OPEN ACCESS

The 3rd World Sustainability Forum
1-30 November 2013

http://www.sciforum.net/conference/wsf3

Article

Policy and market uncertainty affecting Building Energy Efficiency (BEE) promotion: a case study with architects in Malaysia

Queena K. Qian [1,*], Abd Ghani Bin Khalid [2] and Edwin H.W. Chan[3]

[1] Endeavour Australia Cheung Kong Fellow, Zero Waste Centre for Sustainable Design and Behaviour, University of South Australia, Australia;
Building and Real Estate Department, The Hong Kong Polytechnic University, Hong Kong S.A.R., China.

[2] Professor, Faculty of Built Environment, Universiti Teknologi Malaysia, Malaysia.

[3]Professor, Building and Real Estate Department, The Hong Kong Polytechnic University, Hong Kong S.A.R., China.

E-Mails: kun.qian@fulbrightmail.org; drdrghani@yahoo.com; edwin.chan@polyu.edu.hk

* Author to whom correspondence should be addressed; Tel.: +852-34008177; Fax: +852-23623979
E-mail address: kun.qian@fulbrightmail.org; Address: Building and Real Estate Department, The Hong Kong Polytechnic University, Hong Kong S.A.R., China.

Received: 21 September 2013 / Accepted: 18 October 2013 / Published: 01 November 2013

Abstract: Attractive opportunities exist to reduce buildings' energy use at lower costs and higher returns in the long run. As little work done using transaction costs (TCs) approach in this area, this paper using empirical case study of Malaysia to demonstrate how TCs, especially uncertainty aspects affect the business investment of BEE by the major stakeholders, i.e. architects. To solicit views regarding BEE investment, in-depth interviews were conducted with 30 architects who work in major real estate development firms in Malaysia. This research applies transaction cost economics (TCE) to understand the underlying barriers resulting from uncertainty that prohibits the acceptance of BEE by

choice. It provides a detailed analysis of the current situation and future prospects for BEE adoption through studying the impacts from the uncertainty aspects of market and policy. It delineates the market and suggests possible policy solutions to overcome the uncertainties and to attain the large-scale deployment of energy-efficient building techniques. The findings indicate the uncertainties to the BEE decision-makings from both market and policy sides. It establishes the groundwork for future studies on how to choose a particular policy package and what roles government should play to solve the existing problems in BEE development.

Keywords: Building Energy Efficiency (BEE); Transaction Costs (TCs); uncertainty; architects; Malaysia

1. Introduction

Buildings account for 40% of global energy consumption and nearly one-third of global CO2 emissions (Levine et al., 2007). Energy demand in Asia and the Pacific region is projected to grow by 2.75% a year till 2030, which is half of the global demand by then (Heyzer, 2008). Energy demand in the building sector in Asia is projected to grow in parallel with economic and population growth. The United Nations Economic and Social Commission for Asia and the Pacific (Escap) estimated that by using energy efficiency measures and renewable energy, 12% of the overall energy consumption can be reduced (Ahmed, 2008). Compared to developed economies, developing countries, such as Malaysia, in general lack the incentive and technical knowhow to pursue sustainability (Ugwu and Haupt, 2007). There is an urgent call for the developing countries to raise their awareness and contribute their efforts on BEE development so as to combat the climate change and address the environmental concerns (Qian, 2012). In most Asian countries, however, including China, India, Indonesia, Malaysia, the Philippines, and Thailand, the concept of green building is still in its infancy stage.

The benefits to be secured from BEE are only vaguely understood by the general public and have not been widely pursued, particularly in the building industry, though it has proved by theory for a long time (Koeppel and Urge-Vorsatz, 2007). The stakeholders still seem to hesitate about voluntarily entering the BEE market. This may be due to certain characteristics of the market, technologies, and end-users who reject rational, energy-saving choices in the purchase and use of appliances during the life-cycle of a building. Therefore, there is a great potential in studying the stakeholders' concerns that affect BEE investment, which justifies a critical review of the current market situation to address BEE development. Given the current sophistication of technology, a better-designed policy package to promote BEE could increase effectiveness and efficiency by 40% (OECD, 2003). Hence, government's roles and policy uncertainty of BEE promotion need to be studied.

