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COMPENDIUM of SCIENCE & TECHNOLOGY Statistics

DEPARTMENT OF SCIENCE AND TECHNOLOGY

December 2015

COOPERATING AGENCIES / OFFICES

DOST

NSO

REGIONAL OFFICES

NCR

CAR

Region 1

Region 2

Region 3

Region 4A

Region 4B
MIMAROPA

Region 5

Region 6

Region 7

Region 8

Region 9

Region 10

Region 11

Region 12

Region 13
CARAGA

DOST
ARMM

COMPENDIUM of SCIENCE & TECHNOLOGY Statistics

DEPARTMENT OF SCIENCE AND TECHNOLOGY
Planning and Evaluation Service
S&T Resource Assessment and Evaluation Division

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FOREWORD

As the lead agency tasked to monitor the country's science, technology and innovation activities particularly research and development, the Department of Science and Technology (DOST) has carried out nationwide surveys to collect data on financial and human resources devoted to R&D. The first surveys were conducted in the 1980s and continued up to the present covering government, academe, and private non-profit institutions. DOST also collected private sector R&D data from the Philippine Statistics Authority to provide an aggregate picture of R&D in the country. The resulting statistics are relevant inputs for setting R&D directions and priorities and for formulating better science and technology policies and programs. These were documented in the Compendium of S&T Statistics which is updated after every conduct of R&D survey. It includes disaggregation by sector, socio-economic objectives, funding sources, field of S&T, educational attainment of R&D personnel and regional classifications, R&D indicators and trends.

Great improvements were seen in trends in R&D expenditure levels from the 1980s up to 2013. From an average R&D expenditures recorded at only P590 million in the 1980s the R&D expenditures now amounted to P15.915 billion. This represented over 25 folds growth in a span of 40 years. In terms of the number of researchers, from an average of 5,825 researchers in the 1980s, it grew to 26,495 in 2013, representing 355% increase. While the absolute values of R&D expenditures grew over the years, their equivalent shares to GDP remained almost constant at 0.14%. DOST, therefore, encourages all sectors to do R&D activities in order to move to higher levels of productivity and competitiveness.

This compendium also includes data on the ranking of the Philippines in World Economic Forum's Innovation Index. The country consistently improved its ranking from its 111st place out of 140 countries in 2010 to 48th in 2015, climbing 63 notches in the innovation ladder in a span of 5 years. This improvement could be attributed to several big and high quality R&D projects of DOST in the past 5 years.

This publication serves as an update of the
Compendium of S&T Statistics
dated July 2012

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Report on the R&D Expenditures and Human Resources and Updates on R&D Indicators in the Philippines, 2013

Introduction

1. R&D statistics, usually measured in terms of expenditures and human resources, are among the standard statistical indicators that are used worldwide to measure the state of science and technology in any country. R&D statistics are among the key indicators of technology achievement and competitiveness. Policy makers use R&D statistics as basis for setting R&D directions and priority areas as well as for formulating better science and technology policies and programs. Updated, reliable and accurate R&D statistics are therefore important for policy decisions on S&T.
2. In the Philippines, the Department of Science and Technology (DOST) is tasked to monitor the country's S&T activities particularly research and development efforts. This is carried out through the conduct of nationwide surveys to collect data on financial and human resources in research and development. Since 2002, the DOST surveys adopted the guidelines based on the OECD Frascati Manual which includes standard concepts and definitions and covered government, higher education and private non-profit institutions. To obtain a complete picture of R&D spending for the country, DOST arranged with the National Statistics Office (NSO, now PSA) to collect private industry R&D data through their Annual Survey of Philippine Business and Industry (ASPBI).

Results of the 2013 Survey

<u>Human Resources in R&D</u>

3. In 2013, the Philippines had a total of 36,517 R&D personnel. This is more than double or 102% of its number of 18,110 in 2011. Inspection of data revealed that this increase could be attributed to the private industry sector which posted an increase of 237% based the census done by PSA through its ASPBI. Broken down by sectoral distribu-

tion, the private industry sector had more than half or 61% of the total number of R&D personnel while the higher education sector, both public and private higher education institutions, had 28%, the government had 10% and the lowest with only 1% came from private non-profit institutions. Within the higher education sector alone, three-fourths or 75% were employed in public HEIs or state universities and colleges (SUCs). (Table 1).

4. R&D personnel are categorized into researchers, technicians and auxiliary personnel. It is interesting to note that the researchers who are the main movers or implementers of R&D comprised the bulk of the total number of R&D personnel in three sectors - government, higher education and private non-profit institutions. In 2013, almost three-fourths (73 %) or 26,495 worked as researchers, 9% or 3,377 worked as technicians and 17% or 6,378 worked as auxiliary personnel (Table 2). The figures also show that almost half (47% or 12,473) of the researchers in the country were based in higher educational institutions (HEIs) and government institutions while 52% or 13,843 were from private industry and 1% from private non-profit institutions. Within the higher education sector the majority or three-fourths (75%) of researchers were based in the public HEIs while only 25% were from private HEIs (Table 4).

5. The profile of researchers in terms of sex, age, educational attainment and field of research work is shown in Table 5g. In 2013, the government sector had 2,965 researchers distributed as 45% male and 55% female. Majority of researchers or 928 were in ages ranging from 51 to 60 years old, while more or less an equal number of 560 to 590 researchers were in the age brackets of 20-30yrs old, 31-40 yrs old and 41 -50 yrs old and a few numbering 183 were above 60yrs old. In terms of educational attainment, majority or 48% had baccalaureate degrees, 29% had MS/MA degrees, 6% had PhDs, and 15% had post BS/BA diplomas. Half (50%) of the researchers had worked on agricultural science researches, 14% researched on engineering and technology field, 17% on natural sciences, 12% had engaged on medical sciences and 6% on social sciences and humanities. (Table 5g)

6. The public HEI sector had a total of 7,144 researchers, predominantly female (57%). Public HEI researchers were better educated with 12% having PhDs, 41% with MS/MA degrees, 20% had BS/BA degrees and

7% with Post BS/BA degrees. Majority or 24% had researches in natural sciences, 20% in agricultural sciences, 12% engaged in engineering and technology, 8% engaged in medical sciences, 8% in social sciences and 11% in humanities.

7. On the other hand, in the private HEI sector with a total of 2,364 researchers, 51% were female and 49% were male. Just like the public HEI sector, private HEI had more researchers having PhDs (31%) and MS/MA degrees (42%). Majority or 28% had researches on social sciences, 21% had researches on engineering and technology, 17% on natural sciences and 9% on medical sciences.

8. In the private non-profit sector with 179 researchers, predominant were females (61%). Most of the researchers had MS/MA degrees (36%), BS/BA holders comprised 30% and PhD holders, 19%. Most of the researchers had worked in the fields of natural and social sciences.

9. The distribution of researchers by regional classification and sector of performance is shown in Table 6g. In general, more than one-third (34%) of the researchers in all the four sectors were based in the NCR. In the government sector one half (50%) were based in NCR followed by region 3 and Region 4A with 7% and 6% respectively. In the public HEIs, majority of researchers (31%) were based in Region 4A, followed by NCR (18%) and Region 6 (7%). In the private HEIs, the top three in number of researchers were based in NCR with 32%, followed by Region 11 (14%) and Region 2 (10%) In the private non-profit sector, majority (86%) of their researchers were also based in the NCR. Among all regions, ARMM had the lowest number of R&D personnel with only 115. The data indicate that the R&D activities in the country were still mostly done in the NCR and CALABARZON.

Financial Resources in R&D

10. In 2013, the total national R&D expenditures amounted to ₱15.915 billion . This represented an increase of 40% from its level of ₱13.384 billion in 2011. Of this total, the private industry sector contributed more than one-third (36%) of the total. This is followed by the higher education sector (public and private) which spent 34% or ₱5.366 billion. Within the higher education sector, the public HEIs dominated research spending with 89% of the total value of R&D in the sector. The govern-

ment contributed 30% or P4.732 billion. The private non-profit sector incurred the lowest R&D expenditures amounting to only ₱131 million or 0.82%. (Table 7)

11. The R&D expenditures by source of funds is shown in Table 8g. In the government sector, of the total R&D expenditures in 2013, 52% of expenditures incurred were financed through the government's own budgets while 44% were sourced from other government funds for R&D. In public HEIs, the bulk of funding or 74% were financed from other government sources and 2% were from foreign contributions. For the private HEIs, of the ₱555 million spent for R&D, almost three-fourths (71%) were financed through their own institution budgets, 17% came from government funds while 11% came from foreign sources. On the other hand, in private non-profit institutions, more than one-third (39%) was sourced from foreign sources, and the rest with about equal shares of 28% and 29% were sourced from their own budgets and private sources respectively. Private industry expenditures were sourced from their respective company funds.

12. In terms of growth, the government sector exhibited the highest growth in R&D spending in 2013 more than double (170%) of its level of expenditures in 2011. In fact its R&D expenditures picked up speed from its level in 2009. The higher education sector also registered a growth of 32% from its 2011 level. While the private industry contributed the highest share among sectors, its growth rate only slightly increased by 3%. For the private industry sector, R&D cost estimates were based on PSA data taken from the 2012 ASPBI survey. For 2013, the amount of R&D expenditures incurred by the private industry was estimated at P 5.686 billion.

13. Analysis of the funding pattern of R&D expenditures is shown in Figure 8g. In 2013, private funds sources comprised 37% of the total R&D funds amounting to P5.9 billion. Government funds (government institutions, other government funds including funds of public HEIs) contributed 58% or ₱9.242 million. Out of the total government funds 62% was given out as grants. Of the government grants 36% was granted to government R&D institutions 62% was granted to state universities and colleges, 2% was given to private universities, and 0.1% to private non-profit institutions. The rest of the funds from the government were from own budgets of R&D institutions and SUCs.

