Sustainable development and construction industry in Malaysia

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Abstract: *Sustainable construction is a way for the building and infrastructure industry to move towards achieving sustainable development, taking into account environmental, socioeconomic and cultural issues. Differing approaches and differing economic markets lead to different priorities. This paper presents the construction scenario of Malaysia and the developments in sustainable construction taking place in this country. Barriers to the implementation of sustainable construction are discussed. A list of recommendation was proposed to drive sustainable construction in this country. In conclusion, the status of sustainable construction in Malaysia is still in its infancy. The lack of awareness, training and education, ineffective procurement systems, existing public policies and regulatory frameworks are among the major barriers for sustainable construction in Malaysia. Besides the needs for capacities, technologies and tools, total and ardent commitment by all players in the construction sectors including the governments and the public at large are required in order to achieve sustainable construction in Malaysia.*

Keyword: Sustainable development, Construction scenario, Construction industry, Barriers, Malaysia.

Introduction

As the world's largest and most fragmented industrial activity, construction faces a huge challenge in pursuit of sustainability. Construction accounts for an estimated 40% of all resources consumption and produces about 40% of all waste including greenhouse gas emissions. Over a building's lifecycle-through planning and construction, building use and managements, maintenance and renovation, and finally dismantling or demolition-resource consumption and waste production together trigger a number of

environmental problems. These include loss of agricultural land, both by extending human settlements and increasing quarrying and mining for raw materials for construction, deforestation ad pollution. Sustainable construction is about minimising these negative effects. These could be minimised if construction players e.g. owner, contractor, consultant, superintending officer, workmen, etc. do their duties by taking the responsibility to plan the work activities. The aim of this case study has been formulated as: To address the concept of sustainable construction and development. To identify what/how current construction industry practices has adversely affected the sustainability ideal. To explore and propose changes in practice so that sustainable construction and development can be achieved.

Overview on the Concept of Sustainability

Sustainable Development

Sustainable development is a buzzword found in much environmental and some economics literature these days. Certainly the idea of sustainable development has become increasingly popular in the contemporary world. New books on sustainable development have been appearing with increasing rapidity since the United Nations Conference on Environment and Development (the Earth Summit) held in Rio de Janeiro, Brazil in June of 1992, and the number of articles appearing in professional journals has been expanding at what seems to be an exponential rate. The questions are what is all the fuss about? What is sustainable development anyway? And more importantly, why does sustainable development matter? There are a number of important antecedents to Our Common Future, the report by the United Nation's Brundtland Commission (1987) that marks the beginning of the sustainable development concept that has generated all the literature and recent commentary. Divergent economic theorists like E. F. Schumaker of Britain, environmentalists like Barry Commoner and Lester R. Brown, population analysts like Paul Ehrlich, politicians like Willy Brandt of what was then West Germany and Jimmy Carter of the United States, discussions within the United Nations and United Nations Agencies, and a number of environmental organisations spread throughout the world all played roles in formulating ideas that became part of the Brundtland Commission's message. But even though many of the concepts of sustainable development existed before Our Common Future was published, the commission's report, appearing in 1987, started the process of making sustainable development an important issue on the world stage. The Commission identified a number of "common challenges" facing the earth: Population and human resources, food security, species and ecosystems, energy, industrial development, and urbanisation. In the context of these challenges they discussed international environmental problems, what successes had been registered in trying to address those problems, the scope and nature of the environmental problems still facing the world community, and the role of the world's economic systems in developing solutions to these problems and providing long-term relief for what they perceived to be the related problems of poverty and underdevelopment. In the process of describing these challenges and proposing potential policy directions the world community could take to address the

problem they had identified, the Commission presented and defined the phrase, sustainable development (WCED, 1987).

Sustainable development is development that meets the needs of the present without compromising the ability of future generations to meet their own needs.

Sustainable development requires meeting the major needs of all and extending to all the opportunity to satisfy their aspirations for a better life. However, living standards that go beyond the basic minimum are sustainable only if consumption standards everywhere have regard for long-term sustainability (WCED, 1987).

Thus, sustainable development, as a concept, has two primary pillars: Economic development and the consumptive use of the world's natural resources in ways that are sustainable. We have to consume, in other words, with the realisation that resources are finite, and part of our job as human beings is to preserve the human future on this planet into a limitless future. In this concept of the limitless future, the Commission also called for what it termed "equity and the common interest". The Commission declared that "ecological interactions do not respect the boundaries of individual ownership and political jurisdiction". Nor has the local nature of human interaction with the environment been confined, as the result of the creation of ever more sophisticated technologies, to local environmental effects.

