

## UNIVERSITY AND INDUSTRY LINKAGES: PARTNERSHIP FOR HUMAN AND ECONOMIC PROGRESS IN THAILAND\*

*Prinn Prachayanuporn* \*\*

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### INTRODUCTION

The global economy is experiencing unprecedented change, competition and integration. Economic cooperation between countries is becoming critical in this age of increasing global integration. In the complex web of networks and interrelationships that will characterize the world of the 21st century, university and industry linkages (UILs) can play a key role in solving technical problems and enhancing global efficiency through information sharing and other ways and means of cooperation.

The exchange of knowledge and ideas through growing networks of universities and productive sector agents offers channels and mechanisms for economic cooperation that are less politically sensitive than other forms of economic cooperation, such as trade or investment cooperation. It also offers an unprecedented opportunity for universities to play a critical role in promoting and supporting national as well as regional economic dynamism and quality of life.

International cooperation is now possible at much greater levels than before, both for universities and the private sector. Universities, as the traditional providers of knowledge to society, have to play a key role in maintaining and developing competitive advantage along with retaining academic excellence. In Thailand, universities need to go beyond tradition and intensify levels of collaboration with the productive sector. This will not only enhance the provision of knowledge to

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\*\* Assistant Professor, Graduate Programme of Human Resource Development, National Institute of Development Administration.

society, but also the application of knowledge more relevant to the needs and quality of industry and eventually people, as end-users, or the society.

This paper briefly examines the status of university and industry linkages in Thailand, focusing on strategies and opportunities for research collaboration and sponsorship, human resource and curriculum development and innovation to meet the national socio-economic objectives in the context of regional and global development trends.

## **ECONOMY**

Thailand is a newly industrialized country, comprising 76 provinces, with a population of approximately 59 million in 1995. More than 60% of its population make their living in the agricultural industry sector while the rest live their lives in the production and service industries.

Thailand's economy has expanded by more than 8% per year from 1991-1995. Over the period 1985-1994, Thailand recorded the highest growth of GNP per capita in the world - 8.2%. This rapid growth, driven to a large extent by foreign investment and growing exports, has been accompanied by a transformation of the economy towards manufacturing activities, with the manufacturing share of total DP increasing by almost 6% over the past decade to about 29.1% in 1995.

Changing domestic resource costs, combined with increasing competitiveness in global markets, are forcing Thai manufacturers to move into higher valued-added and more sophisticated products. The key challenge to Thai producers in the mid-1990s is to enhance production capabilities and move up the value-added ladder as the country faces competition from other countries in the region.

## **SCIENCE AND TECHNOLOGY**

A critical element in Thailand's future economic success is the enhancement of the overall science and technology (S&T) environment. Yet, this sector is characterized by mismatches in S&T human resource supply, very low levels of R&D activity (Table 1), a private sector with strong manufacturing capability but

weak research, development and engineering capability, and an information technology foundation that is growing but remains insufficient (Table 2).

It can be seen that some indexes indicate that Thailand's intelligence power, in terms of the quality of workers and potential to develop new knowledge and advanced technology is quite low, compared to other countries, as shown in Table 1.

**Table 1:** Some Indexes Showing the Relative Level of Thailand's Intelligence Power Compared with that of other Countries

Countries	Educational Level of Workforce (number of possible schooling years)	Ratio of Scientists (per 1,000 population)	Ratio of Investment in Research (per GNP)
<b>Advanced Industrial Countries</b>			
USA	12.3	55	2.9
Germany	11.1	84	2.9
England	11.5	n.a.	2.3
France	11.6	83	2.3
Japan	10.7	110	2.8
<b>New Industrial Countries</b>			
Korea	8.8	41	1.4
Hong Kong	7.0	47	n.a.
<b>Thailand</b>	<b>3.8</b>	<b>2</b>	<b>0.2</b>

Source: Human Development Report 1995, in *The Dream of our Nation* (Kwam Fun Khong Pean Din), 1996, 45.

Table 2 provides some indexes which demonstrate that Thailand still has to invest much more in communication and information technology, of which both form an important foundation for making the idea of closer linkages between

university and industry possible, and the concept of “learning whenever and wherever wanted” for people practical. This is not to mention the quality of mass media in promoting useful knowledge and information to the public.

