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Engineering Studies in Thailand: A Critical Look at the Past, Important Lessons for the Future

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ABSTRACT: Several years ago, Thailand announced the commitment to becoming a "Newly Industrialized Country" (NIC), probably due to the expectation that prosperity would come from industrial products rather than agricultural products. As a result, the focus of the national policy was on promoting the industrial sector and accelerating the production of technological manpower - both engineers and technicians. However, several problems arose shortly after this, such as environmental problems, unemployment problems, urban density problems, product quality problems, manpower quality problems, and other social problems. These consequences are lessons that we should learn from and remember. Since Engineering involves both good and bad aspects, so in developing the country according to society's expectations, it is important to understand the past, present and future of engineering study in Thailand.

KEYWORDS: Engineering study; Developed country; Developing country; Publication.

INTRODUCTION

All developed countries are wealthy, rich, influential, and are respected by other countries. Most of these countries earn their income from industry: hence, they have a strong manufacturing industry. Since industry depends on science and technology, these countries also have sound academic institutions that initiate various scientific principles and theories. Despite their lack of natural resources, they are still able to gain their wealth from their new bodies of knowledge in science and technology. On the contrary, the countries that are rich in natural resources but lack knowledge often become inferior and gradually lose their self-autonomy. Eventually, they lose their advantages and their national treasures.

According to IMD World Competitiveness Yearbook 2006[1], in 2004, all developed countries invested money in research and development. For instance, the United States of America, Japan, and Germany spent U.S. $ 312,535 million, 135,318 million, and 68,447 million, respectively on research and development. This correlates with the large numbers of research publications from these countries in the ISI-WOS databases[2]. In 2005, the United States of America, Japan, and Germany were the top three out of 100 countries in terms of research publications, with 304,670 (25.6%), 77,263 (6.49%) and 77,124 (6.48%) publications, respectively. It is noticeable that the highest ranking countries, in terms of both research funds and research publications, tended to be the well known developed countries, with the developing and under-developed countries coming lower down the list.

It is widely accepted that engineering is an important field that can bring prosperity to a nation. All that is stated above cannot happen if the country is weak in engineering. This article discusses the history and present status of engineering in Thailand in order to reveal its actual current status and to find suitable solutions for the future.

HISTORY

In 1912, Chao Phraya Thammasakmontri, Director-General of the Civil Service School, founded a technical school called "Yantara Suksa School under the Civil Service School of H. M. King Chulalongkorn (Rama V)". Then in 1916, King Vajiravudh (Rama VI) transformed the Civil Service School into Chulalongkorn University. Hence, the Yantara Suksa School had become the Faculty of Engineering; and the country's first engineering educational institution had opened.

In 1938, an Irrigation Engineering school was founded under the Ministry of Agriculture. The school was transferred to Kasetsart University in 1955, and became the Faculty of Engineering at Kasetsart University in 1967.

The demand for engineers increased along with the development of the country. However, the number of engineers graduating from existing educational institutions was insufficient to meet this demand. Thus, in 1970, three leading technical institutions in the country were combined; and on April 24, 1971 they

were granted the name 'King Mongkut'. This consisted of King Mongkut's Institute of Technology, Thonburi campus, King Mongkut's Institute of Technology, Nonthaburi Campus (presently known as King Mongkut' s Institute of Technology Ladkrabang) and King Mongkut's Institute of Technology, North Bangkok Campus. The Faculty of Engineering was the first major faculty in all the three institutes.

In provinces, Khon Kaen University also established a Faculty of Engineering in 1964. This was considered the first Faculty of Engineering outside Bangkok. The main aim was to support the development of the northeastern region, which featured one-third of the total population and area of the country. In the southern region, a Faculty of Engineering was established together with the foundation of Prince Songkhla's University in 1967. In the northern region, a Faculty of Engineering was opened as part of Chiang Mai University in 1970.

The Faculties of Engineering in most of the universities mentioned above accept students who finish scientific programs at secondary level through the national university entrance system. However, in 1975, Vocational and Technological Colleges were established, which offered Bachelor Degree courses in Engineering. These courses allowed vocational and technical students to extend their study into Bachelor Degree level, which has had the effect of producing engineers who are keen on practice.

It could be said that the beginning phase of the Faculty of Engineering in each of the institutes was a struggle and insufficient in various ways, including, personnel, place, and budget. However, each institute produced efficient engineers who provided their services to society and made a good name for the country throughout the world.

Present Status

At the time when the government issued a policy aimed at developing the country into a "Newly Industrialized Country", the private sector increased its demand for both skilled engineers and technicians. As a result, both government and private educational institutions offered numerous Degrees courses in Engineering. Currently, there are about 63 institutes that offer Degrees in Engineering: 42 government institutions and 21 private institutions. Each year, newly-graduated engineers are sent into the labor market in huge numbers. Nevertheless, when comparing the number of engineers produced each year with that of other industrialized countries, it might be said that we still produce a lot fewer than these countries. However, it is widely criticized that the quantity and quality does not go together.

