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An Investigation of Factors Influencing Design Team Attributes in Green Buildings

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Abstract: Problem statement: Buildings contribute significantly global environmental problems. Better design can minimize these impacts. Design Green Building (DGB) aims to reduce buildings' impact on the environment. However, the green design performance depends on design team attributes. In addition, the Governance System (GS) and Client Quality (CQ) as external factors have influence on Design Team Attributes (DTA) of green building. **Approach:** To identify mentioned factors questionnaire survey was conducted to collect dada required. A sample of 277 respondents has been covered under the study, including architects and engineers practicing design and consultancy building sectors. Analysis data includes descriptive and quantitative analysis by using SSPS software version 16 was carried out. A correlation and regression models was established to explore the relationship between identified factors. **Results:** Architect is most involved one during the design process of green buildings with mean 4.82 followed by mechanical and electrical engineers with mean 4.52 and 4.44 respectively, while structural and civil engineers, interior designers and quantity survivors were 3.71, 3.29 and 2.88 respectively. The most design team attributes were investigated have a significance degree of influence except design team reputation. On the other hand, the other hand, the Governance system and client quality have major influence on these attributes. **Conclusion:** Involvement and participation of all project stakeholders are required. Design team attributes are the key factors to improve green design performance. Governance system and client quality play major role to enhance design team attributes. Therefore, effective regulations and policies may increase performance of the green Effective design team management device should be applied to implement Design team attributes effectively in order to improve green design team performance.

Key words: Green design, design team attributes, performance

INTRODUCTION

Design Green Building (DGB) aims to reduce the impact of the building on the environment. It has been argued that the major environmental impacts of a building are determined at the conceptual design phase, (Coady and Zimmerman, 1998). As Hes (2005) demonstrated, design, which is one of the highest impacting areas on 'green' performance of the built environment. Moreover, decisions made during conceptual design are considered to have the greatest influence on project performance and have the least associated cost (Marsh, 1999). Therefore, it is important that environmental design tools be applied at this stage in order that the environmental implications of different iterations of design may be monitored progressively.

Experiences show that green buildings place too much emphasis on good intentions at the design stage (Aniza Abdul Aziz, 2007). Therefore, Good design team must have the proper design capability and ability to interpret the clients' needs. These attributes are essential because, unless the design is right, a satisfactory building can never be produced (Ling, 2002). Attention has recently been drawn to the need to include sustainability criteria in team selection methodologies. However, while frameworks exist for evaluating project team technical performance, measuring relational and sustainability performance have been problematic (Mahesh *et al*., 2007) This highlights the importance of the design stage and hence the performance of the design teams should be carefully examined. The objective of this study is to investigate the involvement level of design team members during the green process and identify key attributes in order to improve green design performance. Also, the study investigated the variables of governance system and client attributes that influence design team.

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Review of literature: The need for green design:

Design team performance on green building: One of the first steps in a building construction project is the selection of optimal members of the architect-engineers team. Ling (2002) mentioned that the Good design team has the proper design capability and ability to interpret the clients' needs. These attributes are essential because unless the design is right, a satisfactory building can never be produced (Kirmani and Baum, 1992). Selecting the 'right' team is considered critical to the success of any construction project (Mahesh *et al*., 2007). The optimal selection of a firm's professional composition should take place before a project is begun and this will enhance the probability of the team's success (Paul and Carr, 2002). The total design of buildings today requires the involvement of a team of people with a range of relevant experience. This team may consist of the following consultants: architects, land surveyors, structural engineers, electrical engineers, mechanical engineers, hydraulics engineers, quantity surveyors.

