

The Roles of Professional Engineers at the Institutions of Higher Learning in Nation-Building

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Received: February 7, 2013 Accepted: April 16, 2013 Online Published: May 24, 2013

doi:10.5539/ies.v6n6p137

URL: <http://dx.doi.org/10.5539/ies.v6n6p137>

Abstract

This paper discusses the roles of professional engineers (PEs) who are attached to the Institutions of Higher Learning (IHLs) and how their contributions are as important as their counterparts in the industry. This paper highlights the roles for PEs at IHLs based on a survey conducted at selected IHLs in Malaysia. Academician-professional engineers have crucial responsibilities to develop graduates who later promote safer and cutting-edge engineering solutions. These new technologies will make Malaysia an environmentally healthier place and further prepare Malaysia towards a developed nation at the end of the decade. From the survey, we conclude that PEs at IHLs make use of their professional qualifications to enhance their knowledge therefore provide better work quality. We also found that lecturers with these qualifications have higher confidence in their own ability to success in their careers and to face and help the public.

Keywords: professional engineers, institutions of higher learning, economic transformation programme

1. Introduction

Malaysia has less than a decade to achieve a developed nation status by the year 2020 set in the Wawasan 2020. Wawasan 2020 or the Vision 2020 was introduced by the then Prime Minister of Malaysia Dr. Mahathir Mohamad in the tabling of Sixth Malaysia Plan in 1991. The vision aims for economically self-sufficient nation encompassing all aspects of lives from economic prosperity, social well-being, high education standard, stability and psychological balance. Dr. Mahathir, as he is normally called, has envisaged that the economy would have to grow at an average annual growth of 7% to expand from RM119 billions of gross domestic product (GDP) in 1990 to RM920 billions in 2020 (Mohammad, 1990). 22 years down the road (in 2012), the nation GDP stood at approximately RM850 billions, estimated by the World Bank, United Nations and by the International Monetary Fund (IMF). The growth data provided by these organizations have shown that the growth has an exponential trend. Even by a linear extrapolation of these data, one would predict Malaysia would achieve the GDP envisaged by Dr. Mahathir. These projections however did not account for high inflationary effects which have become significant especially in the last decade. Furthermore, the GDP per capita is a more relevant measurement for wealth or level of prosperity.

The current Prime Minister Mohd Najib Abdul Razak has strengthened this objective by launching the economic transformation programme (ETP). Under this programme, a different income concept calculation has been used i.e. the gross national income (GNI). The GNI per capita is set to achieve RM48000 in 2020 from RM23700 in 2009. This would not be achieved unless annual economic growths for these coming years exceed 6%, something that Malaysia has not achieved since 2009. Can this plan succeed to propel Malaysia into the elite group of developed countries? This question subjects to debates, just like the criteria used for a developed country measurements. (Other criteria for a developed country are: level of industrialization, amount of widespread infrastructure and general standard of living.) The more important question should be: what are the contributions from each citizen to support this plan?

Under the ETP, the government has identified twelve national key economic areas (NKEAs) as the core economic activities for the ETP. An NKEA is defined as a 'driver that has the potential to directly and materially contribute a quantifiable amount of economic growth to the nation'. These NKEAs are the oil, gas and energy; palm oil & rubber; financial services; tourism; business services; electrical and electronics; wholesale and retail; education; healthcare; communications content and infrastructure; agriculture; and Greater Kuala Lumpur/Klang Valley.

