis of Users Sample by their departments

Department of the Users	Sample Size	% of the population	No Returned	Response %
Medical staff	184	40	184	100
Administrative staff	138	30	100	72.5
Management Staff	46	10	30	65.2
Patients	92	20	30	32.6
Totals	460	100	344	74.8

Source: Survey (2007

Table 7: Type of Training provided by the Hospital Management for Maintenance staff

Type of training	Frequency	Valid Percent	Cumulative Percent
In-service training	59	29.5	29.5
Workshop/seminar	131	65.5	95.0
Higher Education	10	5.0	100.0
Total	200	100.0	

Source: Survey (2007)

Table 8: Causes of low motivation of maintenance workers.

Demotivating factor	Frequency	Valid percent	Cumulative percent
Lack of working tools/ equipment/materials	38	50.7	50.7
Irregular payment of salaries	12	16.0	66.7
Delayed promotion	8	10.7	77.4
Poor pay	6	8.0	85.4
Lack of opportunities for training/development	6	8.0	93.4
Job insecurity	4	5.3	98.7
Unsafe/unhealthy working condition	1	1.3	100.0
Total	75	100.0	

Source: Survey (2007).

Table 9: Bases for awarding contracts

Basis of award	Frequency	Valid percent	Cumulative percent
Based on priced bill of quantity (B.O.Q)	68	39.8	39.8
Cost reimbursement	64	37.4	77.2
Schedules of rates	39	22.8	100.0
TOTAL	171	100.0	

Source: Field Survey (2007)

Table 10: Analysis of determinants whether a maintenance work may be executed by in-house crew or by outsourcing.

Decision on maintenance work	Frequency	Valid percent	Cumulative percent
The maintenance manager	71	38.6	38.6
The maintenance policy guideline	25	13.6	52.2
The upper management	36	19.6	71.8
The volume of work	28	15.2	87.0
The nature of work	24	13.0	100.0
TOTAL	184	100.0	

Table11: Correlation analysis of in sourcing and outsourcing:

Efficiency of Maintenance Operations	Outsourcing			Insourcing		
	Mean	M.I.S	Rank	Mean	M.I.S	Rank
Getting the latest technologies	4.03	0.81	1	3.89	0.78	5
Better access to special skills	4.01	0.81	2	3.72	0.74	8
Higher security	3.78	0,76	3	3.89	0.78	5
Specialize expertise	3.77	0.75	4	3.9	0.78	4
Higher quality of service	3.73	0.75	5	4.11	0.82	1
Better adjustment to workload fluctuation	3.64	0.73	6	3.77	0.75	7
Avoiding penalties for delay	3.56	0.71	7	3.67	0.73	11
Minimum equipment downtime	3.51	0.71	8	3.7	0.74	9

Better Control of service	3.42	0.68	9	3.91	0.78	3
Reduced equipment expenditures	3.21	0.64	10	3.69	0.74	10
More flexibility in staffing	3.09	0.62	11	2.73	0.55	12
Reduced Cost	2.72	0.54	12	3.98	0.8	2

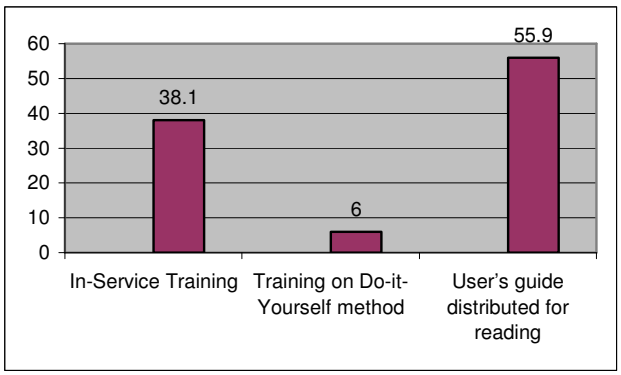

Figure 2: Training type given by the management to the users through Maintenance Department.
Source: Survey (2007)

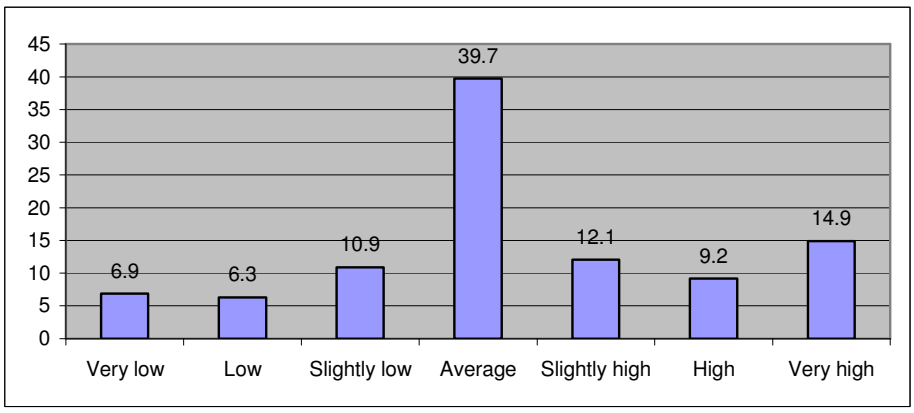

Fig 3: Level of Motivation of Maintenance staff by the management
Source: Survey (2007).

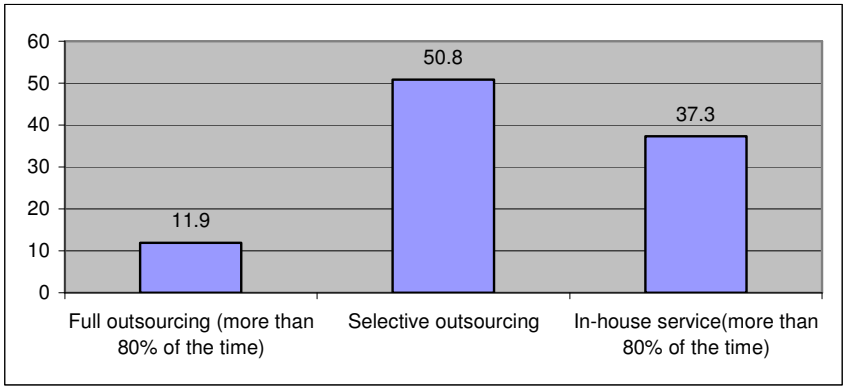

Fig 4: Labour source for the maintenance job execution in public hospitals in southwest, Nigeria
Source: Field Survey (2007)

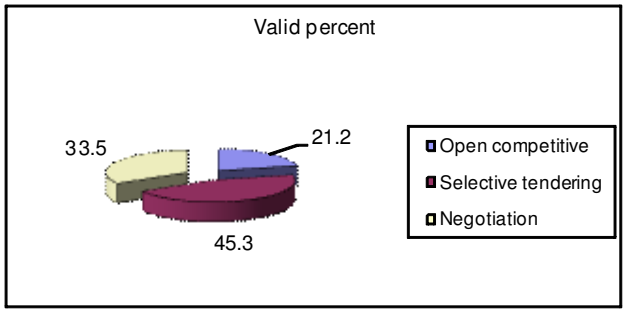

Figure 5: Mode of selection of contractors for maintenance work.
Source: Field Survey (2007)

EFFECTIVE MAINTENANCE POLICY AS A TOOL FOR SUSTAINING HOUSING STOCK IN DOWNTURN ECONOMY

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Abstract

The study considered how effective maintenance strategies could serve as a tool for sustaining housing delivery in periods of economic recession. It identified the causes of neglect of maintenance responsibilities in some selected government institutions, ministries, parastatals and public estates within Lagos metropolis and to develop adequate maintenance implementation strategies for these buildings. In achieving these objectives, opinions of (30) randomly sampled maintenance officers of selected government institutions, ministries, parastatals, and occupiers of selected public estates were collected using structured questionnaires and personal interviews. Data analysis indicated that lack of discernible maintenance culture in the country; lack of emphasis on training, retraining and continuing education on effective maintenance by establishment are the major reasons for neglect of maintenance responsibilities. The study also revealed that majority of the population studied provides budgets for maintenance operation but this was found to be inadequate. The study recommended proactive approaches to maintenance by providing guidelines for maintenance checklist operations on key building elements, frequencies for maintenance operations, and operatives required for effective implementation.

Keywords: Proactive maintenance, Sustainable housing, Maintenance policy, Depressed economy.

Introduction

Improved housing policies and programmes are a major component of achieving the goal of adequate shelter for all. It is clear that the total supply of buildings is inelastic in the long run and the only way to sustain the stock of housing at a particular period is through repairs and maintenance. It is also important to ensure efficient and equitable systems for management and maintenance of the existing housing stock. Historically, in both public and private sectors, maintenance was seen by many as an avoidable task, which was perceived as adding little to the quality of the working environment, and expending scarce resources that could be better placed (Higher Education Backlog Maintenance Review 1998) Maintenance is war. The enemies are the triumvirate of breakdown, deterioration, and all types of unplanned events. The soldiers are the maintenance department and as many civilians as one can recruit. As maintenance leaders, we have many strategies and weapons at our disposal; some new, some old, some complex and some simple, some effective in one theater of operations and some better in another. Each strategy to consider works only with the support of the correct weapons and logistics. The RICS/ISVA Working Committee defined maintenance as “work undertaken in order to keep, restore or improve every facility, to an acceptable standard and to sustain the utility and value of the facility”. This is proactive maintenance. Fifty years ago, the challenge was to get people to identify and care about historic buildings; twenty-five years ago, the challenge was to avert redevelopment. Today, the challenge is to stop the unnecessary loss of historic buildings through neglect (Institute of Historic Building Conservation, 2000). A good manager must be willing to admit to a maintenance problem and actively pursue a solution. How can a good maintenance manager actively pursue a solution? Be a proactive, disciplined and accountable. Manage to maximize available resources, manage based on information. He should be able to give reports on production/operations and feedback from work reports (Adenuga1996).

The study aims at finding how effective maintenance practices will sustain housing stock in Nigeria through the following objectives: Investigating the causes of neglect of

maintenance responsibilities on existing housing stock; examining the importance of maintenance as an instrument for sustaining housing stock; and providing strategic approach and policies for criteria services for housing projects, guidelines for maintenance checklists and frequencies for maintenance operations on existing housing stock.

Theoretical Framework and Review

The Need for Sustaining Housing Stock

There is growing recognition of the need to preserve the existing housing stock in Nigeria as this stock has a critical role to play in addressing the need for affordable housing (Windapo, 2005).

It is also recognized that preservation of the existing housing stock will become more of an issue in the future as this stock continues to age and the economy improves and creates increased pressure for redevelopment. The limited focus on this issue to date has been attributed to a rather slow economy in recent years and limited pressure for redevelopment (Okupe, 2000). On the one hand, preserving the existing stock benefits tenants by retaining the supply of affordable housing. On the other hand, redevelopment may increase the stock of housing, but may or may not increase the stock of affordable rental housing (Onibokun, 1990). While there has been some recent activity in the construction of new housing in Nigeria, most of the units being developed are high-end rental. In this context, and given the insufficient development of new housing, the preservation of the existing affordable housing stock is critically important.

The Need for Maintenance in Sustaining Housing Stock

One of the major forces that catalyze the growth of economic, social and technological advancement of any nation is the development of maintenance culture (Celestine 1989). Our buildings (both public and private) lack adequate maintenance care or attention. It is unfortunate but, glaring fact that our buildings are in very poor and deplorable conditions of structural and decorative disrepair. They are more or less refuse dumps and natural homes for rodents and vermin (Adenuga 1999).

In spite of millions of Naira spent to erect imposing and monumental buildings, they are left, as soon as commissioned, to face premature but steady and rapid deterioration, decay and dilapidation. Maintenance is very important to preserve and enhance the life span of buildings Zubairu (1998). In Nigeria, it has become quite distressful to see the way in which many buildings are allowed to fall into a bad state of disrepair due to lack of maintenance. Many State Governments claim that it is due to lack of funds, but what is the aim of expending huge sums of money erecting such edifices if after a few years, they are allowed to become dilapidated due to lack of proper maintenance? The United Nations Centre for Human Settlements noted that in many developing countries, poor maintenance practices are the result not so much of lack of resources as of ‘’lack of workable strategies,, methodologies and techniques for effective utilization of available resources in a systematic and methodical manner. Traditionally, in the villages, people take pride in the proper care and maintenance of their houses and surroundings. With the mass rural-urban migration that came in the wake of urbanization and post-independence, this culture seems to have been lost in transit. The oil boom of the seventies made matters worse. There was a building boom and very little attention was given to the maintenance of existing stock of buildings by the government. This general lack of maintenance culture has persisted in the country’s town mainly due to the fact that Nigeria does not have a statutory maintenance policy. According to Smith (2003) there should be a law dictating the minimum maintenance requirements necessary to ensure safe and healthy buildings, services and surroundings. There should also be agents to ensure that the law is duly enforced. Best maintenance practices are actually defined in two distinct categories. There are the standards, which are the measurable performance level of maintenance execution, and then there are the methods and strategies that must

be practised in order to meet the standards. The combination of these is elements of an Integrated Planned Maintenance System classified as Maintenance Excellence.

Objectives of Building Maintenance

Oyefeko (1999) enumerated the following as the major objectives of building maintenance:

a) To ensure that the functional requirements of the facility are attained at all times.
b) To create a conducive and tenantable accommodation for owners and occupants users.
c) To enhance the quality of building structure to meet modern day requirements.
d) To prolong the life span of the building.
e) To preserve the physical characteristic of the building and associated services so as to reflect fewer breakdown and thereby reduce the probability of early failure.
f) To ensure that assets are kept at reasonable standard and at least cost.
g) To maximize the economic and financial returns from the use of the building.
h) To ensure the safety of the users/occupants.

Most people know from personal experience how difficult it is to find a reliable builder to carry out domestic repairs. The industry has many faults, including a fragmented structure, a lack of business skills, and a failure to recognize the technical capacity needed for effective repair and maintenance work.

