International Scientific Productivity
of Selected Universities in the Philippines

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ABSTRACT

This paper presents a survey of the productivity, in terms of international scientific publications, of 465 PhDs in the science and engineering colleges of selected research universities in the Philippines. It covers the period 1998-2002. Publication counts are based on research articles listed in the Science Citation Index of the Institute for Scientific Information (ISI). Results indicate that the average productivity of the faculty surveyed is less than one (1) international publication in five (5) years. Only one of the academic units included in the survey was able to achieve the world-class benchmark for research excellence, which is at least one international publication per faculty member per year.

Keywords: international scientific publications, scientific productivity, ISI

Knowledge generation (research) is a primary mission, along with knowledge dissemination (teaching) in most reputable universities. The research function is vital to a university's reputation and pursuit of academic excellence.

In the Philippines, there are more than 1,500 higher education institutions. However, almost all of these are mainly teaching institutions. Only a handful could be truly considered as research universities. A bibliometric search of the international scientific publications using the Institute for Scientific Information (ISI) database indicates that in recent years, an overwhelming majority of international scientific publications from universities in the country came from only two institutions: the University of the Philippines (UP) and De La Salle University (DLSU).

The UP has long been the reputed premiere research university in the country. However, compared with other universities abroad, even the top in the country dims in comparison as reflected in Asiaweek's survey of Asia's Best Universities (Bacani, 1998, 1999, & 2000). In various studies using ISI publication data as a measure of science and technology capability of nations, institutions, and individuals, the Philippines as a country, and UP as an institution lag way behind international standards.

This paper presents a survey of the productivity, in terms of international scientific publications, in selected science and engineering departments of the two lead research universities of the Philippines. In particular, it focuses on the productivity of science and engineering PhD faculty members of UP and DLSU for the period 1998-2002. The survey provides recent and comprehensive research productivity information at the individual and department level. It reflects local benchmark information and it could be useful for international benchmarking purposes.

METHODOLOGY

The survey population

The survey covered all full time PhD faculty members (as of the school year 2001-2002) in the science and engineering departments of the University of the Philippines (Diliman and Los Baños campuses) and the De La Salle University (Manila campus). A total of 465 faculty members from the two universities were included. Their academic rank distributions are as follows: 20% full professors, 42% associate professors, and 38% assistant professors. Table 1 details the academic rank distributions by university.

The list of UP faculty members was obtained from the personnel database maintained by the Human Resource Development Office of UP Diliman and UP Los Baños. The DLSU list came from the "Research@DLSU-Manila, 2001-2002" of the University Research Coordination Office of DLSU-Manila.

Source of publication data

Publication data used in this survey came from the Science Citation Index (SCI), which is a database produced and maintained by the Institute for Scientific Information (ISI). The ISI is a database publishing company that provides the most comprehensive coverage of the world's most important and influential research conducted throughout the world (Testa, 1997). It covers more than 16,000 international journals, books, and proceedings in the sciences, arts, and humanities. It includes more than 15,000,000 papers published since 1945 (Garfield & Welljams-Dorof, 1992). Inclusion of a journal in the ISI database requires an extensive evaluation process. Factors such as the journal's publication standards, editorial board membership, internationality of authorship, and citation data are considered.

Measure of publication productivity

Publication productivity was measured at the individual and department level. Productivity of individual faculty members was determined using the following ratio:

$$\frac{\text{no. of ISI indexed publications of individual faculty members for the period 1998-2002}}{5 \text{ years}}$$

In effect, the measure was the average number of individual ISI publications per year for the 5-year period (1998-2002). A faculty member was given an equivalent of 1 publication count for each ISI article where his or her name appeared, regardless of whether the individual concerned was a sole or co-author.

The following ratio was used for determining the department level productivity:

$$\frac{\text{number of ISI indexed publications (1998-2002)}}{\text{number of PhD faculty members in the department}} \div 5$$

Note that in computing the average productivity, the two ratios may yield slightly different values when a single publication has more than one author coming from the same department.

The period covered was chosen to reflect the most recent ISI data available during the time of data

Table 1. Number of PhD Faculty members and academic rank distributions: UP Diliman campus, UP Los Baños campus, and DLSU Manila campus

University	Academic Rank			TOTAL
	Professor	Associate Professor	Assistant Professor	
UP Diliman	57 (30%)	65 (35%)	65 (35%)	187
UP Los Baños	19 (9%)	90 (41%)	109 (50%)	218
DLSU Manila	18 (30%)	39 (65%)	3 (5%)	60
TOTAL	94 (20%)	194 (42%)	177 (38%)	465

gathering. The beginning period, 1998, complements a previous research productivity survey done by Lim and Saloma (1998) which covered the period September 1988 to May 1998.

