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Report

Science and technology research in Thailand: Some comparisons from the data regarding Thailand's position in the region based on volume of published work

Terry Commins [1,*], Warinthorn Songkasiri [2], Suvit Tia [1], and Bundit Tipakorn [1]

[1]King Mongkut's University of Technology Thonburi, 98 Suksawad Road, Tungkhru, Bangkok 10140, Thailand

[2] National Centre for Genetic Engineering & Biotechnology (BIOTEC), Science Park, Klong Luang, Pathumthani, 12120, Thailand

* Corresponding author, e-mail: thefox@loxinfo.co.th

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Abstract: Three different sources were used to examine the growth or otherwise in the volume of published research from Thailand. One source compares growth over the last two decades, another over the last six years, while a third examines the current status of Thailand's position in relation to neighbouring countries in ASEAN.

All three methods are based primarily on publication in international literature, with an emphasis on science and engineering. The figures do not include publication in local or regional literature and thus do not reflect the total picture in terms of volume. It was not possible using these sources to obtain a publication-per-head-per-researcher to better illustrate output on an annual basis.

Despite these drawbacks, indicators from international sources can be viewed with some confidence and the overall picture is encouraging. Thailand has seen dramatic growth over the last twenty years and consistent growth over the last six. Thailand ranks second in the ASEAN region behind Singapore, in terms of volume of output, and is ahead of Singapore when this output is compared to GDP.

Keywords: science publication, journals, citation index, scientometrics

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Introduction

The generally held belief is that Thailand seriously lags behind other countries in the world, particularly the "Asian tigers", in terms of research and development, or even basic science. In GDP terms, funding for R&D remains low and the country is said to have an almost chronic shortage of skilled researchers. Against this picture it was decided to look at international publication by Thai researchers in the science and engineering fields, to see how the country compared with others in the region. A further objective was to form a picture of whether output was increasing or declining and to suggest what might be the possible causes for this.

Some work has been undertaken in building up a Thai Journal Citation Index (TCI) [1-3] which is a commendable effort, although the focus is on quality whereas this study concentrates on quantity. The evidence is clear that the volume of published work from Asia is increasing [4] and the inference is that quality is increasing commensurately, given the desire by researchers to publish internationally [5]. Examining the data from archived journal articles confirms this trend [6]. It is also apparent that publishing in Asia is on the increase and Thailand is active in this regard with some 228 academic journals produced in the country [7].

In our attempt to gain a clear picture of quantity and to ensure the validity of the data, three different sources/approaches were taken.

Methodology

For the first comparison, major journal or literature providers were searched using the country name as the key word. This returned all published work about, or originating from, the country and is thus not exclusively the output of researchers from that country. For example, the figures for Laos are relatively high, given the low number of researchers in that country. This can be explained by the high external interest in Laos in the fields of biodiversity, medicine and social sciences. In the case of Thailand, Singapore and Malaysia, the figures are considered as reflective of work generated within the country and it is estimated that some 20% is external.

In addition, the search engines employed by the publishers were found to vary greatly in their returns. Some employed the most obscure references to the country contained in the text, while others were more precise with weighted results. Since we were only seeking an indication to obtain a better picture of growth, the data is considered to be reliable for this purpose.

For the second comparison, we explored the ISI Web of Knowledge database [8] for records that are freely available dating from 2001. A search was undertaken for the period 2001-2006, using the country name as the key word and covered the following databases:

- Science Citation Index Expanded
- Social Sciences Citation Index
- Arts and Humanities Citation Index

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To gain an entry into the Science Citation Index, the paper must be published in a peer-reviewed journal, must have at least an English title and abstract, and authors must be from multiple countries. This excludes a large number of regional and local journals; however, the figures remain a useful indicator. For this exercise, Thailand was ranked alongside Singapore, Malaysia, Indonesia, the Philippines and Vietnam.

For a further comparison we drew on an unpublished study undertaken by Blackwell Publishing in 2006 on the growth of research output in Asia generally. This study uses Blackwell and ISI sources for primary data and the focus is mainly on the growth in output from China and Japan. Nonetheless, the findings are quite useful as some comparison with GDP is also made.

During the course of our study a new journal citation service became available [9] and this was also accessed to assess the validity of our previous findings.