Sustainable Construction

Sustainable construction can be considered as an investment in the future. Through conservation of energy, water and natural resources by re-use, recycling, innovative design and the minimisation of waste and pollution we can meet our needs without compromising he needs of future generations. The promotion of sustainable construction is a major part of the Government's policy on Sustainable Development, which recognises that our economy, environment and social well being are interdependent. Sustainable construction is the set of processes by which a profitable and competitive industry delivers built assets (buildings, structures, supporting infrastructure and their immediate surroundings that:

- Enhance the quality of life and offer customer satisfaction;
- Offer flexibility and the potential to cater for user changes in the future;
- Provide and support desirable natural and social environments; and
- Maximise the efficient use of resources.

The Sustainable construction represents one way of approaching the complex issues of sustainability and their application to the construction process. The foundation for the whole process lies in balancing financial, environmental and operational considerations. On top of this comes the assessment and remediation of contaminated land. Above that, sustainable construction considers materials, energy, design and construction. And on top of all of this come the requirements of the community. To many of us, sustainability in the built history may sound like a new terminology. However, if we examine the concept behind this word, it is actually not so, as many of the philosophy expounded have actually being promoted over the years albeit under different names. These past terms would include the likes of "Intelligent Buildings", "Energy Efficient Building", and many other terms including the still grove "Green Buildings". Sustainable construction

is about creating infrastructure and construction methods that are environmentally friendly, don't heavily rely on our rapidly diminishing resources and conserve virgin materials. It is also about minimising waste, pollution, noise and traffic and providing a safer working environment for all involved in construction, maintenance, use and eventual removal of buildings or structures. Good design is at the heart of sustainable construction. The adoption of environmental quality standards such as Building Research Establishment Environmental Assessment Method (BBREEAM), Civil Engineering Environmental Quality Assessment (CEEQUAL) or the National Health Service Environmental Assessment Tool (NEAT) will stimulate the consideration of sustainable issues at the early stages of project development, when significant benefits can be obtained by innovative design or consideration of alternative methods of project delivery. There is often the perception that "green" or sustainable features will increase the cost of projects. Whilst, this may sometimes be the case in relation to initial capital cost, experience is showing that good environmental practice results in god economic performance in the short and longer term. Reducing the use f energy and water not only benefits the environment by conserving resources and reducing pollution, but will also result in substantial cost savings over the lifetime of the building or structure. The costs of energy and water are likely to rise significantly in the future, so these savings are almost certain to be greater than currently predicted. Practical examples of sustainable projects are well known and include such measures as the reuse of crushed aggregates on site, harvesting of rainwater for flushing toilets, the use of ground energy for heating of buildings, reuse of road plannings in asphalt production, natural ventilation and schemes. At the same time, many historical projects and practices may have delivered sustainable results before we even considered what sustainability meant. The economics on many large road schemes and site developments, for instance, led to cut and fill balances that ensured best use of the available materials on site. Re-use of existing buildings or structures will help reduce the demand for natural resources, but will also reduce the emissions and nuisance from construction activities and the associated traffic. Minimisation of waste through good design and control of waste disposal will also encourage better use of resources and help relieve the pressure on our overburdened landfill facilities. In summary, sustainable construction is about building, engineering and refurbishment projects that promote environmental, social and economic gains now and for the future, helping to create a better quality of life today and for generations to come.

Sustainable construction

Construction creates a dichotomy between its role as an economic driver and the environmental challenges it presents if sustainable development is to be secured. Within the EU for example, buildings consume 40% of total energy and are responsible for 30% of CO2 emissions. The construction process creates environmental problems in the form of pollutive emissions, waste, noise, and dust, and is a source of other forms of disruption such as temporary road divisions, blocking of pavements, and so on. Also, there is growing concern over the use of resources and over the effect of the indoor