Database search procedure

The number of ISI publication counts for each faculty member was obtained by accessing the on-line version of ISI's Web of Science database, in particular the Science Citation Index. An exhaustive search was done by retrieving all entries within 1998-2002 using the keyword "Philippines" in the author's affiliation search field. The search was restricted to cover only journal articles. From the entries generated, the names of the faculty members were manually searched and their publication counts per year were tallied. For the department level analysis, the publications identified for each individual faculty member were sorted to identify duplications due to multiple authors coming from the same department.

RESULTS

The overall individual average research productivity of the 465 faculty members was 0.20 for the period 1998-2002. This is equivalent to an average of 1 international publication per faculty member in 5 years. However, from a department level analysis, productivity is slightly lower with an average of 0.17 ISI publication per faculty member. Table 2 presents

the detailed international publication productivity per area and per university.

The basic science departments are the most productive in terms of international publications. In particular, departments in the College of Science of UP Diliman produced the highest number of international publications per faculty member, per year at 0.32. This productivity level is equivalent to an average of slightly less than two international publications per faculty member for the period 1998-2002.

The frequency distribution of individual productivity levels indicated that majority (62.4%) of the surveyed faculty members had no international publications at all during the period covered (Table 3). Only 4.3% were able to publish at least one ISI publication per year, which is considered the "world class" benchmark for excellence in research productivity. The most productive individual faculty member came from the National Institute of Physics of UP Diliman with an average of 7.8 ISI publications per year or a total of 39 ISI publications for the 5-year period covered.

Tables 4, 5, and 6 detail the international publications productivity at the departmental level for the science, engineering, and agriculture colleges included in the survey.

The best performing department was the Marine Science Institute of UP Diliman with an average of 1.15 ISI publications per year per faculty member. It is

Table 2. International publications productivity (1998-2002) of the University of the Philippines (Diliman and Los Baños campus) and De La Salle University (Manila)

Field / Area	UP Diliman		UP Los Baños		DLSU		OVERALL	
	No. of PhDs	Productivity	No. of PhDs	Productivity	No. of PhDs	Productivity	No. of PhDs	Productivity
Basic Science	137	0.32	56	0.14	38	0.11	231	0.24
Engineering	42	0.05	21	0.14	22	0.09	85	0.10
Statistics	5	0.04	5	0.04	-	-	10	0.04
Agriculture	-	-	88	0.17	-	-	88	0.17
Forestry	-	-	29	0.04	-	-	29	0.04
Veterinary Medicine	-	-	10	0.18	-	-	10	0.18
Environmental Science	3	0.20	9	0.04	-	-	12	0.08
OVERALL	187	0.25	218	0.13	60	0.10	465	0.17

Table 3. Frequency distribution of international publication productivity (1998-2002) of science and engineering PhDs in UP (Diliman and Los Baños) and DLSU (Manila).

Publication Productivity	Frequency	Percentage
0.00	290	62.4
0.20 (1 publication in 5 years)	85	18.3
0.40	31	6.7
0.60	24	5.2
0.80	14	3.0
1.00 (5 publications in 5 years)	5	1.0
1.20	7	1.5
1.40	4	0.8
2.40	1	0.2
3.00 (15 publications in 5 years)	2	0.4
3.40	1	0.2
7.80	1	0.2
TOTAL	465	100.0

Table 4. International publication productivity (1998-2002) of the science departments of UP (Diliman and Los Baños) and DLSU (Manila).

Unit / Department	UP Diliman	UP Los Baños	DLSU
Biology	0.07 (n=20)	0.18 (n=25)	0.15 (n=11)
Chemistry	0.13 (n=30)	0.11 (n=18)	0.13 (n=11)
Mathematics	0.07 (n=27)	0.05 (n=11)*	0.10 (n=10)
Physics	0.62 (n=24)	-	0.03 (n=6)
Marine Science	1.15 (n=13)	-	-
Geology	0.28 (n=18)	-	-
Molecular Biology & Biotechnology	0.44 (n=5)	0.50 (n=2)	-
Environmental Science	0.20 (n=3)	0.04 (n=9)	-
Statistics	0.04 (n=5)	0.04 (n=5)	-
OVERALL	0.31 (N=145)	0.12 (N=70)	0.11 (N=38)

*The Math and Physics faculty are under one department.

perhaps the only academic department in the country that has reached the world class standard of at least one international publication per faculty member, per year. The National Institute of Physics of UP Diliman came next with a notable average of 0.62 ISI publications per faculty member per year.

Except for the Molecular Biology units, all other academic units included in the survey averaged less than 0.40 publications per faculty member, per year or less than two international publications per faculty member for the entire 5-year period covered.

Possible sources of error

Some of the faculty members included in the survey may have been affiliated with a foreign institution in some years of the period covered. Therefore, there may be cases of under-reporting individual productivity because the publication counts for this survey were based on ISI entries containing the word "Philippines" in the author's affiliation field.