**Table 2:** Some Indexes Indicating Advance in Communication in Various Countries in Asia, by Per Capita Income.

Country	Per Capita Income (US\$)	Indexes Indicating Advancement in Communication	
		Population/1 TV set	Population/1 Tel. set
Hong Kong	18,520	3.6	1.8
Singapore	14,734	2.6	2.2
Taiwan	9,830	20.5	2.8
Malaysia	7,400	6.7	8.5
Korea	6,080	4.7	3.0
Thailand	5,270	9.0	54.2
Indonesia	2,730	16.3	176.4
Philippines	2,440	20.5	58.7

Source: Robinson and Goodman 1996, in *The Dream of our Nation* (Kwam Fun Khong Paen Din), 1996, 75.

## HUMAN RESOURCE PLANNING AND DEVELOPMENT

Rapid growth of the Thai economy during the 1960s and the 1970s resulted in full absorption of all educated human resources into the labor market. By the 1980s, there were many factors that had contributed to the major changes in the supply and demand of educated human resources.

On the demand side, world recession had caused some significant shifts in the pattern of labor absorption in both the public and private sectors. While there was a decline in the demand for educated human resources in the public sector, which was the major employer, the private sector was not able to absorb the surplus. The large number of educated unemployed became a matter of concern for the planners.

On the supply side, this surplus was caused by some fundamental changes in the educational institutions during the 1970s. The rapid economic growth had stimulated the demand for higher education. The government responded by increasing its expenditure on education. The proliferation of new institutions and increases in enrollment had resulted in a large number of graduates in the late 1970s.

Due to institutional rigidity, education administrators were slow in adjusting to the changes in market demand. For instance, it is projected that between 1997 and 2000, Thailand will need approximately 60,000 engineers and scientists per annum, while it can produce only 10,000 a year as a total number in both professions. It became apparent to the human resource planners that the issue of human resource planning and development is not just trying to improve prediction capability on the demand side but also to find a system which can result in frequent adjustments on the supply side, along with answering the question of how to enhance quality.

## EDUCATION

Higher education in Thailand is provided in a wide range of institutions, both public and private. These institutions are under the responsibility of the Ministry of University Affairs (MUA) and the Ministry of Education (MOE) as shown in Table 3.

Table 3: Thailand's Higher Educational Institutions.

MUA	20 public closed admission universities	2 public open admission universities	31 private universities or colleges
MOE	Vocational Diploma Colleges (where many students study part-time)	Rajamangala Institute of Technology (RIT) (degree level)	Rajabhat Institutes (formerly teacher training colleges but now with university status)

Source: Adapted from Charti Sripaipan and Peter Brimble, 1996, 2.

Of the total enrollment of 1.3 million in all higher education institutions in 1994, 0.4 million were attending open universities, with only a small percentage of these students in S&T programs. In 1993, a total of 10,735 students graduated in S&T subjects (at Bachelor Degree level or higher), of whom 76% were from public universities and 24% from private universities. At the postgraduate level there were only 760 S&T graduates, of whom 91% were from public universities.

The low number of students graduating in S&T at the university level is a critical problem of national higher education which will have a direct effect on the country's capability to maintain economic and advanced technological expansion for agricultural and industrial development for quality of human and societal progress.

### **UNIVERSITY AND INDUSTRY LINKAGES**

Although several universities have long been working closely with some business enterprises, either in the form of academic services to the community or the provision of apprenticeship for students, Thailand is still at the early stage of university and industry linkages (UILs).

Within the Ministry of University Affairs and universities, attempts to advance university-industry cooperation on a national as well as regional level have been made, e.g. in promoting the establishment of centers of excellence, science parks, incubators, and enterprise-based technical training centers, including some groundwork for integrating cooperative education in selected and appropriate fields into the higher education structure. In September 1996, the Ministry of University Affairs assumed a coordinative role to examine modalities of university-industry cooperation in the APEC region, to focus on specific activities and mechanisms to promote closer cooperation between higher education institutions and the private sector.

Many of the UILs formally identified are for short term training or make ad hoc use of consulting and research services, and the levels of understanding and vision of the true potential of such linkages among participants are not substantial. Nonetheless, some recent research studies on this issue indicate that various

activities and linkage mechanisms in training, services and research are emerging and some initiatives are notable.

The volume of research in Thai Universities is quite low and Thai companies mainly use imported technology. This is an area where extensive linkages would not yet soon be expected. Some applied research is carried out by universities for small and medium industries and some lecturers also work as part-time researchers for larger companies. Some companies are setting up research laboratories in universities and some others have formalized research links through signed memoranda of understanding and provision of research grants.