Results

For the initial study, a search of the major journal publishers and technical literature providers was undertaken using the country key words. In the case of Myanmar, we also obtained results using <Burma> as the key word to better reflect the volume of literature for that country. Table 1 shows the total number of records of published work for each ASEAN country held by the major publishers. The search was undertaken on 3 March 2007 and included Blackwell, Cambridge, Elsevier, Oxford, PubMed, Springer, Taylor & Francis and Wiley.

As shown in the table, Thailand ranks second in the region, followed by a cluster of countries with similar results: Indonesia, Malaysia, the Philippines and Vietnam. Since these figures do not indicate growth over time or trends, a second method was employed to determine this using the ISI Web of Knowledge. ISI allows for search on an annual basis back to 2001. Table 2 and Figure 1 show the results of this search undertaken on 20 March 2007, using the country (CU=) parameter.

From Figure 1 it can be seen that the situation for the Philippines, Vietnam and Indonesia remains much the same, as reflected in Table 1 above. However, by using the ISI Web of Knowledge data, Malaysia shows a distinct improvement. While Singapore, Thailand and Malaysia show steady growth, it can be seen that all countries experienced a levelling-off of growth in 2003-2004. The reason for this is not known. It would be particularly useful to measure these figures against data for each country's annual research expenditure – unfortunately such data is not readily available.

As a third measure, data from Blackwell Publishing was examined and compared with the findings above. Selected data was extracted from a Power Point presentation given by Blackwell in 2006. The author of this presentation [4] also used data from the ISI Science Citation Index and applied this to the broader Asian region, focussing on the dynamic growth in science publishing from China, Japan and Taiwan. Some data were provided for Thailand, Malaysia and Singapore and these have been used for our purposes here. Figure 2 shows the percentage increase in science-related papers published over the last two decades from the major Asian regions.

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Table 1. Publishers' Records for ASEAN countries

Country	No. of Records
Singapore	119,370
Thailand	64,248
Indonesia	48,198
Malaysia	45,976
Philippines	44,611
Vietnam	40,273
Laos	25,832
Myanmar	18,182
Cambodia	8,682
Brunei	7,512
TOTAL	422,884

Table 2. Number of Entries from ISI for 2001-2006

Country/ Year	Philippines	Vietnam	Indonesia	Malaysia	Thailand	Singapore
2001	388	390	576	1,044	1,576	4,556
2002	506	380	486	1,031	1,867	4,970
2003	576	565	608	1,330	2,407	5,852
2004	517	468	570	1,482	2,445	6,113
2005	657	654	700	1,798	3,075	7,545
2006	640	664	714	2,045	3,498	7,684

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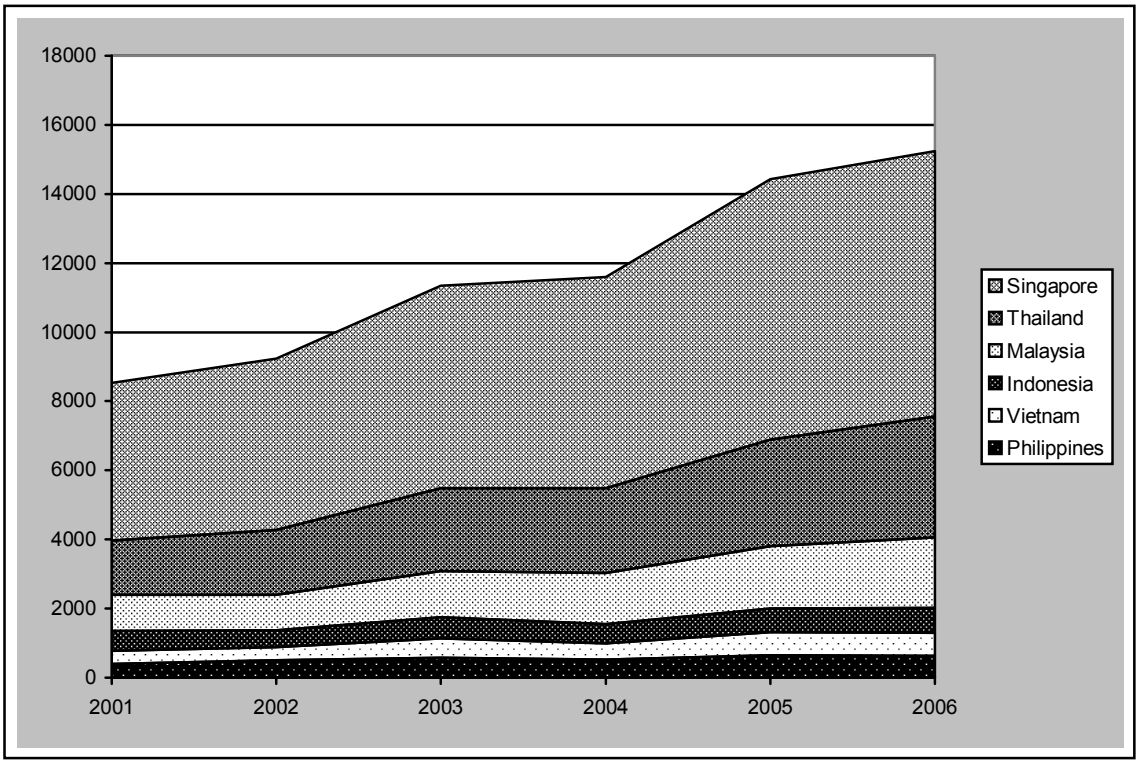