At present, educational institutions in our country employ many engineers from various specialized areas. Most of these engineers went to study abroad after they obtained their Bachelor's Degrees from domestic institutions. Branches of Engineering currently offered in the country include Aerospace Engineering, Agricultural Engineering, Biomedical Engineering, Chemical Engineering, Civil Engineering, Computer Engineering, Control Systems Engineering, Electrical Engineering, Electronics Engineering, Environmental Engineering, Industrial Engineering, Information Engineering, Manufacturing Engineering, Mining Engineering, Mechanical Engineering, Telecommunications Engineering and Water Resource Engineering. In addition, there are also other minor areas of Engineering that branch off from the aforementioned main areas.

In general, the content of each specialized Engineering degree provided by each educational institute is not significantly different. This is because every major Engineering Degree course in every institution is controlled and externally moderated by the Council of Engineers – a federation of the profession that is responsible for issuing licenses for professional practice. At post-graduate level, there are many courses at both Master's and Doctoral degree level, in both government and private institutions. Furthermore, to improve English language skills and internationalization, several institutes also provide English-based courses which are called by various names such as English program, Bilingual program or International program. However, these programs demand higher tuition fees than ordinary programs.

Although there are increasing numbers of Engineering Faculties and large numbers of engineers are produced to serve society each year, the overall scientific, technological and industrial growth of the country still falls short of the planned level. Many of the reasons for this are obvious; for example, the non-scientific and technological basis of society, the inactive and convenience-seeking nature of people, the "western-is-better" values, the instability of the government, the weakness of the domestic industrial sectors, education courses, or even the personal problems of engineers. All are serious obstacles in the development of the country and all can produce negative long-term effects if they are not immediately attended to.

Since the nature of engineering is based on applied science, particularly in the design stage, engineering instructors often work for the industrial sectors. Hence, they rarely conduct research because the industrial sectors offer higher salaries and more attractive benefits. However, in the past decade, several organizations, such as the Thailand Research Fund (TRF), the National Research Council of Thailand

(NRCT), and the National Science and Technology Development Agency (NSTDA) have provided substantial funding for both basic and applied research. As a result, more engineering instructors have joined the research community and are producing several international publications. This is seen as the most concrete and international measure for dramatic growth.

At present, every educational institute should be well aware of the need to conduct research. This is because research produces new bodies of knowledge and forces people to think and innovate. When the instructors are smart, their students will also be smart. Teaching relies only on existing knowledge, whereas teaching combined with research furthers that existing knowledge. However, the nature of research often varies according to the personal expertise of the researcher. Each researcher often resides in his own specialist area and follows his own interests. There is not enough collaborative research, especially cooperation between educational institutions. In addition, most research also clusters within education institutes. Only a few extend their scope into the industrial sector. At the same time, most research funds come from the government rather than the private sector, even though the majority of our graduates work in the private or industrial sectors after their graduation.

Future Expectation

Engineering is a field that 'looks good' for Thai society. Hence, educational institutes try to offer a lot of engineering courses even though they have different background. In fact, the engineering profession can be divided into 2 main types: theoretical and practical. Both have equal importance. Germany is a good example of a country that produces both types of engineers. The first type graduates from Fachhochschule (University of Applied Science) after a 4-year program (equal to Bachelor's degree). These graduates become engineers and cannot further their study into higher education because their program emphasizes specialized knowledge. The second type of engineer graduates from institutions which are known by various names, all of which have the same meaning: Universitaet (University), Technische Hochschule, or Technische Universitaet (Technical University). Their program takes about 6-8 years (equal to a Masters Degree). Engineers from the latter type of institutes emphasize research for the purpose of extending existing knowledge or creating new knowledge. Both types of engineers work collaboratively in the industrial sector and have equal opportunities for professional growth. On the contrary, in our country, engineering courses in every institute in Thailand are barely different. This seems to be an appropriate time for engineering educational institutes to create their own uniqueness. They may choose to produce either an excellent doer or a superb thinker, but not half-of-each as it is the case at present.

Since engineering knowledge progresses continuously and actual engineering work integrates several sciences together, the various engineering education programs should be combined into a single multidisciplinary one. Old or outdated programs should be discarded or adjusted to blend with the changing world. Ethics should be emphasized, as well as environmental awareness. Similarly, some high school education programs should also be improved. For example, at present, senior high school students do not have to take a biology test in the entrance examination for engineering programs. However, the association of engineering with biology (Biological Engineering) and engineering with medical science (Bio-medical Engineering) demands knowledge of biology. Hence, a sound knowledge of biology is necessary for engineering in the future.

Instructors themselves should also do more research. Because Engineering is an applied science, a large number of instructors make extra income from being consultants. This is not wrong because they apply their knowledge in solving problems for the industry. However, it would be better if they tried to relate their work to their teaching profession by using the problems arising in industry in their teaching and research. This way, both new manpower and a new body of knowledge can be simultaneously created.

As said above, Engineering is considered a prestigious field in Thai society. Every year top-grade students generally choose the Faculty of Engineering over other faculties. Engineering has become a high status profession in our society. Some students choose to study Engineering, not because of their preference or ability, but because of the social value. Thus, a certain number of engineering graduates are found working in fields that do not require engineering knowledge, or even in other fields that do not relate to engineering or industry.

Conclusion

This article briefly discusses the history, current situation, and desirable future outcomes of learning, teaching, and research in the field of engineering in Thailand. Even after a long period of Engineering education, there are still many drawbacks which need to be improved. Since Engineering is a science that can literally build the country, those involved should recognize its significance and provide the profession with serious support.

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