14. R&D activities were also classified according to their socio-economic objectives (SEO). Classification by SEO has relevance on the priorities given by the country in the different areas of concern such as agriculture, environment, health, energy and others (Please see Table 9g). Only the data from government, HEIs, and private non-profit sectors have been classified. Overall, in 2013 the top three (3) socio-economic objective of R&D were: for agricultural production and technology with a total of P3,096 million (30%) of total for 3 sectors; for exploration & exploitation of the earth, P2,205 million (22%); and access to information and knowledge with expenditures amounting to P1,111 million (11%). For the control and care of environment only P728 million (7%) was spent, for protection and improvement of human health P572 million (6%) and industrial production and technology P548 million (5%).

15. Table 9g also shows the top socioeconomic objective (SEO) of R&D activities under each sector. In government R&D, the priority SEO which got the highest funding was for agriculture production and technology with P2.1 billion (44%); in public HEIs, the priority SEO was for the exploration and exploitation of the earth with P2.2 billion (45%), in private HEIs, the top SEO was for social structures and relationships with P172 million (31%), and in private non-profit, the top SEO was for the care and control of environment with P68 million or 52% of total for the sector.

16. For an aggregate picture of the country's R&D spending it is also important to look into the private industry sector R&D and how R&D money were allocated according to type of industry. Table 10 shows the R&D spending for 2003, 2005, 2006, 2008, 2009, 2010 and 2012, the years when PSA conducted their ASPBI surveys. No surveys were conducted in some years due to budgetary constraints. From ₱4.018 billion spent for R&D in 2003, gradual increases were registered through the period and reached to ₱5.4 billion in 2012. Highest recorded increase was in 2008 at P7.4 billion but the amount went down in 2009. Through all the years, the private industry sector's R&D activities were mostly focused in the manufacturing industry, taking up the biggest share of more than two-thirds (69%) on the average of the total R&D spending in the sector.

17. The regional distributions of R&D expenditures for all the four sectors are shown in Table 11g. In 2013, in general, the National Capital Region (NCR) lead all the rest of the regions with expenditures amounting to ₱8.1 billion or around one-half (51%) of the total R&D expenditures in the country. Second was Region 4A with P4.8 billion or 30%, in the third place was Region 3 with P766 million or 5%. Region 10 took up the fourth with P584 million or 4%. The rest had small shares with the ARMM having the lowest R&D expenditures amounting to only P7.9 million. R&D intensity ratios for each region are shown in Table 12f.

R&D Indicators

18. R&D statistics remain to be the core data that are used to gauge the state of S&T development in a country. The common R&D indicators are: 1) the number of R&D personnel per million population; 2) the number of researchers per million population; and the proportion of national R&D expenditures to the country's gross domestic product (GDP). A summary of R&D indicators are shown in Table 13a. In 2013, the Philippines' gross national expenditures on R&D as percentage of GDP is 0.14%. Based on headcount, the number of R&D personnel per million of population reached 372 and researchers (less technicians and auxiliary personnel) per million population totaled 270. The Public to Private R&D expenditure ratio is 60:40. Public R&D includes government and public/ state universities while Private R&D includes private industries, private universities and private non-profit institutions. R&D expenditures per researcher was estimated at P601 thousand per researcher.

19. The Philippines is still under-investing in R&D. It lags behind other countries in the ASEAN region. To see how the country fared in comparison with other ASEAN countries, comparative R&D indicators among the ASEAN members are shown in Table 14. The year of latest available data are shown for each ASEAN country. Based on the table, Singapore (2012) was highest in terms of the ratio of gross R&D expenditures (GERD) to GDP and number of researchers per million population having a GERD to GDP ratio of 2.10% and 7,252 researchers per million population; Malaysia (2012) came second with GERD to GDP ratio of 1.13% and 2,593 researchers per million population; third is

Thailand (2011) with a GERD to GDP ratio of 0.39% and 765 researchers per million population; Vietnam (2002) had 0.19% GERD to GDP ratio with 1,178 researchers; Myanmar 0.16% GERD to GDP with 97 researchers per million population; Indonesia reported a GERD to GDP ratio of 0.08% with 173 researchers per million population. The rest of the ASEAN countries had R&D Expenditures to GDP ratios below 0.1% and less than 60 researchers per million population although Brunei Darusalam (2003) had 686 researchers per million population.

20. It is interesting to also look closely on private sector. A higher private industry share in R&D spending would be a good indicator of improving competitiveness and productivity. In 2013, the Philippine share of private R&D expenditures to gross R&D expenditures was 40%. In other ASEAN countries private industry shares were: Singapore, 61%; Malaysia, 64%; Thailand, 51%; Indonesia, 26%; Vietnam, 26%; Lao PDR, 37% and the rest of ASEAN economies had below 10%.

Trends in Gross R&D Expenditures and ratio to Gross Domestic Product

21. Figure 11c shows the trend of the growth of Gross R&D Expenditures from 2002 to 2013. Higher growth rates were registered in 2011 and 2013. The same chart shows the level in terms of percentage share of R&D expenditures to the country's GDP. While the absolute values of R&D expenditures grew over the years, their equivalent shares to GDP remained almost constant at 0.14%.

22. In terms of Public vs. Private R&D expenditures classifications, this is illustrated in Figure 11a. Public R&D expenditures comprise government and public HEIs while private expenditures comprise private industries, private HEIs and private non-profit institutions. The growth trend of public expenditures accelerated starting 2011 and 2013 from the 2009 level and private expenditures showed gradual increases from 2002 to 2013.

Implications of R&D Survey Results

23. While the absolute figures in terms of R&D expenditures of the country continued to increase over the years, the growth rates were slow, averaging only 10% annually. The current ratio of 0.14% R&D expenditures to GDP is very low compared to ASEAN countries like Singapore, Malaysia and Thailand. There is a need to encourage greater R&D investments from all sectors.

24. The country's number of R&D personnel and researchers in particular was lower compared to many of ASEAN countries. Government should pay closer attention to establishing a more conducive environment to create more job opportunities for researchers such as giving more incentives or higher salaries to attract more S&T professionals into research. Science and engineering scholarships should likewise be increased. Upgrading of R&D facilities in universities and government R&D institutions would be most useful in attracting more researchers.

25. It has been reported that the Philippines improved its ranking in innovation index. In the World Economic Forum's Innovation ranking of countries, the country consistently improved its ranking from 2010 to 2015. From its 111st rank out of 140 countries in 2010, it rose to 94th place in 2012, 69th in 2013, 52nd in 2014 and finally to 48th in 2015, climbing 63 notches in the innovation ladder in a span of 5 years. These rankings were based on perception surveys of private business leaders. They indicate DOST's improving visibility especially to the private industry sector. In the past five years from 2010 to present, DOST has embarked on new programs like Nationwide Operational Assessment of Hazards (NOAH), Centrally-powered Hybrid Electric Road Train, Philippine DREAM and LIDAR project, Philippine MICROSAT, Advanced Device and Materials Testing Laboratory (ADMATEL), Electronic Products Development Center (EPDC), Die and Molds Solution Center and Small Enterprise Technology Upgrading Center (SETUP) which all cater to the public and private industry in particular. The past five years had shown improvements of public sector

R&D which could be attributed to several big and high quality R&D projects of DOST.

Recommendations to Improve and Sustain R&D Data Collection

26. Timeliness of R&D statistics has always been a problem. Collection of R&D data from respondent institutions took too long. The DOST encourages all sectors to provide data and participate in its biennial R&D surveys. There is need also to enhance the monitoring capacity of DOST regional offices and train its staff.

27. It would be good to commission a study on the R&D behavior and employment of R&D personnel of private companies including the factors that influence them to do R&D. Based on PSA data, while private sector R&D expenditures registered an annual average growth of 6% from 2002 to 2012, the number of R&D personnel recorded a big leap (256%) in 2012. It is possible that the R&D personnel reported by private companies are those who were also involved in S&T-related activities like product testing, equipment calibration, standardization and quality control and other post-R&D innovation activities.

28. Innovative approaches in collection of R&D data must be considered such as through the Unified Account Codes Structure implemented by DBM which includes R&D budgets by all government agencies and public HEIs. Accounting of funds utilized for R&D by public institutions would facilitate collection of data on R&D expenditures.

HUMAN RESOURCES IN RESEARCH & DEVELOPMENT

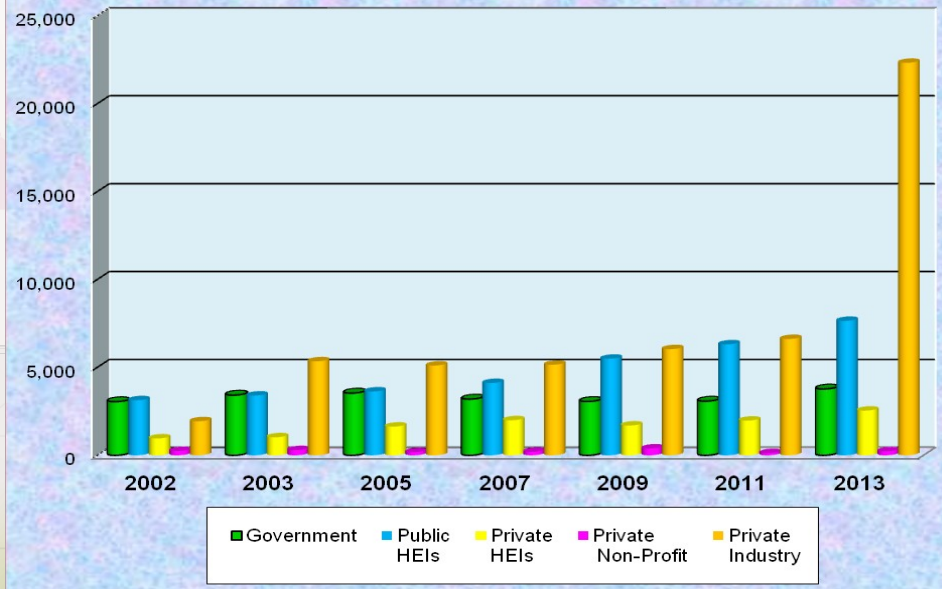
Human Resources in R & D

Table 1. National R&D Personnel
by Sector of Performance, 2002, 2003, 2005, 2007, 2009, 2011 & 2013

