R&D KEY TO TRANSFORMATION

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ABSTRACT

The Malaysian quantity surveyors are facing greater challenges in the face of globalization. The need to be innovative and creative to improveservices to clients is ever growing. Research and Development (R&D) plays a critical role in the innovation process, bringing new products and services to the marketplace.The world's richest and most powerful nations spend a lot in R&D.R&Dis a key factor towards transformation of quantity surveyors to improve its competitiveness, efficiencyand quality of service. Adopting a culture of excellence within an organization, with emphasis on promoting innovative ideas and continual improvements through best practices is important in creating a conducive working environment at the workplace. This can be achieved through R&D. R&D is able to yield significant benefits to individual,organizations and the nation as a whole.Greater emphasis should be giventopromote industry-based R&D. Industry-based R&D is seen as a synergy between the academia and the industry to resolve practical issues and the findings readily applicable to the industry. Recent developments in areas such as Building Information Modeling (BIM), green and sustainability and civil engineering works have seen more active involvement by quantity surveyors. More research works need to be engaged to see greater contribution by quantity surveyors in these areas. R&D is seen as a key to quantity surveyors' transformation.

KEYWORDS
Research & Development (R&D), innovation, transformation, industry-based research.

INTRODUCTION

Research and Development (R&D) could be defined as the process of discovering new knowledge about products and services and application of such knowledge to create new and improved products or processes to meet market requirements. R&D involves revitalization of knowledge and expertise and could result in developments such as new or improved products, improved operational process, meeting changing requirements of customers, cost reduction and meeting changing social and environmental needs (Deloitte, 2011).

R&D has a powerful effect on the development and well-being of an individual, an organisation and a nation as a whole.R&D is a key factor to transform quantity surveyors to reach greater heights in meeting ever demanding clients' expectations.

IMPORTANCE OF R&D

The need of R&D in construction has been highlighted by many researchers (e.g. Barrett, 2007; Kulatunga *et al* 2009).It has been proven that R&D plays a critical role in the innovation process, bringing new products and services to the marketplace. Through R&D, innovation results in higher quality jobs, successful businesses, better goods and services, and more efficient processes (Mowry 2007).

International research has consistently demonstrated the positive correlation between R&D investment intensity and company performance measures such as improved productivity, increased efficiency, better customer satisfaction,sales growth and increased market share in the sectors where R&D is important. Companies are in a better position to achieve and maintain competitive advantage in the increasingly global market place with sustained R&D and other related investment at the right levels (BIS, 2011).

Mowry (2007) highlighted that those companies whose management has invested the most in knowledge through R&D and thus supporting their own innovation have been able to get ahead and to distinguish themselves from the followers and copycat mindset. As such, quantity surveyors must constantly seek, widen and acquire new knowledge, while being innovative in the process of providing services to clients.

Mowry (2007) further outlined three characteristics of effective R&D: First, through R&D, you extend the boundaries of knowledge by generating new products/processes/services and upgrading existing technology. R&D always results in a growth in knowledge and understanding to some degree. Second, R&D capability allows companies to better assimilate knowledge and technology developed elsewhere. R&D is inherently an educational activity that results in improved skill levels of the participants. Third, new product/processes/services development increases the opportunity for additional R&D by attracting new and more demanding clients.

CORRELATION BETWEEN R&D AND NATION'S DEVELOPMENT

It was reported that the declining trend in manufacturing labour productivity in Malaysia is due to lack of technological upgrading, making it difficult for Malaysia's manufacturing sector to compete with those in South Korea, Taiwan, China and Singapore. This decline was most probably a manifestation of its modest emphasis and expenditure on R&D compared to the more advanced nations (Mahani Zainal Abidin & Rajah Rasiah, 2009).