Lives of Building

Sufficiency of the design, constructional details and the methods of building construction determines the usefulness of buildings. It is also dependant upon the way that the building is used and the maintenance policies and practice undertaken during its life (Iyagba, 2005). The life span of the individual materials and components has a contributory effect upon the life span of the building. It is not a question of how long a component will last but of how long a component will be retained. The particular circumstances of each case will have a significant influence upon component longevity. These will include the original specification of the component, its appropriate installation within the building, interaction with adjacent materials, use and abuse, frequency and standards of maintenance, local conditions and the acceptable level of actual performance by the user. The management policies used by the owners or occupiers are perhaps the most crucial factors in determining the length of the component lives.
The study of (Adenuga, 1999) concluded that the rapid deterioration of buildings and their components can be attributed to many different causes:

a) An emphasis upon initial building costs without considering the consequences of cost in use.
b) Inappropriate design and detailing of buildings and components.
c) Use of materials and components that have sufficient data on their longevity.
d) A lack of understanding of the various mechanisms of deterioration.
e) Insufficient attention given to the maintenance of the building stock.
f) Inappropriate use by owners and occupiers.

Life Cycles of Building Components

Previous research (Zubair, 1999; Oyefeko, 1999, Iyagba, 2005) identifies three main components of building and their average life spans:

a) Building shells: which include major physical elements such as structural frames, floors, the building exterior envelope and vertical transportation/services core. These have a life span of 40 to 50 years.
b) Fitting-out elements: these include ceilings, partitions and floor finishes. They have an average life as short as 5 years.

c) Building services: these include mechanical and electrical services, telecommunication and data, lighting and interior transportation systems. Their life span ranges from 5 to 25 years.

Maintenance intervals of building components

Maintenance intervals vary depending on effects of weather over time and natural decay, normal wear and tear and extent of vandalism or misuse. NBA Construction Consultants (1985), outlined average maintenance intervals for building components due to normal wear and tear. The life expectancies and maintenance intervals vary with materials as shown in the table 1 in the appendix.

Roofs**:** The NBA study, recommends that all roofs should be inspected at one or two years intervals with a checklist of potential defects. Flat roofs should be inspected annually. In areas of high pollution, inspections may need to be more frequent. The average life expectancies and maintenance cycles of some common roofing materials are as shown in the table 2 in the appendix.

On electrical installations, any wiring that is more than 35 years old is out of date and should be replaced (NBA, 1985). The expected life of wiring is 20 to 30 years. Lights should be inspected at least every six months. The expected life of lifts before refurbishment or replacement is 20 to 40 years (NBA, 1985). Suspension ropes however, have a life of only about 6 years. Lifts should be checked six months under a planned maintenance programme. Water supply, plumbing and sanitary services: Overflow pipes, taps and ball valves should be checked periodically depending on frequency of use. Bends and channels in the pipes should be inspected and cleaned yearly. Drains should be water-tested every 2 to 3 years. Soak-away pits should be emptied periodically. Air conditioners, these should be checked every six months and serviced annually.
In achieving better performance of all these components, there should be a maintenance programme. This should be determined by the maintenance Manager/ Property Manager depending on his nomenclature, preferably a Professional Builder.

Implementation Strategies

Planning the transition for the implementation of best maintenance practices is essential. Timelines, personnel assignments, documentation and all the other elements of a well planned change must be developed before changes actually begin to take place (Smith, 2003) The following list of proactive maintenance organization attributes are the significant parts of the new approach and therefore need to be addressed in the transition plan.

i. Maintenance skills training – Determine what the training is meant to accomplish. Performing a job task analysis (JTA) will help define the skill levels required of maintenance department employees. The job task analysis should be followed with a skills assessment of employee knowledge and skill levels. Analyze the gap between required skills and available skills to determine the amount and level of training necessary to close the gap.
ii. Work Order System – The work order is the primary tool for managing labour resources and measuring department effectiveness. The computerized maintenance management system will help in defining changes to, or complete restructuring of, any existing work order system. The work order will be the backbone of the new, proactive maintenance organization's work execution information input to, and feedback from computerized maintenance management system.
iii. Planned, Preventive Maintenance Tasks/Procedures – It involves development of maintenance task documentation which include standardize listing of parts, material and consumable requirements, it should identify the craft and skill level (s) required to perform the task and a frequency of performance.

iv. Maintenance Engineering Development – If the organization does not have a maintenance engineering section, one should be established. Their responsibilities in this area should include evaluating preventive maintenance action effectiveness, developing predictive maintenance techniques/procedures, performing condition monitoring, planning/scheduling, conducting investigations of failures including root cause analysis, and performing continuous evaluation of training effectiveness.

v. Establishment, Assignment and Training of the maintenance planner/scheduler – The function of the planner/scheduler is pivotal to a proactive maintenance. He must be familiar with the maintenance process, he must also be a good administrator and he must have the appropriate level of authority to carry out his role of labour usage scheduling and interfacing between many departments within the organization.

Among his responsibilities are: Provide Detailed Job Plan Instructions, determine part requirements for planned job, provide necessary drawings for jobs, ensure drawings are revised and current, arrange for special tools and Equipment, Co-ordinate Equipment downtime with production/operations. Inform production/operations of job progress etc.

- Maintenance Inventory and Purchasing Integration/Revamping – The cost of (parts) inventory is almost always an area where cost reduction can be substantial. With the help of suppliers and equipment vendors, purchasing can usually place contracts or Basic Order Agreements (BOA) that guarantee delivery lead time for designated inventory items. Begin by identifying your facility's parts, material and consumable requirements. All the inventory requirements data should be entered into the computerized maintenance management system.

- Computerized Maintenance Management System – An effective CMMS is critical to an organized, efficient transition to a proactive maintenance approach. It is a phenomenon that can impede or prevent you from ever achieving the standards of Best Maintenance Practices.

It is also a good time determined that the output data is adequate to meet each user's individual requirements.

- Management Reporting/Performance Measurement & Tracking – Hand-in-hand with CMMS review and/or upgrade is the "report generator" function. The CMMS output should be providing maintenance engineering, production/operations, purchasing, accounting and upper management with accurate, effective and useful tools for evaluation and management.
- Return on Investment (ROI) Analysis – Justification of everything in business today is based on cost. In the planning and implementation of the changes, upgrades, etc., there is need to separate the development costs from the routine and normal operating costs of the facility to determine the total cost of implementing Best Maintenance Practices. The key performance indicators are the productivity/operating cost, maintenance labour costs, maintenance material costs, inventory carrying costs, and reliability/availability data.
- Evaluate and Integrate use of Contractors – A final item to consider when incorporating Best Maintenance Practices is integrating the use of Contractors into your facility maintenance and maintenance costs for in-house performance and compare them to the costs of contracting out selected effort. This is likely to be a function of total facility size and operating costs. Some of the maintenance or maintenance engineering efforts that may be considered as potential candidates for contractor performance include; Maintenance (performance of), Capital Improvement and/or Expansion Programs, Condition Monitoring (e.g., Facility Performance Tests) etc. Any maintenance activities that do become a contractor function must still have relevant information/data collected and entered into the CMM.

Methods

For the purpose of carrying out a survey into the causes of neglect of maintenance responsibilities and providing a strategic approach for its best performance, a questionnaire focused on some maintenance officers of some selected government institutions, ministries, parastatals and occupiers of selected public estates within Lagos Metropolis was designed to obtain the data required. The simple random sampling technique was adopted. Thirty (30) of the well completed and returned questionnaires which is about 75% of the total administered generated a data bank of information required. The primary data included the responses to the questionnaires and the findings from personal interviews.

The secondary data comprised theories, research findings through internet, journals and books.

Methods of Data Analysis

The "mean score" method was used to established the causes of neglect of maintenance responsibilities. To facilitate the analysis of the responses, the following numerical values were assigned to the respondents' ratings.

- Strongly Agree (A) -------- 5
- Agree (B) -------- 4
- Undecided (C) -------- 3
- Disagree (D) -------- 2

The four-point scale was used to calculate the mean score for each factor, which was then used to determine the relative ranking by assigning ranks to the mean scores with low mean scores assigned low ranks.

Data Analysis and Discussion

Table 3 indicated that 76.7% of the respondents have maintenance department. This represents a clear majority of the population and thus suggests that maintenance value of buildings. The Engineers occupy at least 40% of the entire population studied with 53.3% respondents failing to disclose the types of staff engaged for maintenance activities. (table 4) The result suggests that Civil Engineers are the dominant of maintenance department in public sectors

From table 5 the fact that 26.7% of the maintenance officers have BSc. or MSc. shows that better performances are expected for maintenance operations. Majority of the maintenance departments studied have the staff strength of 1-5 (53.3%) personnel (table 7) and Engineers dominated the preparation of maintenance programmes and budgets, which do not give a good judgement on maintenance operations,

Tables 8 indicated that, (53.3%) do have budgetary allocation for maintenance programmes. This means the public officers know the importance of maintenance in retaining the economic values of government properties. From table 9, majority declined to give the confirmatory statement on the adequacy of funds but from personal interview, it was gathered that most of them do not have adequate funds for maintenance repairs.

Table 10 also indicated that (83.3%) of government ministries and parastatals have maintenance awareness by making a schedule for periodic inspection of key building elements for functionality. This tends to guide against the risk of total breakdown before effective repairs. From tables 11, the monthly and three months periodic interval commanded highest population which means many public buildings have a planned maintenance programme and also from table 12, they also have maintenance policy for periodic renewal/evaluation with (56.7%). It is observed that most of the maintenance repairs are executed through contracting procurement systems. (table 13) .

The table 14 in the appendix represents the respondents ranking of twenty-one (21) significant reasons for neglect of maintenance responsibility. The result shows that lack

of discernible maintenance culture in the country, establishments de-emphasizing training, retraining and continuing education on effective maintenance are the major reasons for neglect of maintenance responsibilities. Other reasons such as absence of long-term arrangements for the supply of essential service parts for replacement, quality of management in an organization, with indiscipline and ignorance on the part of users are also found to have contributed to the neglect of maintenance responsibilities.

Summary of Findings

From the sample studied, majority of them have maintenance department dominated by Civil Engineers. The Engineers prepare the maintenance programmes and the budgets. About 53.3 % of the samples studied have staff strength between 1-5 personnel. They all have budgetary allocation for maintenance programmes but found to be inadequate. Although they engage themselves in periodic inspection of the key building elements based on the maintenance policy for periodic renewal/ evaluation, the implementation do experience some setback due to inadequacy of fund. Most of their maintenance repairs are executed through contract procurement systems.

The study also has highlighted the numerous reasons for neglect of maintenance responsibilities in Lagos State especially as it relate to buildings. Among twenty-one (21) reasons identified, lack of discernible culture, de-emphasizing training, retraining on effective maintenance by establishments, inability to provide resources for maintenance operations, indiscipline and ignorance on the part of users of both public and private buildings, a retrogressive and negative attitudes of the public towards maintenance were the most dominant factor responsible for neglect of maintenance responsibilities.
From the sample studied, majority of them do provide budget for maintenance operations but the allocation was found to be inadequate. They carried out periodic inspections of their key building elements based on an existing maintenance policy guiding the periodic renewal/evaluation.

Policy Statement for Consulting Services for Housings Projects

Guidelines for Maintenance Checklists

In reporting deficiencies, the maintenance staff or handyman should be guided by the following aide memoirs. It should be noted that the guides that are given here are not intended to be exhaustive. They will, however, focus inspection on the critical areas.

Spaces/Materials	Good	Bad
Washrooms and Toilets ● Check to see if walls are cracked ● Where the walls are made of rubble stone see if the mortar is in good condition ● Check to see if items such as soap holders and toilet paper holders are in place and are in working order		
Corridors and Rooms ● Examine the floors to see if the concrete has been damaged in any way so that persons walking in the corridors or rooms may trip ● Check to see if the walls are damaged and need repairing		
Ceilings, Interior Roofs, and Canopies ● See if the ceilings and the undersides of the roofs and canopies have any watermarks which indicate leaks in the roof ● See if any timber supports are rotten ● Where the roof supports are of steel, check to see if there is any rust ● See if any ceiling tiles need replacing		
Plumbing ● Check to see if there is any water on the floor ● If there is, examine the wash basin to see if it is plugged ● Examine the WC to see if the bowl is cracked		

● Check to see if the toilet seat cover is broken ● See if the flush handle or pull chain is broken ● See if the toilet bowl is fixed properly to the floor so that it does not rock when being used ● See if the sewer pipe is properly fixed to the toilet and that there is no leaking at the joint.		
Electricity ● See if all light bulbs are working and that all are in place ● See if the wall plates are in good condition ● See if the wall switches or pull switches are working ● See if wall outlets are working		
Windows ● See if the windows can close securely ● See if the window operators are in good condition and are working ● See if the bolts and locks are in working condition ● See if the timber surrounding the windows is rotten and should be replaced ● See if the windows leak even when closed		

Spaces/Materials	**Good**	**Bad**
Doors and Frames and Partitions — See if the doors can close properly — See if the bolts and locks are in place and are working — See if the door frame is in good condition and that the timber is not rotten — Where the door is a wood door (brace and batten) see that the door has not warped — Check the partitions to see if the walls are in good condition — Report any loose mortar in a rubble wall — Report any cracked wall		
Roof and Gutters — Check roofs for leaks — Check gutters for holes — Check a timber fence, check for rotten timber		
Water mains — Check ground to see if there are any wet spots which would indicate a leaking water main — See if the water main is properly buried beneath the ground, or is well protected by concrete		
Septic tank — Check to see if the tank has been cleaned in the last three years — See if the access covers fit properly, are in good condition and can be removed for cleaning — See if the holders for the covers will cause people to trip. The holder should be recessed with just enough room for a pickaxe blade to get under the holder — See if the inlet pipe is firmly fixed to the tank and that there is no leak — Where there is a soak away check to see the pipe to the soak away is firmly bedded — See if there is any odour around the tank. If there is, the tank needs cleaning or another soak away should be dug — Where there are tile fields, check to see if the pipes (tiles) are exposed They should be well below ground level — See if the tiles are working and that there is no water on the ground around the pipes		

Erosion near Structures — Examine the ground around the buildings to see if the rain water has removed any material – soil or stones — Check around the pipes to see if the pipes that were buried are still properly buried — Check around telephone or electricity poles on the property to see whether the rain water has removed soils around the bottom of the poles		
Facility Management — The common parts of the air-conditioner to be noted or known — Maintenance Of Air-conditioners — Front Panel — Grille — Air Filter usually behind the grille — Up/Down air flow adjustment louvers — Left/Right air flow adjustment louvers — Cabinet — Ventilation lever — The Control Panel — Power Cord — Compressor which is the main engine and — Fan Motor		
Cleaning And Maintenance ***<u>Cleaning the Filter</u>***: — Turn off the unit before performing any cleaning or maintenance. — If the filter is clogged with dust, the amount of airflow will be reduced, resulting in poor cooling performance. — The filter should be cleaned every 10 days. — At the beginning of every cooling season or after a long period of inactivity, clean the filter before starting the unit. — To remove dust from the filter, use a vacuum cleaner or wash it with clean water. — If the filter is very dirty, wash it with detergent and rinse carefully with clean water. — Dry the filter with a soft cloth. — Do not expose the filter to heat or dry in direct sunlight. — Never operate the unit without installing the filter and the grille as this may result in serious damages to the unit.		
<u>Cleaning of the Front Panel, Grille And Cabinet</u> — To clean the front panel, grille and cabinet, wipe with a soft, dry cloth or with a cloth moistened with a mild soap. — Rinse carefully by wiping with a damp cloth then dry completely. — Avoid splashing the unit with water. — Excess water can damage electrical installation and result in damage. — Never use harsh chemicals or abrasive cleaners on any parts of the unit. — To avoid damage to the unit, do not use hot water over 50^{o}C when cleaning		
<u>Fan Motor and Compressor</u> — These are the very vital parts of the Air-Conditioner, Oiling of the compressor and Fan Motor is unnecessary. — The compressor is permanently lubricated and it hermetically sealed. — The fan motor is life-time sealed and does not require oiling. Call in specialists to test at the fan motor and or the compressor if it is a suspected major problem.		