Contributions from each citizen, male or female, old or young, working or not are required to achieve this target. As mentioned before, the criteria for a developed country is all-encompassing, therefore intangibles contributions such as raising children in harmony, helping each other and encourage others to live healthy lives are also considered as main pillars. This paper discusses the roles of a specific group of teachers and researchers at the institutions of higher learning (IHLs) in order to achieve the tangible targets set in ETP. This group comprises of lecturers with professional engineering (PE) qualifications by the Board of Engineers Malaysia (BEM). For simplicity, this group is called academician-PE throughout the paper. Harun et al. (2012) discusses elaborately that academician-PEs consider the professional qualification as the right platform to enhance their technical capability. This is important because they are the ones responsible to disseminate new technologies to students. Harun et al. (2012) concludes that PE at the industry lead the nation to become a modern and a healthy country, the roles of academician-PEs are as important. Academician-PEs connect industry needs with students and share interesting research to industry and in return they disseminate engineering needs to the academics. This study seeks to understand the roles of these researchers-lecturers who are also professional engineers to build the nation.

2. Method

The works to be discussed in this paper is based on the survey conducted at the IHL, mostly at the Universiti Kebangsaan Malaysia (UKM) in middle of 2012. The survey detailed approach has been discussed in Khamis et al. (2012).

2.1 Sampling Procedures

The survey was conducted using one Google form. It is easy to use and took less than five minutes to complete. The invitations to complete the survey were sent by emails. The survey is voluntary. A five-point Likert scale was used for the questionnaires, in which 1 = strongly disagree, 2 = disagree, 3 = neutral, 4 = agree, and 5 = strongly agree.

Questionnaires were developed based on the requirements and practices found in the literature and based on inputs from researchers. The general rules provided by Dual Factors Theory or Herzberg's Hygiene and Motivational Factors (Herzberg, 1959).

2.2 Sample Size

The sample size is 25; this reflects the small size of lecturers who holds professional engineers qualifications and the difficulties of the team member to get them to participate. Most of the respondents in the survey are in the category of grade DS53/54 to VK5 which constitute more than 75%, grade 53/54 carries associate professorship titles and anything higher than this carries professorship title. The number of years the respondents have served at the current IHL is on average 16 years of service.

From the two personal data above, it can be concluded that an academician takes some times to apply for a PE examination. It could be assumed that an average academician does not regard applying to be a PE is as pressing issues such as the three cores work categories i.e. teaching, research and community services usually expected of academicians. Only a fraction of the survey is shown here to support the issue regarding engineers' contribution at IHLs.

3. Results

A total of 18 questionnaires have been distributed to respondents. This study focuses only on four of the results which are related to 1. Upgrade the quality of career, 2. The advancement of technical capability, 3. Increase confidence to succeed in the field and 4. Increase confidence to face and held the society.

3.1 Upgrade the Quality of Career

Academician-PEs significantly agree that being professional engineers give them opportunities to upgrade the quality of their careers, this is shown in Figure 1. Three quarters of respondents indicate that they either agree or strongly agree with the above statement while the other quarter is indifferent about it. Professional engineers have to fulfill the requirements of Continuing Professional Development (CPD) set up by the BEM. The

establishment of CPD is to promote ‘systematic maintenance, improvement and broadening of knowledge and skill and development of personal qualities for execution of professional and technical duties throughout engineers’ working life’ (Continuing Professional Development Policy, 2005). According to the BEM, it is extremely vital that all PEs committed to their own CPD programme so that they could face these challenges and at the same time take advantage of opportunities that may arise. In BEM or IEM – coordinated CPD programmes, academician-PEs meet their counterparts from the industry. They learn new technologies and trends from their colleagues and the CPD programme itself. Academician-PEs have to travel around and no longer focus too much on their own research and teaching and learning ‘fields’.