Compared to conventional building, the barrier to the BEE market is higher due to uncertainties, such as greater capital costs, new information, new technology, financial risks, and so forth. If there is asymmetric information about quality standards or requirements that are not mandatorily imposed onto the market, the opportunistic behavior of most market players may lead them to continue producing conventional buildings (Akerlof, 1970). From a transaction cost economics (TCE) perspective, researchers regard energy efficiency as a co-ordination and incentive problem, rather than one of utility

maximization, and they emphasize that policy intervention and different institutional structures may lower transaction costs (TCs) and provide net social benefits (Golove and Eto, 1996; Levine et al., 1995). A better understanding of the nature and structure of TCs is necessary to design an incentive scheme that changes the market mechanisms for BEE investment. A lack of concern and the failure to study the role of TCs also affects the potential economic effectiveness of policy implementations and markets.

This research aims to understand the uncertainty in the BEE investment, which causes hesitations to invest BEE in Malaysia. It understands the real estate developers' concerns of uncertainty in their BEE investment from the aspects of market and policy uncertainty. The study tries to understand the impacts of uncertainty on the decision-making of real estate developers in actual practice of BEE investment through interviews with the practitioners in Malaysia.

2. Literature review

2.1. BEE in transaction costs economics (TCE) approach

With socio-economic progress, more building market stakeholders are getting involved and each of them looks after their own business interests which may have conflict with each other. Real estate developers generally do no more than just meeting the basic requirements of the law and policies to minimize the costs engendered by the extra work entailed by mandatory energy efficiency regulations. Contractors also want to avoid these extra tasks, which require special expertise and specialized equipment that they do not typically possess. Manufacturers of BEE products want regulations to be even stricter to create greater demand in the market. Financially, building-design professionals and institutes will not be adversely influenced by the new policies but are apt to succumb to the demands of developers because of the nature of their relationship with them. These conflicting interests are the main sources of the uncertainties of and barriers to BEE development.

TCE argues that markets and organizations provide alternative means of organizing economic activities and that the choice between them depends upon a number of factors, including the relative magnitude of TCs (Williamson, 1979, 1985). TCE explains the behavior of individuals rather than social structures and assumes these individuals to be rational actors in that they seek out opportunities to improve economic efficiency. It attaches particular importance to asymmetric information and opportunism. TCE extends the orthodox/agency framework by first introducing the behavioral assumption of bounded rationality, then focusing on the natures of different transactions and the costs and risks associated with them, and third, explaining why particular types of transaction are associated with particular types of governance structures (Sorrell et al, 2004).

As one of the key TCs variables, uncertainty is commonly conceptualized as outcome unpredictability due to environmental volatility (e.g. changing technology) (Heide & John, 1990, Noordewier et al, 1990, Rindflesisch & Heide, 1997), and/ or arises due to the difficulties associated with monitoring the contractual performance of economic exchange parties (Williamson, 1985). This study chooses to focus upon one dimension of TCs- uncertainty, their impact and perspective in different scenarios, and how they can be minimized by the choice of an appropriate governance structure or policy packages. For the purpose of this research, TCE provides a comprehensive

framework through which to understand the stakeholders in the real estate market in general and the BEE market and its barriers in particular.

2.2. Market and policy uncertainty

Uncertainty is the key element of TCs (Staley, 1998) and plays a vital role in the stakeholders' decision-makings of their BEE investment (Qian, 2012). The primary reason is that the degree of compliance of BEE code cannot be perfectly observed from the public, and some developers and manufacturers may exaggerate the energy efficiency performance. The extreme case is to sell the conventional building product at the price of BEE, which would fill the BEE market with a lot of fake and low-quality non-BEE products. As practical evidences show, the inability to distinguish the BEE from the non-BEEs and the constant doubt from the public further undermines the attractiveness of BEE to stakeholders and eventually leads to a "Lemon market". Moreover, the external factors, such as the stability of economic and policy environment, will also cause the concerns of the stakeholders in their decision-making process on BEE. Based on the interviews among the real estate developers, we may have a better understanding the impacts of TCs from the perspective of uncertainties.

In this study, the authors mainly focus on the uncertainty impact on the real estate developers' decision-making of BEE investment. According to the unique features of BEE market, we further break down the uncertainty into two aspects: policy and market uncertainty.