It can be seen that the world's richest and most powerful nations spend a lot in R&D. Switzerland, Finland, Sweden, Netherland and Denmark are in the top 10 global ranking of the Economist Intelligence Unit 2004-2008.They are high in innovation performance study even though they have a smaller population than Malaysia. They are also listed in the top 10 rankings of the World Economic Forum's Global Competitiveness Index 2008-2009. They dominate the world in many economic sectors, ranging from timepieces, furniture and design, and telecommunication to biotechnology and food processing. Nearer home, the countries that spent high in R&D such as Japan, Taiwan, South Korea, Singapore and Hong Kong are also high up in the Global Competitiveness Index(MPC 2010).

Malaysia has been lagging behind most of the global players in terms of gross expenditure on R&D as a proportion of GDP ratio(GERD/GDP). In the Global Competitiveness Index (MPC 2010), it was reported that Malaysia's GERD/GDP in 2006 was 0.64%. Singapore on the other hand spent 2.31% of its GDP on R&D in 2006. The figures for Japan in 2006 were 3.32, South Korea 3.22, Taiwan 2.58 and China 1.42. Since the late 1990s, mainland China has boosted its R&D spending by 50%. Now China wants to increase that spending to 2.5% of GDP annually, currently valued at USD112 billion or RM400billion.Finland, the Nokia country with only 5.2million population invested 3.4% of its GDP in R&D, one of the highest percentages in the world.

According to a study by EPU, in 2002, Malaysia contributed 10,538 scientific papers to the world, earning the country 55th position, far behind the United States (5 million papers), Japan (1.07 million papers), China (264,400 papers), South Korea (102,300 papers), Taiwan (101,500 papers) and Singapore (33,000 papers). Even Thailand beat us with 14,600 papers. By 2008, Malaysia's ranking in contribution to world science had dropped to 57th. Malaysia had a ratio of 17.9 researchers to every 10,000labour-force in 2005. This placed Malaysia behind South Africa (20.7), Turkey (25.3), Singapore (87.4), South Korea (89.8), and Japan (202.8).

To drive Malaysia's competitiveness, we must focus on building the ecosystem that encourages innovative thinking and creative solutions. What we need to do is to put in place an ecosystem that encourages, recognizes and celebrates creativity and innovation. This can only be reached through increased efforts in R&D by all levels and sectors of the economy.

R&D KEY TO TRANSFORMATION

Whilst the Government has a duty to improve the country's development through efforts in R&D, the quantity surveyors, both at individual and organizational level, need to pay greater emphasis to R&D.The journey to R&D starts at the very top. The chief executive of a company must commit its resources to the building of R&D.

R&D has been recognized as one of the key factors towards transformation. It has been said that companies which persistently invest in R&D outperform others. The pace of technology is accelerating, specialization and systems

requirements are ever increasing, newer technologies are rapidly becoming important, companies therefore need to focus heavily on R&D.R&D will help quantity surveyors add value to the services to their clients. Value-adding is a must in the global economy as we must be able to carry out our services and manufacture products with greater speed and efficiency while maintaining or improved quality (Deloitte 2011).

Barrett (2007), states that R&D can contribute to finding solutions to the challenges faced by the construction industry and making it highly valued by its clients. According to Kulatunga *et al.* (2005), the contribution from R&D to the development of the construction industry is immense as it enhances the effectiveness of construction organizations and raises the international competitiveness through technological advances and managerial development. These views suggest that it is important for the quantity surveyors to move beyond the traditional practices to adopt value-add services and new practices and processes arising from R&D efforts.

Researchers should not carry out R&D just for the sake of publishing but should aim its outcome to add value to the industry, increase efficiency and cost effectiveness. R&D should be viewed as a means to improve our competitiveness in the face of changes the whole world is currently experiencing. (Gue See Sew &Chow Chee Meng, 2009).R&D will become a crucial factor in determining the competitiveness of companies in the marketplace, nationally and internationally.

Pheng and Hua (2002) highlighted the lack of evidence that construction industry adopts new findings of academic research into their practice. Hence merging academic research with industry development requirements seems to be an effective agent of transformation and the way forward in creating an industry which is better responsive to external pressure and changes. *The UK Lambert Review of 2003* explicitly encouraged academics and business people to spend more time together and recommended a "smoother path between Britain's strong science base and its business community".

