

# FOUR DECADES OF EXCELLENCE IN RESEARCH- REVEALED BY INTERNATIONAL DATABASE SEARCHES

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Science and Research are intimately linked. Without research, scientific knowledge cannot grow. Research may focus on creating advances in basic knowledge or aim towards potential applications, but there is only one quality for scientific research, and that is *international quality*. As a consequence, publications at international level are important indicators of the success of research and the strength of a scientific institution. Through the vision of its founding dean, Professor Stang Mongkolsuk, the Faculty of Science at Mahidol University has always placed strong emphasis on research. This vision has been pursued by future deans, so that the faculty has been the focal point in the development of scientific research in Thailand for more than 40 years. Thus, in the initial phase during the mid 1960's, overseas staff supported by the Rockefeller Foundation, initiated research at international level in Thailand. Then, as Thai staff, sent for training abroad, gradually returned and replaced overseas staff, a critical mass of researchers was created at the various departments, leading to the development of strong research programs from the early 1970's. These research activities were closely coupled to graduate training programs, producing Master's and Ph.D. graduates who became staff members at many universities throughout Thailand, expanding research to other universities.

In this article, we will describe the results of searching for international publications from Mahidol University and its Faculty of Science in databases, which provide information on the importance of the faculty in producing research work of international quality over the last 30 years. Such searches only became feasible due to the migration of databases from the printed form to computerized form. Thus, the search of publications of Thai state universities between 1985-1994, listed in SCISEARCH, BIOSIS, MEDLINE, and CHEMICAL ABSTRACTS (CA) databases, was performed by Ruenwongsa and Panijpan<sup>1</sup>, presumably employing the DIALOG Information Services, which became available in Thailand in 1985 and provided dial-up access to more than 300 databases in USA. Our own work<sup>2,3</sup> examining the

publications of Thai institutions was more conveniently performed online using the databases of Institute for Scientific Information-Web of Science (ISI-WOS), which have only been available in Thailand since 1999.

Ruenwongsa and Panijpan<sup>1</sup> showed that 15 Thai state universities has 5,509 publications in 4 databases, SCISEARCH, BIOSIS, MEDLINE, and CHEMICAL ABSTRACTS (CA) databases over the ten year period 1985-1994 (Table 1), thus averaging some 551 papers per year. Of these, Mahidol University (MU) was dominant in producing 2,901 publications, equivalent to 51% of total publications. Chulalongkorn University (CU) followed at 18%, then Chiang Mai University (CMU) at 9.5%, Kasetsart University (KU) at 6.3%, Khon Kaen University (KKU) at 5.9%, and Prince of Songkla University (PSU) at 5.5%. During the same period, the Faculty of Science, MU produced 722 publications in ten years, more than half that produced by all the science faculties in Thailand, followed by CU with 362 publications, then by KU, CMU, and PSU with 85, 80, 75 publications respectively.

Comparison of total publications using the SCISEARCH database only showed that total publications of 15 universities increased from 2,381 publications during 1975-1984 to 3,446 publications during 1985-1994 (Table 1), representing an increase of 45%. Interestingly, increases

for the top two universities, MU (18%) and CU (32%) were less than increases found for the next 4 universities, CMU (177%), KKKU (206%), KU (249%), and PSU (96%), indicating greater growth in terms of research capability for the latter universities.

Our own work, searching for publications from Thailand and Thai institutions in 1999-2005, was performed using Web of Science (WOS) Databases, comprising Science Citation Index (SCI) Expanded, Social Sciences Citation Index, and Arts & Humanities Citation Index. Searches were made using the Advanced Search Mode on the website <http://isiknowledge.com/wos>, and specifying suitable address (AD=) or country (CU=) and publication year (PY=). Document type was selected as "Article OR Letter OR Review" to eliminate meetings abstracts.



**Table 1 Publications of Thai Universities and Faculties of Science during Ten Year Periods 1975-1984 and 1985-1994<sup>a</sup>**

	Whole University <sup>b</sup>	Whole University <sup>b</sup>	Whole University <sup>c</sup>	Faculty of Science <sup>c</sup>
Databases	SCISEARCH	SCISEARCH	SCISEARCH, MEDLINE, Chem Abs, BIOSIS	SCISEARCH, MEDLINE, Chem Abs, BIOSIS
University	Papers/10 yrs 1975-1984	Papers/10 yrs 1985-1994	Papers/10 yrs 1985-1994	Papers/10 yrs 1985-1994
Mahidol	1,481	1,747	2,901	722
Chulalongkorn	477	632	1,031	362
Chiang Mai	131	364	547	80
Kasetsart	51	178	360	85
Khon Kaen	64	198	342	21
Prince of Songkla	71	139	315	75
KMIT-Ladkrabung	ND <sup>e</sup>	ND <sup>e</sup>	61	8
KMIT-Thonburi	ND <sup>e</sup>	ND <sup>e</sup>	50	8
Srinakharinwirot	9	31	48	31
Silpakorn	23	39	45	45
Ramkhamhaeng	2	14	18	18
Maejo	-	5	11	ND <sup>e</sup>
Thammasart	6	6	6	4
Burapa	-	5	5	5
Ubonratchathani	-	1	1	1
<b>TOTAL</b>	<b>2,381</b>	<b>3,446</b>	<b>5,741<sup>d</sup></b>	<b>1,465</b>

