

# **ASIAN FORUM 2002**

## **FOR THE FIELD OF ARCHITECTURE AND BUILDING CONSTRUCTION**

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### **REFORMING MALAYSIAN CONSTRUCTION TECHNOLOGY TOWARDS HIGHER DYNAMISM**

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#### **1.0 Introduction**

The construction industry is one of the economic sectors that will continue to play an important role in contributing to Malaysian economic development. The opportunities provided by the industry must be viewed from the depth of its impact on the economy. The 1997 economic crisis has shown the extent of damage the economy will experience if the construction industry is adversely affected. This effect is magnified because the construction industry supports a multitude of downstream activities that provide opportunities to small and medium scale enterprises

The Malaysian construction industry faces serious problems. Low productivity, heavy reliance on a large pool of unskilled and foreign labour and labour intensive construction techniques. These problems are not easy to resolve. Large financial commitment needs to be invested in order not only to train the existing workforce but to also attract the new potential workforce into the construction market. With the demand in the manufacturing and service sectors together with the negative image of the construction industry, this task would be onerous, or worse, rather impossible. The Malaysian construction industry, therefore, has no other alternative but to invest in technology. The evidence from developed nations has shown that the growth of their economies has largely been driven by continuous technological innovation and creativity through scientific explorations and ingenious applications of engineering tools. Through technology development, the developed nations were able to generate a sustainable well-trained, highly skilled and educated workforce to cope with accelerated industrialization to the extent that the

economic performance of a country is often intertwined with its performance in science and technology.

## **2.0 Drivers of Change**

In the future, with the rapidly changing globalised world, present certainties are fast disappearing. Our comforts, by virtue of our ability to perceive the future no longer hold true. The construction industry can no more confine to its narrow boundary but must follow and adapt to a wider national interest and aspirations. The future for Malaysia is to be based on new knowledge and new skills through knowledge driven economy. Nevertheless, the fundamental drivers for change in the industry are still from the *push and pull* of the following factors. These factors in one way or another, whether singly or in combination will shape the future of the construction industry.

### (a) Social Impact

The demand from changing lifestyle and different preferences will be one of the factors that will influence the construction industry in the future. The quest for better quality of life and the increasing pressure on consumers' rights together with the issues of population growth, urbanisation and migration will further influence the construction industry in the future.

### (b) Economic and Political Impact

The trend of the construction industry in the future will definitely be affected by the economic and political issues such as globalisation and liberalisation of the economy through international or regional agreements such as WTO and GATS, increasing cost of energy, technical barrier to trade, financial protectionism, domination of Multinational Company (MNCs), and etc.

### (c) Environmental Impact

Environmental awareness and protectionism is going strongly especially among the developed countries. The demand for environment conservation through extensive use of non-fossil fuel energy sources, biodegradable materials, composites, recycling and reuse of waste materials together with the climatic changes and depletion of resources will also demand the construction industry to change.

(d) Technological Impact

The application of the information and communication technology (ICT) in every process of the construction industry value chain will further enhance the construction industry in the borderless world. The demand for knowledge worker together with the rapid evolution and development of the information and communication technology will significantly contribute to the trend of the construction industry in the future.

### **3. The Trend of Technology in the Future**

Based on the assumptions about emerging trends and opportunities, the construction industry should be prepared for the following characteristic of the future construction industry. These characteristics have highlighted the areas of technology that should be given priority now to make us ready for the future.

- (i) Construction policies will be focused on improving the productivity. This includes focusing on cost-effective, fast and efficient processes.
- (ii) Safe and secure ICT policy will be set up that will include setting up of our own system, concentrating on real time data management and virtual reality.
- (iii) Construction industry will maximise local input, e.g., local materials, machines, equipment, and other local resources.
- (iv) Networking with R&D centres world-wide to develop our competitive knowledge and update on new discoveries and inventions.
- (v) Development of indigenous technologies and resources, substitutes for materials, machinery and equipment and in biotechnology will be enhanced.
- (vi) More stringent standards will be imposed on built products especially those that concerns human friendliness and comfort.

- (vii) Only skilled manpower can work in the construction industry.
- (viii) Repetitious and dangerous works will be done by automation and robotics
- (ix) Prefabrication, and modularisation will be the accepted practice.
- (x) Open systems will be the method of construction where customers will have more decision making at the earliest possible stage. Throughout its life cycles the built environment can be changed to suit human needs.
- (xi) Energy efficiency will be one criterion for approval and tool for marketing – energy technology, new resources of energy.
- (xii) Every process in the construction industry will be green.
- (xiii) Industry will put more importance in the reusability and recyclability of materials, biodegradability.
- (xiv) Artificial intelligence embedded in built products is a norm.
- (xv) Advanced materials, composite, bio-composite will be the construction material in the future.
- (xvi) Expert systems will be popularly utilized .