ROLE OF STAKEHOLDERS IN TRANSFORMATION VIA R&D

Different stakeholders within the construction industry such as institutions of higher learning, government agencies, contractors, consultants, professional institutions should also play their respective roles in order to transform the construction industry via R&D.

It is worth to quote two examples from the book *The World is Flat* (Friedman, 2006) and *The Blue Ocean Strategy* (Kim & Mauborgne, 2005) on the importance of inculcating an R&D culture within an organization which leads to great success.

Case 1: Wal-Mart

Wal-Mart today is the biggest retail company in the world.It is worth noting that Wal-Mart does not make a single thing. What it has is a hyper-efficient supply chain which moves 2.3 billion general merchandise cartons a year down its supply chain into its stores. How did Wal-Mart evolve from a small company from northwest Arkansas to the biggest retailer in the world? It was through R&D and the use of latest technologies to increase its efficiency and profit that brought Wal-Mart to what it is today.

One of the key lessons learnt from the Wal-Mart success story is the sharing of information, which is a key component in order to make R&D work. Wal-Mart realized that while it had to be a tough bargainer with its manufacturers on price, at the same time it also realized that it is beneficial to both parties if they can collaborate to create value for each other. Wal-Mart was one of the first companies to introduce computers to track store sales and inventory and was the first to develop a computerized network in order to share this information with suppliers. Wal-Mart's theory was that the more information everyone had about what customers were pulling off the shelves, the more efficient Wal-Mart's buying would be, the more quicker its suppliers could adapt to changing market demand.

According to Rena Granofsky, a senior partner at J.C. William Group Ltd., a Toronto-based retail consulting firm; "Opening its sales and inventory databases to suppliers is what made Wal-Mart the powerhouse it is today. While its competition guarded sales information, Wal-Mart approached its suppliers as if they were partners, not adversaries".

"By implementing a collaborative planning, forecasting, and replenishment (CPFR) program, Wal-Mart began a just-in-time inventory program that reduced costs and increased efficiency for the retailer and its suppliers. Thanks to the efficiency of its supply chain. Wal-Mart's cost of goods is estimated to be 5 to ten percent less than that of most its competitors".

The example of Wal-Mart may not be directly related to the construction industry but nevertheless, it serves to illustrate the benefits of sharing of information, which is part of R&D. Similar sharing of information will also be beneficial to the construction industry in general and the quantity surveyors in particular, where information on market demands, clients expectations and latest technologies will be beneficial to all parties. The system, however can only work through close cooperation of all parties involved.

Case 2: Samsung Electronics

Samsung Electronics realized the importance of innovation in its organization by establishing the Value Innovation Program (VIP) Centre in 1998. Core cross-functional team members of its various business units come together in the VIP Centre to discuss their strategic projects. In 2003, the centre completed more than eighty strategic projects and opened more than ten VIP branches to meet business units' rising demands. For example, the world's leading forty-inch LCD TV, launched in December 2002, is the result of one project team's devoted four-month efforts at the centre. So is one of the world's best-selling mobile phone, the SGH T-100, which has sold more than twelve million units in 2002.

Since 1999, Samsung Electronics has established an annual Value Innovation corporate conference presided over by all of its top executives. At this conference, Samsung's hit Value Innovation projects are shared through presentations and exhibitions, and awards are given to the best cases. This is one way that Samsung Electronics establishes a common language system, instilling a corporate culture and strategic norms that encourage innovation through R&D.

In Samsung's case, it can be seen that a healthy R&D culture is encouraged within the organization which lead to business success. The introduction of the VIP Centre encourages creativity and innovation and demonstrates the willingness of its management to allocate resources for R&D for long-term advancement of the company.