Sector of Performance	R&D Personnel (Headcount)						
	2002	2003	2005	2007	2009	2011	2013
All Sectors	9,325	13,488	14,087	14,649	16,673	18,110	36,517
Government *	3,054	3,425	3,539	3,198	3,063	3,082	3,774
Higher Education *	4,093	4,423	5,262	6,103	7,185	8,285	10,189
a. Public HEIs	3,134	3,399	3,631	4,110	5,493	6,311	7,647
b. Private HEIs	959	1,024	1,631	1,993	1,693	1,974	2,542
Private Non-Profit *	242	293	180	199	387	125	227
Private Industry **	1,936	5,347	5,106	5,150	6,038	6,618	22,327

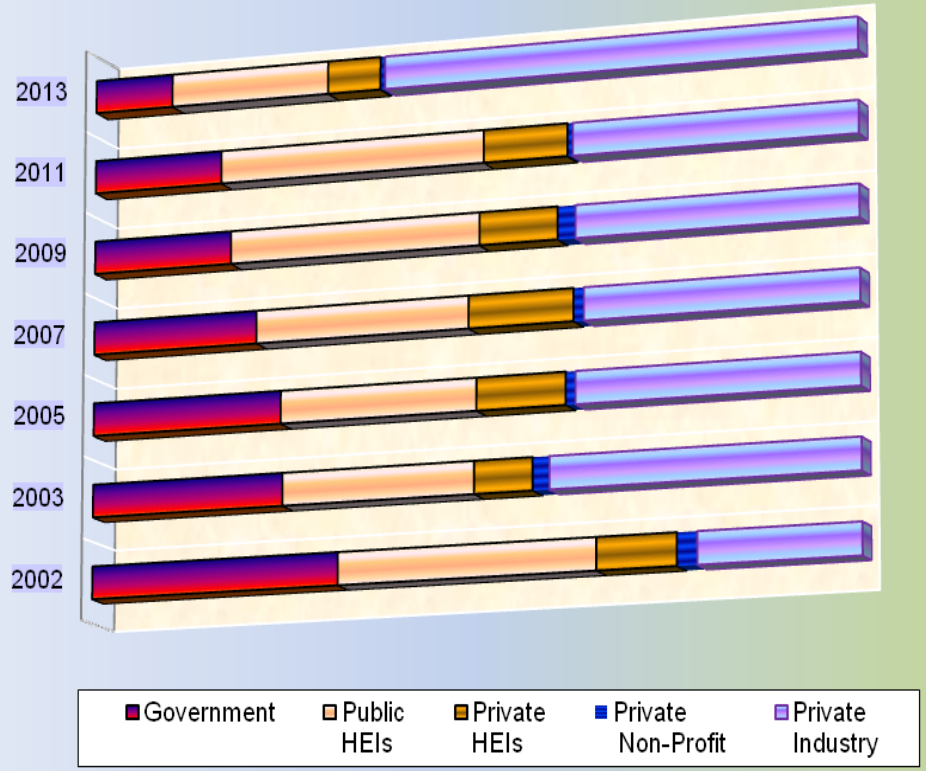
Data Sources:
* DOST Survey R&D Expenditures and Human Resources in Government, Higher Education and Private Non-Profit Sectors, 2002, 2003, 2005, 2007, 2009, 2011 & 2013;
** DOST Rider Survey in NSO's 2003 Annual Survey of Philippine Business and Industry (ASPBI); 2002, 2005 and 2007 data are estimates based on previous PBI data i.e. 2006 & 2012 Censuses and 2010 Survey; and 2009 data are actual results of ASPBI.

Figure 1a. Number of R&D Personnel by Sector of Performance



Human Resources in R & D

Figure 1b. Distribuition of R&D Personnel by Sector of Performance



Human Resources in R & D

Figure 2f. Percentage Distribution of R&D Personnel by Sector of Performance, 2011

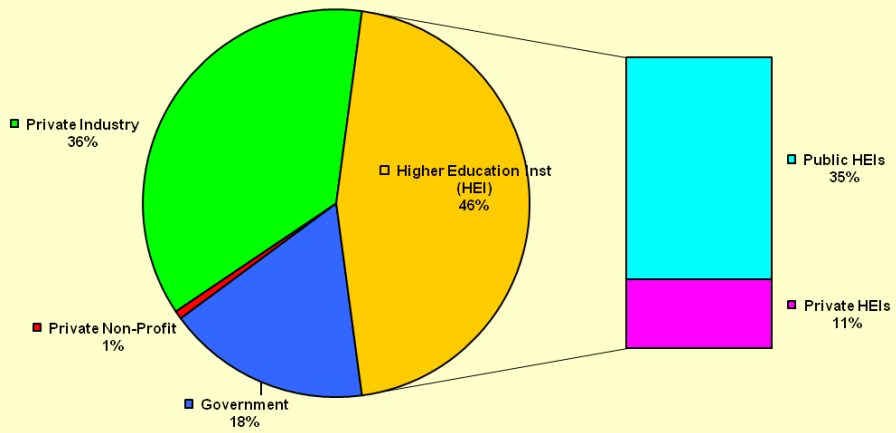
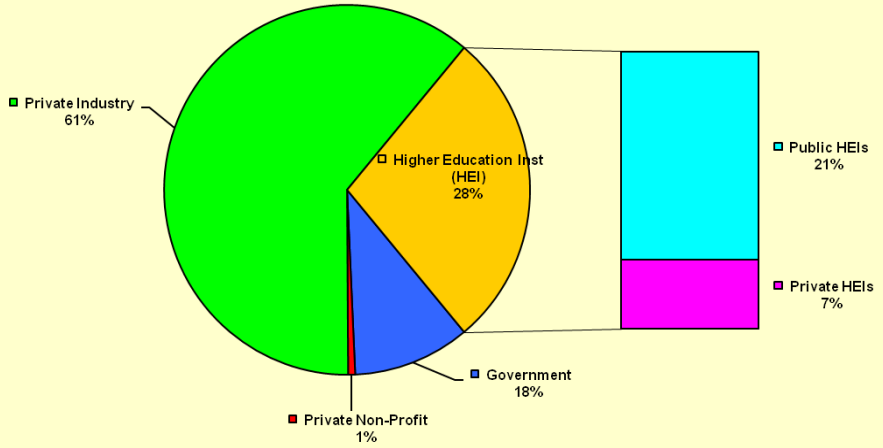


Figure 2g. Percentage Distribution of R&D Personnel by Sector of Performance, 2013



Human Resources in R & D

Table 1.1 Full-time Equivalence of National R&D Personnel by Sector of Performance, 2002, 2003, 2005, 2007, 2009, 2011 & 2013

Sector of Performance	R&D Personnel (in Full-time equivalent)						
	2002	2003	2005	2007	2009	2011	2013
All Sectors	5,811	9,390	9,407	9,357	10,370	11,079	26,333
Government *	2,225	2,594	2,775	2,544	2,356	2,391	2,713
Higher Education *	1,837	2,123	2,259	2,403	2,765	3,038	4,654
a. Public HEIs	1,587	1,815	1,638	1,647	2,273	2,324	4,012
b. Private HEIs	250	308	622	756	492	714	642
Private Non-Profit *	115	161	64	64	153	65	125
Private Industry **	1,634	4,512	4,309	4,346	5,095	5,585	18,841

Data Sources: (same as Table 1)

Table 2. Number of R&D Personnel (Headcount) by Position Category, 2002, 2003, 2005, 2007, 2009, 2011 & 2013

Position Category (headcount)	2002	2003	2005	2007	2009	2011	2013
TOTAL	9,325	13,488	14,087	14,649	16,673	18,110	36,517
Researchers	7,203	8,866	10,690	11,490	13,091	14,169	26,495
Technicians	956	1,245	1,162	1,314	1,381	1,484	3,377
Auxiliary Personnel	1,086	3,265	1,880	1,833	2,195	2,454	6,378
Not Classified	80	112	354	12	7	3	267

Source: DOST 2002, 2003, 2005, 2007, 2009 2011 R&D Surveys; and estimates using NSO-ASPBI 2003, 2005, 2008, 2009 & 2010 and CPBI, 2006.

Human Resources in R & D

Figure 3
R&D Personnel by Position Category
2002, 2003, 2005, 2007, 2009, 2011 & 2013

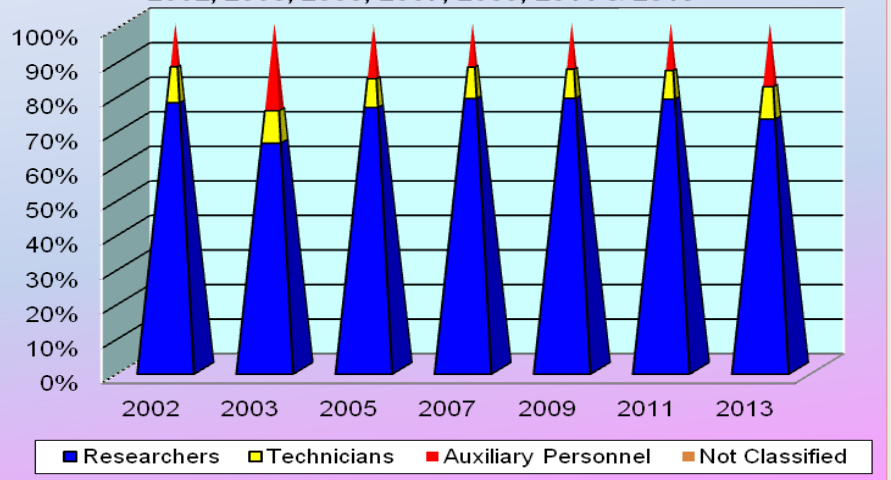


Table 2.1 FTE of R&D Personnel
by Position Category, 2002, 2003, 2005, 2007, 2009, 2011 & 2013

