

The Challenge of Increasing Scientific and Technological Manpower in Thailand

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Introduction

Science and technology (S&T) play a vital role in a country's development either in economic, social or politic scenes. It is also recognized as a foundation for the long-term economic development of the country (Birasak, 2001). Currently, science and technology are described as the engine for sustaining the development of societies and the driving force in the development of mankind's future (Satoru, 2001). The creation of new scientific knowledge is a vehicle by which technical innovations in health, prosperity, and security of the country as well as the continual development of the human resources. Science and technology contribute to the raising of the standard of living of the population and lead to wealth distribution and improvement of the quality of life (Lagowski, 1994).

As the world heads irreversibly toward economic globalization, we are now faced with the unprecedented challenge upon which science and technology progress has a crucial influence. Competition of knowledge-base economies is becoming increasingly dependent on the development of leading-edge technologies and their rapid application by an economy's innovation system (Shin, 1997). For science and technology achievement, Singh (1991) suggests that the successful restructuring and development in newly industrializing countries (NICs), such as Thailand, may be attributed to a number of factors, two of which have a direct bearing upon higher education institutions. The first is quantitative and qualitative scientific and technological manpower. The second is the research and development environment which enables the achievement and sustainability of indigenous industrial development.

Higher education institutions play a singularly important role in the training of scientific and technological manpower because they are often the sole suppliers of high-level scientific and technological personnel. Research and development activity, though shared with other research and specialized institutions, is a crucial part of higher education as it strengthens and enhances training capacity (Thailand Development Research Institute Foundation, 1995).

Since the economic downfall in 1997, Thailand has realized that education is an important tool in training science and technology personnel. Developing only the economy was not the right strategy. Four percent of the gross national product in public education investment and two tenths of a percent of the gross national product in research and development are quite too low for the production of the knowledge-base economy, what Thailand needs for the future. Moreover, many seminars, conferences, and studies have revealed that an unskilled manpower base has been one of the underlying factors causing the economic and financial crisis. Additionally, others have highlighted the lack of Thai graduates capable of independent analytical thought as one factor responsible for the country's economic downfall (Office of the National Education Commission, 1999). As a consequence, Thai education institutions must produce the right portion of manpower in science and technology relevant to

national needs as well as enhance the research and development capacity. This urgent need to reduce the scientific and technological manpower shortage must become an agenda at the national level and be linked to other dimensions of national development.

The aim of this study was to investigate the responses of the educators and other stakeholders to the increasing need of S&T advances and experts in Thailand. Collective perspectives focused on the new human resource development strategy. Three national level organizations were selected to examine. The first was Institution for Promotion of Teaching Science and Technology (IPST), which was responsible for curriculum design at all school levels, and second was the Ministry of University Affairs (MUA), which was in charge of higher education's policies and the last one was the National Science and Technology Development Agency (NSTDA) that provided and conducted R&D projects, human resources development, management and technical services. In addition, three groups of stakeholder were selected for the study based on their responsibilities to accelerate the national S&T manpower capability. Policymakers served as activators and supporters, educators as producers for the output, and students were the inputs of this process.

Procedures

Dramaturgical analysis (Feldman, 1995) was employed to research the problem in order to investigate the stakeholders' reaction to role the S&T manpower strategy. Fundamental to doing a dramaturgical analysis was the question of what performance was taking place or what meaning was being portrayed to an audience and how the elements that make up performance contribute to that meaning. The strength of dramaturgical analysis rested on Burk's (1969) five elements, scene, act, agent, agency, and purpose, which proposed for generating principle from the actor's performance.

This study used these five elements to portray the whole picture of Thailand's S&T manpower capability. The scene referred to the current situation of Thailand's science and technology capability in each stakeholder perspective. The act displayed various problems that were taking place in the setting. The agent meant the groups of people who were involved in the S&T manpower development process as well as their roles to accelerate S&T manpower development strategies. The agency described the projects that support those strategies. The purpose was the reason or motive for those mentioned strategies (Feldman, 1995).

Data Analysis

Scene

The scene of S&T capacity in Thailand is where analysis begins. Clearly, evidence can be found to support the description of great weakness from the stakeholders' perspectives. All of the actors, policymakers, educators and students, reported weaknesses in three distinct areas. The first is that there was no networking among the S&T manpower workers: government, academy and industry sectors. Second, the policy alone was not enough to network diverse groups and individuals. The government did not and could not provide the support needed for this networking

through policy. Finally, science education system in Thailand was inadequate; there were shortages of lecturers/teachers, insufficient science equipment, and the entrance examination is not suitable. The teaching and learning styles emphasized on theory adequate for passing examinations conducted by the instructors. Students and teachers had little exposure to practice. As a consequence, most of graduates (output) were required to be trained again by industry over an extended time before they became productive in industry sectors.