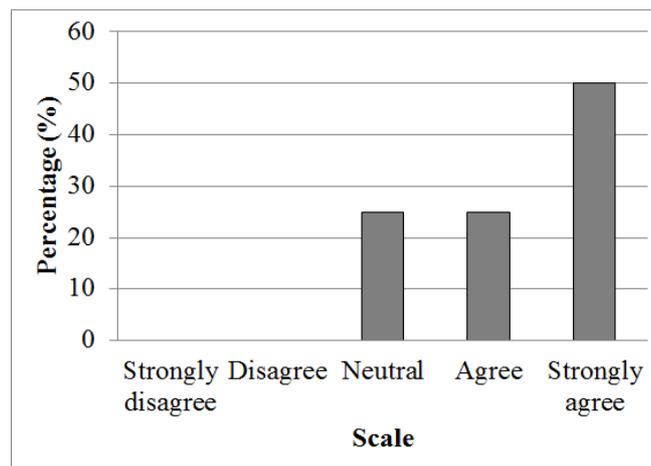


Figure 1. Upgrade the quality of career

A classic example on academician-PEs contribution at IHL is regarding sustainable engineering, this topic is usually discussed in engineering design and ethique courses. In accordance with the intention for more sustainable engineering solutions, more sophisticated, yet environment-friendly infrastructures or building will have to be built. For the building, there are not only seminars on green building; there are also established entities to look after green building projects. The Green Building Index (GBI) was jointly founded and developed by Pertubuhan Akitek Malaysia (PAM) and the Association of Consulting Engineers Malaysia (ACEM) in 2009. GBI leads the property industry towards becoming more environment-friendly. There are already events to promote these initiatives such as awards and promotions to homes and commercial developers who practice such approach. Engineers and architects must work together to achieve this, and more importantly, they must be supported by their peers at IHLs who perform different task to support the same things.

3.2 The Advancement of Technical Capability

For the infrastructures, there are tremendous gaps between Malaysia and the developed countries in terms of sustainable solutions. In the Europe, car users are finding it more difficult to bring cars into cities. Therefore, an alternative solution is to use public transportations. However, making car users difficult travelling around would not have similar effects as public transportations in Malaysia lack connectivity. Large-scale revamp of the transportation system, such as providing the MY Rapid Transit (MRT) system, the largest ever infrastructure project, is the right step. This type of project is already one of the NKEAs identified in ETP i.e. Greater Kuala Lumpur/Klang Valley.

Academician-PEs significantly responded that being professional engineers enable them to further advance their technical capabilities, this result is shown in Figure 2. In the figure, two third of respondents chose in favour of this opportunity. It is important for every PE to continuously upgrade their knowledge, not only in their field of works but also in other disciplines. In this case, academician-PEs in general, regard that the Institution of Engineers Malaysia (IEM) and BEM as platforms for them to learn more. This can be observed in the ways IEM and BEM conduct their continuous professional development programmes. IEM for example has on average of more than three CPD programmes in a week held at its head quarter in Petaling Jaya (a city to the west of Kuala Lumpur), and there are also programmes at its state branches. Advertisements accompanying its monthly

Jurutera, the official magazine for IEM, which circulations exceed 16000 copies, make it easy for members to participate.