Position Category (headcount)	2002	2003	2005	2007	2009	2011	2013
TOTAL	5,811	9,390	9,407	9,357	10,369	11,079	26,333
Researchers	4,373	5,860	6,897	6,955	7,506	8,083	18,257
Technicians	701	945	899	965	1,117	1,197	2,745
Auxiliary Personnel	700	2,495	1,441	1,429	1,744	1,796	5,114
Not Classified	36	89	171	7	2	2	217

Source: DOST 2002, 2003, 2005, 2007, 2009 2011 R&D Surveys; and estimates using NSO-ASPBI 2003, 2005, 2008, 2009 & 2010 and CPBI, 2006.;
FTE - Full-time equivalence

Human Resources in R & D

Table 3f. R&D Personnel by Region and by Sector, 2011

Region	Sector of Performance				
	Total *(3 sectors only)*	Government	Higher Education		Private Non-Profit Inst.
			Public	Private	
Total	**11,492**	**3,082**	**6,311**	**1,974**	**125**
NCR	3,786	1,569	1,239	882	96
CAR	90	51	3	36	
Reg.1	672	161	471	40	
Reg.2	300	44	110	146	
Reg.3	818	307	382	129	
Reg. 4A	1,810	238	1,479	93	
Reg. 4B	206	6	174	26	
Reg.5	649	93	496	60	
Reg.6	489	55	385	39	10
Reg.7	478	62	253	163	
Reg.8	297	73	207	17	
Reg.9	351	113	225	13	
Reg.10	703	68	551	69	15
Reg.11	463	129	157	177	0
Reg.12	180	29	76	71	4
Reg.13	175	74	88	13	
ARMM	25	10	15	0	

Source: DOST 2011 R&D Survey.

Human Resources in R & D

Table 3g. R&D Personnel by Region and by Sector, 2013

Region	Sector of Performance					
	Total	Government	Higher Education		Private Non-Profit Inst.	Private Industry *
			Public	Private		
Total	36,517	3,774	7,646	2,543	227	22,327
NCR	13,107	2,019	1,406	791	193	8,698
CAR	467	50	171	-	-	246
Reg.1	852	120	401	51	-	280
Reg.2	719	182	150	238	-	149
Reg.3	2,568	246	446	143	-	1,733
Reg. 4A	9,235	170	2,271	163	-	6,631
Reg. 4B	563	65	124	8	4	362
Reg.5	873	155	468	92	-	158
Reg.6	1,013	66	530	119	-	298
Reg.7	2,451	155	240	201	-	1,855
Reg.8	667	62	345	31	-	229
Reg.9	430	72	109	127	-	122
Reg.10	1,031	24	413	151	9	434
Reg.11	1,160	149	156	325	20	510
Reg.12	816	166	276	59	1	314
Caraga	390	55	131	41	-	163
ARMM	175	18	9	3	-	145

Source: DOST 2013 R&D Survey, * 2012 Census of Phil. Business & Industry (CPBI)

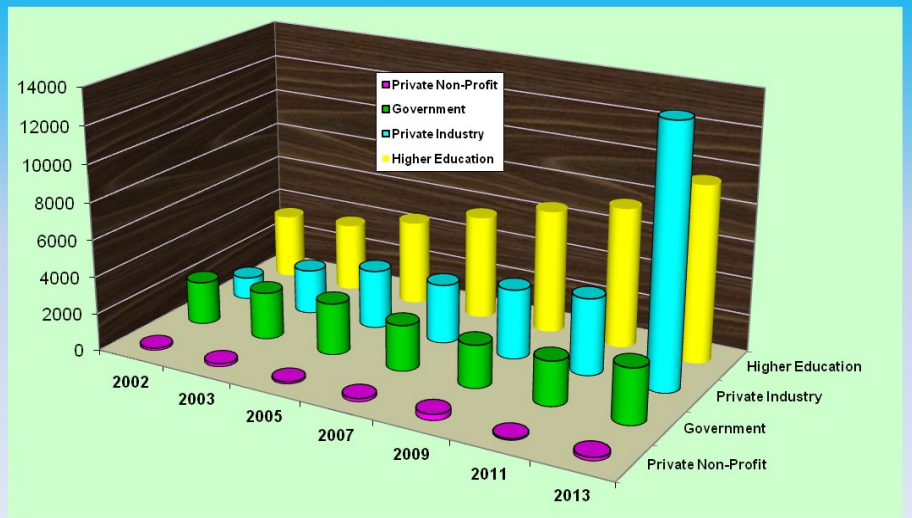
Human Resources in R & D

Table 4. Number of Researchers
by Sector of Performance, 2002, 2003, 2005, 2007, 2009, 2011 & 2013

Sector of Performance	Number of Researchers (Headcount)						
	2002	2003	2005	2007	2009	2011	2013
All Sectors	7,203	8,866	10,690	11,490	13,091	14,169	26,495
Government	2,339	2,557	2,797	2,480	2,318	2,391	2,965
Higher Education	3,513	3,712	4,591	5,622	6,676	7,559	9,508
Public HEIS	2,693	2,856	3,185	3,691	5,111	5,675	7,144
Private HEIs	820	856	1,406	1,931	1,565	1,884	2,364
Private Non-Profit	131	169	112	171	325	85	179
Private Industry*	1,220	2,428	3,190	3,217	3,772	4,134	13,843

Source: DOST 2002, 2003, 2005, 2007, 2009, 2011 & 2013 R&D Surveys; * Estimates using NSO-Annual Survey of Phil Business and Industry (ASPBI), 2003, 2005, 2009, 2010 and 2006 & 2012 Census of PBI.

Figure 4a. Trends in Number of Researchers by Year per Sector of Performance



Human Resources in R & D

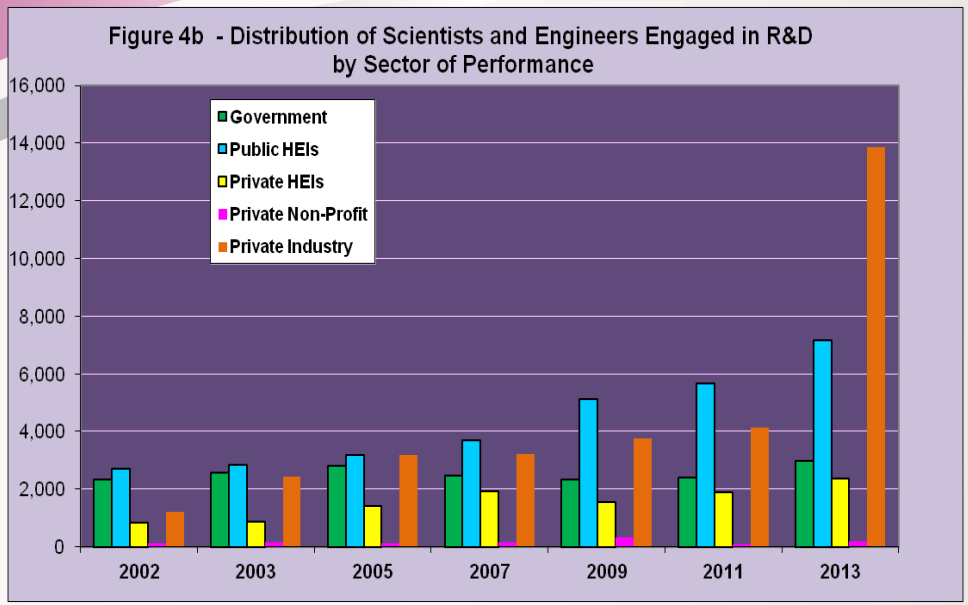


Table 4.1 FTE of Researchers by Sector of Performance
2002, 2003, 2005, 2007, 2009, 2011 & 2013

Sector of Performance	Number of Researchers (in Full-Time Equivalence)						
	2002	2003	2005	2007	2009	2011	2013
All Sectors	4,373	5,860	6,897	6,955	7,506	8,083	18,257
Government	1,704	1,937	2,193	1,973	1,745	1,829	2,131
Higher Education	1,577	1,782	1,972	2,212	2,467	2,715	4,345
Public HEIS	1,364	1,525	1,436	1,479	2,027	2,021	3,748
Private HEIs	214	257	536	733	440	694	597
Private Non-Profit	62	93	40	55	111	50	99
Private Industry *	1,030	2,049	2,692	2,715	3,183	3,489	11,682

Source: DOST 2002, 2003, 2005, 2007, 2009, 2011 & 2013 R&D Surveys; * Estimates using NSO-Annual Survey of Phl Business and Industry (ASPBI), 2003, 2005, 2009, 2010 and 2006 & 2012 Census of PBI.