Before Calling For Service

- If the Air-Conditioner does not operate properly, please check the following items before calling for service.
- If the Air-conditioner does not operate at all, then check.
- Is the power cord loose or disconnected?
- It the fuse blown or the circuit breakers tripped?
- Did you restart the unit before 3 minutes after power failure?
- If the power was off for less than 3 minutes and you restart the Air-conditioner before 3 minutes, a protective devise may cause the air conditioner to shuff, preventing coding operation for some minutes (20 minutes) If the Air-conditioner does not cool properly
- Is the selector set for Fan mode?
- Cooling will not be conducted in Fan mode, Change the selector setting to LOW, MED or HIGH.
- Is the filter clogged with dust?
- A dirty filter can cause the cooling coils to freeze.
- If this happens, clean the filter and replace.
- Rave the Air conditioner on the FAN setting until all the ice disappears.
- Is the THERMOSTAT set properly?
- If your room is too warm, adjust the THERMOSTAT knob to a lower cooling setting.
- Is the VENTILATION lever in the RIGHT (OPEN) operation?
- The lever should be in the LEFT (CLOSED) position during cooling.
- Is the window exposed to direct sunlight?
- Close curtains or blinds to minimize solar energy heating in the room
- Are the windows or doors open?
- Close all windows and doors for maximum cooling.

Frequencies for Maintenance Operations

The table 15 in the appendix suggests periodic inspections of key building elements, the types of staff and number of operatives required for an effective implementation.
The tables are presented covering:(a) the building interior, (b) the building exterior; (c) the compound.
The following abbreviations are used in the tables:

Operator

C: General cleaners
MS: Maintenance Staff
BS: Building Superintendent
BA: Building Administrator
G: Gardener

Notes:

1. For *frequency* the maximum period is given
2. For *operator* the person named is the one responsible for seeing that the operation is carried out.

Conclusion

Building are man-made assets which require regular maintenance if they must contribute to the economic development The study has revealed that one of our greatest economic and social problems, as a nation is the general absence of a maintenance and thrift culture. There is unpardonable neglect and laxity in all spheres of our national life.
However, a number of reasons have been identified in contemporary maintenance practices which cause neglect of maintenance responsibilities and they are contained in the following conclusions: lack of discernible maintenance culture in the country, establishments de-emphasizing training on effective maintenance, no long-term

arrangements being made for the supply of essential parts for replacement. Lack of sound maintenance management, indiscipline and ignorance on the part of users and the general tendency to execute work only when it becomes a matter of urgency. The negative and general retrogressive attitudes of the public towards maintenance, absence of efficient inventory systems, non-adoption of appropriate maintenance cycles were also identified as reasons for neglect. Others are the absence of a form of planned maintenance programme, attention not given to our level of technology, cultural and environment during designs. Non-involvement of maintenance experts during designs and development especially is some complex designs have also been identified as a contributing factor.

The paper also revealed that majority of the population studied provides budgets for maintenance operation but found to be inadequate. They carried out regular periodic inspections on their key building elements based on maintenance policy for periodic renewal/replacement. The implementations do suffer setback due to inadequacy of funds. Although majority has maintenance department dominated by Civil Engineers, these Engineers are also responsible for the preparation of maintenance programmes and budgets. This does not give a good judgment on maintenance operations.

In connection with the problems identified above, the study therefore suggested a proactive approach to maintenance by providing guidelines for maintenance checklist operations on key building elements. It also provides frequencies for maintenance operations, the types of staff and the number of operatives required for effective implementation. As a matter of policy, every individual especially those in the building industry should preserve the quality of existing dwellings and neighborhoods so that people will find our community a healthy, safe and attractive place to call home today and into the future. We should seek a variety of housing options that blend with the character of the surrounding community and the socioeconomic needs of people who live and work here. There is a need to encourage housing development that provides for “live, work, and play” relationships as a way to reduce traffic congestion, encourage economic expansion and increase overall quality of life for our residents. Lastly, we should encourage the increased availability and integration of a variety of housing that supports flexibility, mobility, independent living, and services for all age groups and those with special needs.

Recommendations

The major emphasis for actively pursuing solutions for maintenance ineffectiveness should be on proactive thinking. Adopting a proactive approach to maintenance will improve maintenance effectiveness drastically and more rapidly than instituting an aggressive programme of maintenance effectiveness improvement within the confines of the organizational and cultural environment of an existing, predominantly reactive maintenance programme. An effective computerized maintenance management system should be established for efficient transition to a proactive maintenance approach. Every organization should have adequate budgetary allocations, maintenance policy, and periodic inspections of key building elements. There should be a reformation of the building industry and this should include the enhancement of the role of trade organization, the provision of more specialized training opportunities, and a system of voluntary licensing of firms, backed up by regular inspections of work to ensure maintenance of standards. It is essential that any reforms be accompanied by measures to persuade home-owners to make greater use of reputable builders, even if this costs them more. In the long term, better value for money will be obtained from good quality work. A combination of incentives (such as government-backed warranties for work by licensed builders) and compulsion (for example, by stronger enforcement of regulations) will be required to achieve this. ‘Cowboy’ firms flourish not just through poor training and organization within the building industry but also because home-owners and the government allow them to. A comprehensive effort is needed to produce the quality of output necessary to safeguard the nation’s housing stock into twenty-first century. “Best Maintenance Practices” are bench marking standards, but these are real, specific,

achievable and proven standards for maintenance management that have made many maintenance departments more efficient, having reduced operating costs, improved reliability and that have increased morale within the organization.

The paper also revealed that majority of the population studied provides budgets for maintenance operation but this was found to be inadequate. There is need to reform the industry and therefore educate consumers in order to boost standards and increase the volume of nations' investment.

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Appendix

Table 1: Life expectancy of floor finishing materials

MATERIAL	LIFE (YEARS)	MAINTENANCE INTERVAL (YEARS)
Carpet	10	3 – 4
PVC tiles	15 – 20	5
Linoleum	15 – 25	5
Woodblock	45 – 60	Polish yearly, re-sand and re-

		seal every 10 days
Woodstrip	60 – 65	"
Terrazzo	50 – 65	9 – 10
Granolithic	50	9 – 10
Quarry tiles	50 – 65	6 – 7

Source: NBA Construction Consultants (1985)

Table 2: Life expectancy of roofing materials

MATERIAL	**LIFE (YEARS)**	**MAINTENANCE INTERVAL (YEARS)**
Built-up felt	15 – 20	3 – 4
Asphalt	20 – 60	6 – 7
Clay tile	25 – 70	4 – 5
Concrete tile	20 +	Very durable
Asbestos cement	26 – 40	Generally 6 – 7 depends on air pollution
Zinc		ditto
Aluminium		ditto

Source: NBA Construction Consultants **(**1985)

Table 3: Organizations with maintenance department.

		Responses	Percentage(%)
(i)	Undecided	2	6.7
(ii)	Yes	23	76.7
(iii)	No	5	16.7
	Total	30	100

Table 4: Professional Staff that make up Maintenance Department.

		Responses	Percentage (%)
(i)	Civil Engineers	12	40.0
(ii)	Estate Surveyors	2	6.7
(iii)	Builder	6	20.0
(iv)	Quantity Surveyor	5	16.7
(v)	Neutral	5	16.67
	Total	30	100

Table 5: Qualification of Maintenance Officers.

		Responses	Percentage (%)
(i)	HND	1	3.3
(ii)	BSc	8	26.7
(iii)	MSc	8	26.7
(iv)	PhD	2	6.7
(v)	Neutral	11	36.7
	Total	30	100

Table 6 : The Professionals responsible for preparing Maintenance Programme/Budget.

		Responses	Percentage (%)
(i)	Estate Surveyor	1	3.3
(ii)	Engineer	10	33.3
(iii)	Builder	3	13.3
(iv)	Quantity Surveyor	1	3.3
(v)	Neutral	14	46.7
	Total	30	100

Table 7: Staff Strength in Maintenance Department.

		Responses	Percentage (%)
(i)	1-5	16	53.3
(ii)	6-10	9	30.0
(iii)	11-20	1	3.3
(iv)	Above-20	2	6.7
(v)	Neutral	2	6.7
	Total	30	100

Table 8: Organizations with Budgetary allocation for Maintenance.

		Responses	Percentage (%)
(i)	No	12	40
(ii)	Yes	16	53.3
(iii)	Neutral (Neither Yes or No)	2	6.7
	Total	30	100

Table 9: Adequate of Maintenance Budget

		Responses	Percentage (%)
(i)	No	6	20.0
(ii)	Yes	4	13.3
(iii)	Neutral	20	66.7
	Total	30	100

Table 10: Periodic Inspection of Key Building Elements

		Responses	Percentage (%)
(i)	No	2	6.7
(ii)	Yes	25	83.3
(iii)	Neutral	3	10.0
	Total	30	100

Table 11: Time for Periodic Inspection

		Responses	Percentage (%)
(i)	Daily	2	6.7
(ii)	Weekly	4	13.3
(iii)	Monthly	8	26.7
(iv)	Three Months	9	30.3
(v)	Six Months	1	3.3
(vi)	Neutral	6	20.0
	Total	30	100

Table 12: Organizations with Maintenance Policy for Periodic Review/Renewal

		Responses	Percentage (%)
(i)	No	8	26.7
(ii)	Yes	17	56.7
(iii)	Neutral	5	16.7
	Total	30	100

Table 13: Procurement Method for Maintenance Repairs

		Responses	Percentage (%)
(i)	Direct Labour	4	13.3
(ii)	Labour Only	4	13.3
(iii)	Contracting	10	33.3
(iv)	Neutral	12	40.0
	Total	30	100

Table 14: Responses To The Ranking Of Top 21 Significant Reasons For Neglect Of Maintenance Responsibilities

S/NO	**CAUSES**	**NUMBER OF RESPONDENTS SCORING**				**MEAN SCORE**	**RANKS**
		5	4	3	2		
1.	Lack of discernible maintenance culture in the country	19	7	3	1	4.467	1
2.	Establishments that de-emphasize training, retraining and continuing education can hardly possess an effective maintenance	17	11	1	1	4.467	1
3.	No long-term arrangements are made for the supply of essential parts for replacement.	16	9	1	4	4.379	3
4.	The quality of management of a given organization influences the scale of efforts, extent of facilities and resources for maintenance operations.	14	14	1	1	4.367	4
5.	Indiscipline and ignorance on the part of users often lead to persistent breakdown	16	10	2	2	4.333	5
6.	The general tendency is to execute work only when it becomes a matter of urgency.	15	11	2	2	4.300	6
7.	Attitude of the public towards maintenance is negative and generally retrogressive.	15	9	3	2	4.276	7

8.	No attention is given to our level of technology, our cultural background and environment during design.	15	10	3	2	4.267	8
9.	Lack of data and poor information processing handicap effective maintenance	12	13	4	1	4.200	9
10.	Absence of efficient inventory system leads to frequent shortage of materials and spare parts.	12	14	2	2	4.200	10
11.	No adoption of appropriate maintenance cycles for building maintenance.	9	19	1	1	4.200	11
12.	There is absence of a form of planned maintenance programme	13	11	2	3	4.172	12
13.	Unavailability of funds to procure spare parts limits the potentials of an establishment to undertake successful maintenance programme.	16	6	1	6	4.103	13
14.	In most cases, maintenance consideration that are purely technical decisions are taken by non experts due to political influence.	14	9	3	4	4.10	14
15.	Natural deterioration due to age and environment.	12	10	3	4	4.034	15
16.	There's use of poor quality components and materials for building execution.	12	9	2	5	4.000	16
17.	There is complexity in design and non-involvement of maintenance experts during design stage.	10	11	3	5	3.897	17
18.	Some establishments are unwilling or reluctant to support innovations	7	15	4	4	3.833	18
19.	Lack of adequate funds and interest in the area of research and development.	7	13	4	6	3.700	19
20	Obsolete equipment and project designs imposed owing to the preponderance of undue political influence.	17	11	3	9	3.533	20
21.	There is lack of skilled manpower to undertake maintenance work especially in those buildings designed and constructed by expatriates.	7	7	2	9	3.480	21

Analysis of sampled data, 2009
Strongly Agree --5; Agree ---4; Undecided ----3; Disagree---2

Table 15a : Building Interior .