INDUSTRY-BASED R&D

Many researchers have suggested that greater emphasis should be givento industry-based R&D as opposed to purely academic or theoretical based R&D. Industry-based R&D is seen as a synergy between the academia and the industry to resolve practical issues, thuscombining their respective expertise and strengths.Day-to-day issues and practical problems faced by industry players can be viewed from academic perspective.

Industry-based R&D can be done by formulating collaborative efforts between the academia and industry players such as quantity surveying practitioners, government agencies, contractors and developers.Industry players have a host of data and information whilst the academia has the expertise, methodology and techniques of R&D. Collaborative efforts between academia and industry players can help systematically organize the data and information available in the industry. The data arelater critically analysed to be meaningful and help policy makers make informed decisions.

University researchers and post graduate students can undertake practical issues and problems faced by the industry by engagingthemselves with the respective industry players.In this way, their research will be directly relevant to practical issues and the solutions found directly applicable to the industry. Vice versa, industry players facing practical issues and problems while discharging their services or duties can engage university researchers to help look into these issues and find solutions from both practical and academic perspective. With these collaborative efforts, the academia will benefit by having more practical and meaningful research whilst industry players will benefit by enhancing their knowledge and professionalism. Sharing knowledge and data will add value to both the academia and the industry.

THE QS TRANSFORMATION.

Recent years have seen quantity surveyors become the key advisers on construction and development strategy; but they must continue to reinvent themselves to remain at the top (Ross Davies 2006).Transformation in the roles and duties of quantity surveyors can be seen in several areas.

Building Information Modeling (BIM)

Advancement in information and communication technology (ICT) has transformed the way quantity surveyors perform their duties in many ways. The evolution of Building Information Modeling (BIM) has enabled integration to take place, thereby permitting the integration of design, measurement and procurement processes. With the use of BIM, measurements and quantity taking-off can be performed almost instantly. This will drasticallyreduce the time to produce the bills of quantities, the document where many quantity surveyors spent most of their time. With BM, re-measurement works due to change in design either during conceptual, design development or construction stage can be done almost instantly thus permitting informeddecision making be done objectively. The bills of quantities in future may perhaps be done in a manner to suit BIM thus suggesting that the Standard Method of Measurement (SMM) may need to be reviewed to accommodate BIM. More research needs to be done in relation to BIM in collaboration with other construction professionals for it to be explored and implemented smoothly and efficiently.

Civil Engineering Construction Works

Recent years have seen more active involvement and key roles played by quantity surveyors in civil engineering construction works. Construction of water treatment works, waste water treatment works, solid waste management works, marine works, drainage and irrigation works,oil and gas works, electrical power works, telecommunication and transportation works including airports, ports, highways, railways, mass rapid transport (MRT) works have seen active participation and contribution played by quantity surveyors in areas of planning, costs, procurement, project management, risks management and contractual aspects of the projects. In line with the way quantity surveyors analyse building construction costs with the use of Elemental Cost Analysis (ECA), which has proven its benefits in many ways, a similar approach can be undertaken to analyse construction costs of civil engineering works in terms of its elements, componentsor processes of the works. Through R&D, innovation and advancement of technology will see significant contributions by quantity surveyors in many aspects of civil engineering works.

Green technology and Sustainability

Green technology, sustainability, renewable energy and carbon emission are the topics of the day. The Malaysian Government has established a National Green Technology Policy (NGTP) which emphasised that Green Technology shall be the driver to accelerate national economy and promote sustainable development (KeTTHA, 2010). The Policy is built based on four pillars i.e. seek to attain energy independence and promote efficient utilization; conserve and minimize the impact on the environment; enhance the national economic development through the use of technology; and improve the quality of life for all (KeTTHA, 2010). The birth of a Low Energy Office (LEO) which housed the Ministry of Energy, Green Technology and Water (KeTTHA)and a Green Energy Office (GEO) which housedthe Malaysian Green Technology Corporation (GreenTech Malaysia) and many other certified Green buildings reflect the publicand private sectors commitment towards initiatives on sustainable development.Quantity surveyors in collaboration with other construction professionals and specialists can participate and contribute in green technology and sustainable development research initiatives especially in areas such as energy efficiency, renewable energy, carbon footprint, low carbon emission and the like.Quantity surveyors can also contribute and play a key role in research on viability of Low Carbon Citieswhich may become a reality in Malaysia in the near future.