#### **4.0 The Strategies in Technology Reform**

The present scenario of the global and domestic construction market due to the globalization and the liberalization of the economy require the Malaysian construction industry to become the driver of change by advancing into building knowledge and technology capability through technology reform. Therefore, the following strategies are recommended to the industry:

##### *4.1 Accelerate R & D with increase participation of the private sector.*

Construction is among the largest and most influential industries in Malaysia, however, only a small percentage of its expenditure is spent on research. Government commits most of the funding and only a small portion actually comes from the industry. This lack of research has been provided as a reason for the diminished competitiveness of this industry in Malaysia. Looking at Japan's success in the construction industry, a country that is committed to spending money on research and obtains over 80 % of funding from the industry; it is evident that in order for Malaysia to increase its competitiveness,

research and development must become a priority. It is apparent that research initiatives must not only be a concern of the government, but industry participants as well.

#### *4.2 Launch aggressive programme for technology acquisition*

There are five major ways of acquiring technologies through importation: technology licensing, joint-venture investment with multinational corporations, foreign owned firms operating their technologies locally, technology transfer arrangement through mega projects and direct purchase of technology package from known suppliers. The principles of competitive intelligence, i.e the strategic and tactical knowledge needed to maintain a competitive advantage especially which regard to competitors' capabilities, intentions, strength and weaknesses; market preferences; and trends in technology, society, and the business environment in general, need to be applied.

#### *4.3 Intensification of K-contents in construction activities*

The construction players must be facilitated for the provision of infrastructure, incentives and training to promote the development of knowledge-intensive products, processes, systems and services in order to be a knowledgeable society. The inclusion of knowledge in current economic activities increases value-add and creates new values. In undertaking the task of developing knowledge, the government will need to establish a world-class laboratory and research institution for knowledge generation, acquisition and diffusions. The government should also institute various fiscal and non-fiscal measures to attract the investment by the private sector in this area.

#### *4.4 Leapfrogging for knowledge and skill acquisition*

Skilled people are needed to discover new knowledge, invent new products and processes, maintain and operate production processes and utilize new products and processes to advance the frontier of knowledge. However, the training process will take time and thus, leapfrogging for knowledge and skill acquisition should be considered. Therefore, attracting foreign experts especially in critical specialization should be considered. Other alternatives include brain pool programme for strengthening of R & D

through collaboration with renowned scholars and reexamination of programmes to bring back Malaysian experts who are employed abroad.

#### *4.5 Instituting a procurement policy to support innovation and the development of indigenous technology*

A procurement policy of the government sector must reflect the desire to promote indigenous technology, encourage capacity building and effective technology transfer. This then acts as catalyst for technology transfer, human and technology capacity building and innovative practices. The procurement exercise will be tied to project-specific endeavours of strategic significance with opportunities for technology transfer, revenue generation and competency development. This can be implemented in the privatization projects, mega-infrastructure projects and multi-million procurement from vendors of leading companies.

#### *4.6 Creating partnership between the Government Research Institute, Universities and the private sectors*

The linkages between the public and private sector should be enhanced through the establishment of collaborative research programmes. Maximum industrial participation in these activities will ensure the sharing of expertise and facilities to enable the diffusion and transfer of knowledge. Industrial inputs in determining the technology needs of the industry are critical to ensure the appropriateness and the effectiveness of the technology.

#### *4.7 Promoting co-development of technology through strategic alliance with leading international research institutions*

International collaboration and cooperation through promotion of international linkages should be encouraged. The establishment of regional and international network could be capitalized into dynamic partnership that offers both results and the cross-fertilization of ideas. Strategic alliances with foreign firms whereby resources are equally provided by partners on the basis of pre-arranged agreements contribute tremendously towards building technology capability or even technology transfer.

#### *4.8 Provide innovative funding scheme for technology development, acquisition and commercialization*

Under the 7<sup>th</sup> Malaysian Plan RM 1 billion was allocated for R & D activities through various funding grant such as IRPA and IGS. However, the utilization rates of these funds have been reportedly low. What need to be expended are greater efforts to make known the availability of the funds especially among the construction industry players. This would require closer interaction between the managers of the fund and industry groups. Funds for technology acquisition and commercialization should also be given priority either through funding from banks, venture capital sources or government facilitated financial assistance programmes.

#### **5.0 Conclusion**

There should be a paradigm shift for the Malaysian construction industry to migrate from a labour intensive industry to a technological based industry in order to increase its competitive edge especially in the era of globalization and the liberalization of the world economy. Only by the usage of the state-of-the-art or the cutting edge technologies through the industrialization of the construction sector can only the Malaysian construction industry increase its productivity and competitiveness in order to ensure the sustainability of the industry in wealth creation and improving the quality of life. The direction for the needs of technological reform is clearly predetermined by the aspirations and desires of Vision 2020 which among its challenges is to establish a scientific and progressive society that is not only innovative and forward looking but also a contributor to the scientific and technological civilization of the future.