Human Resources in R & D

Table 5f. Profile of Researchers in 2011 by Sector of Performance

Classification	Government	Higher Education		Private Non-Profit
		Public	Private	
Total Researchers	2,391	5,675	1,884	85
By Sex				
Male	1,094	2,352	825	25
Female	1,297	3,323	1,059	60
By Age Group				
Below 20 years old	-	-	-	-
20-30	328	739	311	16
31-40	550	1164	584	25
41-50	608	1336	377	19
51-60	760	1788	283	16
Above 60	136	396	79	5
Not classified	9	252	250	4
By Educational Attainment				
With PhD	219	2,078	499	19
MS/MA	735	2,265	912	27
Post BS/BA	429	476	122	21
BS/BA	971	657	208	8
Post HS	33	34	7	7
HS and Below	1	11	-	3
Not classified	3	154	136	
By Field of Research Work				
Natural Sciences	497	1,246	374	7
Eng'g & Technology	388	810	226	1
Agricultural Sciences	978	1,735	36	5
Medical Sciences	251	201	254	29
Social Sciences	203	1,282	748	33
Humanities	4	122	57	-
Not classified	70	279	189	10

Notes: Data for Private Industry Sector are not available, hence national total cannot be generated

Human Resources in R & D

Table 5g. Profile of Researchers in 2013
by Sector of Performance

Classification	Government	Higher Education		Private Non-Profit	Private Industry
		Public	Private		
Total Researchers	2,965	7,144	2,364	179	13,843
By Sex					
Male	1,335	3,070	1,078	70	7,681
Female	1,630	4,074	1,286	109	6,162
By Age Group					n.a.
Below 20 years old	5	12		1	
20-30	580	1430	354	39	
31-40	586	1710	718	44	
41-50	570	1571	600	23	
51-60	928	743	427	22	
Above 60	183	428	130	17	
Not classified	113	1250	135	33	
By Educational Attainment					n.a.
With PhD	175	870	735	34	
MS/MA	850	2,902	1,001	65	
Post BS/BA	455	479	153	26	
BS/BA	1,412	1,434	290	54	
Post HS	55	24	100		
HS and Below	9	17	8		
Not classified	9	1,418	77		
By Field of Research Work					n.a.
Natural Sciences	512	1,723	407	58	
Eng'g & Technology	423	850	485	9	
Agricultural Sciences	1,485	1,408	17	24	
Medical Sciences	359	599	220	18	
Social Sciences	156	585	667	68	
Humanities	30	774	192	2	
Not classified		1,205	376		

Notes: Data for Private Industry Sector are not available in all disagregation, hence national total cannot be generated

Human Resources in R & D

Table 6f. Number of Researchers, 2011
by Region and Sector of Performance

Region	Sector of Performance			
	Government	Higher Education		Private Non-Profit Inst.
		State	Private	
Total	**2,391**	**5,675**	**1,884**	**85**
NCR	1,158	1108	879	78
CAR	38	1	36	
Reg.1	110	432	40	
Reg.2	26	100	146	
Reg.3	291	363	96	
Reg.4A	154	1341	91	
Reg.4B	6	168	26	
Reg.5	63	490	41	
Reg.6	54	372	36	1
Reg.7	48	182	159	
Reg.8	71	182	17	
Reg.9	90	93	13	
Reg.10	62	526	63	3
Reg.11	118	156	171	
Reg.12	27	58	61	3
Reg.13	68	88	9	
ARMM	7	15	-	

Human Resources in R & D

Table 6g. Number of Researchers, 2013 by Region and Sector of Performance

Region	Total	Sector of Performance				
		Government	Higher Education		Private Non-Profit Inst.	Private Industry
			State	Private		
Total	26,495	2,965	7,144	2,364	179	13,843
NCR	9,067	1,486	1,286	748	154	5,393
CAR	349	34	162			153
Reg.1	711	86	401	50		174
Reg.2	654	181	147	234		92
Reg.3	1,817	204	415	124		1,074
Reg.4A	6,654	170	2,210	163		4,111
Reg.4B	377	43	101	8	1	224
Reg.5	701	103	415	85		98
Reg.6	867	57	508	117		185
Reg.7	1,686	151	217	168		1,150
Reg.8	504	46	301	15		142
Reg.9	328	52	76	124		76
Reg.10	785	20	371	120	5	269
Reg.11	911	121	134	322	18	316
Reg.12	658	143	263	56	1	195
Reg.13	312	52	130	29		101
ARMM	114	16	7	1		90


FINANCIAL RESOURCES IN RESEARCH & DEVELOPMENT

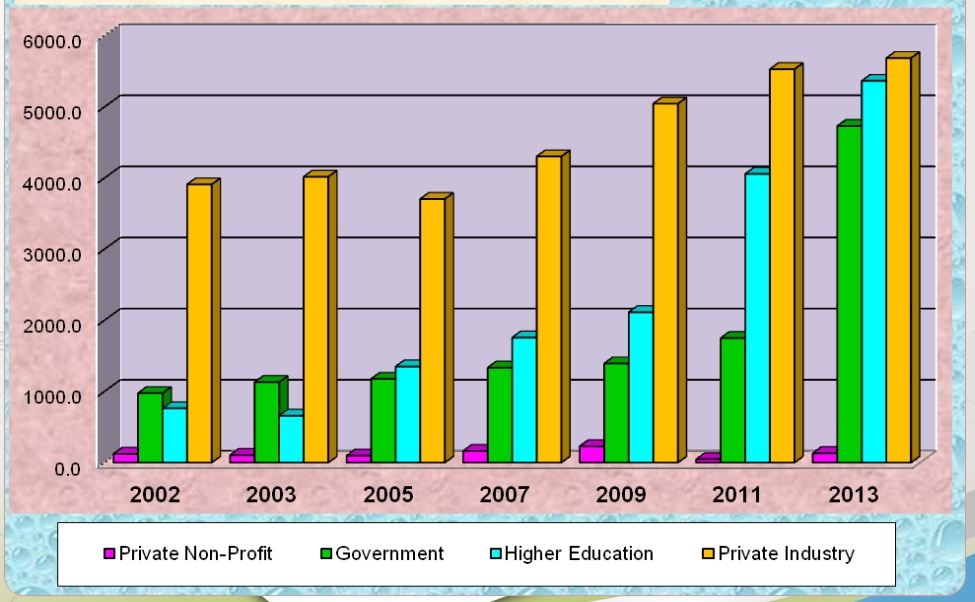
Financial Resources in R & D

Table 7. National R&D Expenditures
2002, 2003, 2005, 2007, 2009, 2011, 2013

Sector of Performance	R&D Expenditures (In Million Pesos)						
	2002	2003	2005	2007	2009	2011	2013
All Sectors	5,769.80	5,909.70	6,326.74	7,556.36	8,779.16	11,383.97	15,914.71
Government*	975.60	1,129.60	1,175.33	1,333.94	1,392.69	1,749.35	4,731.59
Higher Education*	762.40	657.40	1,350.10	1,756.91	2,112.66	4,058.51	5,366.03
Public HEIs*	640.00	455.00	1092.87	1326.45	1745.32	3,403.44	4,810.96
Private HEIs*	122.40	202.40	257.23	430.46	367.33	655.07	555.07
Private Non-Profit*	121.70	104.60	96.21	162.17	228.45	46.09	130.97
Private Industry**	3,910.10	4,018.10	3,705.10	4,303.35	5,045.37	5,530.02	5,686.12

Sources: *DOST 2002, 2003, 2005, 2007, 2009, 2011 & 2013 R&D Surveys; **DOST Rider Surveys in NSO's 2003 and 2005 Annual Survey of Philippine Business and Industry; Estimates from 2006 & 2012 Census PBI and 2010 ASPBI and actual result of 2009 ASPBI

Figure 5. National R&D Expenditures by Sector of Performance
2002, 2003, 2005, 2007, 2009, 2011 & 2013
(in Million Pesos)



Financial Resources in R & D

Figure 6f. Distribution of R&D Expenditures by Sector of Performance, 2011

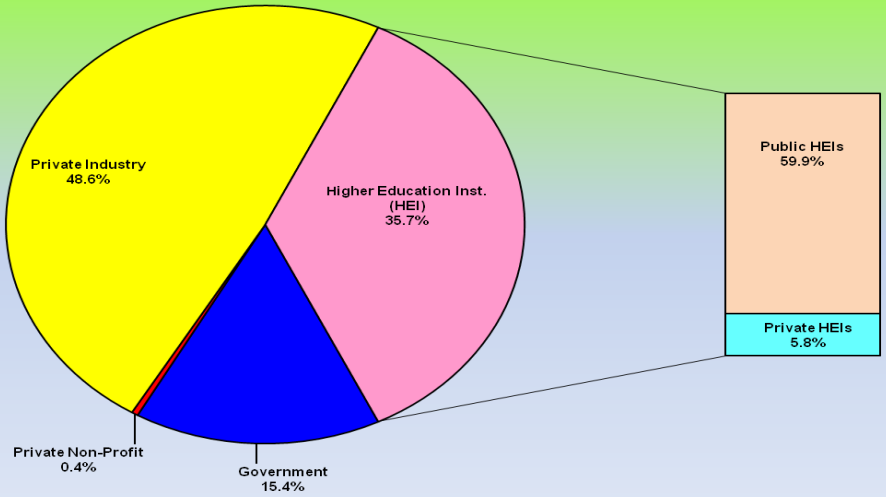
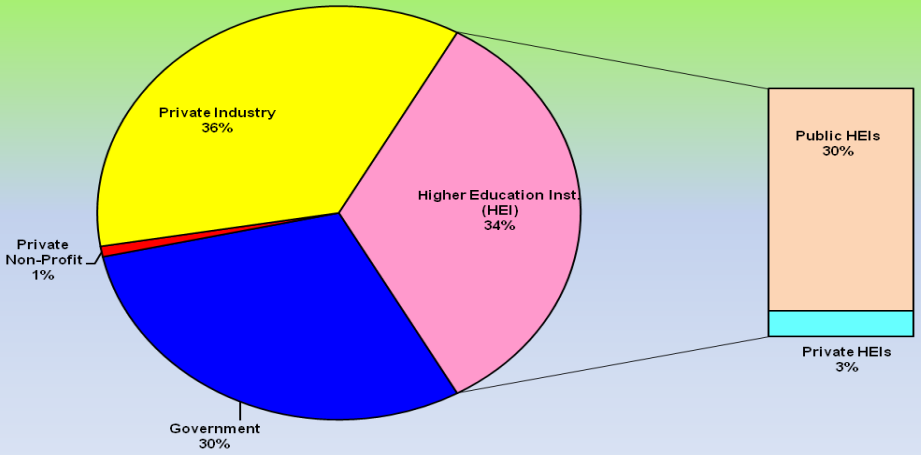