3. Methodology

3.1. Interview with the architects in Malaysia

The world's primary energy consumption is estimated to increase by 1.5 times from 2004 to 2030: fully half of that increase will come from Asia (Hong et al, 2007, Chan et al, 2009). Therefore, a zoom-in focus of the building industry in Asian countries, especially developing regions gives a different perspective, comparing to its developed counterparts. Malaysia, as a case study, is therefore representative with the implications to a wider range of applications to similar Asian developing countries. This study is focusing on the opinions from the architects on the uncertainty aspect of decision-making of the BEE investment. As architects deal with developers, contractors, government regulatory bodies, and the public-end-users, whose role and business interests in creating and delivering BEE are relatively neutral, and provide a link with a more objective view between the government and the market.

In-depth interviews with the architects who work in big real estate development firms in Malaysia were conducted to solicit their views on issues regarding BEE investment1 The research team travelled to Malaysia in July and August 2012 and contacted the potential interviewee, through the Malaysian Institute of Architects (Pertubuhan Akitek Malaysia - PAM) - contact through Universiti Technologi of Malaysia (UTM), and Construction Industry Development Board CIDB of Malaysia. The interviewees include 30 architects (mainly building designers) and representatives of developers who actively worked in major real estate development firms or architectural firms in Malaysia. The purpose was to

[1]One day CPD conference in Kuala Lumpur, Malaysia was held to collect views from the professional participants in the construction field. A guest lecture to the architect association in Malaysia is organized to explain the research objectives and consolidate the views from experienced building designers.

get the first hand opinions of real estate developers about the role of uncertainty in their BEE investment. This study also provides a better picture of BEE market development relating to a specific institution in the Malaysia case, and provides reference for designing rational policy.

The findings of the interview with the buildings designers show the business environment and market/ policy expectation on BEE development in Malaysia. The responses from architects are important to understand the market/business expectation from a more objective perspective.

3.2. Setting Hypotheses and Design of interview questions

The interview questions were designed to address "uncertainty" issues regarding BEE investment. Two hypotheses regarding "uncertainty" were developed from the aspects- "market uncertainty" and "policy uncertainty", and related open-end questions about the interviewees' opinions were designed to test each of them.

The hypotheses and the interview questions were designed based on the literature review and pilot discussions with a few experts in industry and academia. The relations between the market and policy uncertainties, two hypotheses (H), and three interview questions (Q) are listed in Tables 1 below. Remarks in the following paragraphs explain how the interview questions and the hypotheses are interrelated. The purpose of these interviews is to understand the uncertainty that affecting the BEE investment decisions from the architects' viewpoint.

3.2.1. Market uncertainty

The market also creates many uncertainties for developers. They may be hesitant to invest in BEE due to a lack of confidence in estimations of market demand. The end-users' expectations and concerns about BEE may be better known, so that both the developers and the government could seize the opportunity to promote BEE. This brings H1 onto the horizon. Q1 and Q2 are designed to detail the behavior and concerns of the market end-users about BEE by segmenting the customers so that the real estate developers might have a more confident business strategy and that the government can design its incentive policies to cater to more focused groups based on a better understanding of the needs and concerns of both end-users and developers.

3.2.1. Policy uncertainty

Policy also affects uncertainty during different implementation stages. This uncertainty affects the worries and enthusiasm of the market variously, thus affecting the effectiveness of the policies themselves. The policy uncertainty is based on the assumption that the timing of the policy's introduction is a major factor in causing uncertainty for the architects (H2). Q3 is designed to elicit information about how the stage at which the policy is implemented affects the architect's concerns, which gives government information that lets it have market concerns in mind as it implements policy at different points in the process. The results will also shed light upon the confidence that the stakeholders have towards the long-term consistency of government policy.

4. Empirical analysis

4.1. Interview results

Table 1shows the major opinions (extraction of the top ranked points from the collection of answers) of the interviews, which have been summarized and grouped under a few dominating points in the "Summary of the Key Responses" in table 1. It was an interview exercise where the respondents could give several options or views to one question. The rate of respondents with the views close to the summarizing key point is shown in the right hand column of the table. The % rate shown for the answers of each question shows the weighted similar opinions to each interview question among the interviewees, which cannot be taken as comparison with another question in absolute value or importance. The interviewees are free to have multiple answers to each interview question, as long as they do not conflict with each other. Therefore the percentage of the different views to each question does not necessarily add up to 100%. Those Key Responses highlighted in bold letters are the significant issues to be discussed in more details in the following section.