Spaces/Materials	Frequency	Operator
Washrooms and Toilet		
— Inspect and report deficiencies	- Daily	- C/MS
— Wash floors, toilet bowls, urinals, wash basins with disinfectant and deodorant	- Daily	- C
— Order replacements	- Immediately	- SS/SA
— Replace broken elements	- Quarterly	- MS
— Repair	- Immediately	- SS
— Paint	- Annually	- MS
Corridors and Classrooms		
— Inspect and report deficiencies	- Daily	- C
— Wash walls	- Weekly	- C
Ceilings, Interior Roofs, Canopies		
— Inspect and report deficiencies	- Annually	- MS
— Repaint	- Every 4 years	- MS
Laboratories and other Technical Areas		
— Clean all counters, floors and walls	- Daily	- MS
Plumbing		
— Inspect and report deficiencies	- Daily	- MS
— Repair or replace defective pieces	- Immediately	- SS
Internal Communication System		
— Inspect all internal communications to ensure that the system is functioning properly and report defects	- Quarterly	- SS
Electricity		
— Inspect electricity wiring on a room-by-room basis and report deficiencies	- Quarterly	- MS
Furniture		
— Repair or replace broken elements	- Annually	- MS

Table 15b : Building Exterior

Spaces/Materials	Frequency	Operator
Wood		
— Inspect panels, louvers, railings and report deficiencies	- Annually	- MS
— Replace all broken wood louvers	- Daily	- BS
— Replace other damaged elements	- Quarterly	- SS
— Clean and paint marked surfaces	- Annually	- MS
Windows		
— Inspect and report deficiencies	- Daily	- MS
— Remove broken glass louvers or panes (see above also)	- Immediately	- MS
— Order replacements for broken glass and other elements	- Immediately	- BS
— Replace broken elements	- Quarterly	- MS
— Grease and oil louvers operators or handles	- Annually	-MS
— Replace broken wire-mesh grills	- Quarterly	- BS/MS
— Wash windows	- Quarterly	- C/MS
Doors and Frames and Partitions		
— Inspect and report deficiencies	- Quarterly	- MS
— Oil hinges etc	- Annually	- MS
— Replace defective and broken hardware	- Immediately	- BS
— Repair or replace defective doors and/or frames	- Immediately	- BS
Stairs and Balconies		
— Sweep stairs and balconies	- Daily	- C
— Wash stairs, walls and rails	- Quarterly	- C
— Clean metal work of rust and coat with primer and paint	- Annually	- MS
— Sand and paint wood railings or posts	- Every 2 years	- MS
Roofs and Gutters		
— Inspect and report deficiencies	- Annually	- MS
— Repair and replace roof sheets and gutters as required	- Weekly	- BS
Metal Panels		
— Inspect	- Annually	- MS
— Wash and remove graffiti	- Annually	- MS
— Clean rust and repaint	- Every 2 years	- MS

Table 16: Frequencies for Maintenance Operations Compound

Spaces/Materials	Frequency	Operator
Gardening		
— Clean flower beds	- Weekly	- G
— Watering and fertilize plant	- Daily	- G
— Remake plant beds	- Quarterly	- G
— Prune plants, trim hedges	- Monthly	- G
— Grass playing fields	- As required	- G
— Cut grass	- Weekly	- G
Fence		
— Inspect and report deficiencies	- Quarterly	- MS
— Repair	- Every 2 years	- MS
— Paint	- Every 2 years	- MS
Walkways and Courtyards		
— Sweep	- Daily	- C
— Clear litter and rubbish	- Daily	- C
Drainage Ditches		
— Clean routinely	- Weekly	- C
— Clear blockages caused by excessive rain	- Immediately	- MS
— Repair damaged drain	- Annually (August)	- MS
Water Mains		
— Inspect and report deficiencies	- Quarterly	- MS
— Maintain earth cover	- Quarterly	- MS
— Repair breaches/leaks	- Immediately	- BS
Septic Tank		
— Inspect and report deficiencies	- Annually	
— Clean and flush out	(August)	- MS

— Repair	- Every 4 years - Immediately	- MS - BS
Erosion near Structures — Inspect and report deficiencies after heavy rainfall — Return soil, grass area, redirect water source — Repair eroded area	 - Quarterly - Quarterly - Immediately and as required	 -MS - MS - BS
Rubbish Bins — Empty drums and burn (or carry away) rubbish — Inspect and replace bins if necessary	 - Daily - Annually	 - C - MS

Source:Whitlock Brothers (2001) and Iyagba (2005)

COST PERFORMANCE FOR BUILDING CONSTRUCTION PROJECTS IN KLANG VALLEY

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Abstract

Since seventies, the economic of Malaysia has undergone rapid growth. Construction industry constitutes an important element of Malaysian economy. It shows how important to control and manage the projects in good quality and efficiently. There are four fundamental constraints needed to be considered when managing the construction projects, which are scope, cost, time, and quality. In order to manage the projects successfully, it is necessary to consider whether the project is within those four constraints. However, it found that there were many problems on cost performance in many countries. One of the major problems was cost overrun in construction projects. In Malaysia, the problem of cost overrun considered significance in construction industry. There were many factors that contribute to cost overrun in Malaysian construction projects. The factors might become risks and lead to negative effect to the projects. Hence, this research is to identify factors that contribute to cost overrun and potential measures to overcome the problem with the focus given to construction projects within Klang Valley. The method used in this research is quantitative based. A questionnaire survey conducted to collect data from the respondents that consisted of project manager, quantity surveyor, M & E Engineer, C & S Engineer, and other related respondents. Questionnaires were distributed to 30 respondents from construction firms in Klang Valley. Data collected form a database for analysis using Statistic Package for Social Sciences (SPSS) version 17.0. Descriptive statistics and ranking analysis were used in data analysis. The result shown that the most serious factor contributes to cost overrun was inaccurate or poor estimation of original cost and the factor do not affect most was mistake in design. The most important method to control construction cost is proper project costing and financing. On the other hand, the least important approach was establishing a system in design. In conclusion, the problem of cost overrun is not a small issue but could cause serious problems to the construction industry in Malaysia.

Keywords: Construction projects, Cost overruns, Cost performance, Malaysia

Introduction

Malaysia is in the process of rapidly developing. Intan Rohani et al. (2009) reported that since seventies, the economic in Malaysia has undergone rapid growth. It found that construction industry constitutes an important element of Malaysian economy. According to Chan (2001: 10), "*the construction sector achieved a more moderate growth of 11.8% in 1996 after recording a high growth of 15.2% in 1995*". Its constribution to GDP (Gross Domestic Product) is estimated to be stabilised at 4.5%.

In construction industry, it is important to have control on cost performance of projects to ensure the construction cost is within the budget. So, project cost management is needed to keep the project within its defined budget. Project Management Institute (2004: 14) defines project management as "*application of knowledge, skills, tools and techniques to project activities to meet project requirements*". A project gets more scientific and systematic when the project gets larger and more complex. This is because the project becomes necessary to integrate and coordinate human inputs and some of physical components within the four fundamental constraints which are scope, cost, time and quality.

According to Ramli (2003), cost management in construction industry is less effective compared to time management. Categories of project cost management include project resource planning, cost budgeting, cost control and cost estimating. Two important components of cost control are cash flow management and project accounting. It should determine the projected final cost and consider the projections of future cost where it involving scope, time and quality.

Cost overrun is a major problem in project development and is a regular feature in construction industry. The situation of a construction project in which budgetary estimate exceeds estimation, budget exceeds budgetary estimate, and settlement exceeds budget is a universal phenomenon. Construction cost which is out of control adds to investment pressure, increases construction cost, affects investment decision-making and wastes the national finance might result in corruption or offence. Hence, it is important to identify the factors that contribute to cost overrun to avoid and reduce the problems.

Cost Performance

"Cost is among the major consideration throughout the project management life cycle and can be regarded as one of the most important parameters of a project and the driving force of project success" (Azhar et al., 2008: : 7). Gido and Clements (2003) mentioned that cost performance is an effective technique in project management effort expended and it is widely accepted in the literature and industry. Earned Value Analysis (EVA) is used to evaluate cost performance of different types of projects. Cost control, cost estimating, and cost budgeting are three cost related processes that interact among each other and with other scopes of construction projects.

Besides that, Gido and Clements (2003) stated that there are four cost-related measures in cost performance analysis which are used to analyze cost performance of a project. The measure is used to evaluate the project whether the project is being performed within the budgeted cost or whether it is in line with the actual cost. The four cost-related measures are TBC (total budgeted cost), CBC (cumulative budgeted cost), CAC (cumulative actual cost), and CEV (cumulative earned value).

Normally, cost estimation will be made before start a project so that it can be controlled within cost budget. A project may require more than one person and may occur more than once during the life of a project which depending on the complexity of the project. It may be very simple or extremely complex when managing the cost of project. In project management, it should also consider the needs of project stakeholders in the project cost (Gido antd Clements, 2003).

It found that it is important to studies more detail on costs of building and it is agreed by Ashworth (1994: 6) found that "*cost studies of buildings consist of the application of the techniques and expertise of economics to construction projects*". Also, it is to ensure available resources are used efficiently and to increase the rate of growth of construction work in the most efficient manner.

Cost Overrun

Cost overrun is a very common phenomenon and majority projects in construction industry facing this problem. Cost overrun occurs when the final cost or expenditure of the project exceeds the original estimation cost, Avots (1983). Angelo and Reina (2002) pointed out that cost overrun is one of the main problems in construction industry. The problem may found in both developing and developed countries. This problem is quite serious and futher study on this issue is needed to reduce the problems. There are some factors contribute to cost overrun in construction industry which are found from the researchers' study. The factors are as follow:

Inaccurate or Poor Estimation of Original Cost

Peeters and Madauss (2008) stated that the biggest factor that contributes to overruns of budget is inaccurate estimation of original or initial cost of a project. It is because of technical problem on how to estimate project costs and also not enough project information in the early stage of project.

Inflation of Project Costs

Harrison (1981) stated that inflation of project costs cause increasing of costs. Inflation of materials, equipments, and labours costs may vary geographically within a country, from country to country, and contracts of subcontractors with suppliers may involve different inflation protection terms that agreed with a client. As inflation goes up, interest rates will go up and the costs will increase too.

Improper Planning

According to Frimpong (2003), improper planning and management experience limitation caused failures of using technical. The processes to produce a product become slower and take longer period to complete the project.

Fluctuation in Price of Raw Materials

Price fluctuation causes cost overruns in most cases where it is hard to estimate the cost accurately because it is objective. This happen caused by high inflation of price in developing countries or the speculation of suppliers (Long et al., 2008).

Poor Project Management

Poor of site supervison and management and poor project management assistance contribute to problem of cost overrun in construction projects. Poor of site management reflected the weakness and incompetency of contractors. Skilful and experience human resource is insufficient in site management (Long et al., 2008).

Lack of Experience

Chan and Park (2005) found that most of the contractors are lack of experience especially in financial management. The distributon of the costs do not plan well in the projects. It might cause over of costs budgeted.

Obsolete or Unsuitable Construction Equipments and Methods

Obsolete and unsuitable equipments and methods cause the progress of construction works become slower. Some countries try to import or transfer the modern technology into their countries. However, the method is unsuccessful because lack of skilful human to operate the technology (Long et al., 2004a).

Unforeseen Site Conditions

Nega (2008) found that actual site conditions of a project are not usually determined until excavation is completed. It is sometimes possible that site conditions are overlooked by the initial review or conditions have changed due to change of weather conditions or sub-soil conditions. The unexpected conditions on sub surface sometimes require fundamental redesign of projects with high expense. Changes of site conditions become a problem for machinery and supplies to move in and out of the site. This also increase costs required.

Mistake in Design

According to Long et al. (2008), mistakes in design or poor design are caused by the low-competence designer. The approval design or drawing process becomes low quality and ineffective especially for those with government-funded projects. The unrealistic design which found after the start the construction projects has to change and it could lead to cost overrun.

Insufficient Fund

Long et al. (2008) noted that delay of the projects followed by cost increasing to cover all the expenses during construction. Owners are not preparing sufficient fund for project and pay on time as shown in contract agreement to contractor.

Poor Contract Management

Ogunlana and Olomolaiye (1989) mentioned that many contractors in developing countries have organizes their own commercial undertaking. They are good in managing expense because they are familiar with the business of making money. They pay low wages, submit low bids and low ability to plan and coordinate contracts. They do not follow the agreement that stated in contract.

High Cost of Machineries

Chan and Park (2005) found that high cost of machineries is one of the market related problems. Construction industry is mainly market driven where it is influenced by curent market style. For example, when the oil needed to run machineries increasing, the rental cost of machineries also inceasing.

Construction Cost Underestimation

In order to get project approval for the project, some parties have deliberated underestimating of costs for their project. It is quite serious situation that occurred on some project (Nega, 2008).

Measures to Control Construction Cost

There are some measures which are found from the researchers' study to control the construction costs or to overcome the problems of cost overruns. The researchers have their own opinion on how to solve the problems. The measures are as below:

Proper Project Costing and Financing

Kaliba et al. (2009) stated that delays of schedule may occur caused of delayed in payments due to complex financial processes in client organisations. Delay in payment would cause financial difficulties to contractors and subsequently delay the schedule to complete the activities on site. Interest could be charged on delayed payments hence inducing cost overruns in the project.

Competent Personnel

Kaliba et al. (2009) mentioned that contractors, consultants, and clients should ensure that they have the right personnel with appropriate qualifications to manage their projects efficiently. It is better if construction manager have experience and qualifications in project or construction management.

Appropriate Scope Definition

Nega (2008) agreed that only concern on the works required to complete the project successfully. Guard against incomplete identification of scope is important to avoid frequent changes. Also, do not incorporate the works out of scope to avoid unnecessary works.

Proper Cost Control

Ashworth (1994) mentioned that one of the client's requirements in respect of construction project is assessment of its expected cost. Proper cost control is important as it is the general trend towards greater cost-effectiveness and ensures construction costs not solely in the context of initial costs, but in terms of life-cyccle costs or total cost appraisal.

Risk Management during Project Execution

Peeters and Madauss (2008) found out some approach to avoid cost overruns. In any development project, there must be contain certain amount of risks. Therefore, a risk management function needed to be performed by project manger to determine and reduce the risks of the particular project. The aim of risk management is to minimise any risk that might result failure to meet the project requirements.