There were also rare typographical errors in the ISI entries that may have affected the publication counts. As an example, some of the entries retrieved had foreign university affiliations but the country indicated was Philippines. In the same manner, it is also possible that a Philippine institution entry had been erroneously encoded with a different country address. In this case, the entry would not have surfaced using the search procedure for this study.

It should also be noted that some of the articles had multiple authors coming from different departments, colleges, or even universities. Therefore, in these few cases, the articles were counted under two or more departments.

DISCUSSION

International scientific publications in the Philippines are produced mostly by international organizations situated in the country such as the International Rice Research Institute. A significant proportion also comes from academic institutions.

Table 5. International publication productivity (1998-2002) in the engineering departments of UP (Diliman and Los Baños) and DLSU (Manila).

Unit / Department	UP Diliman	UP Los Baños	DLSU
Chemical Engineering	0.05 (n=8)	0.16 (n=5)	0.12 (n=10)
Civil Engineering	0.04 (n=11)	0 (n=2)	0.10 (n=2)
Electronics & Communications Engineering	0.04 (n=9)	-	0 (n=2)
Industrial/Manufacturing Engineering	0 (n=1)	-	0.07 (n=3)
Mechanical Engineering	0 (n=6)	-	0.08 (n=5)
Agricultural Engineering	-	0.16 (n=14)	-
Geodetic Engineering	0.20 (n=1)	-	-
Material Engineering	0.10 (n=4)	-	-
Engineering Sciences	0 (n=2)	-	-
OVERALL	0.04 (N=42)	0.14 (N=21)	0.09 (N=22)

However, as pointed out earlier, the overwhelming majority of publications from academic institutions in the Philippines came from the two research universities included in this survey.

In general, the survey results indicated that even the top science and engineering academic departments of the country were performing way below satisfactory levels in terms of research productivity. In contrast with some of the reputable Asian universities, indeed, we dim in comparison. The University of Tokyo, as a whole, had an average of 2.10 international publications per faculty member based on the 1998 Asiaweek survey of Asia's Best Universities (Bacani, 1998). The Australian National University, Kyoto University, and the Chinese University of Hongkong had productivity levels ranging from 1.34 to 1.48. To be more specific with the benchmarks, consider the following figures 10 years ago from the National University of Singapore:

Department	No. of PhDs	International Publications	No. per PhD
Chemistry	36	182	5.08
Physics	31	113	3.65
Zoology	23	36	1.57
Mathematics	40	42	1.07
Botany	24	14	0.67
TOTAL	154	389	2.53

(Source: Lacanilao, 1999)

Table 6. International publication productivity (1998-2002) in the College of Agriculture of UP Los Baños.

Unit / Department	Productivity
Agronomy	0.22 (n=10)
Dairy Training & Research Institute	0 (n=3)
Entomology	0.20 (n=11)
Horticulture	0.18 (n=16)
Institute of Animal Science	0.08 (n=16)
Institute of Food Science & Technology	0.20 (n=7)
National Crop Protection Center	0.07 (n=6)
Post Harvest Training & Research Center	0.10 (n=2)
Plant Pathology	0.20 (n=9)
Soil Science	0.30 (n=8)
OVERALL	0.17 (N=88)

Although the measure of publication productivity employed in this survey is very strict and limited, most academic scientists would argue that this has got to be the major indicator of research performance especially in the hard sciences and engineering. For the scientific community, publication is the culmination of a research process. As Lacanilao (1999) puts it, proper publication means publishing results in a primary journal that is adequately peer-reviewed and accessible. Adequate peer review ensures the correctness of methods and journal accessibility allows verification of results. It is in this regard that publications in journals that are indexed in the ISI database are now used as standard indicators of science and technology performance of nations, institutions, or individuals.

There are substantial research activities on-going in the major research universities in the Philippines. However, it seems that very few research projects find their way to being published internationally. To a large extent, lack of funding, inadequate research facilities, and heavy teaching loads are serious impediments to research productivity of academic scientists in the Philippines. But perhaps beyond these limitations, the research culture in Philippine universities is such that publication is not the targeted culmination of a research activity. As noted by Lacanilao (1999), most research projects in the University of the Philippines end up only as project reports, presentations at conferences, or published in "grey" literature.

It can be observed that in recent years, the University of the Philippines and De La Salle University have been actively addressing issues of research productivity among their faculty members. Administrations have been sending out the message clearly that they give a premium to research productivity of their faculty members. The two universities have been implementing more deliberate measures in improving research support systems and instituting rewards and incentive schemes. We could therefore most likely expect improving trends in their scientific productivity.

But for now, the kind of research culture necessary for Philippine universities to achieve world class standards is definitely not well entrenched yet even in the premiere research university of the country. It would still take a lot more of continuous organizational reorientation and realignment of systems and policies in order to foster the desired conditions. Culture takes years or even generations to become fully imbibed in the system.

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