University industrial liaison offices tend to concentrate their activities according to the expertise of the university, as well as that of their directors. Most of them are part of the university civil service system, either as an informal organization attached to the Office of Research Affairs or as recognized by Royal Decree. The only exception is Chula Unisearch of Chulalongkorn University which is an autonomous unit created by a special regulation issued by the University Council.

Chulalongkorn University even established the Intellectual Property Institute, as a separate legal entity to enable the holding of equity in companies providing training, consultation, and research services. The Power Management Institute, a public-private partnership providing training in power management and energy efficiency, is one of the first companies invested in by this new institution.

Science parks have been a popular topic for academic talks recently and many feasibility studies have been in operation. Nevertheless, none of the plans has been implemented to date. The first two parks are likely to be non-university parks developed by the National Science and Technology Development Agency and the Thailand Institute for Scientific and Technological Research. The private sector has also proposed some initiatives, such as the Alpha Silicon Research Park by the Alphatec Group.

As for support activities and sponsorship, the private sector does provide student scholarships, support for public service activities of students and donations of equipment or cash, but they are nowhere near the scale in developed countries

both in cash and in kind. This may be partly because the mentality to support educational institutions is not well entrenched in Thai culture, and partly due to extremely low tax benefits for those who carry out charitable activities. Importantly, mechanisms and channels to involve the private sector in human resource and academic activities, such as human resource and curriculum development, remain weak.

## **HUMAN RESOURCE AND CURRICULUM DEVELOPMENT AND INNOVATION**

Many companies retain university professors as consultants on an individual basis and utilize miscellaneous analysis and testing services at universities as the need arises. However, some university industry liaison offices have built up a network of longer-term relationships with certain companies. Many companies are willing to accommodate summer training for university students. Quite a number of industry people lecture at universities in their private capacity.

Continuing education or short training courses are commonly offered by universities. Many companies sponsor their employees to attend these courses. Some even allow time off to take degree courses on full salary (usually with some conditions such as signing a contract to pay back either in terms of money or obligation for long-term employment). Tailored courses to meet the need of a particular company are less common, but increasing. The feedback on the quality and skill requirements of graduates is generally obtained only through informal personal contacts.

Public training courses are usually offered through a centralized Continuing Education Center and by respective faculties. Company-specific courses are more likely to be provided by industrial liaison offices and university-owned training companies. The Petroleum and Petrochemical College of Chulalongkorn University provides an example of international Master's degree courses that receive a very high level of support from industry through corporate sponsored scholarships.



## **CONSTRAINTS**

Some recent studies have identified the following constraints faced by UIILs in their relative novelty in the Thai context:

1. ingrained attitudes and skepticism from both sides which have formed a significant credibility gap between them;
2. bureaucratic regulations and attitudes that continue to influence the university sector in a number of areas;
3. continuing tendencies for academics to pursue private sector work through personal contracts;
4. weaknesses in the intellectual property rights system;
5. lack of adequate channels for communication, support and formal collaboration;
6. low support of activities and sponsorship from the public and private sectors;
7. some set goals are quite idealistic and much too advanced to achieve in a short time span.

## **IMPLICATIONS FOR ENHANCING UNIVERSITY AND INDUSTRY LINKAGES**

The following implications are drawn for promoting university and industry linkages in Thailand:

1. Principally, the basic tasks of higher education institutions in Thailand comprise teaching, conducting research, providing academic services and promoting the national cultural heritage and integrity. To perform these functions in the globalization process effectively, the government should reorganize the higher education system to best serve these functions and to cooperate with industry for mutual interest.

At the university level, attention should be given to the university and higher education sub-systems which emphasize research studies to explore new academic frontiers and to produce human resources with master and doctoral degrees. Most institutions working under these sub-systems are public and private

universities under the responsibility of MUA, including the community college sub-system which emphasizes continuing education and providing academic services to the community to serve local needs, especially those situated in the rural areas (such as Rajabhat Institutes and RIT which work under the MOE).

2. The role of universities in the process of economic and social development, amidst the rapid change in today's world, should be reappraised and geared to the four key global trends in higher education, i.e. popularization, liberalization, internationalization, and modernization. Universities, as the traditional providers of knowledge to society, should now go beyond tradition and intensify levels of collaboration with the productive sector as deemed appropriate (Table 4).