Figure 6g. Distribution of R&D Expenditures by Sector of Performance, 2013



Financial Resources in R & D

Figure 7a. Trends in R&D Expenditures by Year per Sector of Performance

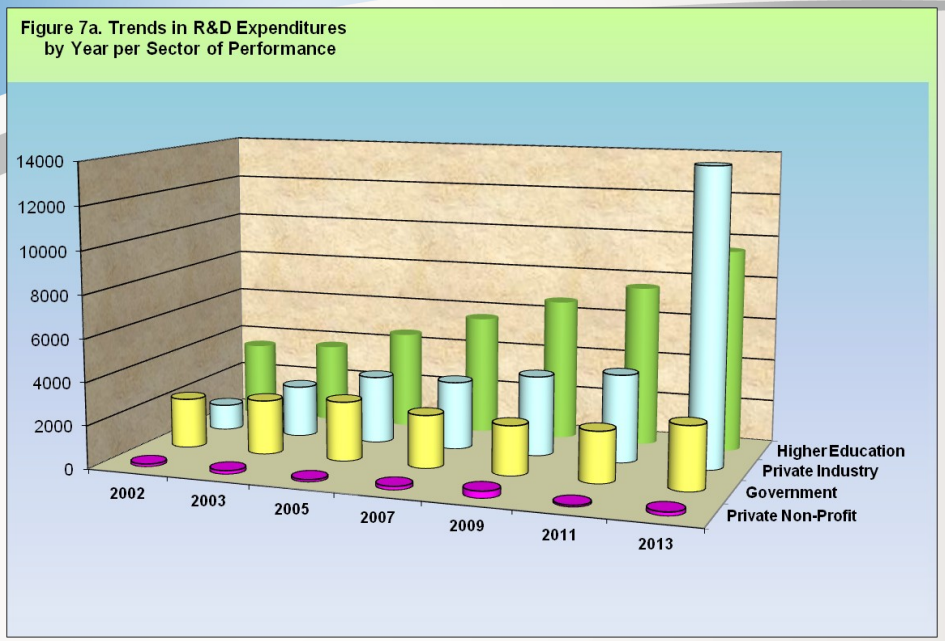
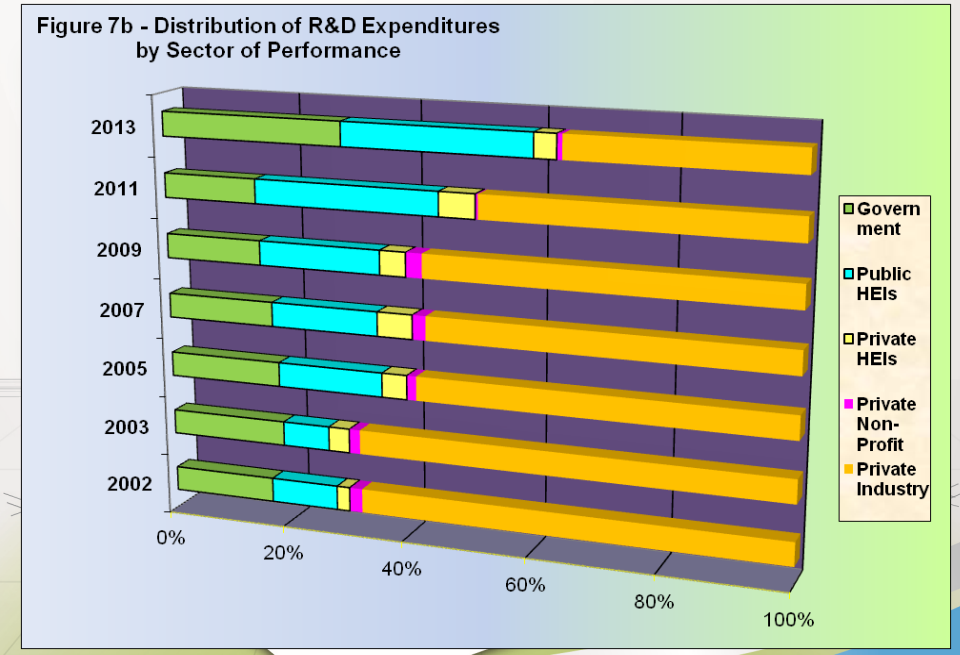
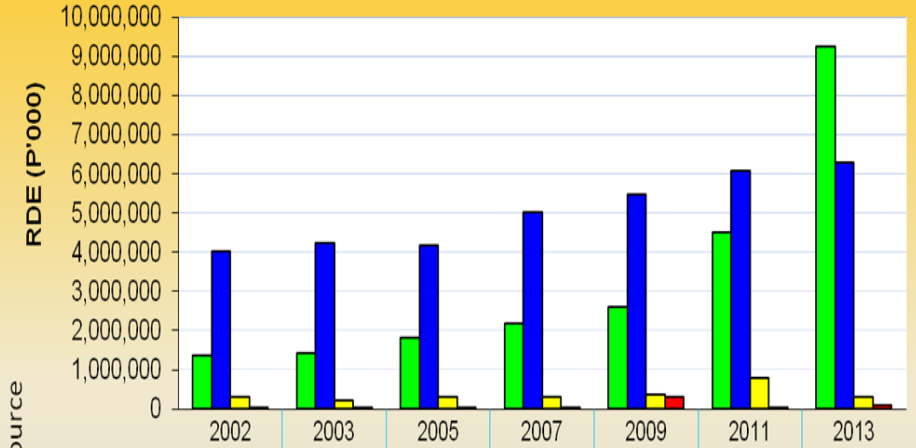


Figure 7b - Distribution of R&D Expenditures by Sector of Performance



Financial Resources in R & D

Figure 8
R&D Expenditures (RDE) by Funding Source
2002, 2003, 2005, 2007, 2009, 2011 & 2013



Funding Source	2002	2003	2005	2007	2009	2011	2013
Govt Funds	1,376,569	1,435,664	1,826,621	2,171,464	2,608,707	4,517,000	9,242,158
Private Funds	4,035,443	4,244,666	4,178,488	5,031,890	5,483,550	6,080,828	6,299,035
Foreign Funds	318,989	226,513	301,509	311,472	380,207	780,328	292,474
Other Sources	38,760	2,904	20,119	41,534	306,701	5,816	81,044

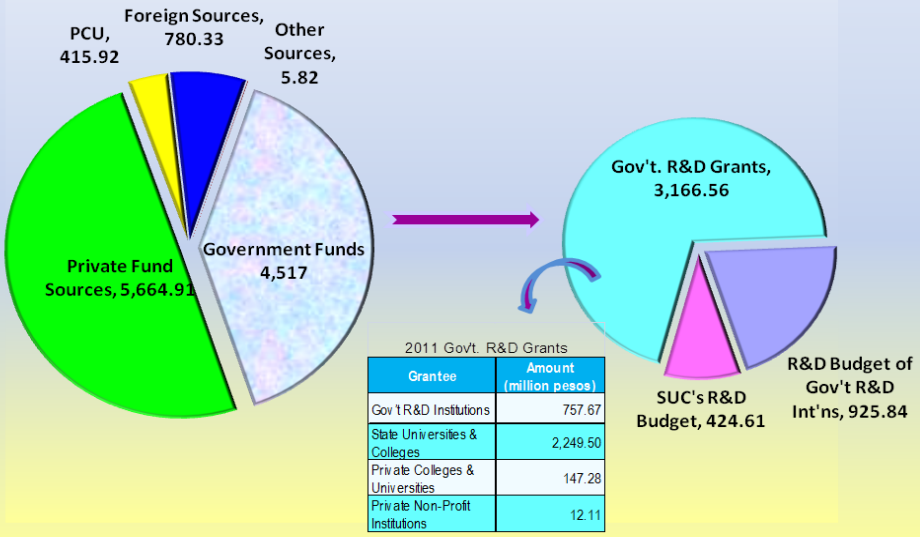
Financial Resources in R & D

Table 8f. R&D Expenditures by Funding Source and Sector of Performance, 2011

(In Thousand Pesos)

Funding Source	Total RDE	Sector of Performance				
		Government	Higher Education Institutions		Private Non-Profit	Private Industry
			State	Private		
Total	11,383,971	1,749,349	3,403,442	655,072	46,086	5,530,023
Institutions' Own Funds	7,293,250	925,835	424,607	398,536	14,249	5,530,023
Government Funds	3,166,558	757,667	2,249,498	147,282	12,111	-
Private Funds	138,019	4,966	111,203	17,383	4,467	-
Foreign Funds	780,328	60,452	613,270	91,348	15,258	-
Other Sources	5,816	429	4,864	523	-	-

Figure 8f. R&D Expenditures (RDE) by Funding Source and Sector of Performance, 2011



2011 Govt. R&D Grants

Grantee	Amount (million pesos)
Gov't R&D Institutions	757.67
State Universities & Colleges	2,249.50
Private Colleges & Universities	147.28
Private Non-Profit Institutions	12.11

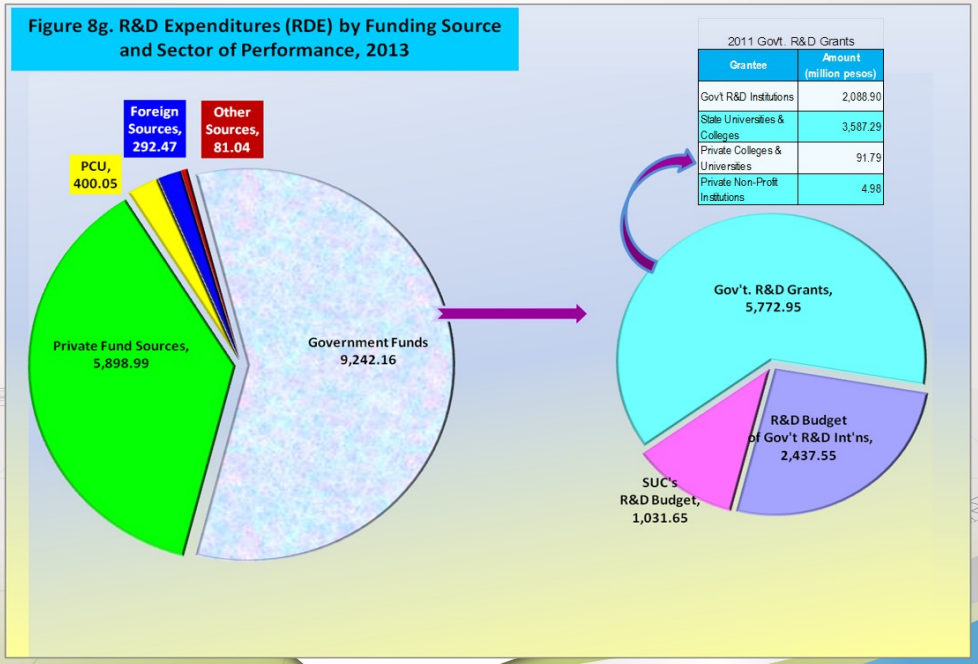
Financial Resources in R & D

Table 8g. R&D Expenditures by Funding Source and Sector of Performance, 2013

(In Thousand Pesos)