In design green buildings, a careful selection process which ensures that each member of the professional design team has demonstrated experience on design green building (Mahesh *et al*., 2007) and Kerr (2008). The performance of designers is therefore important because any decision made at the inception of the project will affect project performance (Lukumon and Tham, 2007). One of the major barriers mentioned by agencies is the lack of green design knowledge that internal and external decision-makers exhibit throughout the construction process (Grund, 2005). In addition, Lack of education is often cited as a major barrier to implementing green design (Carlisle *et al*., 2004; Shafii, 2005). Lee and Egbu (2006) cited that the importance of a knowledgeable project team has been indicated by (Othman *et al*., 2005). Being the originators of brief development, project team members' knowledge or the lack of it can be a value source or a risk source to the project. This view is echoed by Hatten and Lalani (1997) who suggest that by selecting an appropriate design team, the chance of delivering a project on time and within budget might increase. Design team for that reason needs to be equipped with the knowledge and tools to be able to translate into a design, the increasingly stringent environmental performance goals of clients and create buildings that meet these new objectives (Graham, 2000).

Governance system impact on design team attributes: The explosion of construction activities led to gab between effective policies and environmental problems. The lack of directives from high-level leadership such as the Governor, Executive Directors, General Managers and Policy Makers is considered as one of the most critical barriers to implement green design, this leads to a lack of mandatory green design standards and control mechanisms. Lam *et al*. (2008) and Sha *et al*. (2000) repeated that a lack of practical understanding of sustainability has hampered the effective enforcement of legislation for sustainable construction. There is a relationship between different governance systems and climate change outcomes in terms of the institutional framework, policies developed, capabilities developed to innovate and speed of adaptation (Griffiths *et al*., 2007). There is currently limited policy and standards to guide green practitioners and no fiscal incentives for green building (McAllister and Sweett, 2007).

The process of driving green buildings in Southeast Asia region is slow. Shafii (2005) reported that there are barriers in green design development in the region which include: Procurement issues and Regulatory barriers. A number of these measures have been adopted by the Malaysian government including policies, regulations and programmes. However, they are still inadequate in mitigate the Environmental problems. Shafii (2008) stressed that the development of green building in Malaysia is relatively slow; this in part, It might be due to the lack of incentives and regulatory procedures to guide sustainable building construction. Furthermore, most current incentive programs are aimed at the developer, not at the people designing and constructing the building. Each group, particularly those on the design team, can influence the way the building and landscape are designed and constructed. However, most financial incentive programs are targeted at the developer, thereby providing a little incentive to those carrying out the study to build more sustainably (Hes, 2005).

Influence client quality on design team attributes: Although there is growing awareness of green building issues in the Southeast Asia region, it is still in its infancy. In Malaysia the awareness on green building issues in the design and construction is still low and developing countries like Malaysia have only just began to address the challenges of sustainable construction. Shafii (2008) and Hes (2005) mentioned that the crucial in the process of achieving a successful built development project is to confirm the necessary commitment on the part of the Client or those with the requisite authority within the Client Group. Client commitment, expertise and direction are particularly important in the early stages to inform strategic thinking.

The clients must be knowledgeable in their organization mission and their operations Barrett and Stanley (1999). The absent from the knowledge and experiences in implementing the construction project levels the clients with no clue on what to expect and how to play their roles and responsibilities (Koukkari *et al*., 2005); Fogarty (2007) and Soetanto and Proverbs (2002) mentioned that three aspects of client performance to be greatly influenced, which are: (1). The capability of client's representatives; (2). Client's past performance and experience; (3). The financial soundness and reputation of the client.

Ng *et al*. (2007) Found that even the present clients more organized they were less committed and lack of focused during briefing as they perceived that the task is belonging to the design team. Hes (2005) found that the 94% of designers agree that they would increase their use of sustainable design solutions if sustainability was part of a client's corporate mission. Therefore, there is a need for stimulation of activities for breaking down the barriers which hold back the development of green building and construction in the country.

Job performance theory and design team attributes: Two perspectives can show the performance, task performance and contextual performance. Task performance refers to the competency level of employees in performance various tasks and duties inherent in fixed jobs and study roles (Avery and Murphy, 1998) while contextual performance is defined as extra task proficiency that contributes more to the organizational, social and psychological environment that helps accomplish organizational goals. Borman and Motowidlo (1993) distinguish between task and contextual performance. Task performance refers to an individual's proficiency with which he or she performs activities, which contribute to the organization's 'technical core'. Contextual performance refers to activities, which do not contribute to the technical core but which support the organizational, social and psychological environment in which organizational goals are pursued.