Act

The act is what is done during the performance. At front stage, a variety of strategies are launched to recover S&T manpower shortage capacity. At back stage, however, these opportunities cannot mobilize sufficient researchers and scientists due to the lacking of the proper environment to nurture this talent and fewer channels or incentives for potentially great scientists to pursue their passion.

At front stage, students are persuaded to join in the S&T cycle. At back stage, after graduation they cannot find the suitable job. The demand and supply do not match. Policymakers are working based on the supply system which seems to response to the country's need. But in reality, there are not enough jobs provided for output of the process. Many higher education institutions still have little or no contact with industry or the service sectors. This causes the mismatch between the requirements of the industry and the academic institutions.

Agent/Agency

Three national level organizations were selected to examine. They were all in charged of the national S&T manpower policies. The IPST was responsible for curriculum designed to shape the citizens of Thailand into S&T literate citizens and also chose to develop the talents of select S&T manpower students. The MUA was in charge of higher education's policies for producing the graduates as well as enhancing research and development in S&T areas. The NSTDA provided and/or conducted R&D projects, human resources development, management and technical services, technology investment, public awareness and information services. These strategies were designed to increase the networks, the knowledge bases and the general overall capacity of S&T in Thailand.

The agent includes the actors and the roles that they played in Thailand's effort to improve S&T manpower capacity. The actors were policymakers, educators (both university faculty and secondary science teachers) and students (university undergraduate students and graduate students). Their roles they played are as follows:

The IPST. At front stage, the IPST saw as its role to provide standards for citizens in terms of science education. However, for a long time the national entrance examination has been a problem. Students accord less attention to their in-school learning while devoting their time to tutorial classes to prepare for university entrance examination. Of highest interest to teachers, students and parents is the students' success in the university entrance examination. At back stage, IPST curriculum that tried to support scientific process skills through practical experience could not accomplish this. Teachers did not satisfy the professional development scheme

provided by the IPST. When they did try to communicate, there was no cooperation between the teachers, students and parents. There was an apparent problem with social value.

Furthermore, at front stage, IPST saw as its role the development of a select group of talented students. These individuals received funding and support unlike any other students in Thailand. At front stage, they were special nurtured and received resources from the hungry S&T capability pool. At back stage, the outcome was not satisfaction because most of these talented students did not get into the S&T tracks for their careers. It was the resource constraint and wastage.

The MUA. The MUA saw as its role to manage the educational policy within the framework of the national demand in higher education level. To this end, the Ministry is in charged of the budget allocation for the universities, particularly public universities, to produce S&T graduates to meet the country's need. In case of faculty professional development policy, a number of faculty were sent abroad to strengthen their own potential in order to support the process of production quality S&T manpower and to develop their research capacity. Hence, in the future these groups of faculty are assumed to be the new generation for the national S&T capabilities.

For the faculty's task, at front stage, they were expected to conduct the research to support the process of teaching and learning. The inventions from research are supposed to bring innovation into industry sections. Meanwhile, the faculty have their roles to response both teaching and conducting research. Owing to this, more budgets such as the Asian Development Bank loan are being pulled into this research circle. Additionally, Royal Jubilee Ph.D. and Consortium Project allowed faculty more opportunities to serve both the demand of increasing graduate students and conducting research at the same time.

At back stage, due to the MUA's policy that the university has to generate more S&T graduates, more students (input) enter in this process. Most of the instructors are teaching more students in the undergraduate level and supervise more advisees in the graduate level. Teaching load and other responsibilities are very high. The amount of time that faculty devote to their own research or interaction with students was scarce.

In another respect, the culture of conducting research is dominated in some universities that have the strong relationship with the research fund institution. For instance, the prestigious university obtained the first priority to receive the grant from the funding organization. In contrast, private universities possess no opportunity to get support from these pools. When the research granting committees consider the research project to be supported, the name of the project's owner comes up as one of the criteria. Meanwhile, the grants are provided based on the status of faculty or institution not blind review.

In conclusion, the roles of networking between academic and the industrial sectors are originate supported that by the MUA that help the faculty to increase potential for the process human resource development in higher education system and to help industrial sector to develop technology capacities in their productions in the near future.