Funding Source	Total RDE	Sector of Performance				
		Government	Higher Education Institutions		Private Non-Profit	Private Industry
			State	Private		
Total	15,914,710	4,731,594	4,810,956	555,072	130,967	5,686,120
Institutions' Own Funds	9,587,945	2,437,554	1,031,652	396,274	36,345	5,686,120
Government Funds	5,772,951	2,088,898	3,587,288	91,787	4,978	-
Private Funds	180,297	67,089	70,752	3,772	38,683	-
Foreign Funds	292,474	73,030	106,324	62,668	50,452	-
Other Sources	81,044	65,023	14,940	572	510	-

Figure 8g. R&D Expenditures (RDE) by Funding Source and Sector of Performance, 2013



Financial Resources in R & D

Table 9f. R&D Expenditures by Socio-Economic Objective and Sector of Performance, 2011

(In Thousand Pesos)

Socio-Economic Objective	Sector of Performance			
	Government	Higher Education		Private Non-Profit
		State	Private	
Exploration and exploitation of the earth	3,563	1,024,433	8,018	-
Infrastructure and general planning of land-use	104,510	12,067	44,594	3,159
Control and care of the environment	402,537	635,471	53,906	553
Protection and improvement of human health	134,505	446,561	71,984	3,198
Production, dist'n & rational utilization of energy	17,162	75,443	37,040	-
Agricultural production and technology	558,646	805,040	38,515	5,171
Industrial production and technology	86,076	53,604	129,569	2,666
Social structures and relationships	48,109	142,981	188,067	17,508
Exploration and exploitation of space	-	106	824	-
Defense	39,811	-	136	-
Access to information and knowledge	147,517	112,983	61,323	966
Others, not elsewhere classified	106,823	94,754	21,096	10,632
Not classified	100,089	-	-	2,233
Total RDE	1,749,349	3,403,442	655,072	46,086

Table 9g. R&D Expenditures by Socio-Economic Objective and Sector of Performance, 2013

(In Thousand Pesos)

Socio-Economic Objective	Sector of Performance			
	Government	Higher Education		Private Non-Profit
		State	Private	
Exploration and exploitation of the earth	16,942	2,177,137	10,545	0
Infrastructure and general planning of land-use	88,232	263,348	25,646	996
Control and care of the environment	43,871	493,911	121,688	68,182
Protection and improvement of human health	220,493	292,556	55,630	3,752
Production, dist'n & rational utilization of energy	41,521	45,309	21,475	0
Agricultural production and technology	2,089,681	960,041	22,543	23,815
Industrial production and technology	406,549	77,901	59,021	4,395
Social structures and relationships	78,880	178,489	172,420	15,389
Exploration and exploitation of space	482	1,195	0	0
Defense	139,811	90	0	0
Access to information and knowledge	977,041	83,433	44,529	6,288
Others, not elsewhere classified	618,306	236,008	19,384	8,151
Not classified	9,785	1,537	2,192	0
Total RDE	**4,731,594**	**4,810,956**	**555,072**	**130,967**

Financial Resources in R & D

Table 9.1

R&D Expenditures by Socio-Economic Objective

2002, 2003, 2005, 2007, 2009, 2011, 2013 (in thousand pesos)

Socio-Economic Objective	2002	2003	2005	2007	2009	2011	2013
Exploration and exploitation of the earth	70,058	27,189	51,264	55,594	445,619	1,036,015	1,936,650
Infrastructure and general planning of land-use	27,733	52,237	227,593	191,219	176,584	164,330	356,380
Control and care of the environment	182,990	272,130	267,533	381,803	434,567	1,092,468	966,647
Protection and improvement of human health	239,254	182,208	196,711	298,562	361,345	656,247	556,110
Production, dist'n & rational utilization of energy	26,595	75,691	43,129	202,058	248,664	129,645	84,500
Agricultural production and technology	767,922	764,942	826,150	948,105	1,709,540	1,407,372	3,120,139
Industrial production and technology	193,387	100,476	518,104	186,837	219,233	271,915	491,676
Social structures and relationships	146,992	193,246	147,403	153,154	256,619	396,665	316,580
Exploration and exploitation of space	500	0	1,816	27,997	28,621	930	1,677
Defense	56,519	48,517	54,870	136,125	36,917	39,946	139,902
Access to information and knowledge	43,256	68,939	97,353	232,969	163,120	322,789	1,372,593
Others, not elsewhere classified	104,454	106,087	189,717	438,591	20,171	233,305	880,041
Not classified						102,321	5,695
Total RDE	1,859,660	1,891,662	2,621,643	3,253,015	4,100,999	5,751,627	10,228,590

Note: This distribution of RDE by SEO is for 3 sectors only: Govt, HEIs and PNPIs

Financial Resources in R & D

Table 10. R&D Expenditures in the Private Industry Sector by Type of Industry, 2003, 2005, 2006, 2008, 2009, 2010, 2012

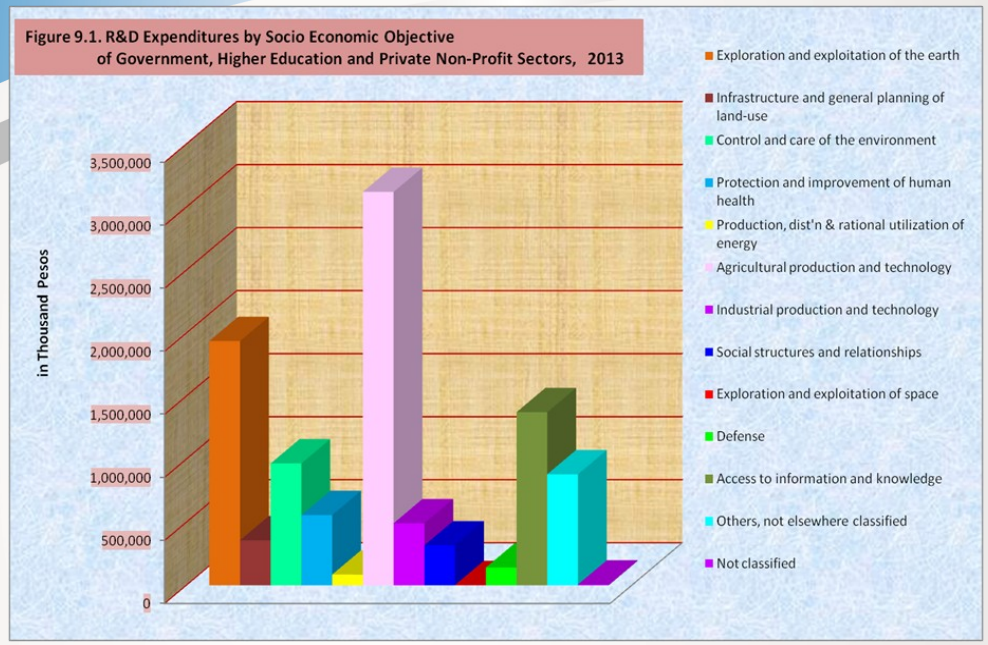
(in thousand pesos)

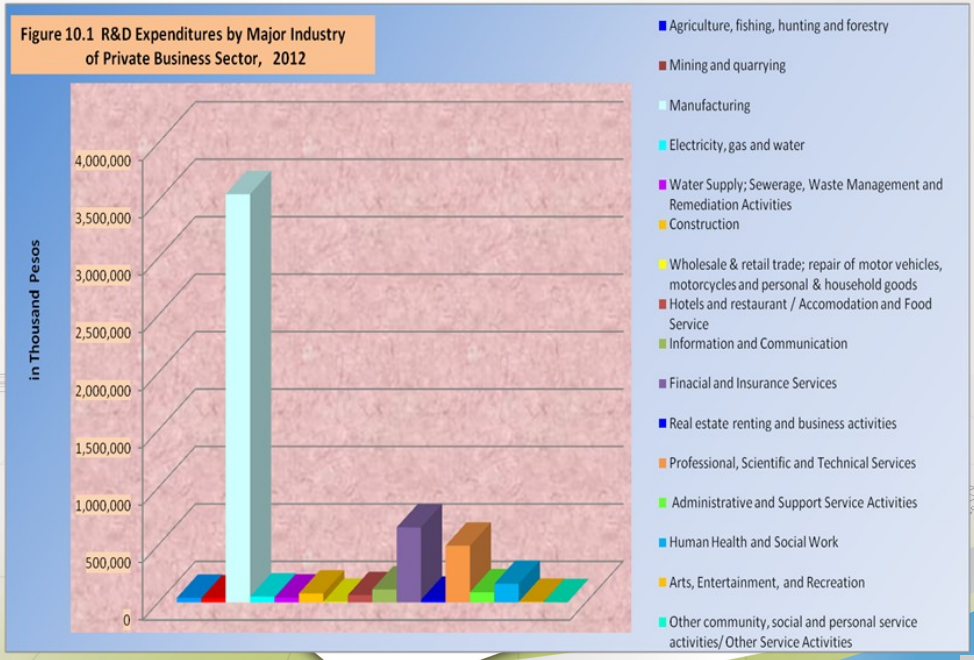
Private Industry Major Sector	R&D Expenditure						
	2003	2005	2006	2008	2009	2010	2012
Total All Industry Sectors	4,018,085	3,705,095	4,034,104	7,376,075	5,045,369	5,232,642	5,399,924
Agriculture, hunting and forestry	34,382	58,849	18,519	44,689	38,865	36,053	39,984
Fishing	43	2,841	1,034	1,272	276		
Mining and quarrying	8,274	4,959	212,979	8,941	69,503	31,525	34,732
Manufacturing	3,279,598	2,314,377	2,756,726	5,766,530	3,482,472	2,905,092	3,552,909
Electricity, gas and water	174,373	33,545	102,467	98,500	126,566	67,827	49,783
Water Supply; Sewerage, Waste Management and Remediation Activities							41,086
Construction	10,220		102,467	61,355	17,754	38,769	77,635
Wholesale & retail trade; repair of motor vehicles, motorcycles and personal & household goods	159,075		91,126	109,360	187,938	185,458	5,596
Hotels and restaurant / Accomodation and Food Service	26,795	29,589	38,907	34,902	30,674	69,544	63,616
Transport, storage and communication	6,131	704,062	46,093	36,287	0	-	-
Information and Communication							112,557
Financial intermediation	28,284	89,425	82,159	408,196	217,515	719,557	652,190
Real estate renting and business activities	178,540	359,295	433,443	482,995	699,197	0	22,362
Professional, Scientific and Technical Services						707,296	492,793
Administrative and Support Service Activities						314,242	87,845
Human Health and Social Work	37,996	52,977	84,113	33,063	61,417	147,720	161,804
Arts, Entertainment, and Recreation							4,379
Other community, social and personal service activities/ Other Service Activities	74,374	55,176	64,071	289,985	113,192	9,559	653