Organizations are increasingly implementing teamwork and other group study arrangements. Therefore, organizations become more interested in team performance than in individual performance Sonnentag (2001). To improve design team performance, factors affecting design team attributes need to be identified. Various researchers have discussed the attributes and characteristics of teams in organizations (Cohen *et al*., 1996; Srivastava and Lee 2005; Schmitt *et al*., 1984). Green design requires the design team to collaborate with each other.

Task performance and contextual performance are important factors affecting the performance of a design team in a construction project. The task requirement is recognized as an important factor in performance; however, particularly in a setting with a need for active team performance, this task completion is strongly linked to a people requirement. This people factor effectiveness has been shown to be a predictable function when considering occupation, organization and personality traits Day and Silverman (1989).

One of the major barriers mentioned by agencies is the lack of green design knowledge that internal and external decision-makers exhibit throughout the construction process. And lack of education is often cited as a major barrier to implementing green design. Design team needs to be equipped with the knowledge to be able to translate into the design, the increasingly stringent environmental performance goals of clients and create buildings that meet these new objectives. Shafii (2005) showed that the Lack of Training and Education in green Design and Construction and Lack of Professional capabilities/Designers are the main barriers of sustainable buildings in Malaysia. The poor green buildings performance and lake of research in this area provide motivation for this study.

Understanding how humans perform complex cognitive activities, such as architectural and engineering design has been the raison d'etre of design method research for the past four decades. The performance of designers is therefore, important because any decision made at the inception of the project will affect project success. For professional and technical service firms, the reputations, experience and skills of employees are their main assets (Empson, 2001).

MATERIALS AND METHODS

To capture the perception of professionals, a preliminary questionnaire survey was conducted. The preliminary questionnaire is divided into two parts, the first part requires respondents to provide their personal particulars including their job title, experience, number of construction projects involved, type of buildings designed by his/her firm followed by type of procurement, type of building and size of the projects they have been carried out, while the second part focuses on uncovering the expectation of experts on the governance system, client attributes and design team variables.

A survey package consisting of the questionnaire, post card, pen, stamped envelope and a covering letter explaining the objectives of the study was posted to

professionals in various architectural consultancy firms as well as Engineering consultancy firms selected by the list of architects downloaded from the PAM website, whereas the list of engineers provided from their AECM organization directory. The population for this study became key design team players for architects registered with the Malaysian Institute of Architects (PAM) and Engineers registered with Association of Consulting Engineers Malaysia (ACEM). Only architects registered in PAM and Engineers registered in AECM are selected as the research context. The target population includes architects and Engineers working in design consultancy located in Malaysia. Projects handled after January 1, 2003 were included in this study. This date was chosen because it was assumed that respondent who chooses projects handled before than this date may not have had all project details to complete the questionnaire.

A total of 1180 survey questionnaire was distributed 278 valid replies were received, which represents a response rate of 24%. SPSS virsion16 was used to analyses data collected. The technique of descriptive statistics was used to describe and make sense of the data. The descriptive statistics included the frequency and mean for many variables. Many variables were examined to determine the influence degree of external variables on design team attributes. A correlation, multiple liner regression was used.

Theoretical framework: The study investigated external factors influencing design team attributes to improve design team performance of green buildings. The proposed model variables are based on the previous studies has discussed on the literature review of the field of the study adapted from Ling (2002) to evaluate architects and engineers performance.

Job performance theory state that job performance should be measured from two perspectives; task performance (Hunter, 1983) and contextual performance (Borman and Motowidlo, 1993). The Task performance is the proficiency and skill in job specific tasks and differentiates one job from another (Van Scotter and Motowidlo, 1996). The criteria for measuring it are consisting of cognitive ability, job knowledge, task proficiency and job experience (Schmidt *et al*., 1986). While the Contextual performance occurs because people work in an organizational setting instead of by themselves and therefore, require to communicate with one another, coordinate activities, follow instructions and seldom go beyond their job descriptions. The criteria of measuring it are consisting of conscientiousness, initiative, social skills, control and commitment (Borman and Motowidlo, 1993).

