FACTORS SPURRING GREEN BUILDING INDEX CONSULTANCY ACCEPTANCE

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ABSTRACT

The purpose of this paper is to investigate the factors influencing Green Building Index consultancy (GBI) acceptancein “green” residential buildings in Malaysia.A survey questionnaire instrument was utilized to gather data opinion of 150 respondents of building construction consultants and developers with local building authorities involving planners, architects and green building senior officers. Based on the quantitative analysis and results, the discussion about the study variables is revealed with ANOVA and correlational analysis. The study reveals that overall perception of cost effectiveness among specializations were significantly different while, the correlational analysis shows that there is significant relationship between management, quality of design, time effectiveness, quality of result, compliance with GBI requirement and cost effectiveness.This paper provides insights into the greeen building issues and contributes tothe understanding of the consultancy in green residential building development.

Keywords :*Green Building Index (GBI), Green Residential buildings, Consultancy,Malaysia,*

INTRODUCTION

GBI consultancy is indeed a new field in the Malaysian construction industry that looks at a wide range of services across the board from architecture, engineering, planning and some knowledge of materials. It is a process of getting buildings rated green with a clear focus on assisting architects, developers, construction professionals, public authorities, contractors and other clients to identify the many potential benefits of considering sustainability within a construction project, such as; reduced operational cost (whole life costs of an asset), improved resource use, waste minimisation, energy efficiency, the use of renewable energy and many other innovative practices which aim to minimise the impact on our environment (GBC, 2013). GBI consultancy is a building science technology and operations available to designers, builders and owners who want to build green and maximise both economic and environmental performance through integration of people, processes and technologies that deliver sustainable buildings (Paumgartten, 2003).

There are clear indications that, developers are not keen or willing to pay more or invest in this initiative (Raschid et al., 2011) as it is believed that green building cost more than conventional buildings due to consultancies and construction implementation cost overrun.More so, there are perceptions that green building may remain a niche market because the environment is still a cost externality in construction, green products are prohibitively expensive and technically unreliable, or because environmental issues are unimportant to most consumers (Brick, 2003; Cassidy, 2004; Groonroos& Bowyer, 1999; Loftness, 2004; Seiter, 2005). This study is pertinent in that, it ascertains the different perception of approach to cost effectiveness and its relationshipswith other acceptance factors in GBI consultancy based on expertise view of expertise view of

professionals and regulators namely -Public (local building authorities and construction agencies) and private sectors (architects and planners).

IMPERATIVE OF GBI CONSULTANCY

Designing green buildings could be more complex than designing conventional buildings. The early design stage is therefore important to the overall success green building project (Elforgani et al., 2012). It is a phase where vital decisions are carried out to develop green building design. To understand the complexity of activities during the design stage could be very difficult (Girard and Robin, 2006; Knudstrup and Hansen, 2005 and Newton, 2008a). During the design stage, the team members are required to have knowledge of the mission of their organization and to understand their operations; knowledge and experience in building construction (Ahmed, 2007). Adequate knowledge of the organization's mission and their operation tends to provide the required design information to the design team (Barrett and Stanley, 1999). Gaia (2004) highlighted that most clients should give more consideration to training to increase knowledge concerning green design issues.

As a result of complexity of the design process, the efforts put in to planning and control is commonly either insufficient or inappropriate (Tilley, 2005). Thus, more knowledge and experience are needed to cope with green design requirements. Effective communication during the design process is an iterative in nature and requires shared understanding and commitments from the client and other project participants involved. It is a dynamic process that continues during the early design phase of the building project and develops from general to more detailed features as it progresses. Furthermore, efficient and effective coordination, collaboration and communication among clients and consultants are required to overcome complexity and difficulty inherent within the design process of green buildings. The client's representatives are required to have management skills in order to be able to organize and coordinate the design process effectively with the design team and other project participants (Elforgani and Rahmat, 2012).

FACTORS AFFECTING GBI CONSULTANCYACCEPTANCE

There are no sufficient data on the acceptance of green building development among building stakeholders in Malaysia; therefore this study is considered new and exploratory. After studying a number of research papers, guidelines, related to this study, such as Soetantoet al. (2001), Egemen and Mohamed (2005), Chow and Ng (2003), GBI (2013), Consultants'Performance Evaluation (CPE) EvaluationReport Form, Ahmed and Kangari (1995), Kärnä (2004) and Al Momany(2000), this paper identified six acceptance factors which include: Approach to cost effectiveness, Administration and Management, Quality of Design, Time, Quality of design,Quality of Work and Compliance to GBI requirements.