The NSTDA. NSTDA is seen as a new agency established for the purpose of meeting the urgent need for S&T development in Thailand. It is a juristic (self-governing) body that enjoys being part of the government system but outside the government administrative bureaucracy. This freedom allows great efficiency in research support. NSTDA's roles are seemed to support research as their first priority. The role of human resource development, however, is found too.

In fact, NSTDA cannot provide educational degrees for students. Due to the relationship between faculty in various universities and the faculty in the NSTDA, the NSTDA was allowed to create numbers of higher-level graduates along with the research outcome. Additionally, NSTDA has taken its duties to promote the dissemination and use of research findings. These two crucial roles were the relevant strategies to promote S&T manpower development in the present-day situation to meet the urgent need of the nation.

Furthermore, the administrators in this organization are the elite scientists of the country. Most of them used to be faculty or administrators from universities. Their perspectives of national S&T capability are clear for guiding in their performances.

Purpose

From the review of literature, considering the S&T system of other developed/developing countries should help Thailand to accelerate its S&T capabilities. The process needs S&T manpower development, R&D promotion, and strong support from the government.

The IPST's purpose can only serve to create the foundation of the future S&T manpower. Although the IPST tried to strengthen its own structure by supporting talented students to join its circle, these policies have no impact on the outcomes.

The MUA's purpose can serve both S&T human resource development and some R&D activities between academic and industry. In the latter task, it was seen just in the beginning step.

The NSTDA's activities serve the all purposes for fulfilling the national S&T capabilities. The close relationship among each stakeholder in academic area and industry field seem to strongly support their policies. The purposes of their policies were relevant by their multifunction responsibilities.

Summary

Life is a stage upon which performers play. Through the dramaturgical analysis, although a variety of strategies were launched to the process of development, the problems were remained. First of all, the long-established educational system was very bureaucratic. As a result, the policymakers from the government focused mainly on the teaching rather than R&D, particularly in the field of science and technology. Therefore, the solution should be conducted from the top-bottom performance, along with the bottom-top activities. Secondly, the current science students are in dilemma since it will be difficult for them to find jobs after their graduation, thus, science

curricula should be designed sufficiently so as to provide students with the appropriate foundation for their chosen professional courses. Moreover, the quality of education should be improved urgently due to the rapid changing and more specialized requirement of the production sector. Thirdly, the universities should set up the proper environment to support faculty's both teaching and conducting research. Part of solutions was to reduce teacher's overload and their researches should be more practical rather than only academic purpose.

Furthermore, the higher education institutions should have more contacts with industry and the service sectors. Fourthly, the investment in S&T capability, especially in the process of production of S&T graduates needed plenty of resources and time consuming. The results could not see in the limited period. The long- term policies need to be support continuously. The government must play a prime role in initiating and fostering various measures to re-engineer and re-orient the production of the scientific and technological manpower to meet the growing and changing demands of the production sector.

All in all, The development process needs opportunity, infrastructure, and support. The organization which response for the monitoring the development of S&T capability must be composed of qualified leaders pertaining to high competency and intelligible vision. Bureaucracy system seems to be not relevant for the process. The current problem should be solved from the roots by making awareness among the government officers, educators and students as well as industries and others.

References

- Birasak, V. (2001). White paper on Thailand 's science and technology. Unpublished manuscript.
- Burke, K. (1969). A grammar of motives. Berkeley: University of California Press.
- Feldman, M.S. (1995). Strategies for interpreting qualitative data. Thousand Oaks: CA. Sage.
- Lagowski, J.J. (1994). Science in the national interest. Journal of Chemical Education, 71(11), 905-911.
- Office of the National Education Commission. (1999). Thailand Education Reform: The National Educational Act 1999: Hope for a Better Thailand. [www document]. URL http://www.onec.go.th/move/news/nov_28a.html
- Satoru, O. (2001, July). Sci-tech feature. Look Japan,47, 32-33.
- Shin, T. (1997). Technology foresight: applications and its potential to the APEC region. In Y.Yuthavong (Ed.), Proceedings of APEC Symposium on Technology Foresight, Thailand, 37-55.
- Singh, J.S. (1991). Higher education and development: the experience of four newly industrilizing countries in Asia. In Z. Morsy & P.G.Altbach (Eds), Higher Education in An International Perspective. (pp. 142-156). New York: Garland Publishing, Inc.
- Thailand Development Research Institute Foundation. (1995). The Strategy of technological manpower development for economics and competition capacity. Unpublished manuscript.