As shown in Fig. 1 The conceptual model of this study is part of the main study model has two independent variable, the first one named as Government System (GS) with sub factors named as regulations and policies, fiscal and incentive and type of procurement. While the second independent variable is Client's Attributes (CA) with sub factors named as Knowledge of client, Client skills on green building and Commitment to green building, to be an external factor that may have an influence on the design team in green building in Malaysia.

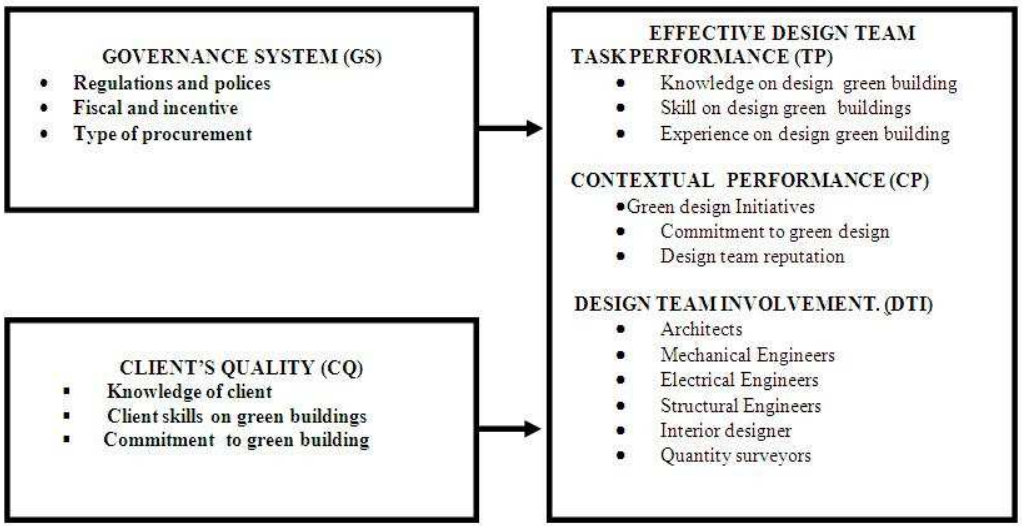

Fig. 1: Conceptual model of effective design team

However, the dependent is an output variable Effective Design Team (EDT) is consisting of three measurements first is Task Performance (TP) have three elements named as design team Knowledge, skill and Experience on design green building, Second is Contextual Performance (CP) also have three elements named as design team Initiatives, commitment and reputation on design green buildings. Third is Degree of Involvement (DI) among design team members.

To answer the research questions of this study should test these following two hypotheses: first is there positive influence between the government system and effective design team attributes. Second is there positive influence between the clients quality and effective design team attributes.

RESULTS

This part will present the result of collected data analyzed start with the Characteristics of respondents, description of the factors mean and Std. Division, the techniques of validity and readability, correlation matrix and multiple liner regression have used.

Characteristics of respondents: In the first part of the fieldwork, A total of 1180 survey questionnaire was distributed 277 valid replies were received from Architects and Engineers professionals registered with PAM and AECM organizations, which represents a response rate of 24% of all questionnaires sent. Intended for 41% of the respondents were architects followed by 40% mechanical and electrical engineers while structure and civil engineers were only 19% of the total respondents. The fact that they were senior personnel rendered further validity to the survey results and their firms represented almost a quarter of the design firms practicing in Malaysia. All of respondents had more than 5 years of relevant experience and 80.1%, of respondents had over 15 years and lowest percentage was 13.4% had over 10 years of experience practicing in construction industry. Among the 227 respondents, the percentage of respondents who had involved in the construction projects was 89.1%. This proportion illustrates that the respondents were very experienced. Moreover; the respondents were credible and capable of answering the questionnaire and their views noteworthy. This study is exploratory in nature and is mostly qualitative with limited quantitative analysis.