Appropriate Contractual Framework

Peeters and Madauss (2008) has supported that once the objective of cost has been estimated, it is followed by choosing an appropriate contract model where there are techniques to make a relationship between the initial estimate and final price.

Increase Supply of Materials

Frimpong et al. (2003) found that there should prepare adequate allowance for any emergency case in order to cover increasing in material cost due to inflation.

Realistic Cost Estimation

The initial cost estimates should be as accurate as possible. Accuracy of cost estimation allows clients to check and determine the required funds for executing the project are made available when required (Kaliba et al., 2009).

Efficient Management

Gould (2002) stated that efficient management is important to produce a productive and cost efficient site. Scope may changes due to inadequate planning and feasibility studies. In order to control the project effectively, the project manager must follow up the schedule to avoid additional costs and ensure the building can be occupied on time as planned.

The techniques to overcome the problems of cost overrun are found by literature study. From the literature study, it found that there are eleven variables that are suggested by the researchers to overcome or reduce the problems of cost overrun in construction projects. An appropriate technique should be considered and used in construction projects in Malaysia to reduce the problems of cost overruns.

Research Methodology

There are four main stages involved in this study. They are:

Stage 1: Preliminary Study

The problem area of research is identified at the first stage. Some considerations needed are level of expertise, interest, magnitude, measurement of concepts, availability of data, relevance, and ethical issues.

Stage 2: Research proposal

A research proposal includes the overall plan, structure, scheme, and designed method to get answers for the existing problems that constitute to the research project. Besides, a research proposal should outline the various tasks that have planned to undertake to fulfil the research objectives or obtain answers of the research questions.

Stage 3: Data Collection and Processing Data

After have determined the research problem, formation a study design, constructed a research instrument and selected a sample, data will be collected from where it will draw inferens and conclusion for the study. The method used to collect data in this study is questionnaire survey. The questionnaire is designed based on the objectives of the study. The questionnaires were distributed to 30 respondents of different projects. Then, it is followed by processing data. The data collected from the respondents will be analysed. Due to limitation of time and cost, the following limitations were used during the data collection process.

- The project was completed projects in Klang Valley.
- The project was completed in between years 2000-2009.
- The project size in contract value is at least RM 5,000,000.

Stage 4: Conclusion and Recommendations

At this stage, all of the relevant data were written up in a report. This included conclusion and recommendation for the research. The conclusion will be tied up with the objectives to ensure the objectives have been achieved.

Data Analysis and Discussion

The data collected by using questionnaire survey method will be analyzed by using Statistics Package for Social Sciences (SPSS) version 17.0. The data were collected from 30 respondents of construction consultancy firm in Klang Valley. The questionnaires were distributed to the relevant respondents which include project manager, quantity surveyor, M & E Engineer, C & S Engineer, and others repondents who have knowledge on cost overrun in their projects. The respondents need to answer the questions based on their projects selected which include types of project and total cost for the projects. It is also to identify the cost performance in their project.

The method used in the data collection is descriptve statistics. Purpose of descriptive analysis is to summarize the data collected from the respondents. In this study, decriptive analysis is applied in discussing the respondents' profile, projects' profile and respondents' opinion on the relevant projects. Two types of question are used in the questionnaire which is multiple choice questions and Likert scale. Table 1,2 and 3 shows the result collected from the 30 respondents:

There are many factors that contribute to cost overrun in construction projects. From literature review, it was found that there were thirteen main factors that contribute to cost overruns. The factors contribute to cost overrun includes inaccurate or poor estimation of original cost, inflation of project costs, improper planning, fluctuation in price of raw materials, poor project management, lack of experience, obsolete or unsuitable construction equipements and methods, unforeseen site conditions, mistake in design, insufficient fund, poor contract management, high cost of machineries, and construction cost underestimation.

Since cost overrun is a quite serious problem, so it is necessary to identify the measure can be implemented by contractors to control their construction cost. There are eleven measures have been identified which include proper project costing and financing, proper cost control, competent personnel, efficient management, risk management during project execution, realistic cost estimation, appropriate scope definition, appropriate contractual framework, establish training programs, increase supply of materials,and establish a system in design. The ranking of variables were identified based on the mean.

Table 3 shows ranking for measures used to control cost overrun in construction projects. From the result, it found that poor estimation in project costs is the main factor contributes to cost overrun in the projects of Klang Valley area. In respondents' opinion, mistake in design is not a serious problem if compare with other factors. Since poor estimation is the main problem, so the respondents consider that the main measure to overcome cost overrun is by controlling project costing and financing properly. Besides that, it found that the mistake in design is not a serious problem, so the respondents consider that establish a system in design is not very important for them to overcome cost overrun.

Conclusion

Cost performance in contruction projects is a critical issue in Malaysia. It was found that most of construction projects in Malaysia are affected by cost overrun. Finding of the research shows that construction industry suffered for the problem of cost overrun in projects. Two main variables that contributed to the cost overrun in Malaysian construction projects are poor estimation of original project cost and underestimate the construction cost by quantity surveyors.

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Appendix

Table 1: Result Obtained from Multiple Choice Questions

Questions	Major answer from respondents	Percentage (n=30)
Position of respondents	Project manager	44
Frequency of Respondents' involvement in cost overruns	5-10 times	47
Types of project selected	Residential	60
Total cost for project selected	More than RM 20,000,000	37
Ratio for actual project cost to target project cost	0 to 8, 0.81 to 0.90, 0.91 to 1.00	23.3

Table 2: Ranking on Factors Contribute to Cost Overrun

Variables	Mean (n=30)	Standard Deviation	Ranking
Inaccurate / poor estimation of original cost	4.30	0.794	1
Construction cost underestimation	4.30	0.837	1
Improper planning	4.27	0.828	3
Poor project management	4.20	0.847	4
Lack of experience	3.90	0.803	5
Poor contract management	3.83	0.950	6
Inflation of project costs	3.80	1.031	7
High cost of machineries	3.67	0.884	8
Fluctuation in price of raw materials	3.47	1.167	9
Unforeseen site conditions	3.47	0.776	9
Insufficient fund	3.33	0.959	11
Obsolete / unsuitable construction equipments and methods	3.27	0.828	12
Mistake in design	3.17	0.986	13

Table 3: Ranking on Measures to Control Construction Cost

Variables	Mean (n=30)	Standard Deviation	Ranking
Proper project costing and financing	4.70	0.466	1
Proper cost control	4.50	0.682	2
Competent personnel	4.47	0.681	3
Efficient management	4.43	0.728	4
Risk management during project execution	4.33	0.711	5
Realistic cost estimation	4.13	0.629	6
Appropriate scope definition	3.97	0.718	7
Appropriate contractual framework	3.80	0.714	8

Establish training programs	3.67	0.758	9
Increase supply of materials	3.53	1.074	10
Establish a system in design	3.50	0.820	11

EMPLOYEES FEEDBACK ON OFFICE WORKSPACE CONFIGURATION IN PUBLIC HIGHER LEARNING INSTITUTION

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Abstract

Space planning is an integral part because without proper planning, a good workspace configuration could not be achieved. Models and concepts that were reviewed could be an essential guide in planning process. Attention should be put on the core elements as the workspace is design for a purpose. If the design fails and the users were not satisfied, then the configuration could be considered fail as a whole where it cannot help the organizations reach their goals and objectives. Therefore, a thorough understanding of the planning process will be very useful to achieve the ideal workspace configuration. This research aims to study and analyze workspace configuration that has been implemented in offices on public higher learning institution in Malaysia. Based on the observation and the data gathered, the workers comfort and satisfaction level are very important as these two aspects would result in the overall productivity of the organization. The workspace in offices should be reconfigured according to the people, location, design and worker's work style. These factors play an important role in shaping a good working environment with a proper workspace configuration. Questionnaires were distributed to each case study and feedbacks from the respondents were gathered. The questions enquired on their perception and the satisfactory level on their current workstation. Case studies will provide essential background information reflecting the office workspace configuration in today's offices. This study believes to be valuable in identifying the criteria and key factors affecting the satisfaction level of the workers. Analysing data will provide the first indication of how well the space configuration practice is performing and helped pin point problem areas within office workspace. It is anticipated that this study would contribute to the development of a better office workspace by improving quality and value of workspace configuration of public higher learning institution in Malaysia.

Keywords: Satisfaction level, Workspace, Public higher learning institution.

Introduction

A workplace is essentially made up of a number of planned zones and workspaces. Organizations live by their informal structures, based on the day-to-day activities that include the daily tasks, problem-solving and learning situations. The informal structure involves workers to interact and share ideas among each other despite their hierarchy level. They are allowed to communicate freely in terms of achieving the same goal for the organization. The way they interact and where they do it makes a workspace an essential part of allowing them to be able to work as a team. The workspace thus becomes essential to organizational performance as its configuration plays an important role as a medium of interaction and resource.

Leete (2003) stated that when asked to name important factors contributing to workplace evolution, many would agree that technology has done the most to change the way we work. Tyler (1997) concurs that office-layout design is changing to take advantage of such mobile office technology as cordless telephones and laptop computers. That same technology allows more people to do more of their work without coming into the office at all. As employees become more mobile, companies are realizing that dedicating floor space to the service of a person who is not always there to occupy it is a waste of resources. Moreover, it can lead to the office equivalent of a village riddled with holiday homes where too many empty spaces for a proper working atmosphere to develop.

Some companies are concluding that permanent desks and workstations should be given only to those who occupy them throughout the working day. According to Lindahl (2004), work environment qualities have received attention from researchers for a number of years. If, however, the work environment qualities are very poor, the focus at the place of work will be on carrying out the working tasks at their most basic level. The physical workplace is one of the top three factors employees take into account when deciding to accept or leave a job, so this clearly has a massive effect on employee productivity, meaning that employers have to give serious thought to issues such as employee comfort, access to people and equipment, privacy and flexibility (Sule, 2007). Thus, this research aims to study and analyze workspace configuration that has been implemented in offices as they have an influence on the people in the workplace and also on the organization.

Problem Statements

According to Lindahl (2004), spatial issues are seldom discussed when it comes to evaluating organizational performance. The buildings, or the premises, where the organization performs its activities are often taken for granted. Usually there is an existing building where the organization has to adjust to what is already there. This refers to the facilities including furniture and space that the existing building offers. This differs from a new building that is constructed with the economy of the construction and corporate style in mind, rather than organizational performance which marks a totally different view of space configuration. Since modern organizations are not fixed structures, and might be described as arenas for networking where people interact in different ways, a dynamic view of their resources becomes important. A typical matrix organizational structure would be a good example of how modern organization performs. The basis for the matrix organization is an endeavor to create synergism through shared responsibility between project and functional management. Information sharing is mandatory in such an organization, and several people may be required for the same piece of work. However, in general, the project manager has the total responsibility and accountability for the success of the project. The functional departments, on the other hand, have functional responsibility to maintain technical excellence on the project. Each functional unit is headed by a department manager whose prime responsibility is to ensure that a unified technical base is maintained and that all available information can be exchanged for each project (Visitask , 2004).

Organizations live by their informal structures, based on the day-to-day activities that include the daily tasks, problem-solving and learning situations. The informal structure involves workers to interact and share ideas among each other despite their hierarchy level. They are allowed to communicate freely in terms of achieving the same goal for the organization. The way they interact and where they do it makes a workspace an essential part of allowing them to be able to work as a team. The workspace thus becomes essential to organizational performance as its configuration plays an important role as a medium of interaction and resource. The overall performance of an organization will be study based on their workspace design.

Aim and Objectives of Research

The aim of this research is to study and analyze workspace configuration that has been implemented in Malaysian higher learning institution offices as they have an influence on the people in the workplace and also on the organization. Case studies will provide essential background information reflecting the office workspace configuration in today's offices. Research objective is to identify the criteria and key factors that result in changing the workspace configuration, and how it affects its workers. In completing this research, following objectives are needed:

a) To evaluate current workspace configuration and determine the satisfaction of the users.
b) To identify the key factors that would result changes in the office workspace configuration.

c) To illustrate how better workspace configuration would allow better working environment for employees in an organization.

Workspace Configuration – An Overview

A variety of workspace forms for offices have been derived from the application of what have become known as integrated workspace. It combines the nature of the physical settings, the information technology that supports it, the nature of work patterns and processes, and the organizational culture and management (Chilton and Baldry, 1997). Benhar (2004) stress in his article that the office environment is an evolutionary process whereby rows of desks began to give way to the rise of furniture systems that created highly flexible and efficient workstations for the rapidly growing white collar workforce. Leete (2003) asserted that when asked to name important factors contributing to workplace evolution, many would agree that technology has done the most to change the way we work. As highlighted by Miller (2007) in an interview, the thing that's most different about office spaces today is that pretty much anything goes. With IT approaches, there's the office where people work on their laptops in a variety of unusual environments (Tyler, 1997). Technology allows more people to do more of their work without coming into the office at all (Robertson, 2000; Peterson & Beard, 2004). As employees become more mobile, companies are realizing that dedicating floor space to the service of a person who is not always there to occupy it is a waste of resources. Moreover, it can lead to the office equivalent of a village riddled with holiday homes where too many empty spaces for a proper working atmosphere to develop. At the other extreme is the traditional office that can be seen much of, from legal firms to accounting firms, where individual offices with individual people and workstations, or some pool area with support staff. It really depends on how the employees work and the privacy they need. Whether it is a brand new operation, full-scale office relocation or a partial re-organization, a carefully planned and implemented workplace can have a profound impact on the performance of an organization (Steiner, 2005).This is very important as employees' needs do make a huge contribution to the organization productivity and therefore it is consider as a business need to have a comfortable, sustainable and technology friendly workspace design.