Approach to cost effectiveness

Cost overruns according to Brick (2003); Cassidy (2004); Groonroos and Bowyer (1999); Loftness (2004) and Seiter, (2005) are common problems in residential development. The use of good project cost control procedures are major concern of clients and owners in the general acceptance of green building development.In their study to review the green building demand factors for Malaysia Aliagha et al. (2013), opinionated that higher cost perceived to be associated with green building may have been based on outdated information and poor green building skill and practices while good life cycle assessment,integrated building design, effective commissioning, operation and maintenance complement to guaranteecontinuous cost savings.

It is a common knowledge that clients and developers are not willing to pay extra cost in the green building development (Yudelson, 2007) as such, design development should be managed within cost plan, services provided by GBI consultants, project growth in relation to the original design quality and balance of cost between estimate elements should be controlled (Sean, 2009). GBI consultants have to consider all design options and adopt the most appropriate one under all prevailing constraints to produce a value-added design and the life cycle cost of the project should be examined to optimally minimize the operation and maintenance costs (Chow and Ng, 2003).Effective approach to cost planning and control will facilitateGBI consultancy in accomplishing profit maximization.

Administration and Management

The demand for green construction as well as increasing high cost perception for green buildings means GBI consultants should manage a green project with tighter budget and tighter profit margin (Robichaud et.al., 2011) as effectively managing the risks which could lead to cost overrun is very essential in green building consultancies. The appropriate understanding of the consultant roles in controlling risk is important during the early design stage and preventing the increase of related costs (Jaworski & Samanta, 2006) within the context of the Client's operating environment and objectives and of the needs of the project is crucial (CPERF, 2013). The extent to which the GBI consultants takes charge of and effectively manages the process has a direct effect on the inputs required of the client.

Proper management systems for GBI consultancies can be developed by selecting design teams members that posses sustainable design knowledge embedded within the firm's design culture with a history of creative problem solving skill to achieve efficient and otherwise effective solutions. The design team members ought to be comfortable in working through challenges with owner and user charrettes while providing possibilities for better communication and coordination between stakeholders in design.

Quality of Design

Quality of design in green building as a matter of fact is indicated by completeness and correctness of specifications, drawings, catalogues, understanding of the project objectives and constraints, thoroughness of and logical approach in problem analysis and exploration of alternatives, appropriateness of concept and sensitivity to context (physical and non-physical, image, site, geography, function, client, etc.), functional / technical requirements: effectiveness of concept in providing for functional and technical requirements: including flexibility and expansion. If these qualities are not reflected in the GBI requirements that alone could lead to non acceptance of the services provided GBI consultants as such may require repeating the process and additional cost.

GBI consultants should have the ability to propose innovative and alternative design to improve the quality standard and reduce the time, cost and risk (Ullman, 2001). Creative solutions in the design of individual elements are highly recommended to meet elemental estimates and uplift

the overall quality of the design (Chow and Ng, 2003). Without clarity in mind, GBI requirements may be considered an add-on rather than an integral aspect of design creating a perverse incentive for members of the design team to show how expensive green building could be (Ahmed, 2007). Though it is a general perception that green is expensive (MatRaschid, 2013), not all green building measures add cost, but the ones that save money usually must be made early.

Time Effectiveness

When GBI consultants and design team members acquire real experience, the amount of time required to successfully integrate green into a project will definitely be reduced drastically. It is therefore essential that GBI consultants and all design team members attend and pass the GBI facilitators course. In a study on Managing the Cost of Green Buildings Syphers et al. (2003), highlighted that lack of experience with green building technology, green building components, and energy- and water-modeling programs can significantly impact the cost overruns. They also found that time could be wasted in researching inappropriate technologies, or the owner could accept a bid that is two or three times too large for commissioning services. There is rarely enough There is rarely enough funding in the budget to pay for all incurred costs;time to fully research all the interesting new green materials and accurate contract administration and progress reporting, on-schedule delivery of services in every stage, effective effort to meet the scheduled milestone and completion dates as stipulated in the contract and timeliness of estimating and cost plan monitoring. It is therefore useful to work out a process for discovery and decision-making ahead of time (Syphers et al., 2003).