The results of the statistical test of the mean, which are shown in Table 1, the architect is most involved one during the design process of green buildings with mean 4.82 followed by mechanical and electrical engineers with mean 4.52 and 4.44 respectively, while structural and civil engineers, interior designers and quantity survivors were 3.71, 3.29 and 2.88 respectively.

Key design team attributes: The significance level for this study was set at 0.05 in accordance with the conventional risk level (Cohen, 1992). The results of the statistical test of the mean, which are summarized in Table 2, showed that designers generally agree with the factors that affect design attributes, except for one design team reputation of practicing in the design green buildings. Although it would be assumed that having a good reputation is important.

Correlation matrix: Correlation coefficient is a measure of the strength of any linear association between a pair of random variables (Newbold, 1991). It measures how closely a change in one variable is tied to the change in another variable and vice versa. Unlike linear regression, random variables are treated symmetrically, where the correlation between X1 and X_2 is the same as the correlation between X_2 and X_1. The correlation relationship is measured on a scale of 21-11, where 0 represents no correlation or no linear relationship between the scores, 21 is for perfect negative correlation and 11 is for perfect positive correlation.

Table 1: The involvement degree of design team during design green buildings

Design team members	Std.	Mean	Not important	Slightly important	Moderate	Important	Very important
Architect	0.559	4.82	0.7	0.7	1.8	90.0	87.7
Structural engineers	1.051	3.71	2.8	7.6	33.6	27.4	28.5
Mechanical engineers	0.720	4.52	0.4	1.4	6.9	28.9	62.5
Electrical engineers	0.776	4.44	0.7	1.4	9.0	30.7	58.1
Interior designer	1.214	3.29	19.4	21.7	33.9	14.8	20.2
Quantity survivor	1.246	2.88	20.2	25.0	31.8	13.0	10.0

Table 2: The Mean and Std. of the variables

	BR and P	BP	CKn	F and I	CC	DTKn	DTSk	DTCo	DY In	DT Re
Mean	4.410	3.44	4.400	4.270	4.660	4.720	4.210	4.510	4.18	3.51
Std. deviation	0.899	1.08	0.764	0.764	0.698	0.613	0.905	0.725	1.04	1.26

*BR and P: Building Regulations and Policies; *BP: Building Procurement; *Ckn: Client knowledge; *F and I: Fiscal and Incentives; *CC: Client Commitment; *DT Kn: Design Team Knowledge; *DT Sk: Desugn Team Skills; *DT Co: Design Team Commitment; DT In: Design Team Initiatives; *DT Ru: Design Team Reputation

Table 3: Correlation matrix of the factors contributing the design team of green building

	TP	CP	DI	CC	F and I	C Kn	R and P	BP
TP	1.000							
CP	0.585**	1.000						
DI	0.176**	0.200**	1.000					
CC	0.174**	0.338**	0.210**	1.000				
F and I	0.200**	0.387**	0.169**	0.477**	1.000			
C Kn	0.231**	0.214**	0.250**	0.410**	0.237**	1.000		
R and P	0.152*	0.087	0.220**	0.122*	0.263**	0.221**	1.000	
BP	0.096	0.048	0.368**	0.025	0.149*	0.098	0.123*	1.0

**: Correlation is significant at the 0.01 level (2-tailed); *: Correlation is significant at 0.05 level (2-tailed); *TP: Task Performance; *CP: Contextual Performance; *Di: Designs team involvement; *R and P: Regulations and Polices; *F and I: Fiscal and Incentive; *BP: Building Procurement; *CKn: Client Knowledge

Table 4: Effective design team attributes model summary

				Change statistics		
Model	R	R^2	Std. error of the estimate	R^2 change	df1	Sig. F change
1	0.456[a]	0.21	0.43003	0.208	2	0.0001

[a]: predictors: (constant), CA, GS; [b]:dependent variable: EDTA

Table 5: ANOVA

Model	Sum of squares	df	Mean squares	F	Sig.
Regression	13.222	2	6.611	35.75	0.0001
Residual	50.299	272	0.185		
Total	63.521	274			

[a]: Predictors: (constant), CA, GS; [b]:Dependent variable: EDTA

The correlation coefficient matrix obtained by the (2-tailed) Pearson's correlation analysis is shown in Table 3. The observation shown that most of the independent variables are correlated with the dependent variable. This confirms that the independent variables which affect design team attributes have been correctly identified. It is also observed that many independent variables are correlated with each other.