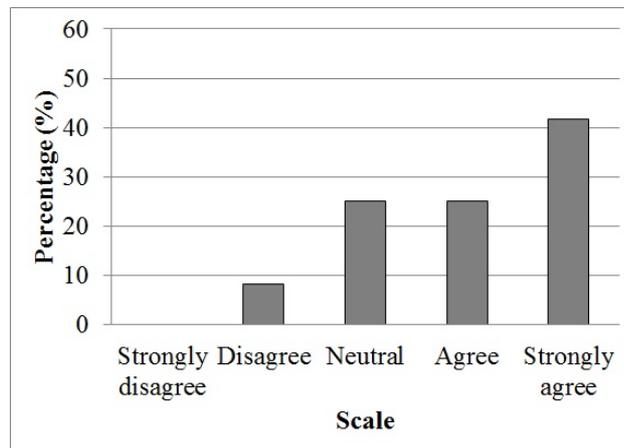


Figure 2. The advancement of technical capability

An academician must be well-prepared while giving his or her lecture, a question shall be returned with an answer. Answers that do not address question appropriately may give a perception that the lecturer is not prepared or simply does not understand the subject matter. As a plus point, a lecturer must be able to relate subject matter with the reality. Missing connections between reality and lectures make the latter boring because they are perceived not contributing other than for examinations and grades. A lecturer with experience is able to assign student with the right assignments. This is just like the training in industry every student is required (usually at the third year in some universities) to complete prior to graduation. Students need to learn and appreciate real problems in the industry before coming back to the universities. With the advanced technical capability, the lecturer is able to guide student to the component of the course that are relevant and needed by the industry. The lecturer is able to balance the course needs which are to teach student with fundamental knowledge, the industry needs include cutting edge technologies and interesting products, and community needs which are safe and environment-friendly solutions. For example, in a design course, more stress is placed on sustainable and environment-friendly designs rather than simply profitability or manufacturability of certain products. Putting university, industry and community needs together, a lecturer is not only able to make student concentrate (so that they grab the required fundamental knowledge in the course), but also lecturer is able to make student realise which technology the industry is after. At the same time, the lecturer is able to instill good values in students' minds, therefore fulfilling the community needs for a safer environment. At UKM for example, the Engineering Ethics course is taught by four academician-PEs whose backgrounds are very diverse. Such course gives opportunities for students to understand the more important values (ethique and safety) in their jobs.

3.3 Increase Confidence to Succeed in the Field

Respondents also overwhelmingly agreed that being a PE itself raise the level of confidence to success in the field. 75% of respondents chose strongly agree to this question, 17% chose agree and the remaining 8% were indifferent, this is shown in Figure 3. Confidence in the subject matter is important in lecturer's daily works. For example, in a lecture room, a PE-academician may find it more comfortable to talk about an engineering issue compared to a lecturer who is not especially when the discussion is focused on matters related to ongoing local engineering problems. Recently, there are occasions of landslides/mudslides within the Klang Valley. As landslides/mudslides are matters related to failure in observing safe engineering procedures or standards. These matters are strongly related to BEM codes of conducts where every engineer has to diligently observe; PE could elaborate on this issue with comfort either in their lecture rooms or when their opinions are sought.

Confidence is also needed to deliver the message more successfully. One of main objectives in teaching any subject at an IHL is the delivery method to students. Student could capture the subject content more easily if a lecturer gives a talk elaborately with example of past experiences and referencing the right codes or standards. In research too, confidence could be the determining factor in successful proposals for grant. A confident researcher, who knows industrial needs would not be hesitant to propose targets that are relevant to the industry. For

example, solar power, an abundant source that is hardly tapped in Malaysia (Harun et al., 2012). This field needs no more of research into photovoltaic panel, as far as producing power from the sun is concern. What is needed is the right research concerning tariff, procedures and the ease of installing and maintaining such panels in the country. Then only the indigenous producers could actively act and install these panels. In order to convince panels (of reviewers) for research grants, proposals shall address real problems including solving them. This is beyond simply documenting the problem in details. This would require thorough understanding where researchers must have spent time in those industries. This could be achieved if researcher have worked in those industries or actively participate in talks like the one arranged by the IEM or provide consultancy services in related areas.