Quality of Result

Ling (2000); Chow and Ng (2003) are of the opinion that, consultants' initiative to provide the best possible solutions in terms of time, cost and quality is desirable. Consultants have to make every endeavour to suggest innovative and creative ideas to minimise the time, cost and risks and improve the overall quality of the project. According to Kuprenas (2003), the design team meeting frequency and the process of written reporting of design phase progress were found to be statistically significant in reducing design phase costs. Otherwise, the use of project manager training and a project management based organizational structure were found to be processes that do not create a statistically significant in reducing design phase costs. All reports have to be presented in a systematic manner with adequate quality and timeliness of amendments / addendums during tender phase, responsiveness to dcc requests, quality of response to dcc requests, timeliness of shop drawing / submission reviews, quality and timeliness of reporting were major and evidence to support all recommendations. Considerations should also be taken if the reports are necessary to present to laymen. All the drawings, plans and figures in the reports should be precise so that the proposed scheme can be visualized.

Compliance to GBI requirement

GBI consultants should not just observe the requirements as specified in the client's brief, but also put effort into assisting the client in identifying and developing other crucial objectives and requirements for the project (HM Treasury, 1997). It is essential to provide the services adhered to the client's brief throughout the design stage as the external environment might change radically. Non-compliance to legislation could lead to abortive work and delays. Identification of client's requirements and project objectives: GBI consultants should not just observe the requirements as specified in the client's brief, but also put effort into assisting the client in identifying and developing other crucial objectives and requirements for the project (HM Treasury, 1997). By properly identifying the client's requirements and project objectives, best value design, which is technically sound, practical, aesthetically good, and cost-effective, could be produced.

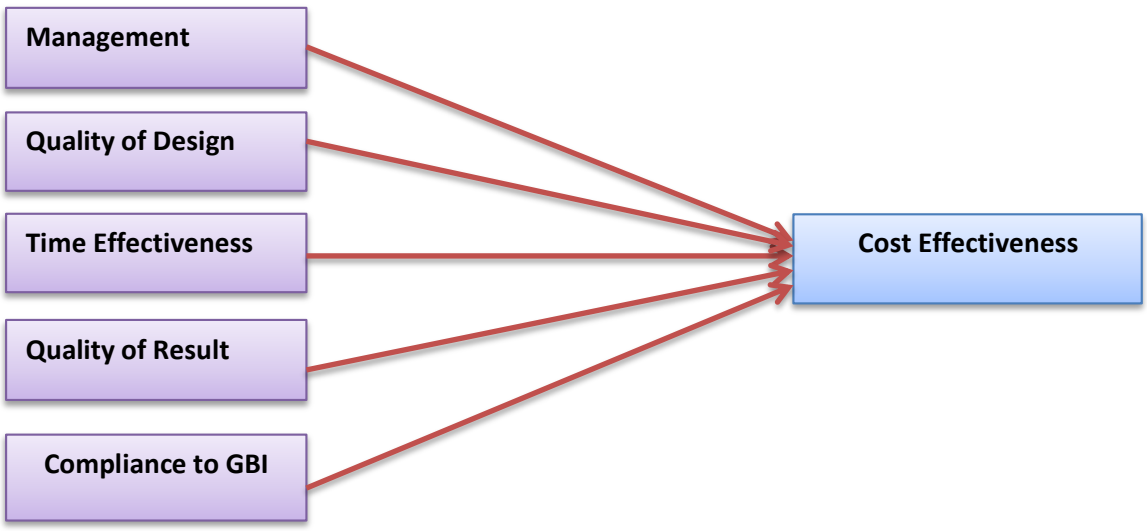
It can be concluded that careful selection of building methods can save manpower and reduce overall costs, as well as reducing risk and environmental damage. Efficient and effective coordination, collaboration and communication among clients and consultants are required to overcome complexity and difficulty inherent within the design process of green buildings. Innovative and creative ideas minimize the time, cost, and risks, and improve the overall

quality of the green building project. In addition, non-compliance to legislation could lead to abortive work and delays.

STUDY VARIABLES

This model was based on empirical research to provide the framework for the development of the research model was test in this study (Figure 1). The study model includes management, quality of design, time effectiveness, quality of result and compliance with GBI requirement as independent variable and cost effectivenessas dependent variable.