Based on the correlation outcome, most of the factors have significant positive correlations with each other at $p<0.01$, highest value Contextual Performance against. Task Performance 0.585 this indicates the strong of relationship between task and contextual performance. While the lowest value is Fiscal and Incentives against Degree of Involvement 0.169, this indicates the team members' participation and involvement by government incentives due to the all incentives don't focus on design firms. The significance of some correlations was only at $p<0.05$, i.e., Building Procurement against Fiscal and Incentives with value of 0.149, building procurement against building regulations and policies with value of 0.123. This indicates that the passive procurement not encouraged efficiently by fiscals and incentives and building regulations and policies from government. Building regulations and policies against task proficiency with value of 0.152 also building regulation and polices against client commitment with value of 0.122. However, governance system factors and client attributes have a significant influence on design team attributes.

Multiple liner regression analysis: The Predictive power of the model is judged through the statistical measurement coefficient of determination (R^2), which is a measure of the goodness of fit for the model. R^2 is used to measure the strength of the correlation when more than two variables are being analyzed. The R^2 gives the proportion of the variance of Y, which is explained by the independent variables, reflecting the overall accuracy of the predictions. However, when the number of independent variables is introduced into the model, R^2 also increases. A better estimate of the model goodness of fit is adjusted R^2. Unlike R^2, it does not inevitably increase as the number of included explanatory/independent variables increases. The optimum regression model to be selected should be the one that fits the data the best and yields the most accurate prediction of a design team attributes.

The regression coefficient of variable indicates the changes may happen of the predictors score with the entire variable in the model and they are a positive effect. Regression analysis of the Effective Design Team Attributes (EDTA) with Government System (GS) and Client's Attributes (CA) has positively influenced Design Team with a coefficient of determination R2 of 0.21. This indicates that 21% of the Design Team was explained collectively by Government System (GS) and Client's Attributes (CA) as shown in Table 4. The F-and t-tests were used to assess the goodness-of-fit of the models and their individual parameters, respectively. A probability of less than 0.05 is generally considered the highest to indicate a significant difference Fox (1997).

Table 6: Coefficients

Model	Unstandardized coefficients		Standardized coefficients			95% confidence interval for B		Correlations			Collinearity statistics	
	B	Std. error	Beta	t	Sig.	Lower bound	Upper bound	Zero-order	Partial	Part	Tolerance	VIF
Constant	2.301	0.220		10.481	0.000	1.869	2.734					
GS	0.196	0.043	0.0260	4.5100	0.000	0.110	0.281	0.365	0.264	0.243	0.873	1.146
CA	0.229	0.450	0.2930	5.0750	0.000	0.140	0.318	0.386	0.294	0.274	0.873	1.146

[a]: Dependent variable: EDTA

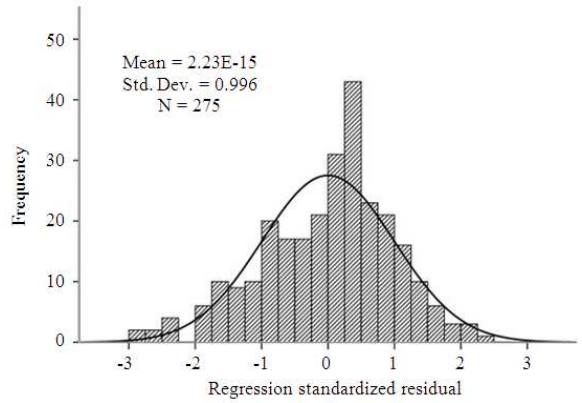

Fig. 2: Histogram of Effective Design Team Attributes (EDTA)