a) Workspace Design

As stated by Benhar (2004) in his article, the quality of workstations is far superior today, with a greater range of acoustic, consideration and visual privacy, and configurations offering multi functional versatility, as wireless technology becomes more advanced and affordable. A growing number of employers can expect to move more of their space from panel based workstations to the more flexible open desking systems. Steiner (2005) highlighted that the inter-connected nature of today's workplace has set a new benchmark for office workspace design. The need to reconfigure traditional workspaces to suit today's technology and business world has become so important because they affect the organization workforce as a whole. Emerging trends for the next generation workplace, which includes modular systems with multi-tasking functionality, mobility and flexibility, are a clear trend. Solutions that combine storage with soft seating and incorporate power and data connections in breakout area seating are among the new innovative solutions available today (Steiner, 2005). Ergonomics and health are still high on the agenda, with fully adjustable chairs, desks that incorporate lift technology, keyboard trays with wrist supports and more products that incorporate adjustable flat screen technology appearing in the workplace. Lighting solutions that enhance visibility between workstations and distinguish between private workstations and interactive social spaces are becoming more familiar features, also creating a feeling of natural daylight in areas where employees have no access to windows (Steiner, 2005). Hughes stated that cabling solutions for electronic data and telecommunications are being addressed by innovative, easily accessible flooring systems or through ceiling troughs. As teams regroup and evolve essential IT and power supplies can easily be reconfigured in line with the new requirement. Cabling has also been incorporated into seating, further contributing to the emerging concept of workplace freedom; people are no longer

confined to working solely from their traditional workspace (Miller, 2007). Flexibility is the main key that shapes today office workspaces. Alongside with ergonomics and health, the new design of modern office workspace collaborate many solutions that concludes a better configuration that meets the needs of today's organization.

b) Workspace Flexibility

According to Benhar (2004), the main goal of tomorrow's office will be to help workers capture, organize, analyze and share information more easily and efficiently. Ultimately, the focus is not on gadgets, but on production, privacy and personalization for office workers. All of the high technology concepts making their way into the workplace will certainly require new and more versatile workspace design to ensure the comfort and productivity of tomorrow's office worker. The office spaces of the future will likely be designed to improve efficiency without having to worry about reserving rooms and getting people from different points. In much the same way that people move around their own homes to do different things, such as socialize in the living room and read quietly in the bedroom, offices need to enable variety (Benhar, 2004). As always, flexibility and mobility is the key. Current designs still focus on the computers, but the technological building blocks are now in place for a more mobile approach. As new technology and work patterns are incorporated into new designs, the next few years should offer some unique visions for the office of the future. Already it is clear that the future will offer more variety in office space, including comfortable and spacious rooms for entertaining clients, quiet thinking spaces and social areas that give people a place to escape the desk. While the paperless, wireless office may still be a long way away, the thought of designing workspace that will reduce clutter while addressing the need for storage solutions, personal interaction and the incorporation of advancing technologies. The non-territorial options offer some flexibility for staff churn and make economic sense as some companies find they can no longer afford to provide one desk per person. However, the challenge facing facility managers is to create a flexible space that can seamlessly accommodate multiple modes of working (Steiner, 2005). Be it individual or group working space, it is inevitable that future flexibility in today's space configuration is essential. This is not only to ensure that the workspace is sustainable for future use, but also to minimize distractions and disruptions during business which in time will cost loss of profit to an organization.

c) Shaping the Workspace

Steiner (2005) stated in his article that in the current corporate world, more and more people are becoming "Knowledge Workers". Born out of the fast-paced IT sector, the principles of relying on the individual's power of ideas, thought leadership and information to make the right decisions that enhance competitive advantage are crossing over and being adopted by other industries. Knowledge transferred through human collaboration via formal or informal meetings and social interaction is further enhanced by communication technology, which can ultimately translate into company assets. With a variety of needs depending on job function, specific tasks, work-style and personal life, knowledge workers have greater freedom in choosing when and where to work, which helps in the achievement not only of optimum productivity, but also a healthy work/life balance. It naturally follows that the design of the physical workspace and infrastructure must also evolve to successfully accommodate this changing approach to work. Advances in emerging areas of technology such as mobile and wireless devices, power cells and pervasive computing solutions may have further accelerated the changes in the workplace, but this will only continue to have an influence as long as the costs of implementing such solutions are not prohibitive; and the workforce successfully adopts and utilizes the tools to their full potential. In office environments, by far the single greatest cost to employers is that of the salaries of the employees occupying the space. Successful organizations have, therefore, recognized that an effective workplace helps attract and retain the right staff (Steiner, 2005). The physical workplace is one of the top three factors employees take into account when deciding to accept or leave a job, so this clearly has a massive effect on employee productivity, meaning that employers have to

give serious thought to issues such as employee comfort, access to people and equipment, privacy and flexibility (Sule, 2007).

Data Gathering/Methodology

A total of three case studies were selected for this study. The three case studies were selected based on their business nature as a public higher learning institution. The next criteria were to choose the most suitable and typical office in the public higher learning institution that would resembles and illustrate the other offices workspaces in the institution. Thus, the facilities department office was chosen as the case study for each public higher learning institution. The selection was done based on the capability of facilities department in each institution to reflect as the ideal office workspace as they are the ones who plans and configured offices workspaces within the institution.

Post Occupancy Evaluation (POE) method which uses questionnaire to obtain feedback from targeted groups was used (Preiser, 1989). Sets of questionnaire papers were distributed on each case study as a populated sample to obtain data. The questionnaire was set in the simplest form that could be easily understood. The questionnaire was divided into two sections, section A and section B, respectively. The first section which is section A is meant for background information purposes. Background information questions were mainly to obtain information on the respondent's basic information that consist of gender, race, age, working years and job types. Section B of the questionnaire will enquire on the office workspace configuration. The office workspace section intends to evaluate the user's workspace and satisfactory level on their current workspace. The respondents were asked to give a 'yes-no' answer on the first six questions and only the last question allows them to choose and rate the overall satisfactory level of their current workspace. The nature of these questions was established based on literature reviews and past (Lee, 2006; Leishman et al., 2003; Heerwagen & Zargeus, 2005).

The methodological framework used in this study stems from compilation of written discourse from which discourse analysis has identified patterns in the data (Bender, 2007). Results obtained from questionnaires would be further analyzed and categorized into groups for ease of referencing. Data will be presented in graphs for better understanding. Data obtained from case study will be analyze and finalized. Based on the approach, this study will utilize interpretation methods to capture meaning from the data, categorized the data, and produced the findings from the data obtained.

Result & Discussion

Table 1 below summarized the employees feedbacks gathered from the sample of the case studies. A total of 120 questionnaires were sent out to three public higher learning institutions in Malaysia. However, based on the total questionnaires received, only 88 questionnaires were accepted for data analysis with 19 rejected due to uncompleted answer. This results in 73.33% of valid response rate on current workspace configuration and its satisfactory level.

Section A Results

The figures presented below shows the background information for the case studies. The gender, race, age, job type and working experience are all vital data that would be essential during the overall findings of this research.

The information obtained from the figure 1 shows that the number of female workers exceeds the number of male by 52.94%. They also consist of many races that include Malays, Indian and 5.88% respondents of other races (Figure 2). The main job type for

the workers as indicated in figure 3 are administrative support and that governs a majority of 88.24% of the total sample. Managerial level consists of only 11.76% of the total sample. None of the respondents were in the technical line and after some random interview done with the workers in the office, the technical staffs were mostly working outside at the time and no feedback could be obtained from them. Workers in the office are mostly around the age of 26-35 years old. Figure 4 shows that workers that belong under the age of 25 were 26.47%, 36-45 years old were 17.65% and 46-55 years old were only 2.94%. From figure 5, workers above the age of 55 years old were 5.88% from the total sample in the office. Most of the workers have the experience working in the office for around 1-5 years. The rest of them worked less than a year and only 11.76% already worked for 6-10 years in the office. The second largest figure in the working experience chart which was 17.65% belongs to workers with experience working in the office for more than 10 years. These workers can be considered as seniors as they spent the most time in the office.

Section B Results

Figure 6 in the appendix indicates that 85.29% of the respondents gave negative feedback which disagrees that their workspace is suitable for their daily task. In the second question, 73.53% of them also disagreed that the workspace allows them to work efficiently.

Furthermore, 79.41% of the respondents disagreed that their workspace provides flexibility for communication and interaction with other staffs in the office. Another 76.47% gave a negative feedback that their workspace cannot be personalized according to their own needs. The question on privacy saw a majority of 94.12% of the respondents stated that their workspace does not provide enough privacy and only 5.88% stated the other way.

Based on the questionnaires, ranking analysis was conducted to identify most contributing factors. The results were ranked based on mean reading shown in Table 2. The result obtained revealed that all intervening variables tested are important in determining employees' dissatisfaction. The average mean ranking in Table 2 indicates that the variables 'privacy' is the most contributing factors followed by 'suitability' and flexibility', respectively. Majority of the respondents does not agree that their workspace is suitable for their daily tasks. They also express difficulties in carrying out their routine works efficiently on the current workspace. This reflects on the negative side of the management that configures the workspace as many of the workers neither were unhappy nor satisfy with their workspace.

The overall satisfaction of the respondents toward their workspace can be sum up as dissatisfying. As per figure 5, 32.35% were very dissatisfied and 29.41% dissatisfied with the current setting of the workspace. Another 29.41% gave an unbiased feedback while only 8.82% indicates a satisfying condition with their current workspace configuration. Majority of the workers are dissatisfied with the overall workspace configuration. This could be illustrated with the high percentage of dissatisfaction feedbacks from the respondent's as shown in Figure 7. Furthermore, with the lack of privacy and the inability to personalize the workspace as the worker's desire also contributes to the dissatisfaction feedbacks. Satisfactory level was on the low as the workspace provided does not meet the workers needs.

From observation, workspace in the case studies uses cubicle system or cell type office model. The cell type model focuses on individual processes to allow concentrated study for the workers. It was designed for the workers to work without much distraction from others. Although it may seem fit for administrative tasks to be carried out in the workspace, however, feedback from respondents stated the opposite. This might due to the small space provided for each individual. The small space makes it hard for them to do their daily tasks efficiently and therefore resulting in poor satisfactory level among the

workers. Managerial or supervisory level staffs that have their own room were not affected much but the ones that were situated among the workers might find it uneasy to perform their tasks and holding meetings with clients. These rigid cell type model workspaces allow access for communication and interactions among workers. Nevertheless, the limited space discourages the interactions between workers and does not allow great communications with clients. Visitors and clients that came to visit the office for business purposes will find this configuration upsetting as informal meetings and effective communication with the workers are hard to ensue. Majority wanted a change and the satisfactory level was very poor. Improvements are really needed in order to help the workers continue to be productive. Otherwise, it will result losses to the organization in terms of overall work productivity.

Actions based on recommendations should be implemented to help maintain their workers productivity level. The workers morale and comfort level should also be the main priority as their work could have a big impact on the organization's business process. Above all, the study illustrates the workspace configuration and the impact on its workers. It is highlighted that there are plenty room for improvements and therefore recommended actions could act as a guide for the management to implement in the future.

Conclusion

Supporting business processes are the backbone to any infrastructure, especially in the new knowledge worker era. Evolving and dynamic, these include work profiling, user surveys, self-assessment surveys and effective internal communications, all of which help identify the solutions that are most appropriate for individual workers or groups (Steiner, 2005).

Although cubicles are excellent for concentrated processes, a small space provided for each individual might be inadequate and could cause discomfort to them. The workspace should be reconfigured and provide a bigger space for each individual worker. This might help to enhance their comfort level thus encouraging them to perform their work task in a better manner. The workers comfort and satisfaction level are very important as these two aspects would result in the overall productivity of the organization. In terms of communication flexibility, suggested actions would be to provide informal meeting area that can be accessed by workers and clients at the same time. These would benefit the organization in terms of business process and productivity. For managerial or supervisory level staffs, they should be provided a room to suit their job type as it would help them feel valuable and treated as to their rank. This will help to boost their working morale and increase the overall work productivity.

Overall, the workspace in offices should be reconfigured and this time, suggestions by workers should be taken seriously. The workspace should be configured according to people, location, design and worker's work style. These factors play an important role in shaping a good working environment with a proper workspace configuration. It is hoped that this research would benefit organizations to thoroughly understand the important factors and help them to plan and create an ideal workspace for their workers.

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Appendix

Table 1: Summary of respondents' feedback

Total Questionnaires Sent Out	120
Total Questionnaires Replied	107
Total Questionnaires Rejected	19
Valid Respondent's Rate	**73.33%**

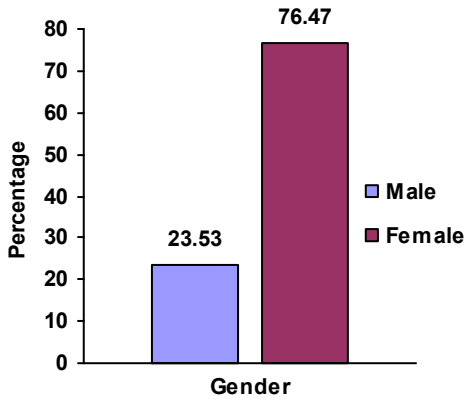

Figure 1: Percentage of respondent's gender

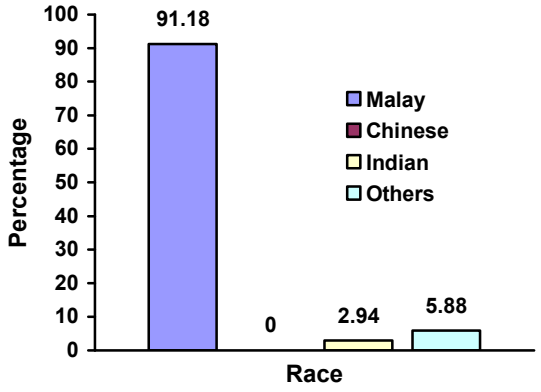

Figure 2: Percentage of respondent's gender

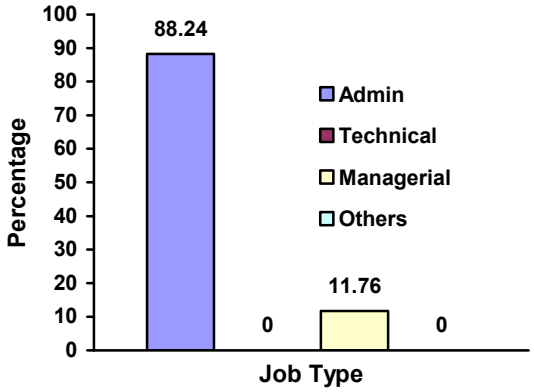

Figure 3: Percentage of job type.