<sup>a</sup>Data taken from Panijpan and Ruenwongsa<sup>1</sup>; <sup>b</sup>Number of publications in 10 years listed in SCISEARCH; <sup>c</sup>Number of publications in 10 years listed in SCISEARCH, MEDLINE, CHEMICAL ABSTRACTS and BIOSIS; <sup>d</sup>Total unique publications amounted to 5,509; <sup>e</sup>No data provided

To provide a perspective for Thailand, a search of publications in 2005 showed that the top 100 countries/territories account for more than 99.6% of world publications. USA was by far the most productive with over 304,670 articles, equivalent to 25.6% of the total. Japan, Germany, England, and People's Republic of China followed closely at 2<sup>nd</sup>, 3<sup>rd</sup>, 4<sup>th</sup> and 5<sup>th</sup> position respectively with 6.5-6.0%. Thailand lies in 43<sup>rd</sup> position in the world with 2,615 publications or 0.22% of world publications<sup>2</sup>. It occupies 7<sup>th</sup> position of the Asian countries (following Japan, People's Republic of China, South Korea, India, Taiwan and Singapore), and is second to Singapore (6,528 publications) among the 10 ASEAN countries. Interestingly, Thailand showed the highest increase (142%) in publications among the five top ASEAN countries, increasing from 1,076 publications in 1999 to 2,615 publications in 2005. This 142% increase over 7 years is much higher than the 45% increase between publications during the 10-year period 1975-1984 and the 10-year period 1985-1994 found earlier<sup>1</sup>. Moreover, during 1999-2005, the average number of Thai publications/year in WOS databases was about 1,800<sup>2</sup>, 5-fold higher than the average number of 345 Thai publications/year listed in SCISEARCH databases

during the period 1985-1994<sup>1</sup>, indicating an encouraging increase in research capability.

We also compared the publications of some 30 Thai institutions during the period 1999-2005 (Table 2). MU still produced the most publications of any Thai institution, 3,204 publications between 1999 and 2005, but now contributes only 22.7% of the Thai publications, compared to the 50% contribution observed during 1985-1994 (Table 1). Instead, other institutions increased their relative contributions, so now nine institutions published more than 100 papers in ISI-WOS databases in the year 2005, namely MU, CU, CMU, PSU, Asian Institute of Technology (AIT), KU, KKU, National Science and Technology Development Agency (NSTDA) and King Mongkut's University of Technology Thonburi (KMUTT) (Table 2). Nevertheless, MU increased publications from an average of 172 papers/year listed in SCISEARCH in 1985-1994 to an average of 432 papers/year listed in WOS in 1999-2005.

In particular, CU is catching up in terms of publications, and produced 48% and 89% of the publications of MU in 1999 and 2005 respectively. Thus, the publications of faculties or equivalent agencies of MU and CU were investigated. The numbers of publications of the top ten



faculties/institutes of each university are shown for 1999 and 2005. *The Faculty of Science, MU was clearly the most productive faculty in terms of international publications, not only for these two universities, but also for the whole of Thailand.* It more than doubled its publications in 6 years. The next most productive faculty, the Faculty of Medicine,

CU also doubled its publications in 6 years, but still produced fewer publications than the combined output of the three MU medical faculties. The Faculty of Science, CU and Faculty of Engineering, CU showed dramatic 4- and 9-fold increases in publications during this period.