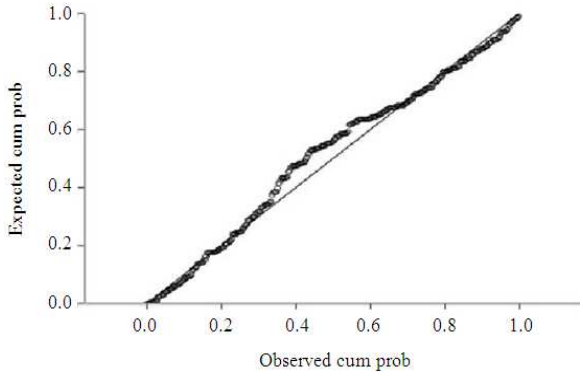

Fig. 3: Normal P-P plot of regression standardized residual of Effective Design Team Attributes (EDTA)

The result of the Analysis Of Variance (ANOVA) is shown in the Table 5 is tests the overall significant of the model. The method used for regression is entered by the first run of analysis was two cases wise has deleted to get over all predictors significant with the dependent. The result of this as shown in Table 5 the model was significant at p-value is 0.001 with F test value 35.75.

For the Design Team regression model, the p-value was 0.001 (less than 0.001) for the F-test 35.75. These probabilities acceptable the null hypothesis to be barred, the model and factor assumed satisfactory. The histogram explains the model with normal distribution, mean of 2.23E-15 and Standard Deviation of 0.996 (Fig. 2). Moreover, the Fig. 3 it shows the linearity of equation between observed cumulative probability and expected cumulative probability and the normal P-P plot of regression standardized residual of Effective Design Team Attributes (EDTA).

Hypotheses 1and 2: The Government System (GS) and Client's Attributes (CA) had Significant positive effects on Effective Design Team Approach (EDTA), as expected ($t = 4.51$, $p<0.01$and $t = 5.08$, $p<0:01$, respectively) (Table 6).

Regression equation: The general multiple liner regression model equation (Y) is consisting of predictors (X's), regression coefficients that estimate from the data (B's) and including the Errors (E):

$$Y = \beta0+\beta1*\chi1+\beta2*\chi2+\ldots.\beta n*\chi n+\varepsilon$$

$$EDTA = 2.301+0.196*GS+0229*CA \quad (1)$$

DISCUSSION

Level of design team involvement: One of the primary study objectives is to identify the degree of design team member's involvement during the green design process of building projects. The high level of architect, mechanical and electrical engineers involvement and low level structural and civil engineers, interior designers and quantity survivors involvement during the design process of green buildings indicates that the architectural, mechanical and electrical designs have high influence during the design process of green building in terms of their decisions regarding to building envelop, choice of materials, energy efficiency. Moreover, architects and M&E engineers could be considered as key players during this stage, while others have less influence on design green buildings.

Low involvement of other design team members during design process influence green design performance, for example, late of quantity surveyor

involvement could lead to increase uncertainty and complexity due to green materials selection and availability. To overcome green design process complexity more involvement and participation required from all project stakeholders. Involvement and participation in green design process should be encouraged from the begging, may such as implementing Green Design Charrette Approach (GDCA) will increase green design performance that because the charrttee provides design teams with a tool to assist in the development, facilitation and effectiveness of multi-stakeholder design processes in the early stages of the green design. Such a process can lead to significant savings in time, resources and money by bringing together the key players (client, contractors, suppliers and end user) in the project through a facilitation-heavy process to identify problems and opportunities early in the design phase. Design charrettes are becoming more common in design practice and are an excellent way to bring a range of expertise and interests together to collaborate and create effective solutions to complicated projects with effective involvement of all design team members will speed design decisions, save resources, overcome design process complexity and avoid any conflicts may arise among the team members. However, this may be coherent with radical people who have been practicing for many years and resistant to change (Hambrick and Mason, 1984) or due to the design green buildings are a new concept among designers in the Klang valley. Design green building is not easy motion, design team characteristics have major influence on green design performance. Due to the recently green design introduced most of the design team members not knowledgeable on green design requirements. Even Green Building Index (GBI) has been introduced the design team still infancy on green design. Moreover, training courses required for green design skill such as design assessment tools, simulation programs and technical software.