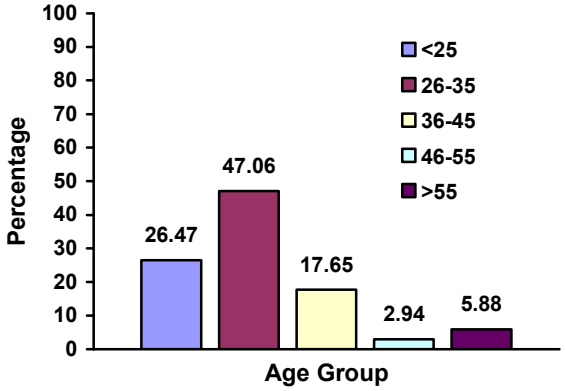

Figure 4: Percentage of respondent's age group

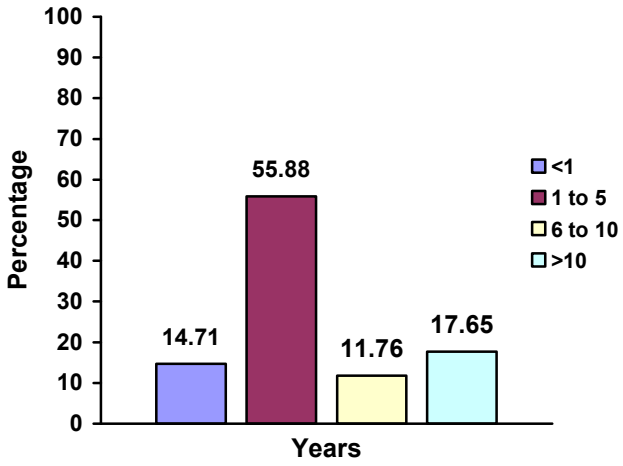

Figure 5: Percentage of working experience.

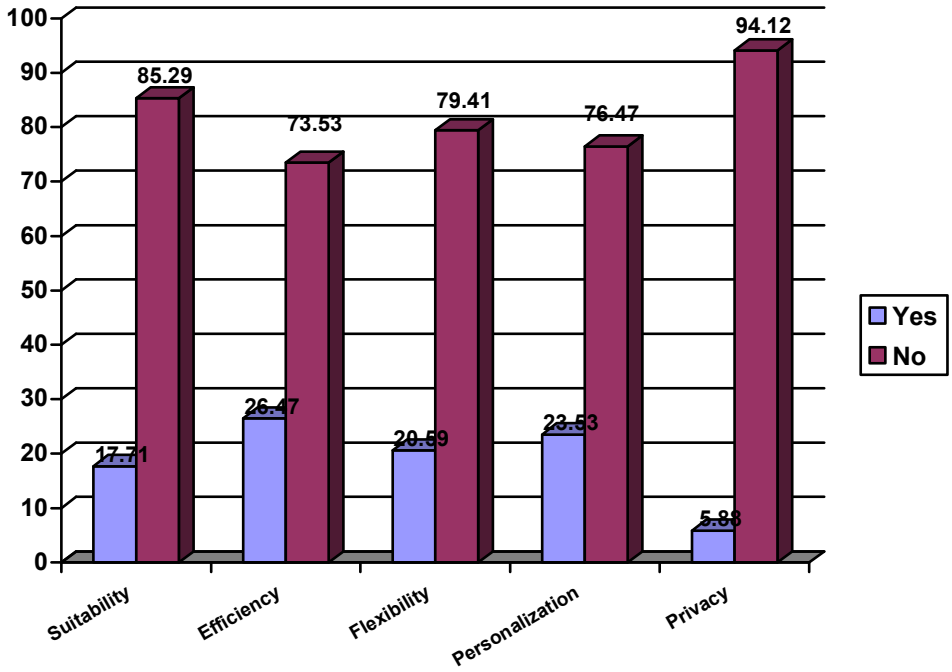

Figure 6: Percentage feedback from building occupants

Table 2: Ranking analysis for office configuration factors

	Mean, N=34	Rank
Suitable	**1.88**	**2**
Efficiency	**1.74**	**5**
Flexibility	**1.79**	**3**
Personalization	**1.76**	**4**
Privacy	**1.94**	**1**

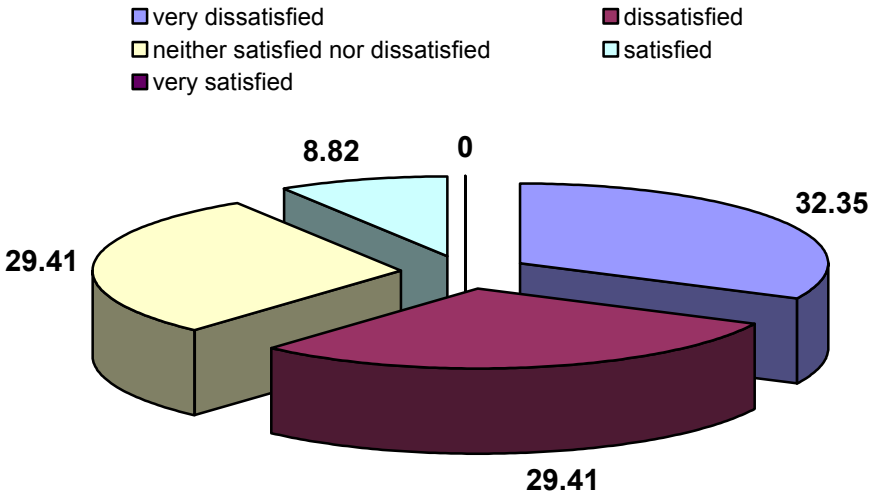

Figure 7: Overall satisfaction level of building occupants

THE GREEN HOME CONCEPT – ACCEPTABILITY AND DEVELOPMENT PROBLEMS

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Abstract

People nowadays are more concerned about the environment since they know the effect of pollution to the environment and to human's health. The conventional homes used up large amounts of power and produced large amount of carbon dioxides annually. Therefore, conventional homes are one of the sources of global warming. Conventional homes also polluted the environment. Green Home Concept is an effort made to reduce the impacts of conventional homes. Green home is a concept whereby a home is created to use less energy, water and natural resources, to provide good air quality and comfort, to generate less wastage, and can be considered as a sustainable development that improve the homeowners' lifestyle. It is still a new trend in Malaysia housing development scene. This research focuses on the people's acceptability and development problems that occur when developing green home by adopting case study and structural interviews methods. Questionnaire has also been applied to ascertain the Malaysian homeowners' acceptability towards this new development concept. This research has also highlighted the concept and designs of green home in Malaysia. The findings reveal that uncertainty on people acceptability towards green home and the price are the biggest problems faced by developers when developing green home.

Keywords: Conventional home, Green home development, Housing developers, Home Owners.

Introduction

Green Home is a space and energy efficient home which can offer cosiness and healthy living environment to its residents. Green Home operates by using sustainable resources. It is considered as a sustainable resources in the sense that it can maximize our resources by taking its resources from the natural environment and produce less effect on the environment. Green Home concept has to be applied from its building materials to its insulation and lightings. Green Home can fill up the homeowner's life with lavishness and style and is considered as a new positive feature to the community. There are two types of Green Homes which are Healthy Green Homes and Affordable Green Homes. Healthy Green Home emphases on controlling a home's resources which can pollute the environment for both the builder and homeowner. For the Affordable Green Home, the energy-saving features must be able to estimate cost efficiently (Yuldelson, 2007). Therefore, Green Home can be considered as a lifetime home.

Nowadays, the world's population is getting more and more concerned about the activities which can lead to global warming and cause pollution to the environment. Earth is excessively being exposed to all kind of pollutant resources. Every individual have to play their roles in protecting the Earth. Green technologies can be used to protect the earth and change our environment. The United Nations Environment Programme (UNEP) announced the environmental problems of water shortages and global warming are two major issues that the world faced. UNEP stated that all of these environmental issues will endanger the humans besides endanger the earth (Harris, 2007). Home owners used up large amounts of power and become a major source of the global warming since it produced between 10 and 30 tons of carbon dioxides annually. Some 1.8 billion tons or more carbon dioxides could be saved by applying green development (Harris, 2007).

Thus, sustainable development and green development play a big role to reduce the pollution of the Earth. Green Home Concept is one of the efforts made to reduce the

impacts homeowners and builders caused to the environment. Although Green Homes have been around for centuries but they are only practiced mostly in the Western countries. Architects started to design homes which used less electricity. They introduced the use of solar energy in 1970s when the first major global energy shortage took place (Harris, 2007). Although Green Homes have exist for such a long time but there are still not many experts and experienced green building developers availabler, even in the western countries. This concept has just set its foot in Malaysia in year 2007 through the development of the luxury Green Homes at Taman Tun Dr Ismail (TTDI), Ampang, Selangor (Andrew, 2007). This means that the Malaysians have started to realize the importance of maintaining the environment which is being seriously polluted, evidenced by a global warming phenomenon. Malaysians should put more effort of protecting the environment starting from their house as homeowners. Green development has begun to be emphasized in construction these days by local developers. Thus, this research focuses on the people's acceptability and development problems when developing Green Home.

Research Objectives

The followings are the objectives of this research:-

i. To explore the concept and designs of green home in Malaysia.
ii. To identify the problem faced by the developers when developing green home.
iii. To investigate the people's acceptability towards green home development.

Research Methodology

This research has been conducted using both quantitative and qualitative approaches. The quantitative approach is applied to study and analyse the understanding of green home concept of the homeowners in Malaysia and determining which problems affecting most to the development. The qualitative approach is carried out to explain about the green home concepts and the problems which may encounter by the developers. Interviews with the developers in Klang Valley and Penang have been conducted to get the first hand information on the green home concept and problems in Malaysia.

For the quantitative approach, 150 questionnaires have been distributed to the homeowners to determine their level of awareness and understanding on green home concept in Malaysia. The homeowners from Klang Valley and Penang were selected as the survey's target due to the existence of this type of development in these areas.

Analysis of Findings and Discussions

Structural Interviews

At least three series of interviews were conducted with a developer (YTL Land and Development Berhad (YTL)) in March 2010. All matters pertaining to development of Green Home were discussed and a special reference was made to development of the 'Bird Island Project' during the interview sessions. The following paragraphs reported the interview outcomes.

The Concept of Green Home

Based on the interviews, the concept of green home used by YTL to develop the Bird Island Project is the Zero Home Energy Concept. The aim of Zero Home Energy concept is to achieve zero energy cost. The company adopted this concept because the company's mission is "Seeking Zero". The mission is considered as a starting point for the Malaysian to take their responsibility starting from their lifestyle to protect the environment and to build up a sustainable society. The aim of the concept suits the mission of YTL perfectly. The green home of the Bird Island Project is provided with energy-efficiency appliances. It uses renewable energy as its power source. The green

home of the project produces its own energy by sending some of the energy back to the utility. At night or during the day without sunshine, the power stored during sunny days is being used as the power source of the house.

Differences in Designs between Conventional Home and Green Home

The main difference between a conventional home and a green home is that the conventional home used up 30% more energy compare to green home. Green home which was developed by YTL is situated at an environmentally friendly place which is at the Maple of West Sentul, where it is surrounded by the greenery. This allows for the green home to maximise its exposure to the sunlight to generate the required energy. Conventional home can be built anywhere. The trees and shrubs surrounding green home can act as the natural shades to cool down the house.

Day lighting can be used to lessen the usage of electricity. It is the natural light to come through the windows and openings of the house. It also provides heating and cooling purposes to the house besides lighting up the interior of the house. Day lighting allows the sunlight to fall evenly on the green home. Day lighting design can help to maximise the usage of solar energy in green home. Day lighting is very useful in Malaysia because Malaysia has exposure to sunlight all year long since it is located at the equator line. Glass doors and windows are being used in designing green home to allow the daylight to enter the house. Windows must be placed at the right place of the house to serve their function as ventilators. Light tube is also being used to have surface which can reflect the daylight and pass on the light to the home interior. Green home at Bird Island used light tube because it has lesser heat transfer compare to skylight. Sustainably-source silicone glass fabric is being used to build the Bird Island's green home. Since this type of glass is very light and flexible, the green home can sway with the breeze. It also allows daylight to enter the house and allow the homeowner to have a glance to the sky whenever the wind blows.

Solar energy is the form of renewable energy used in Malaysia as green home's energy resources. Solar energy can produced heat and electricity. Solar roof shingles is installed to generate solar energy for green home. Solar thermal system captures and stores the heat obtained from the sun and being turn into heat. Backup boiler is being used to generate heat on the cloudy day and cold weather day. By using solar energy, the homeowner can save electricity cost at Bird Island.

The Green Home Competition

To achieve the outstanding and workable designs of its Green Home at Bird Island, YTL had conducted the 'Green Home Competition' and invited entries of expert property developers from other countries. The 'Green Home Competition' held by YTL was considered as a successful competition. Six countries participated in this competition. Among them are Atelier Ten, Grant Associates and Plasma Studio which are from United Kingdom. Germany was represented by the GRAFT, while Zoka Zola represented the United State. Innovarchi from Australia, KplusK Associates from Hong Kong, and MAD from China also took part in this green home competition. These firms are the firms which have the expertise and experiences in designing and developing green home in their countries.

The main objective of this competition is to stimulate new ideas and to promote contemporary architecture with the adoption of sustainable technologies. There are a few criteria that the participants had to fulfil to take part in this competition. The designs of the participants must cover innovation, usage of new approaches to materials and sustainability, and apply contemporary design to create a sustainable community and landscape. The designs also must include new approaches of adopting sustainable technologies, low maintenance resolutions and the ability to meet the target of energy usage. In addition, the designs must be best in terms of its cutting edge design and meet the highest international standards for energy, efficiency and sustainability.

Government's Encouragement in Sustainable Development

The Malaysian government had been encouraging the development of green home since year 2006. The Ninth Malaysian Plan shows that the government of Malaysia had started to emphasise on sustainable development. Based on the interview, it is revealed that in year 2009, the Malaysia Government introduced a new policy which is called the National Green Technology Policy. This policy will lead the country towards energy efficiency and sustainable development and this of course includes the development of green home in Malaysia. The vision of Green Malaysia is stated in this policy. The launch of the Green Technology Policy paves the way to a green and sustainable environment for our future generation. This policy promotes the usage of green technology in development. The Malaysia Government provides incentives for the developers to develop green home in Malaysia. The planning approval of green home is also easier to obtain compared to the planning approval of conventional home.