Table 1 Key Interview Responses on the market and policy uncertainties of BEE

H1 The end-users' variable expectations about BEE increase market uncertainty to the developers (e.g. ., they may misinterpret a focused group as the end-users of their final products.)		
Q1 Occupant's behavioral variety may affect developers to produce different BEE of different performance.	- An annual report of the carbon performance of each building/ household will be very good in transforming the occupant's behavior. It's always about the awareness and transparency.	**28.95%**
	- In the future, with the carbon audit, people can understand and compare the carbon performance, and by that information and transparency, people can compare and shape their behavior.	**28.95%**
	- Less than 20% (10-20%) of the influence to investing in BEE comes from the occupant's behavior.	10.53%
	- Though it has influence, still the cost is the major concern.	**28.95%**
Q2 Social classes of building owners (different education level, financial status and experience to appreciate the benefit of BEE). How do social classes affect the developers' concern in BEE investment?	- The rich people in higher social classes will appreciate the benefits of BEE better than the low income people, which attract the developers to invest in BEE for high price luxury buildings.	21.28%
	- The higher educated class will appreciate the BEE better, as it contributes towards a better environment. This attracts the developers to invest in BEE targeted to the educated class.	**42.55%**
	- The experiences of building owners make them appreciate the benefits of BEE better. This attracts the developers to invest in BEE targeted to this class of experienced end-users.	34.04%
	- Social classes of building owners do not affect the developers' concern in BEE investment.	2.13%
H2 The earlier the stage of BEE policy implementation, the greater the real estate developers' TCs concern.		
Q3 When facing a new incentive and an existing matured incentive scheme, would the developers' concern be different in their decision to invest on BEE? In other words, encountering BEE incentives, would the developers have more concerns during which stage of implementation of the incentive scheme? Why are they different?	- Based on the international experience/ practice, the government will first take part in the new BEE movement by having all government projects integrated with the new GB features as pilot projects (demonstration projects) and share the experience with the market. After a certain period of time, they could address all these worries, and they will then mandate the polity to the market.	**33.33%**
	- The developer will welcome to adopt incentives in early stages of implementation of the incentive.	11.11%
	- Established incentive schemes are more easily understandable and acceptable. The developers would like to see what happened to the others first.	15.56%
	- The earlier stage it is, the more challenge and concern will be, and at the latter stage, it becomes more like a formula to follow.	15.56%
	- For a new incentive, the most concern to the market is whether it's stable and long-lasting. Therefore, more established incentive scheme incurs less concern.	15.56%
	- More concerns during the early stage because more uncertainty.	8.89%

4.2. Observations on the findings:

4.2.1. Market uncertainty (H1):

Two interview questions are designed to test H1. Q1 and Q2 are designed from the occupants' behavior and social class aspect respectively.

Regarding the occupants' behavior (Q1), surprising coincidence occurs that three equally weighted views (28.95%) were expressed as in the followings: "An annual report of the carbon performance of each building/ household will be very good in transforming the occupant's behavior. It's always about the awareness and transparency."; "In the future, with the carbon audit, people can understand and compare the carbon performance, and by that information and transparency, people can compare and shape their behavior"; and "Though it has influence, still the cost is the major concern." While the first two indicate the importance of the influence by occupant's behavior which would both do good to transform the behavior with more transparency and awareness, the third one stress out the cost concern still plays an important role. 10.53% of the respondents believe that "less than 20% of the influence to investing in GB comes from the occupant's behavior".

Regarding how social class might affect the developers' concerns (Q2), only 2.13% think that "Social classes of building owners do not affect the developers' concern in investing in BEE." The majority (42.55%) believe that "The higher educated class will appreciate the GB/BEE better, as it contributes towards a better environment. This attracts the developers to invest in GB/BEE targeted to the educated class." Another 21.28% respond that "The rich people in higher social classes will appreciate the benefits of GB/BEE better than the low income people, who attract the developers to invest in GB/BEE for high price luxury buildings." These two answers suggest that the developers and government incentives will better target at those with more money and education. Furthermore, 34.04% vote that "The experiences of building owners make them appreciate the benefits of GB/BEE better. This attracts the developers to invest in GB/BEE targeted to this class of experienced end-users. " It indicates that the market demand for GB/BEE through knowledgeable consumers is still the main drive for increasing the market penetration by categorizing the market.

4.2.2. Policy uncertainty (H2):

One interview question (Q3) is designed to test Hypothesis 2. The question looks into how policy uncertainty affects BEE development by creating additional TCs. This question solicits the opinions of the interviewees about the developers' concerns regarding the different stages of BEE policy implementation.

