

CHAPTER 7

CONCLUSION AND RECOMMENDATIONS

This chapter is to assimilate and present all the issues discussed earlier and to propose the strategies for building industry-university partnership in Thailand, and make recommendations for further study. This chapter is divided into four sections, namely conclusion on existing industry-university partnership's success, status of R&D in industrial sector and university, conclusions and recommendations for university and industry in Thailand, and recommendations for further research.

7.1 General Conclusion

To compete in a globalised world, a country requires better engineering skills, higher technological capability and skills, and research and development. This is indeed essential for Thai manufacturers that have to improve their technical knowledge. Only by joining hands in research and development with universities or government can they survive in this global competition. Linkages with university will help industries to solve technical problems, business problems and improve global efficiency through information sharing. However, the relationships between academic institutions (universities) and industries in Thailand are very weak. The question arises for this thesis is how to improve existing and building new viable industry-university partnerships for Thailand.

The question leads to the two major objectives of this thesis. The first objective is to identify an appropriate partnership model suitable for universities in Thailand as a developing countries. The second objective is to determine strategies for a university to set up a particular partnership model to aid in the development in industry.

During the thesis, the data and information are gathered from various sources: literatures, internet, correspondence from selected universities in Europe, Asia and America, and interview results with respondents from government, university, and private firms.

The research methodologies involve five steps. In the first step, partnership models in various countries are studied in broad perspective to give an idea of each partnership model characteristics. In the second step, existing partnership models in various countries are analysed carefully with aims of gaining experiences from other successful universities, identifying the common features of successful partnerships, and assessing which model is most compatible with certain market conditions. In the third step, the characteristics of Thai industries and universities are analysed. Then, the partnership model that deemed compatible with the characteristics of Thai industries and universities is chosen. Finally, the strategies for designing the partnership approach are proposed based on the data gathered from various sources.

Section 7.2 to 7.4 are conclusion of the findings from the investigation of partnership models from various countries, the Thai industries and universities characteristics, and the recommended strategic plan for designing the partnership approach by respectively.

7.2 Conclusion on Existing Industry-University Partnership's Success

The different partnership approaches could not be categorised by the level of country development. Some universities in the same country type had different partnership approaches, such as,

Developed Countries: Texas A&M University (Research-Oriented Park Model), University of Twente (Agency Model).

Newly Industrialised Countries: Hong Kong University (No Model Applied), National University of Singapore (Membership), Nanyang Technological University (Research-Oriented Park Model).

Developing Countries: University of Indonesia, De La Salle (No Model Applied), ITB (Agency Model).

Universities in developed countries had chosen all types of linking mechanism with a big number of projects for each linking mechanism. Universities in NICs also showed all types of linking mechanisms, but fewer in number than universities in developed countries, especially regarding consortia and licensing. Universities in developing countries were concentrating on consultancy and contract research.

Regarding the benefits and weaknesses of each partnership approach, the following conclusions can be drawn:

- The higher universities' technological capabilities and the more components of innovative capabilities the universities have, the more successful are their partnerships with industry.
- The higher industry clients' technological capabilities and attributes (past experience, size), the higher recognition of the importance of partnership, and the more success in partnerships with university. The operating experience of industry and the nature of operating environment with government support policies, programs and interventions regarding cooperation with universities are very important. For example, government support in Korea and Singapore is very strong.
- Universities that had chosen the Science Park Model are the most successful in partnerships with industry, followed by Membership Model and Agency Model. Successful universities have consortium projects and product licensing. Partnership model is still important but it should be combined with other success factors such as technological capabilities of university,

technological capabilities of industry, innovative capabilities of university, type of linking mechanism and operating environment.

7.3 Status of R&D in Industrial Sector and University

Industrial Sector. R&D efforts have been initiated in large and medium enterprises. The R&D investment promotion by the Office of the Board of Investment has helped increase the R&D activities in the private sector. R&D activities in the initial stage are geared towards product improvement and design.

University. Research activities are conducted at the levels of research institutes, departments and research units, but mostly at the departmental level. Most of the research projects currently being undertaken depend on the interests of researchers and financial sources. On average, the research budget of each research unit during past three years ranges between 0.1-16.8 million baht per year, and the number of researcher (lecturers) depends on the size of the unit. Research outputs are mainly research reports disseminated in the form of articles. Non-publication outputs are rare, and mostly are in the forms of computer software, designs and patent registration. Linkages with the industrial sector are mainly created through consulting services, contract research and seminars.

Most regional universities concentrate on research consistent with local resources and development because regional industries are mainly small and medium industries related to agriculture and requiring low technology. Research-related linkages with universities are very rare, and mostly are in the forms of theoretical and consulting services.

Overall, universities concentrate on basic research and applied research rather than development research. Most research outputs are irrelevant to the needs of the private sector. This is due to the fact that public research is supply-push. The collaboration from the beginning will enable universities to know the exact demand of the industry, leading to the commercialisation of research outputs by the industrial sector.