**Table 4: Modalities of University-Industry Linkages**

Modality Group	Type of Linkage Activity	Description of Linkage Activity
1. Training/Education	Cooperative Education	Involving students spending a significant portion of their academic program in private companies
	Industrial Training (continuing education)	In the application of new technologies such as CNC machine tools
	Small Business Training	Addressing issues of concern to small or nascent entrepreneurs
	Entrepreneurship Training	Similar to small business training with a stronger focus on current issues with regard to entrepreneurship
2. Service/Consulting	Visiting Lecturships	Formal arrangements where private companies support staff to participate in teaching activities
	Industrial Extension Services	Including testing, calibration, repair services, production trouble-shooting, simple design modifications
	Technology Brokerage/ Licensing	Assistance in obtaining or licensing technologies either from the university or from a third party
	Business Consulting/Services Direct or Indirect Investments	From business schools, or through research parks, science parks, incubators Through equity investments and venture capital schemes
3. Research	Coordination of Technology-Related Issues	Through such inter-organization entities as regional technology councils
	Research Consulting	Contractual research carried out for a private company with specified terms
	Joint or Cooperative Research Projects	Often carried out in dedicated laboratories, centers or institutes
	Partnership Contract	Long-term arrangement between university and company to build up research/ education facilities
	Personnel Interchange or Industrial Fellowships	On a regular or long-term basis
	Shared Equipment or Facilities	On a regular or long-term basis

*Note: This list of modalities does not include pure gifts or donations (such as equipment donations, endowment contributions, financing professorial chairs, etc.) to universities, which may well be very good ways of improving relationships between a company and university and may improve teaching and research.*

Source: Adjusted from Baba 1985, 1988, as modified by Chartri Sripaipan and Peter Brimble 1996, 5.

3. It takes sincere and serious collaborative efforts to make the university-industry linkage program successful. Initiatives can take various forms but the key actors always include university, industry, and government. Closer cooperation is expected from policy governing units as the MUA, MOE, the educational consortium of universities, research funding agencies, chambers of commerce, and investment promotion agencies to incorporate the concept of university-industry collaboration explicitly into the overall move towards university reforms and also into the mission statements of Thai universities.

4. Promote the trend towards “life-long learning” and ongoing and continuing education – especially in the S&T area. UILs can play a role in accelerating S&T capacity in many related areas, i.e. (a) technical personnel, through enhancing course relevance, upgrading the work force, and supporting more efficient use of both university and industry resources; (b) S&T infrastructure, through increasing the supply of technical services and results of public sector R&D to the private sector; (c) technological capability, through sharing resources, embarking on mutually beneficial cooperative research and technology transfer endeavors, and solving technical problems in industry; and (d) information technology, through strengthening IT facilities and information resources and ensuring the most effective use of available information. This could be supported through tax incentives for the establishment of private industry retraining centers and other programs that involve explicit university-industry collaboration.

5. Direct promotion of linkage activities and mechanisms by (a) technical and advisory support; (b) financial and fiscal incentives for promising linkage activities; and (c) fiscal incentives for corporate philanthropy and other support for increased private sector participation in the higher education sector.

6. Introduce explicit programs to enhance regional cooperation in the area of university-industry collaboration.

## CONCLUSION

One of the main problems of our region is a shortage of highly qualified personnel, largely caused by rapid economic growth and tremendous shifts in the skill level of personnel required by the transition to higher value-added and more sophisticated industrial activities.

Like other countries in the Region, Thailand has recognized the need to adjust its higher education sector in line with the trends toward globalization and rapid technological change. The Eighth National Economic and Social Development Plan of Thailand (1997-2001) has focused intensively on development of human resources and quality of life amid rapid economic growth.

In this context, Thai universities should become more relevant, more efficient, more modern and more outward-looking in the approach to producing the highly qualified personnel required to meet the challenges of tomorrow.

A key element to achieving this goal is to promote greater cooperation between universities and the private sector through curriculum reform, new delivery mechanisms, and introduction of new courses. At the same time, private companies should be more open to work with the university sector and to supporting joint programs in the areas of research, training and services.

While recognizing the need to ensure private sector inputs into the reform process of higher education and higher educational inputs into the growth process of the industrial sector, a balance should be upheld between inputs from both sectors. This is to allow the university's core to retain its key characteristics and maintain its function as society's knowledge base, while permitting appropriate flexibility in the core mission to respond in a dynamic manner to changing conditions, keeping in mind that the final goal of UILs is to conform to the national goals of education promulgated in the Royal Command Announcement, which emphasize balanced and harmonious development in an individual, i.e. a balance between intellectual, spiritual, physical, and social development.

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