Environmental Features

Green home uses energy-efficiency appliances in order to lessen the usage of energy. LED lights are being used in green home to replace the fluorescent lamp used in conventional house. The LED lights are energy saving compare to the fluorescent lights used in conventional home. Low-flow water fixtures are being installed in green home to lessen the consumption of water. Low-flow water fixtures can function as good as the normal high-flow water fixtures. Green home in the Bird Island uses low-flow water fixture in order to meet the goal of water efficiency. Grey water recycling system is also being installed at the green home of Bird Island. It can channel the water from shower and sink back to the plumbing. The grey water recycling system can help to save up to 35%-40%of the annual water bill.

Green home is being built by using eco-friendly building materials such as metal and cement tile roof. Lightweight bamboo frame is being used to build green home at Bird Island. The bamboo frame is being wrapped in a tensile, environmentally friendly fabric and being used as the wall of the house. It can reflect sunlight, maintain the coolness of the interior of the house and decrease the needs of air conditioner. Green home gives the homeowner a healthier life since green materials are being used to construct the house. Green materials contain zero volatile organic compounds. Construction materials such as paint contain volatile organic compounds which will cause health problem such as kidney problem to the homeowner. Green home uses low volatile organic compound paint so this means that green home has better indoor air quality compare to conventional home. Green home at Bird Island uses fresh air ventilation system which only used up small amount of power source to provide good indoor air quality.

Barriers to Green Home Development

Developers faced a lot of problems when developing green homes in Malaysia. Thus, YTL also faced the same scenarios and problems. One of the problem the company faced is the lack of green technology in Malaysia. Although the government started to promote sustainable development and green technology in Malaysia, some of the green materials and green technology used to develop green home cannot be obtained in Malaysia. Most of the green materials such as the lightweight bamboo frames are being imported from foreign countries. Besides that, green technology used to build a green home such as the plumbing of the low-flow water system, the grey water recycling system and etc needs to be imported from overseas since Malaysia still does not produce this type of technology. This will lead to the increase in the price of green home compare to conventional home because of the occurrence of the extra costs.

Furthermore, the workers have to be sent to overseas to undergo training courses on the green technology. YTL Corporation sent a lot of its workers to undergo training starting year 2006 so that they have the skills to help the company to develop green home and

green building in Malaysia. A few millions had been spent to train the workers. Even the sales and marketing personals need to be trained in marketing green home.

Based on the interview, it was found that the biggest problem faced by the developer is the homeowners' reaction and acceptability level towards green home. Since green home concept is still new to the Malaysian citizens, they do not understand the benefits and concept of green home although the government and developers already started to promote it since year 2007. The demand for green home is low because the homeowners would still prefer to buy conventional home since the price of the conventional home is cheaper. Malaysians are lacking in awareness towards a sustainable development. Most of the homeowners are not willing to pay more to buy green home and this makes the demand of green home low and difficult to sell compare to conventional home.

Benefits of Green Home

Green home can help to preserve the environment since it uses renewable energy as its power source. Bird Island's green home uses solar energy as its energy source. Green home is also water efficiency. YTL green home uses low-flow water fixtures and grey water recycling system to lessen the water usage of the house. Therefore, green home can cut down waste since it uses 50% less amount of water compared to conventional home. Natural resources are being protected since green home is being built by renewable materials such as bamboo frames.

Moreover, green homes can cut down the expenses of the homeowners in the long run. Although the price of green home is more expensive compare to conventional home because of the green materials and green technology it used, but these costs can be deducted in the long run since green home has lower maintenance and operation costs. Since a green home is energy and water efficient, it can reduce the amount of utility bills. This happens because a green home uses low-flow water fixtures, grey water recycling system, solar thermal system and day lighting. Green home allows the homeowner to have a healthier life since the material use to build green home has zero volatile organic compounds. Green materials have lower toxic level of chemical. Thus, the indoor air of green home is fresher and has less pollutant compare to the indoor air of conventional home. Green home has fresh air ventilation system to filter all the mites, dusts and pollutant from the indoor air to provide fresher air to the homeowners.

Difference in Price of Green Home and Conventional Home

The green home of the Bird Island Project is about RM750,000 for each unit but the green home there is not for sale. It is only for rental purposes. However, YTL will develop green home for sale in year 2011. The price of green home which is predicted is around RM250,000 to RM300,000 per unit. It is a little bit expensive compared to the price of conventional home as the materials and technology used is different. YTL tries to lessen the pricing gap between the price of green home and conventional home to attract more homeowners to purchase the green home.

Strategies to Increase Demand of Green Home

Since the demand for green home in Malaysia is not high compared to the conventional home, YTL has made collaboration with the Ministry of Housing and Local Government to spread the awareness of green homes to Malaysia homeowners. The government and company will publish articles about green homes and sustainable development in the local newspapers to increase the awareness of the homeowners in Malaysia. YTL will also promote green home and its benefits in each home exhibition which is held throughout Malaysia. This can help to increase the demand for green home in Malaysia. The company will try to cut down the costs of green home so that it will not have a large gap in price compared to the conventional home. If the price of green home is affordable, more homeowners in Malaysia will purchase green homes instead of conventional

homes. This will boost the demand for green homes in Malaysia and can lead our country towards sustainability development and achieve the Green Malaysia vision.

Findings and Analysis of the Questionnaire Survey

The questionnaire survey was conducted to determine the reaction and level of acceptability of the homeowners in Malaysia. This aspect will be related to the problems of green home. Based on a pilot study conducted in Klang Valley and Penang in February 2010, most of the developers complained that the homeowners' reaction and acceptability towards green home is the main problem of developing green home in Malaysia. Therefore, the questionnaire survey is conducted to prove this fact. From 150 questionnaires distributed, 50 respondents (34%) responded and have given their views based on the questions asked.

Awareness of Homeowners towards Existence of Green Homes in Malaysia

Less than 50% (only 22 out of 50 respondents) know about the existence of green home in Malaysia. This happens because green home is still a new concept in Malaysia and most of the homeowners do not have exposure about green home since the government and the developers have just started to promote this concept of housing in Malaysia.

Definition of Green Home

Most of the respondents answered 'an energy efficient home' as their answer for the definition of Green Home. This is evidenced by 68% respondents answering the question positively. The rest of the respondents answered this question negatively i.e. 'is the same as the *Green House*' and 'home which has lots of plants'. This happens because the respondents do not know what actually a green home is. The exposure to green home is still low in our country. Some of the Malaysian might have heard of green home but they do not have any idea and adequate understanding about green home. This eventually will lead to low demand of green home in Malaysia and them developers who develop green home will face problem to sell this type of houses.

Decision to Purchase Green Home if Difference of Price Occur

The result shows that some 68% of respondents do not want to purchase green home if there is a difference in price between green home and conventional home. It happens because the green home price is a lot higher compared to the conventional home since the green materials and green technology used make green home has high construction cost. The homeowners in Malaysia are not aware of the pollution the conventional home causes to the environment. They lacked of understanding about the concept and benefits of green home since the exposure towards green home to the homeowners of Malaysia is still inadequate.

Criteria When Buying a House

Price of the house is the criterion which has achieved the highest frequency, 40% of respondents think that it is the most important criteria they look at when purchasing a house. The homeowners will buy a house which is cheaper if the features and designs of the house are almost similar. The factor of 'concept of the house' has the lowest frequency whereby only 14% of respondents consider the concept of the house as important when buying a house. They are more concerned about the price and the location of the house they are going to purchase. As a result, it can be concluded that if the price of green home is higher compared to conventional home, the homeowners who do not have adequate understanding about green home will prefer to buy conventional home since it is cheaper.

Features which are Important to a House

Ventilation has the highest mean value which is 4.14 and thus, is the most important feature of a house according to the respondents. Ventilation is important because it is needed to get rid of indecent odour, pollution and water vapour and bring in fresh air for the homeowners. Ventilation is also needed to cool off the interior of the house during hot sunny days. Thus, the design of green home must have better ventilation compared to the conventional home to attract more buyers. Landscape however, has the lowest mean which is only 3.32 which means that the respondents think that it is not as important compared with other features of the house. 30% of the homeowners think that landscape only has an aesthetic value to their house and do not know that landscape such as trees provides natural shades to their house and their house will have better ventilation and indoor air quality if plants and trees are being planted around their house. Table 1 summarized the results of the research.

Does Green Home Benefits Homeowners in the Long Run

According to this question, 75% of the homeowners know that green home provide benefit to homeowners in the long run. They were aware that green home is energy efficient so green home will save up more energy compare to conventional home. Green home uses solar energy as its main energy resources. It also has low-flow water fixtures and grey water recycling system to save up the usage of water. By using all these appliances, green home can cut down the amount of the utility bill. There are 25% of the respondents who think that green home do not benefit the homeowners in the long run. They just think of short term benefit which they can get from purchasing conventional home that is it is cheaper compared to green home.

Benefits of Green Home

The benefit of green home which is to reduce pollution to the environment has the highest frequency whereby 36% of respondents choose this as the benefit of green home. From the result it was found that most of the respondents only have brief understanding about green home. However, small percentage of respondents which is only 4% realized that green home can help to save money in the long run. This benefit has the least frequency because most of the respondents do not have the knowledge that green home can actually help them to save money in the long run. They are not familiar with the features and the contribution these features can make to green home which will help the homeowners save money in the long run. Table 2 summarized the findings.

Differences between a Conventional Home and a Green Home

As depicted in Table 3, the factor of 'green home is energy efficiency' has achieved the highest frequency, where 48% respondents chose it as their answer. This means that this is the only difference known by most of the respondents. This indirectly shows that the Malaysian homeowners only have understanding of green home until the energy efficiency stage. Table 3 summarized the other findings.

Price of Green Home whether it is Affordable

Most of the respondents think that green home's price is not as affordable as the price of conventional home. Some 55% of respondents think that the price of green home is not affordable if the price is set between RM200,000 to RM300,000 per unit for a single storey terrace house. Although some of the homeowners have a certain understanding about green home, but the price of green home that is expensive prevent them from buying it. They still prefer to buy conventional home since it is more affordable. These homeowners do not know whether green home will help them save up more money in the long run. Most of them just think of the short term benefit of buying conventional home that is it is cheaper compared to green home. The understanding and awareness of green home still need to be strengthened among the homeowners in Malaysia.

Features Needed in Green Home

Fresh air ventilation has the highest mean value which is 4.05 as shown in Table 4. This means that it is the most important feature needed in green home. Fresh air ventilation is very important because it can avoid the outside air from affecting the indoor air quality. It will filter out the dusts and pollutants of the outside air and provide healthy indoor air for the homeowners. Low-flow water fixture has the lowest mean that is 3.82. Most of the respondents do not think that low-flow water fixture is necessary in green home. Some of them think that low-flow water fixture might let them have unpleasant shower experience and think that the flow of water will be low and affect their daily life. They do not know that actually the low-flow water fixture can function as well as the high-flow water fixture and moreover it can help to help the homeowners to save water.

Decision of Homeowners whether to Purchase Green Home in the Future

Some 59% of the respondents do not want to purchase green home in the future. They still prefer to buy conventional home. This may happen because the price of green home is more expensive compare to conventional home. The price of green home can be said to influence the purchasing power for green home. Moreover, this may happen because the respondents still do not have a clear understanding about the design, features and benefits of green home at this stage. The developers and government must be more proactive when promoting this new development concept to the homeowners in Malaysia to increase and strengthen their understanding towards green home. Thus, people's reaction is the main problem of green home in Malaysia and this happens because of the price of green home.

Conclusion

Based on the research analysis, conclusion can be drawn that green home concept is still at infancy stage in Malaysia and the homeowners in Malaysia are not really aware of its existence and the level of acceptability is very low.

From the interview conducted with the developer of YTL, it was found out that the company used Zero Energy Home Concept for the Bird Island Project. Green home in Malaysia is being built from green materials such as bamboo frames, sustainably-source silicone glass fabric and etc. Green technology is also being used to build the green homes. The Bird Island green homes have energy and water-efficient appliances. Grey water recycling system and solar thermal system are being installed in the green homes. Green home at Bird Island uses solar roof shingles to generate the energy used by the occupier of the house. This means that it uses renewable energy as its power source. There are a number of problems faced by the developers when developing green home in Malaysia. One of the problems faced by the developers is lack of green technology and green materials in Malaysia. Most of the materials need to be imported from foreign countries making the costs of construction for green home higher than conventional home. Homeowners' reactions towards green home are the biggest problems developers faced when developing green home.

From the questionnaire survey, it is proven that the main problem of green home in Malaysia is the homeowners' low level of acceptability and reactions towards green home. Most of the homeowners in Malaysia are not aware of green home and they lacked understanding towards this new concept which had already set foot in our country since year 2007. This accounts for the low demand of green home in Malaysia. The homeowners lacked understanding about the concept, designs and the benefits of the green home being introduced to them. Moreover, they are not willing to purchase green home because the price is more expensive compared to conventional home. They are not aware that a green home can help them to save money in the long run.

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Appendix

Table 1: Features which are Important to a House

Features	Mean Value
Ventilation	4.14
Design of house	3.64
Space	3.58
Landscape	3.32

Legend: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree

Table 2: Benefits of Green Home

Benefits	Frequency	(%)
• Reduce pollution to the environment	18	36
• Green home can help to save money in the long run	2 16	4 32
• The green home owners will have a healthier	14	28

life • Green home can save energy		
Total Respondents	**50**	**100%**

Table 3: Differences between Conventional Home and Green Home

Factors	Frequency	%
• Green home is energy efficient • Green home used solar energy system • Green home is built by using high quality and green material	24 11 15	48 22 30
Total Respondents	50	100%

Table 4: Features Needed in Green Home

Features	Mean Value
Fresh Air Ventilation	4.05
Solar Energy System	3.91
Natural Lighting	3.86
Low-flow Water Fixture	3.82

Legend: 1=strongly disagree, 2=disagree, 3=neutral, 4=agree, 5=strongly agree