Figure 1.Variables Involved in the study(Source: Author)



METHODOLOGY

This research targets practitioners and professionals – architects, builders, planners, quantity surveyors with involvement in green building design and construction within local ministries, municipalities, governmental bodies and consulting offices with previous involvement in green building. A survey questionnaire was designed to gather data by the research objectives. Variables in this study are mainly categorical in nature. They involve the opinion of the respondents towards the general acceptance on services provided by GBI consultants. Thus, opinion rating scales were used in measuring the variables attributes. A five level rating scale ranging from totally not accepted to totally accepted based on likert scale from 1-5 was used to in the second part for the assessment of acceptance level. Due to the resources and time limitation the research sample only covered the Kuala Lumpur and Selangor areas. A total of 524 questionnaires were sent out only 150 were returned. The acceptance criteria questionnaire was considered in testing questionnaire validity. However, the validity of a questionnaire is reliant on its reliability and if a questionnaire cannot be proven to be reliable, there is no need examining its validity (Emory, 1991). The study tested the reliability of the questionnaire using Cronbach's Coefficient Alpha method, the one-way ANOVA was conducted to compare the means of cost effectiveness perception based on respondents'

specialization namely Architect, Engineer Project, Manager Construction, Supervisor and Quantity Surveyor. Correlation analysis was applied to determine the relationship between study variables namely management, quality of design, time effectiveness, quality of result, compliance to GBI requirement and cost effectiveness. Statistical Package for Social sciences (SPSS) was used as a means to process the data and results. The results and discussion for this survey is presented below.

RESULTS AND DISCUSSION

Demographics Background

The distribution of respondents according to the type of organisation that they worked for shows in the results, 37.3% (n = 56) respondents work with Consultant organization, which represented the majority of the sample size. Whilst 35.3% (n = 53) of total respondents that participated in this study are working at contractor organization. Respondents that are working in Project Management Consultant comprised of 20% (n = 30). Finally, 7.3% (n = 11) of respondents are owner (developer) participated in this study. 53.3% (n = 80) respondents hold a Bachelor Science degree, which representing the majority of respondent. 40% (n = 60) respondents hold Master of Science degree, 6% (n = 9) respondents have education qualification at the Diploma level. Finally, only 0.7% (n = 1) respondent hold a PhD. This result indicated that the majority of respondents were educated. 44.7% (n = 67) have more than 20 years working experience, which represented the majority of respondents. 41.3% (n = 62) respondents have been working in construction industries between 11 to 20 years. Meanwhile, 12% (n = 18) respondents were involved in construction industries between 6 to 10 years, and finally only three respondents or 2% have been working in construction industries for less than 5 years. This revealed that most of respondents have very well experience in construction industries. Architects represent 22% (n = 33) of the total respondents whilst 20% (n = 30) of total respondents are employed Engineers. Respondents who worked as Project Managers amount to 20% (n = 30), and respondents who are employed as Construction Supervisor are 20% (n = 30). Finally, 27% (n = 18) of total respondents are Quantity Surveyors.

ANOVA test

Table .1 shows the ANOVA test found there was a statistically significant difference in the mean of respondents' perception of cost effectiveness score among the specialization categories with $F = 15.709$ and significant level smaller then .05 ($p = .000$).

Table 1: ANOVA test

Specialization	N	Mean	Std. Deviation	F	Sig.
Architect	33	4.16	.298	15.709	.000
Engineer	30	3.58	.510		
Project Manager	30	3.78	.542		
Construction Supervisor	27	4.30	.256		
Quantity Surveyor	30	4.05	.287		

Bonferroni Post Hoc Multiple Comparisons Test

Table 2 shown the Bonferroni Post Hoc multiple comparisons test, the result revealed that there was a statistically significant difference in the mean perception of cost effectiveness

based on respondents specialization namely Architect, Engineer, Project Manager, Construction Supervisor and Quantity Surveyor. This study found the significant difference for the following
pairs: Architect (*M* = 4.16, *SD* = .298) and Engineer (*M* = 3.58, *SD* = .501) with a mean difference (*MD* = .584) and the p-value of 0.0001. This study also found a significant deference between Architect (*M* = 4.16, *SD* = .298) and Project Manager (*M* = 3.78, *SD* = .542). There a significant deference between Engineer (*M* = 3.58, *SD* = .501) and Construction Supervisor (*M* = 4.30, *SD* = .256) with p-value less than .05. The result also shows the mean difference between Engineer (*M* = 3.58, *SD* = .501) and Quantity Surveyor (*M* = 4.05, *SD* = .287), p-value of 0.0001. Finally, there is a significant deference between Project Manager (*M* = 3.78, *SD* = .542) and Construction Supervisor (*M* = 4.30, *SD* = .256) with a mean difference (*MD* = .473) and the p-value of 0.0001