THE WAY FORWARD

Based on the *Global Competitiveness Report 2009-2010* (MPC 2011), outside our borders, new economies are making quantum leaps that are astonishing in their inventiveness and threatening in their competitiveness. Outside our borders, the economic divide between countries that are innovating and countries that are not, is widening. The statistics are disturbing. Unless we get really serious about cultivating R&D, creativity and promoting innovation, transformation in all sectors of the economy including the construction sector in general and the quantity surveyors

in particular, to a level on-par with the leading economies will not readily happen. And unless that transformation happens, it will not be long before our competitiveness decline.

Thomas Friedman in his best-selling book entitled *The World is Flat; The Globalized World in the Twenty-First Century (2006)* quoted the following African proverb:

Every morning in Africa, a gazelle wakes up.
It knows it must run faster than the fastest lion or it will be killed.
Every morning a lion wakes up.
It knows it must outrun the slowest gazelle or it will starve to death.
It doesn't matter whether you are a lion or a gazelle.
When the sun comes up, you better start running.

REFERENCES

1. Barrett, P. (2007), Revaluing Construction: a holistic model, *Building Research and Information*, Vol. 35 No.3, pp. 268–286
2. Chandanie Hadiwattege & Sepani Senaratne, (2011).A Literature Synthesis: Merging Academic Research and Industry Development Requirements for a Better Responsive Construction Sector, *Proceedings of the15th Pacific Association of Quantity Surveyors (PAQS) Congress 2011*.Colombo, Sri Lanka.
3. Chong Khuat Hock, (2009).Hock's Viewpoint, *Arresting Malaysia's Relative Decline.*
4. Department for Business Innovation and Skills (BIS), United Kingdom (2011).*website: http://www.bis.gov.uk/*
5. Deloitte, (2011)*Research and Development Expenditure: A Concept Paper, July 2011*
6. Friedman, T.L. (2006). *The World is Flat: The Globalised World in the Twenty-First Century (updated and expanded)*, Penguin Books, London, England.
7. Gue, S.S. & Chow, C.M., (2005). Bridging The Gap Between R&D and Construction Industry, *Proceedings of the Sixth International Conference on the Construction Industry in the 21st Century, 2011*. Kuala Lumpur, Malaysia.
8. Lim, K.W. (2009). Let's Innovate Malaysia Now. *Professor Emeritus Tan Sri Dato' Sri Dr Lim Kok Wing's personal blog.*
9. Mahani Zainal Abidin & Rajah Rasiah, (2009).The Global Financial Crisis and the Malaysian Economy: Impact and Responses. *A joint Institute of Strategic and International Studies (ISIS)and University of Malaya Report commissioned by UNDP*.
10. Malaysian Green Technology Corporation (GreenTech Malaysia), (2010), *The Green Energy Office – Inside Malaysia's First Certified Green Building & Low Carbon Emission Building.*
11. Malaysian Productivity Corporation (MPC), Ministry of International Trade and Industry Malaysia, *Global Competitiveness Report 2009-2010.*
12. Malaysian Science and Technology Information Centre (MASTIC), Ministry of Science, Technology and Innovation, (2004).*Malaysian Science and Technology Indicators: 2004 Report*
13. Ministry of Energy, Green Technology and Water, Malaysia (KeTTHA), (2010), *National Green Technology Policy.*
14. Mowry, S. (2007).How Important is R&D for Asia.*Journal of Multi Media Manufacturer, July/August 2007.*
15. Pheng, L.S. and Hua, L.N. (2002). The Strategic Responses of Construction Firms to the Asian Financial Crisis in 1997-1998. *International journal for Construction marketing.* 1, 22-32.