7.4 Conclusions and Recommendations for University and Industry in Thailand

Both university and industry characteristics in Thailand as developing country seem to match with the approach of choosing Agency Model with better efficiency than existing status and have to develop the partnership to Membership Model or Research-Oriented Park Model as soon as possible. The strategic plans for designing partnership approach are recommended into 3 phases within 5 years. The goal of Phase I is to reform the universities' administrations and academic processes. The goal of Phase II is to foster the relationship between industry and university through enhancing the existing Agency Model. The goal of Phase III is to establish the Research-Oriented Park Model in each region of Thailand.

To be successful in implementing in Phase I, there are some requirements which have to be improved, including improving technological capabilities, and building stronger commitment through integrating vision, mission, goals, strategy and reward system, establishing innovative internal network, and also promoting industry service champions. The industry needs are upgrading in the areas of industrial management, technical advice in materials and software, and information sharing both in technical and non-technical fields.

Universities in Thailand should clearly understand its present internal characteristics and the external conditions and compare those with the conditions required by the Agency model. This comparison will clearly indicate where improvement is necessary. Outstanding critical features to be improved are:

- Two-way communication between management and lecturers should be directed to build commitment and encourage each other. Through this communication, both management and lecturers can discuss how to improve technological capabilities and having more components of innovative capabilities.
- The reward system should be revised based on the lecturer performance. This new system will be reducing unnecessary expenditures and encouraging good lecturers to develop their capabilities.

To measure the success in Phase I, the performance indicators of Phase I are recommended as: average response times to service to industries, efficiency of using the places, buildings, laboratories, equipments, etc. and competitive S&T rank in R&D management

In order to be successful in implementing in Phase II, the new marketing strategy of research agencies/administrative agencies and promoting agencies offices as focal points to public should be established. Universities must reach out through comprehensive outreach programs and related efforts to understand the needs of society and industry. “Corporatisation” of the higher education sector can help to make universities more responsive, more innovative in developing linkages, more efficient at using resources, and more proactive in disseminating information about the universities strengths and services. In this phase, universities should expand their services in many types.

The productive sector must also reach out to seek stronger partnerships and joint programs with higher education, to be proactive in participating in university planning exercises – curricula development, research planning and so on. Groups of industries in particular should make stronger joint efforts to identify industry or technology specific programs that can be undertaken with the universities, and to work with universities to help them understand the needs of industry.

To measure the success in Phase II, the performance indicators of Phase II are recommended as: number linking mechanisms, number of joint research with industrial sector, income of research agencies, number of employees in research agencies, and the rank of competitive S&T rank.

In order to make successful in implementing in Phase III, universities must plan the parks carefully. A park should identify the opportunities emerging in the region of its operation and also attempt projection of future trends. Additionally, a park should have visionary leaderships and the president of university should become a strong supporter industry-university partnerships through research-oriented park.

To measure success in Phase III, the performance indicators of Phase III are recommended as: number technology transfer, number loss of the most capable researchers to other countries, number of successful companies, development of high-value added industries, ROI, profitability and debt ratios, and the rank of competitive S&T rank.

For the role of government, government has been seen to have a critical support role to play in industry-university linkage development at three levels. First, to ensure a stable macro-economic environment that is conducive to long-term decisions of both universities and industries. Second, to support general science and technology activities – manpower, S&T infrastructure, intellectual property rights, and firm-level technological activities. And third, to encourage industry-university linkage activities and mechanisms, either through indirect incentive structures that reward such activities or through direct financial support to specific research centres or other industry-university linkage activities. Carefully planned government support programs for industry-university linkages were seen in many of develop and new industrial countries.

7.5 Recommendations for Further Research

The industry-government-academia collaboration is significantly essential to develop a country. In order to foster the innovation, economic and technology development, the linkages between academic institutions or universities, public and private R&D institutes, and industry should be strong.

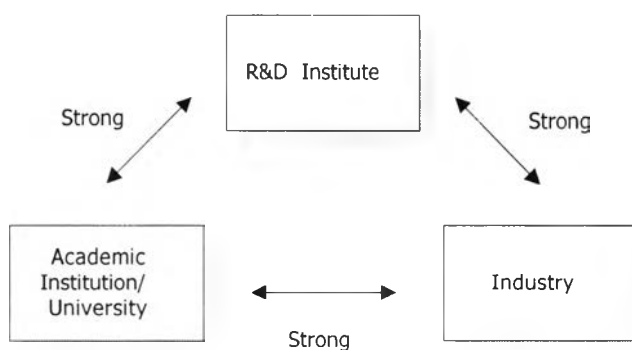


Figure 7.1: An Ideal Triangle Collaboration

An ideal collaboration among government R&D institute, academic institution, and industry in Thailand should be strong (Figure 7.1). However, this thesis is only covering one linkage, that is, between university and industry. This thesis only covers the

question how to improve the linkage between industry and university. Further research about all those linkages is recommended, for answering this following research question: How to strengthen all linkages of the innovation triangle (especially in Thailand)?