Figure 1. Growth in number of publications in ISI over time (cumulative)

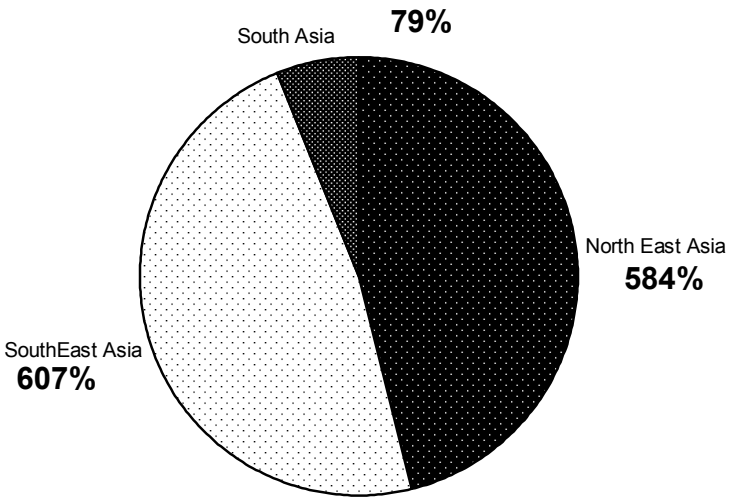

Figure 2. Percentage increase in papers published 1983-2003

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It can be seen from Figure 2 that the greatest growth has been in South-East Asia. This has been led primarily by Singapore and Thailand. Given that North-East Asia includes established research leaders such as Japan, Korea, Taiwan, and emerging China, the growth for South-East Asia can be considered remarkable. Figure 3 shows this in terms of the number of science-related articles published from South East Asia over the two decades.