environment on our health and productivity (Patermann, 1999). Therefore, there is an overarching need for developing countries to be able to assess the sustainability of their infrastructure projects using international metrics (economy, society and environment - the triple bottom line). This needs to be carried out while incorporating specific indicators for sustainable harmonious existence that are suitable for their development needs and priorities (Ugwu and Haupt, 2007). In addition to the fulfillment of environmental dimension, the construction industry should also look into the other two pillars of sustainable development – economic and social (WCED, 1987). Ding (2005) pointed that it's impossible to carry out building projects without measuring their environmental effects. This will help them in making a decision as environmental friendly projects (San-Jose et al., 2007). Challenges facing sustainable construction occur on all three levels of economic analysis: macro, meso and micro (Bon and Hutchinson, 2000). Therefore, economic viability of business is at the heart of sustainable development because it generates profit and provides employment and through that contributes to general social welfare. Therefore, two types of economic issues are relevant for business: micro- and macro-level concerns. Micro- level issues are related directly to the economic performances of a company and include the usual financial measures such as sales, turnover, cash flow, and profit and shareholder value. Macro-economic issues link corporate performance with considerations at the national and international levels (Azapagic, 2003). This is a challenge for sustainable construction, whose goals often rely on long-term outlooks. The most effective way to stimulate sustainable development is by means of market based economic measures that affect individual economic agents in the short as well as the long term (Bon and Hutchinson, 2000). To ease the transition towards environmental sustainability in construction and building, all actors should be working together as a chorus (Warnock, 2007). It is clear that the various activities of the construction sector have to be regarded and analysed when considering sustainable development. As a matter of fact, on one side, the built environment constitutes one of the main supports (infrastructures, buildings,) of economic development, and, on the other side, its construction has significant impacts on resources (land, materials, energy, water, human/social capital) and on the living and working environment. Hence the construction industry has a lot of direct and indirect links with the various aspects of sustainable development (CIB, 1998). During the construction stage, typical environmental impacts from implementing a project include air pollution, the emission of sulfur dioxide, and the degradation of water quality, noise pollution, and the generation of solid waste. During its operation, a construction project consumes a vast amount of energy and environmental resources. At the end of a construction project's life cycle, the demolition activities generate a large volume of various construction wastes. Such construction generated environmental impacts are common in both developed and developing countries and regions. Project performance traditionally refers to the outcomes of construction cost, construction time, and construction quality (Shen et al., 2005). The achievement of sustainable construction posses stiff challenges. Most pollutant emissions result from construction and refurbishment (Zimmermann et al., 2005).

On the macroeconomic level, the goals of sustainable construction are being

implemented most actively in countries in which the share of construction in output has been decreasing for decades (Bon and Hutchinson, 2000). The share of construction in output is increasing in LDCs and NICs, but the goals of sustainable construction are considerably more difficult to implement there. This is a global challenge for sustainable development in general. The market-based measures promoting sustainable development in advanced and developing countries will need to be differentiated to account for different roles of the construction sector in these two economic environments (Bon and Hutchinson, 2000). On the mesoeconomic level, the construction sector, which assembles the products of all other sectors, depends crucially on the implementation of the goals of sustainable development across the national economy as a whole. Economy-wide market-based measures promoting sustainable development are required. Production lines feeding the construction sector are not only long and ever longer, but they are also richly intertwined. Without a full understanding of these interactions it is difficult, if not impossible, to assess the overall environmental effect of different materials, components, and procedures used by the construction sector. Thus any imposed regulatory constraints and standards will be incapable of monitoring and therefore of effective enforcement. As international trade in this field increases, this challenge becomes greater (Bon and Hutchinson, 2000). On the microeconomic level, constructed facilities are erected with ever shorter time horizons in mind because their owners are facing an ever more uncertain economic environment. As derived-demand goods, which depend on the demand for other goods and services produced in them, constructed facilities are generally becoming lighter, they are increasingly dominated by mechanical, electrical, and electronic equipment, and they are ever better adjusted to specific short and medium-term economic objectives of their owners. This is a challenge for sustainable construction, whose goals often rely on long-term outlooks. The most effective way to stimulate sustainable development is by means of market based economic measures that affect individual economic agents in the short as well as the long term (Bon and Hutchinson, 2000). Construction activities consider major contributor to environmental pollution or impacts (Chan and Chan, 2004; Yao et al., 2007). Social responsibility and respect for human rights are becoming part of the commercial agenda within construction. Internalization of social responsibility practices in the construction sector is beginning to become apparent. This can be seen in the improvement of working environment quality, safety and health; and the provision of opportunities for employee development and employment equity. While the regional construction sector is beginning to engage with these issues, the selection of business partners based on ethics and environmental responsibility criteria or the provision of projects' ecological impact reports to clients are incipient or virtually non-existent (Gomes and Silva, 2005). Developing and implementing sustainable development objectives in buildings and construction is particularly important in developing countries where there may be considerable social and economic problems, such as low or poor levels of health, education and employment and limited economic resources (Gibberd, 2005).