Correlation Analysis

The objectives of this study are to determine the relationship between management, quality of design, time effectiveness, quality of result, compliance to GBI requirement and cost effectiveness. To achieve the objectives, the Pearson correlation's statistical analysis has been used to test the relationships. Pearson correlation's statistical analysis determines the direction and strength of the relationship between the independent and dependent variables factors (Hair et al., 2010).

Table 3: Correlations between Variables

Variables	1	2	3	4	5	6
Management	1					
Quality of Design	-.015	1				
Time Effectiveness	-.067	-.245**	1			
Quality of Result	-.361**	.262**	-.058	1		
Compliance to GBI	.196*	.586**	-.283**	.267**	1	
Cost Effectiveness	.310**	-.407**	.462**	-.515**	.171*	1

***. Correlation is significant at the 0.01 level*

Table 3 displays the correlation analysis results. This study found that the positively significant relationship between management and cost effectiveness ($r = .310$, $p < 0.01$). It indicates that the effective management roles in the organization also have high level in managing cost effectiveness. This finding supports the first hypothesis and Robichaud et al., 2011; Jaworski & Samanta, 2006 and CPERF, 2013, that appropriate understanding of the consultant roles in controlling risk is important during the early design stage and prevents the increase of related costs within the context of the Client's operating environment, objectives of the project. The results from this study shows that there is negative significant relationship between quality of design and cost effectiveness ($r = -.407$, $p < 0.01$). This means that the quality of design significantly influence cost effectiveness. It is noted that if organization do a good and quality design, it may reduce cost. Thus, support the second hypothesis and consistent with MatRaschid, 2013 opinion in chapter 2 that though it is a general perception that green is expensive not all green building measures add cost but when completeness and correctness of specifications, drawings, catalogues, understanding of the project objectives and constraints, thoroughness of and logical approach in problem analysis and exploration of alternatives, appropriateness of concept and sensitivity to context are exhibited in the strategies then money can be saved.

Table 3 also displays the correlation analysis between time effectiveness and cost effectiveness. This study found that the positively significant relationship between time effectiveness and cost effectiveness ($r = .462$, $p < 0.01$). It indicates that the respondent who has a high level in handling time effectively may also good in handling cost effectively. This

finding supports the third hypothesis and consistent with Syphers et al. (2003) that only knowledgeable and expereinced GBI consultants and design team members with green building technology, green building components and energy - and water-modeling programs should be engaged in the process as the amount of time required and money expended to successfully integrate green into a project will definitely be reduced drastically.

The results from this study shows that there is negative significant relationship between quality of result and cost effectiveness ($r = -515$, $p < 0.01$). This means that the quality of result is significantly influence cost effectiveness. It is noted that when organization produce good result or outcomes it will reduce cost. Consultants have to make every endeavour to suggest innovative and creative ideas to minimise the time, cost and risks and improve the overall quality of the project. The finding is in line withLing (2000) and Chow and Ng (2003) that consultants' initiative to provide the best possible solutions in terms of time, cost and quality is desirable. This result supports the forth hypothesis of this study.

The last hypothesis suggests that there is a significant relationship between compliance to GBI requirement and cost effectiveness. This study supported the hypothesis when it found that is a significant relationship between compliance to GBI requirement and cost effectiveness ($r = .171$, $p < 0.01$). This result indicates that high compliance to GBI requirement will also influence high level of cost. This is consistent with the literature review that shows that developers are only going for minimum rating; hence, green residential buildings in Malaysia only contribute 50% to sustainability. It is perceived that going for a higher rating or compliance to GBI criteria incure more cost. This statement is supported by Yudelson, 2008; Yusuf e. Al., 2013 and GBI, 2013.