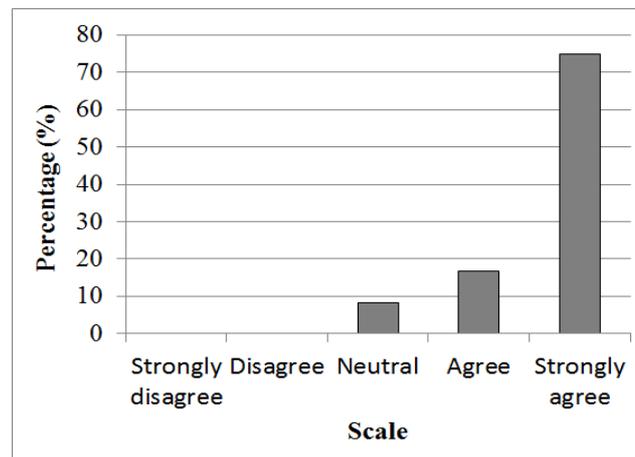


Figure 3. Increase confidence to succeed in the field

3.4 Increase Confidence to Face and Help the Society

The last survey question to be discussed is the level of confidence to face and help the society. Figure 4 shows that all respondents either agree (33%) or strongly agree that being a professional engineer increase their confidence in their relationship with the public. Again, referring to the example of solar power source for Figure 3, a confidence researcher would propose targets that require changes in policies and acts. It would involve high level research comprising of understanding, surveys, analysis and proposal that finally convince law makers to initiate changes at relevant bodies such as the Sustainable Energy Development Authority (SEDA) and the National Renewable Energy Policy & Action Plan. There are already ongoing articles, proposals and lobbies regarding these such as in Chong (2012), however much more are needed to make impacts.

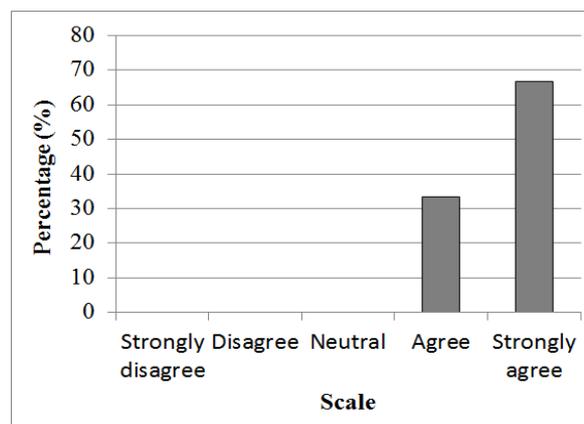


Figure 4. Increase confidence to face and help the society

4. Conclusions

The roles of professional engineers at the institutions of higher learning are important in many ways in realizing Malaysia's aspiration towards becoming a developed nation at the end of the decade. In the first two survey results discussed here, we find that lecturers with PE qualifications upgrade the quality of their careers. All PEs have to attend the required CPD courses/seminar or talks in order to renew their membership, therefore all PEs shall have the latest information about recent standards, engineering trends and technologies. Having the required information, academician-PEs apply their knowledge to deliver lectures more successfully. These lecturers also link the industry to the activities at IHL. In research too, academician-PEs apply their knowledge in specialised segment where the industry really after. In the last two results, lecturers with professional engineering qualifications believe that their confidence within themselves and their confidence to interact with the public are increased. Increased confidence is necessary to convince the public of some subject matter especially when unfounded allegations or claims flood the information gateway, the Internet. With these approaches, it is hoped that Malaysians' aspirations are achieved.

Acknowledgements

The author would like to express their gratitude for the financial supports provided by UKM's grant Penyelidikan Tindakan/Strategi (PTS).

References

- Chong C. F. (2012). *The Malaysian Feed-In-Tariff*, Jurutera, pp. 44-45.
- Continuing Professional Development Policy for Professional Engineers, BEM. (2004).
- Harun, Z., Khamis, N. K., & Arshad. I. (2012). *The roles of Professional Engineers at the Institutions of Higher Learning and in Industries*. Prosiding-Seminar Pendidikan Kejuruteraan dan Alam Bina 2012. pp. 686-695.
- Herzberg, F., Mausner, B., & Snyderman, B. B. (1959). *The Motivation to Work* (2nd ed.). New York, New York: John Wiley & Sons.
- Khamis, N. K., Harun, Z., Mat Tahir, M. F., Wahid, Z., Mohd Sabri, M. A., Mohd Ihsan, A. K. A., & Saibani, N. (2012). *Faktor Motivasi dan Kekangan Memohon Jurutera Professional di Kalangan Ahli Akademik: Satu Kajian Empirikal*. Prosiding-Seminar Pendidikan Kejuruteraan dan Alam Bina 2012. pp. 631-638.
- Mohammad, M. (1990). *The way forward*. Malaysian Business Council.