The influence of governance system and client quality on design team attributes: Governance system plays major role toward implementing green building features. Generally, the most respondents have the same opinion on factors that influence design team performance, except design team reputation. However, this may be coherent with radical people who have been practicing for many years and resistant to change (Hambrick and Mason, 1984) or due to the design green buildings are a new concept among designers in Klang Valley. Design green building is not easy motion. Design team characteristics have major influence on green design performance.

One of the major barriers of design green buildings is the lack of green design knowledge that internal and external decision-makers exhibit throughout the building phases. This includes project managers, architects, engineers, developers, contractors, other various construction professionals and internal agency staff. Generally, there is a lack of understanding of what green building is, what its benefits are, how it is measured and how it is implemented. In particular, stakeholders need to be educated on such things as: - The process of implementing green design concepts; products and systems of Green building, related cost benefits and Information resources. In addition, two particular gaps must be considered beyond the general lack of knowledge; firstly, the lack of GBI qualified professionals. Secondly, lack of knowledge and skills on Life cycle assessment. Attached with the lack of green building knowledge is the perception by design firms that there is a lack of data about the benefits, durability and payback of green design features and green products.

Offering education and training on green building to project stakeholders involved in the design process including developers, project managers, architects, engineers, consultants, suppliers and contractors might change green building perceptions as well as give the knowledge required to include green building technology into a project. Particular training required to include GBI official recognition courses and LCA training for relevant professionals.

There is a relationship between different governance systems and green building outcomes in terms of the institutional framework, policies developed, capabilities developed to innovate and speed of adaptation. The gaps between effective policies and design green buildings resulting from a lack of practical understanding of green building in Malaysia has hampered the effective enforcement of legislation. Some public policies include education and training required to help ensure that both agency representatives and design teams understand how to implement green design policies and procedures effectively.

The lack of directives from high-level leadership is one of the most key obstacles to green design. High-level leaders include the Government, Executive Directors, General Managers and Policy Makers. Currently, no executive orders or policies exist that require conditions influenced building projects to establish sound green building/green design. The lack of support from the high-level decision- makers led to a lack of compulsory green design standards and control mechanisms. As a result, when and if green design initiatives are created, they are usually voluntary and not enforceable.

Due to the recently green design introduced most of the design team members not knowledgeable on green design requirements. Even Green Building Index (GBI) has been introduced the design team still infancy on green design. Moreover, training courses required for green design skill such as design assessment tools, simulation programs and technical software. More collaboration among sectors and organizations and the participation of all stakeholders and individuals are required to achieve green design.

CONCLUSION

There is a lot to know about the design green buildings and there is still much study to be done both in Malaysia and internationally on methodologies and green design development and in design team Attributes. Most design team members involved in design green buildings are Architects, electrical, mechanical engineers, while the interior designer and quantity surveyor are less involvement. For an effective design team leader should clarify roles within the team and encourage design team members for more participation.

Offering education and training on green building to project stakeholders involved in the design process including developers, project managers, architects, engineers, consultants, suppliers and contractors might change green building perceptions as well as give the knowledge required to include green building technology into a project. Particular training required to include GBI official recognition courses and LCA training for relevant professionals.

The core of this study is to identify key design team attributes in order to improve the performance level of design green buildings by using task performance and contextual performance theories. The key attributes of task performance theory are green design knowledge, green design skill and the experience on design green buildings. The attributes of contextual performance theory are commitment to green design, initiatives on green design. The effectively design team attributes contribute to green design performance need effective management approach to insure high participation and efficient communication among the design team members.

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