CONCLUSION

This study provides an interesting insight into the GBI consultancy in residential building development in relation to factors influencing its acceptance Malaysian Construction Industry. The different perception of cost effectiveness and the relationship between management, quality of design, time effectiveness, quality of result, compliance to GBI requirement and cost effectiveness which were the GBI consultancies acceptance factors identified in this study with consideration to residential building development were analysed. Key data was obtained by surveys addressed to professionals and regulators -Public (Local Building authorities and Construction agencies) and private sectors (Architects, builders, and Planners).with involvement in green building practices in Malaysian construction industry.Based on the result of ANOVA, this study suggested that the overall perception of cost effectiveness among specializations were significantly different. Meanwhile, the correlational analysis shown that there is significant relationship between management, quality of design, time effectiveness, quality of result, compliance to GBI requirement and cost effectiveness. GBI consultants have to make every endeavour to suggest innovative and creative ideas to minimise the time, cost and risks and improve the overall quality of the project. Findings revealed that knowledgeable and expereinced GBI consultants and design team members with green building technology, green building components and energy and water-modeling programs should be engaged in the process as the amount of time required and money expended to successfully integrate green into a project will definitely be reduced drastically.The survey is somewhat confined, as it only expressed experts' opinion in residential building development.A follow up survey that seeks to address other GBI building classification would provide a worthwhile comparison of experts' concern in respect to green building within the practical context of consultancies.

REFERENCE

Ahmed, N. (2007). The influence of client's attributes during briefing process on project success.Universiti Teknologi MARA, Shah Alam.

Barrett, P. & Stanley, C.A. (1999). Better Construction Briefing. 1st Edn., John Wiley and Sons, Oxford, ISBN-10: 0632051027, pp: 168.

Cassidy, R., (2003). White paper on sustainability – a report on the green building movement.

Chow, L-K. and Ng, S. T. (2003). Performance-based evaluation for engineering consultants: a study of assessment criteria. In: proceeding form Greenwood, D J (Ed.), 19th Annual ARCOM Conference, 3-5 September 2003, University of Brighton. Association of Researchers in Construction Management, Vol. 1, 433-42.

Egemen, M. & Mohamed, A. N. (2005).Clients' needs, wants and expectations from contractors and approach to the concept of repetitive works in the Northern Cyprus construction market.Journal of Building & Environment. Vol. 3, No. 4, pp. 165-179.

Egemen, M. & Mohamed, A. N. (2005). "Different approaches of clients and consultants to contractors' qualification and selection." Journal of Civil Engineering and Management. Vol. 6, No. 4, pp. 267-276.

Elforgani M. S. and Rahmat I. 2012 "The Influence of Clients' Qualities on Green Design Performance of Building Projects in Malaysia-Descriptive Study" American Journal of Applied Sciences 9 (10): 1668-1677, 2012ISSN 1546-9239

Elforgani, M.S. & I. Rahmat, 2012. The influence of Clients qualities on green design performance of building projects in Malaysia-descriptive study. Am. J. Applied Sci., 9: 1668-1677.

GBI Consulting. (2009). Our Services - Your Innovater and Enabler to go Green. Retrieved March5, 2013, from GBI Consulting: http://www.gbic.com.my/services.html.

Green Building Index. (2013). Retrieved from www.greenbuildingindex.org

Hair, J., Black, W., Babin, B., & Anderson, R. (2010).Multivariate data analysis (Seventh Ed.). New Jersey: Prentice-Hall. Inc

HM Treasury (1997) Appointment of Consultants and Contractors, Procurement Guidance No. 3, Procurement Group, UK Government Procurement Group, London.

Knudstrup, M.A. & Hansen, H.T.R. (2005). The Integrated Design Process (IDP): A More Holistic Approach to Sustainable Architecture. Arkitektur and Design, Aalborg

Ling, Y.Y. (2000) A theoretical framework for selection of consultants by design-build contractors, Journal of Construction procurement, 6(2), 147-163.

Soetanto, R., Proverbs, D. G. & Holt, G. D. (2001). Achieving quality construction projects based on harmonious working relationships Clients' and architects' perceptions of contractor performance. International Journal of Quality & Reliability Management. Vol. 18, No. 5, pp. 528-548.

Ullman, D.G. (2001). Robust decision-making for engineering design, Journal of Engineering Design, 12(1), 3-13.

Yudelson, J. 2008Marketing Green Building Services: Strategies for Success, Oxford: Elsevier