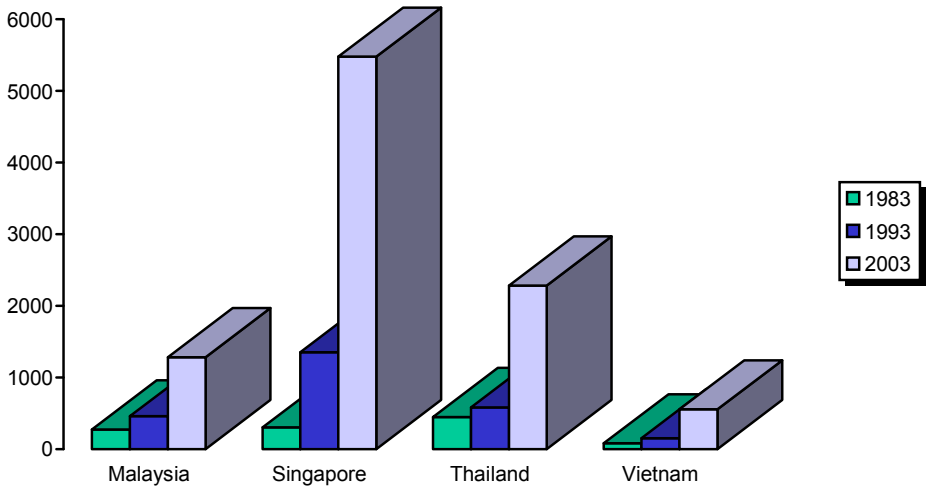

Figure 3. Number of science articles published in 1983-2003

Interestingly, the scientific focus in the Asian region, represented by publication, varies considerably. For example, in Malaysia, Taiwan and Singapore, the focus is mainly on electronics, materials science and the physical sciences. For South Korea, the emphasis is on engineering, life sciences and materials science, whilst for Thailand the growth has been driven by the life sciences and the medical sciences. The Blackwell presentation went on to compare growth in terms of economic factors and some of the relevant data is presented in Figure 4.

Since citation data is made available on a commercial basis and thus difficult to obtain or verify, our findings were tested against data from a new citation service to determine reliability. The SCImago [8] service uses data commencing in 1996 from Scopus (Elsevier) to determine country rankings, based on volume of output:

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World Ranking	
Singapore	33
Thailand	42
Malaysia	49
Indonesia	64
Philippines	67
Vietnam	70

This ranking confirms that our findings are in close accord with the international situation for scientific publishing.

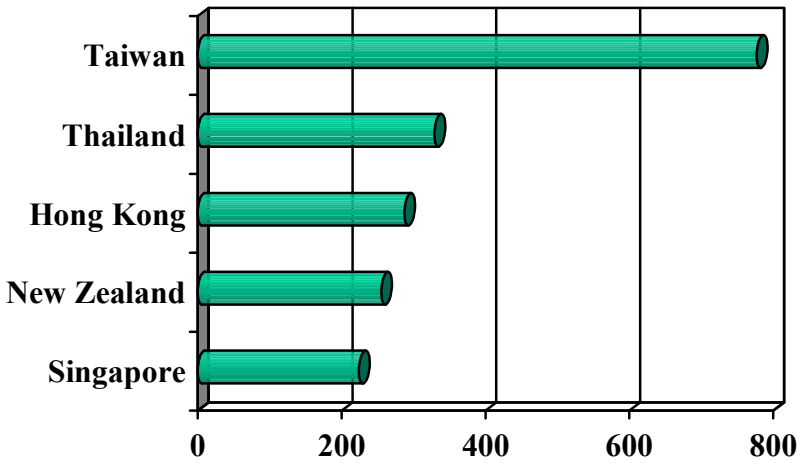

Figure 4. Articles per capita-GDP for selected countries in the region

Conclusions

From the initial study it is apparent that Thailand ranks as second in the ASEAN region in terms of volume of research articles published. This position is confirmed by other studies. Thailand has seen over 400% growth in science research output over the last two decades. Purely in percentage terms, this is on a par with South Korea.

The second study, while confirming Thailand's position, shows steady consistent growth over the last six years. By comparison, growth for the Philippines and Indonesia has been slightly erratic. Since all of the data is based on publications in English, Thailand's reasonably good performance should be viewed in terms of the distinct disadvantage the country has in terms of English when

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compared to Singapore, Malaysia and the Philippines. Further evidence from SCImago confirms Thailand's ranking as second in the region.

From the third study it can be concluded that Thailand is caught in a major upsurge in research output from the Asian region (Figure 2), and the country's performance is quite creditable when compared to economic factors. Science and technology research in Thailand was given a considerable funding boost when the National Science and Technology Development Agency (NSTDA) came into operation in 1992. Three of the NSTDA major centres, BIOTEC, MTEC and NECTEC have been established since 1983-86. While not conclusive, viewing the data for research output from 1983 until 1993, and from 1993 until 2003, no peaks occur in concert with increased research funding in these key areas. This may in part be due to the current focus on life and medical sciences.

The authors recommend further detailed study be undertaken to attempt to determine the effect scholarships granted by the National Research Council of Thailand have had on raising Thailand's international publications profile. Some examination to determine the particular fields where growth is occurring would also be useful indicators. Unfortunately, factual data on overall government research spending in the region is difficult to obtain.

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