**Table 2 Total Publications from Thai Institutions between 1999 and 2005 Searched Using Institution Name\***

Institution	1999	2000	2001	2002	2003	2004	2005	Total
Mahidol University (MU)	308	335	366	385	504	527	599	3,024
Chulalongkorn University (CU)	148	225	244	331	414	497	534	2,393
Chiang Mai University (CMU)	88	110	119	178	196	241	275	1,207
Prince of Songkla University (PSU)	64	69	116	130	128	119	176	802
Asian Institute of Technology (AIT)	67	85	110	113	125	102	129	731
Kasetsart University (KU)	60	75	73	85	112	117	173	695
Khon Kaen University (KKU)	48	72	91	98	118	117	135	679
National Science and Technology Development Agency (NSTDA)	33	48	52	66	116	113	145	573
King Mongkut's University of Technology Thonburi (KMUTT)	34	37	60	55	88	113	121	508
Ministry of Public Health (MOPH)	37	49	49	56	69	64	79	403
Thammasat University (TU)	18	24	32	55	56	91	86	362
Armed Forces Research Institute for Medical Science (AFRIMS)	41	39	44	56	56	40	35	311
Suranaree University of Technology (SUT)	10	11	22	28	34	72	58	235
Chulabhorn Research Institute (CRI)	13	25	23	31	32	26	33	183
Srinakharinwirot University (SWU)	15	17	15	30	22	18	37	154
Burapha University (BUU)	1	2	25	28	27	34	28	145
Thai Red Cross Society (TRC)	13	13	9	20	21	22	27	125
Silpakorn University (SU)	11	10	8	12	18	27	29	115
Naresuan University (NU)	9	7	9	13	25	22	27	112
Mahanakorn University of Technology (MUT)	8	6	8	17	13	10	26	88
King Mongkut's Inst. Technology Ladkrabang (KMITL)	6	5	5	18	21	9	12	76
Ramkhamhang University (RU)	7	5	5	14	12	8	10	61
Rangsit University (RSU)	2	6	9	12	11	7	11	58
Walailak University (WU)	3	5	6	6	8	9	17	54
Ubon Ratchathani University (UBU)	6	5	6	6	5	9	17	54
Maejo University (MJU)	3	4	2	1	4	11	11	36
Rajamangala Universities/Institutes of Technology (RJM)	2	6	3	4	9	4	9	37
Maharakham University (MSU)	2	2	0	1	4	8	12	29
Rajabhat Universities/Institutes (RJB)	1	1	0	1	4	7	11	25
King Mongkut's Inst. Technology North Bangkok (KMITNB)	0	0	1	2	4	6	10	23
<b>Total</b>	<b>1,058</b>	<b>1,298</b>	<b>1,512</b>	<b>1,852</b>	<b>2,256</b>	<b>2,450</b>	<b>2,872</b>	<b>13,298</b>

\*Data taken from Svasti and Asavisanu<sup>2</sup>

**Table 3 Publications of Top Ten Faculties in Mahidol University & Chulalongkorn University in 1999 and 2005<sup>a</sup>**

Mahidol University			Chulalongkorn University		
Faculties & Institutes	Y 1999	Y 2005	Faculties & Institutes	Y 1999	Y 2005
Fac Sci	95	225	Fac Med	67	156
Siriraj Hosp	70	101	Fac Sci	32	136
Fac Trop Med	78	93	Fac Engn	11	101
Ramathibodi Hosp	40	70	Petr & Petrochem Coll	5	47
Inst Res & Dev Sci & Techn	22	54	Fac Pharmaceut Sci	14	39
Fac Pharm	6	28	Fac Vet Sci	8	32
Fac Med Technol	3	19	Fac Dent	3	20
Inst Mol Biol & Gen	6	18	Natl Res Ctr Env & Haz Waste Mgt	-	8
Inst Nutr	4	17	Fac Allied Hlth Sci	1	7
Fac Dent	8	9	Met & Mat Sci Res Inst	-	6

<sup>a</sup>Data taken from Svasti and Asavisanu<sup>2</sup>



**Table 4 Publications of Faculties of Science of Thai Universities**  
from ISI-WOS databases Publication Year 2005\*

University	Fac Sci Publications	University	Fac Sci Publications
Mahidol (MU)	225	KMUTT	10
Chulalongkorn (CU)	136	KMITL	9
Chiang Mai (CMU)	112	Rajabhat (RJB)	9
Prince of Songkla (PSU)	81	Naresuan (NU)	8
Kasetsart (KU)	52	Silpakorn (SU)	7
Suranaree (SUT)	36	Maharakham (MSU)	6
Khon Kaen (KKU)	24	Rangsit (RSU)	6
Burapha (BUU)	22	KMITNB	5
Srinakharinwirot (SWU)	15	Ubon Ratchathani (UBU)	5
Thammasat (TU)	11	Maejo (MJU)	4
Ramkhamhang (RU)	11	Rajamangala (RJM)	4
Walailak (WU)	11	Mahanakorn (MUT)	1

\*Data include Faculty of Science, Institute of Science, School of Science, Faculty of Applied Science, Faculty of Science and Technology, but do not include Faculty of Medicine, Faculty of Technology, Faculty of Biotechnology, School of Bioresources & Technology, Faculty of Liberal Arts & Science

We also recently compared the publications of the Faculties of Science from 24 universities for the 2005 (Table 4). The Faculty of Science at MU clearly produced more publications (225) than that any other university, amounting to about 28 % of the publications from all the science faculties in Thailand.

In conclusion, search of research publications in international databases show that the Faculty of Science, MU has not only played an important role in stimulating scientific research in Thailand, but is also the faculty producing most international publications in Thailand, regardless of field. This finding is good cause for celebration, on this special occasion of the 48<sup>th</sup> Anniversary of the Faculty of Science at Mahidol University. Nevertheless, faculties of science at other universities are increasing in research capability, so that our faculty must continue to encourage research. This requires not only

equipment and infrastructure, but also creation of atmosphere conducive to research, encouragement for staff to do research, and impressing upon young staff research should be geared to publications at international level.

#### References

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