The construction industry is one of the main contributors to the depletion of natural

resources and a major cause of unwanted side affects such as air and water pollution, solid waste, deforestation, toxic wastes, health hazards, global warming, and other negative consequences (Augenbroe and Pearce, 1998). The environmental impacts of the construction industry are extensive (Hill and Bowen, 1997). Construction and refurbishment clearly emerge as a major source of environmental loads (Zimmermann et al., 2005). The construction process originates affections in the environment, as emissions in to atmosphere, spills into the water, occupation and contamination of soils, use of natural resources and waste generation (San-Joe et al., 2007). Shen et al., (2005) confirm that during the construction stage, typical environmental impacts from implementing a project include air pollution, the emission of sulfur dioxide, and the degradation of water quality, noise pollution, and the generation of solid waste (Shen et al., 2005). At the end of a construction project's life cycle, the demolition activities generate a large volume of various construction wastes. Such construction generated environmental impacts are common in both developed and developing countries and regions. Project performance traditionally refers to the outcomes of construction cost, construction time, and construction quality (Shen et al., 2005). Moreover, throughout the world, the construction industry is responsible for high levels of pollution resulting from the energy consumed and during the extraction, processing and transportation of raw materials (Ding, 2005). The construction industry, whilst important for every society, also has implicit and explicit responsibilities for environmental protection (Ding, 2005). The factors that explain the decrease of the action of the construction in the production in subsequent phases of the economic development include less population growth, less migration, and the most physical capital already implemented. This carries to the declining action of physical advantages in the investment (Bon and Hutchinson, 2000). As a result, construction and demolition waste have a high impact on the environment. The form of this impact can be air or water pollution, and its associated energy usage. Environmental impact from energy usage occurs during the operation of recycling activities, where most of the operations are carried out by means of mechanical processes that need electrical power. Impact on air and water pollution mostly occurs from waste transportation and the composition period of wastes in landfill areas, i.e. from greenhouse gases and leachates (Yahya and Boussabaine, 2006). The construction industry has been identified as one of the most unsustainable industrial sectors and there is increasing awareness of the need for improvement through initiatives such as the construction best practice programme CBPP, and movement for innovation (Robinson et al., 2006). The increased awareness in measuring the impact on society is in response not only to the need to minimise the environmental effects of construction activities but as part of the corporate sustainability agenda to give something positive back to society (Robinson et al., 2006). Adopting sustainability principles requires proactive management of financial, human, environmental and social capital and a shift from the shareholder to the stakeholder perspective. Corporate responsibility is at the centre of the sustainability debate, to improve governance by managing both hard physical (tangible) and soft knowledge (intangible)

assets. Sustainability principles should therefore be related to the context of the business, i.e. it should address issues of what is produced (products – projects/services), how it is produced (processes), by whom (people) and its implication for stakeholders – investors, consumers and society. In the context of construction, this means, for example, a need to be involved in environmentally, socially acceptable and ethically sound projects, using processes that enhances regulatory compliance, minimises waste, rework, defects and pollution, and delivered by people trained in sustainability and working within a safe environment (Robinson et al., 2006). There is a need for the development of appropriate measures reflecting sustainability objectives and to assess their knowledge implications for continuous improvement. For example, designing out waste is a major issue for many construction firms. However, using "number of skips" as a measure of wastage may inform the finance/accounting department about the level of waste in monetary terms but such information is of limited use to the environmental department (Robinson et al., 2006). Failure to integrate sustainability principles into an organisation's business strategy could result in a loss of competitive advantage and business opportunities, which will undermine long-term performance (Robinson et al., 2006). Construction organisations are expected not only to embrace the concept of sustainability but also to apply its principles as a way of doing business and managing its knowledge assets to facilitate continuous improvement in organisational performance (Robinson et al., 2006).

Conclusion

The aim of a traditional construction is to complete the development as cheaply as possible. There are certain rules and standards which must be observed, but to win a contract and then complete it profitably, the only other considerations are economic. One aim of Sustainability is closing this gap between economics and the real world or, as an economist would say, internalities. If these costs are to be invoiced, we need to know how much to charge, which means putting a price on the environment. This is anathema to many environmentalists, as it can be seen as the first step toward trading in the environment, or selling the world for personal gain. A sustainable construction project; therefore, must aim to redress the imbalance caused by economists having only half the information at their disposal. It should aim to balance the financial, environmental and operational aspects of every decision, every material and every system in the development. This is not easy to do as well as the different languages of economics and environmentalism; there are still almost incomprehensible dialects within each discipline. How many tones of CO2 are equivalent to a tone of waste? Or the quality of a river? Or the existence of a species? Should we tax work, which we want people to do, more than smoking, which we do not? Or driving? Or landfill? Clearly, the subject is vast and complex. In fact, it touches everything we do in every walk of life. There is yet no system which can take account of these disparate themes and help us to take measured decisions. The best we can hope for at this stage of our own development is to do our best to reach the right decision, based on the information available and to be opened and honest about the decision-making process, so that others can follow it (or avoid it). This is the approach we have chosen for sustainable

construction. In the future, energy prices and sources will change, some materials will be found to be more hazardous than was previously thought and some development processes will improve. But a decision made today with today's information and today's values is the best anyone can ask for.

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