The majority (33.33%) think that "Given international experience", in Malaysia, "the government will first take part in the new movement by initiating all their projects involving new BEE features as pilot or demonstration projects and share the experiences with the market. After a certain period of time (some said a few years), they can investigate the concerns that arose and then mandate the policy." The stakeholders prefer the government to take the lead and assume the risk first. Three equally weighted views (15.56%) regarding the stages of policy implementation all point towards the direction to confirm the H4- "the earlier stage of BEE policy implementation, the greater the TCs concerns are". However, even so, still a positive percentage of the views (11.11%) agree that "The developer will welcome to adopt incentives in early stages of implementation of the incentive." This

could be interpreted as the stakeholders have some worry about the long-term consistency of its policy. Even risking the uncertainty of the early stage of the policy implementation, they will venture to take advantage of the incentive before it could be changed later.

5. Discussions and recommendations

The following summarizes the key discussions, from the aspects of market and policy uncertainty accordingly.

5.1. Market uncertainty

- Most people believe that the diversity of occupants' behaviors could lead developers to produce different BEE/GB at different levels of performance. There is a need to have a standard measurement for buildings, such as carbon performance report and/or carbon audit, so that consumers know what good performance actually is.
- Regarding how social classes might affect the developers' concerns about BEE investments, the highly weighted view lies in that the more highly educated and knowledgeable about green buildings will appreciate BEE more, which could contribute towards a better environment. Besides, the rich people in a higher social class also tend to prefer BEE than those of low income class. This indicates that these two categories of social classes- the well-educated and the rich, would be of interests to both the real estate developers and the government when they make decisions favorable to BEE. It confirms a segregation of the market to BEE is an efficient way to understand and to promote the BEE.

5.2 Policy uncertainty

- The earlier the stage of BEE policy implementation, the higher the real estate developers' concerns about TCs. The conclusions echoes the interviews with architects are that during the early period (e.g., the briefing stage) of a BEE project, there are more extra tasks involved than at other stages, and they present higher risks and greater TC concerns.
- Government policies/incentives should address the problem in the early stages of BEE projects. Any new incentives should avoid unnecessary uncertainties for the stakeholder at the early stage of implementation of a new scheme.
- Most people think that more concerns arise during the early stages of development because of higher uncertainty. Most people agree that the government can do better on the basis of international experience and practices. Most people prefer the government to take the lead and assume the risk of trying BEE first. After a certain period of time, they could delineate these concerns and then mandate a solution to the market.
- In general, the majority of respondents agree that for a new incentive, the greatest concern for the market is if it is stable and long lasting. Therefore, the more established the incentive, the less the concern, and the earlier the stage, the greater the challenge.

The study shows that there is a call for turning to stricter guidelines and requirements for BEE, and a variety of policy tools including appliance standards and labeling, building energy code, building

energy performance rating and certification, financial incentive, government demonstration, awareness raising etc., are being utilized in Malaysia. Policy in Malaysia is still in a very early stage of development, comparing to developed countries. A well-established institutional infrastructure that might support the implementation of the building energy codes is yet to be established. In the building sector, it needs a firmer policy and focused strategies to increase the acceptance of energy efficiency measures and the use of sustainable approach to building design and construction. Innovative financing from international bodies need to be solicited as recommended. The government should have long-term strategies and clear and consistent policy for BEE promotion, to create a positive investment environment and raise the stakeholders' confidence and the market's expectations for business investment in BEE. Policy design should take into consideration the impact of transaction costs on the decisions of market stakeholders. Market stakeholders want the government to take the lead to try out BEE projects to cut down any uncertainty before they join the investment. People need better education on green initiatives and require a trustworthy system to measure building energy efficiency. Only when both the end-users and the developers appreciate the benefits of energy efficiency building will they create a favourable business environment for the BEE market.

6. Conclusion

This study has adopted the TCs approach to studying the real estate developers' concerns on BEE investments and has focused on uncertainty in particular. This research has analyzed the uncertainty from the perspectives of market and policy. The research design employed an interview survey, which has provided data from discussions with top-level practitioners and executives of architect firms in Malaysia. The data provides a list of findings and a valid test of the hypotheses as they apply to the case of the Malaysia BEE real estate development. The study reveals the market situation and suggests policy solutions to overcome the concerns of uncertainties to promote building energy efficiency.

Acknowledgments

The work described in this paper was supported by research grants provided by The Hong Kong Polytechnic University and Universiti Teknologi Malaysia. The authors would like to thank all those who contributed to the interviews and those who contributed in reviewing the manuscript. Special thanks to the Endeavour program for the supports.

Conflict of Interest

The authors declare no conflict of interest.

References

1. Akerlof G., 1970, The market for "lemons": quality uncertainty and the market mechanism. Quarterly Journal of Economics 84, 488-500.
2. Ahmed, A.Z., 2008, Integrating Sustainable Energy in Buildings: a case study in Malaysia, FAU Conference, Copenhagen, Denmark, 14-15, May, 2008.
3. Chan, E.H.W, Qian, Q.K., & Lam, P.T. I., 2009, The Market for Green Building in Developed Asian Cities – the Perspectives of Building Designers, Energy Policy (37), pp.3061-3070.

4. Golove, W.H., Eto, J.H., 1996. Market barriers to energy Efficiency: a critical reappraisal of the rationale for public policies to promote energy efficiency, report done by Energy & Environment Division, LBL-38059,Lawrence Berkeley National Laboratory, University of California,USA..
5. Heide, J.B., and John, G., 1990, Alliances in industrial purchasing: the determinants of joint action in buyer-supplier relationships. Journal of Marketing Research, 27 (1), 24-36.
6. Heyzer, N., 2008, Devoting their energy to finding security. The New Straits Times, Friday 1 May 2008, NST Press.
7. Hong, W., Chiang, M.S., Shapiro, R.A., Clifford, M.L., 2007, Building Energy Efficiency, Why Green Buildings Are Key to Asia's Future, Laurenzi, M.P. (editor), Copyright © 2007 the Asia Business Council, ISBN 10: 988-99565-1-9, ISBN 13: 978-988-99565-1-6
8. Koeppel and Urge-Vorsatz, 2007, Assessment of policy instruments for reducing greenhouse gas emissions from buildings- Report for the UNEP-Sustainable Buildings and Construction Initiative, Central European University, Budapest, ISBN:978-963-87714-0-7.
9. Levine, M. D., Koomey, Jonathan G., McMahon, James, Sanstad, Alan H., Hirst, Eric, 1995, "Energy Efficiency Policy and Market Failures." Annual Review of Energy and the Environment 20: 535-555.
10. Levine, M., D. Ürge-Vorsatz, K. Blok, L. Geng, D. Harvey, S. Lang, G. Levermore, A. MongameliMehlwana, S. Mirasgedis, A. Novikova, J. Rilling, H. Yoshino, 2007: Residential and commercial buildings. In Climate Change 2007:Mitigation. Contribution of Working Group III, to the Fourth Assessment Report of the Intergovernmental Panel onClimate Change [B. Metz, O.R. Davidson, P.R. Bosch, R. Dave, L.A., Meyer (eds)], Cambridge University Press,Cambridge, United Kingdom and New York, NY, USA.IPCC 4th Assessment Report, Working Group III report, Chapter6, Residential and commercial1 buildings.
11. Noordewier, T.G., John, G., and Nevin, J.R., 1990, Performance outcomes of purchasing arrangements in industrial buyer-vendor relationships. Journal of Marketing, 54 (4). 80-93.
12. OECD, 2003. Environmentally sustainable buildings, challenges and policies. OECD publications Service, Paris, France.
13. Qian, Q.K., 2012, Barriers to Promote Building Energy Efficiency (BEE)- A Transaction Costs (TCs) Perspective, PhD thesis, The Hong Kong Polytechnic University.
14. Rindfleisch, A., and Heide, J.B., 1997, Transaction Cost Analysis: past, present and future application. Journal of Marketing, 61(4),30-54.
15. Sorrell S., O'Malley, E., Schleich, J., Scott S., 2004, The Economics of Energy Efficiency: Barriers to Cost-Effective Investment, Edward Elgar Publishing Limited.
16. Staley, S.R., 1998, Ballot-box zoning, transaction costs and land development. Urban Futures Working Paper, No.98-2. Los Angeles, CA: Reason Public Policy Institute. Online, available from http://www/urbanfutures.org/wpballot.html Accessed 2002.
17. Ugwu, O. O. and Haupt, T. C., 2007. Key performance indicators and assessm ent methods for infrastructure sustainability--a South African construction industry perspective. Building and Environment 42 (2):665-680.
18. Williamson, O.E., 1979, Transaction cost economics: the governance of contractual relations, Journal of Law and Eocnomics, 22, 233-61.
19. Williamson, O.E., 1985, The Economic Institutes of Capitalism, Free Press, New York.