Sources: NSO-Annual Survey of Philippine Business and Industry (ASPBI), 2003, 2005, 2008, 2009, 2010; NSO-Census of Philippines Business and Industry (CPBI), 2006 7 2012

Note: Data does not include R&D expenditures in Private Education sector as this was already covered in DOST R&D survey in the Higher Education Institutions (HEIs).

Financial Resources in R & D





Financial Resources in R & D

Table 11f. R&D Expenditures by Region and by Sector, 2011

(in thousand pesos)

Region	Total	Sector of Performance				
		Government*	Higher Education*		Private Non-Profit Inst.*	Private Industry**
			State	Private		
All Regions	13,143,224	1,749,349	3,403,442	655,072	46,086	7,289,276
NCR	7,390,700	1,108,087	1,952,563	547,707	29,174	3,753,169
CAR	55,046	8,529	764	3,405	-	42,348
Reg.1	131,792	48,494	68,600	1,047	-	13,651
Reg.2	49,776	4,461	12,254	32,183	-	878
Reg.3	668,350	216,357	60,832	12,710	-	378,451
Reg.4A	3,208,059	44,539	973,979	1,430	-	2,188,111
Reg.4B	50,575	14,902	28,077	1,162	-	6,433
Reg.5	132,214	33,335	81,318	7,079	-	10,482
Reg.6	66,088	16,694	26,468	1,358	3,359	18,209
Reg.7	549,403	11,019	3,878	19,777	-	514,730
Reg.8	181,387	93,675	23,674	795	-	63,243
Reg.9	25,491	13,526	11,140	676	-	148
Reg.10	301,015	45,350	49,500	13,506	8,953	183,707
Reg.11	243,393	53,217	97,580	6,716	-	85,880
Reg.12	38,418	11,743	6,208	3,303	4,600	12,564
Reg.13	42,792	24,697	6,155	2,219	-	9,721
ARMM	8,724	722	451	-	-	7,551

Source: *DOST 2011 R&D Survey; ** Estimated from NSO's 2010 ASPBI

Financial Resources in R & D

Table 11g. R&D Expenditures by Region and by Sector, 2013

(in thousand pesos)

Region	Total	Sector of Performance				
		Government*	Higher Education*		Private Non-Profit Inst.*	Private Industry**
			State	Private		
All Regions	15,914,710	4,731,594	4,810,956	555,072	130,967	5,686,120
NCR	8,068,936	2,334,740	3,065,714	447,343	110,023	2,111,115
CAR	34,319	4,942	12,835	-	-	16,543
Reg.1	199,236	41,000	104,054	2,633	-	51,549
Reg.2	98,594	76,672	2,769	12,973	-	6,180
Reg.3	766,342	557,753	46,525	9,139	-	152,925
Reg.4A	4,834,649	1,239,109	894,915	4,472	-	2,696,154
Reg.4B	106,527	93,332	6,790	157	1,584	4,664
Reg.5	172,971	66,742	80,611	12,925	-	12,694
Reg.6	183,936	24,596	94,603	8,483	-	56,254
Reg.7	256,835	10,934	5,024	12,784	-	228,093
Reg.8	70,478	9,223	44,502	8,388	-	8,364
Reg.9	66,331	42,061	13,434	3,795	-	7,042
Reg.10	583,751	106,111	229,550	12,668	12,722	222,701
Reg.11	220,319	35,442	112,863	16,513	2,425	53,076
Reg.12	121,841	64,501	28,584	1,920	4,214	22,622
Reg.13	121,704	20,784	64,623	519	-	35,778
ARMM	7,940	3,653	3,560	361	-	365

Source: *DOST 2011 R&D Survey; ** Estimated from NSO's 2012 CPBI

Financial Resources in R & D

Table 12e. R&D Intensity (Ratio of RDE to GDP) by Region, 2011

Region	R&D Expenditures (P'000)	Regional GDP* (P'000)	RDE/RGDP (%)
Philippines	13,143,224	9,708,331,799	0.14
NCR	7,390,700	3,461,447,602	0.21
CAR	55,046	209,515,838	0.03
Reg. 1	131,792	299,314,607	0.04
Reg. 2	49,776	166,150,284	0.03
Reg. 3	668,350	885,868,921	0.08
Reg. 4A	3,208,059	1,640,077,536	0.20
Reg. 4B	50,575	173,610,041	0.03
Reg. 5	132,214	199,312,226	0.07
Reg. 6	66,088	387,794,519	0.02
Reg. 7	549,403	590,909,134	0.09
Reg. 8	181,387	240,777,700	0.08
Reg. 9	25,491	197,625,379	0.01
Reg.10	301,015	379,624,420	0.08
Reg.11	243,393	406,720,757	0.06
Reg.12	38,418	273,018,326	0.01
Caraga	42,792	108,485,520	0.04
ARMM	8,724	88,078,989	0.010

Source: *2013 Philippine Statistical Yearbook, NSCB; RGDP-Regional Gross Domestic Product

Financial Resources in R & D

Table 12f. R&D Intensity (Ratio of RDE to GDP) by Region, 2013

Region	R&D Expenditures (P '000)	Regional GDP* (P '000)	RDE/RGDP (%)
Philippines	15,914,710	11,548,191,402	0.14
NCR	8,068,936	4,290,630,471	0.19
CAR	34,319	227,924,971	0.02
Reg. 1	199,236	359,706,535	0.06
Reg. 2	98,594	208,546,727	0.05
Reg. 3	766,342	1,018,224,367	0.08
Reg. 4A	4,834,649	1,881,381,141	0.26
Reg. 4B	106,527	186,762,078	0.06
Reg. 5	172,971	240,303,496	0.07
Reg. 6	183,936	455,654,312	0.04
Reg. 7	256,835	732,977,310	0.04
Reg. 8	70,478	250,344,509	0.03
Reg. 9	66,331	230,651,364	0.03
Reg.10	583,751	438,917,211	0.13
Reg.11	220,319	461,427,167	0.05
Reg.12	121,841	333,172,764	0.04
Caraga	121,704	130,475,588	0.09
ARMM	7,940	101,091,392	0.008

Source: Philippine Statistics Authority (w w w .psa.gov.ph)


5 %
50%
70%
R&D INDICATORS

R&D Indicators

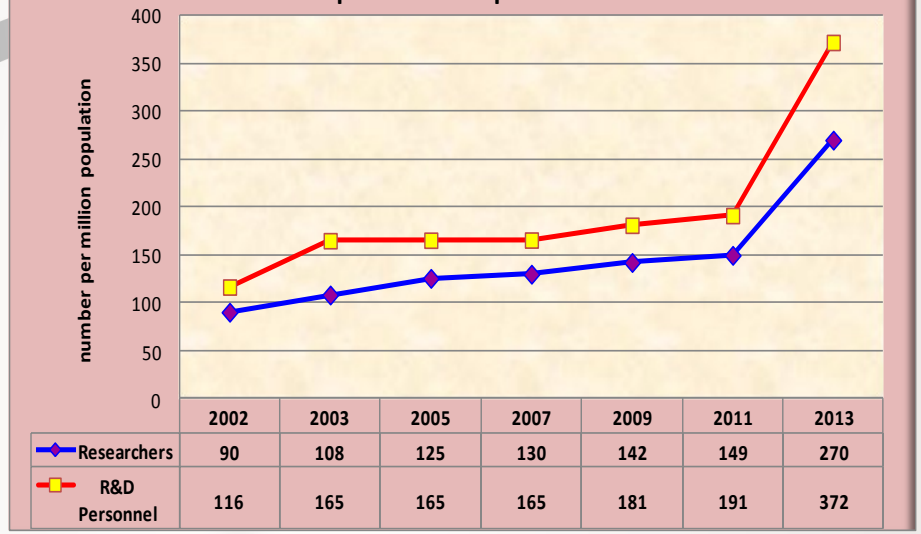
Table 13-a. R&D Indicators
2002, 2003, 2005, 2007, 2009, 2011 & 2013

Indicator	2002	2003	2005	2007	2009	2011	2013
Total R&D Personnel (Headcount)	9,325	13,488	14,087	14,649	16,673	18,110	36,517
Total R&D Personnel **(FTE)**	5,811	9,390	9,407	9,357	10,369	11,079	26,333
No. of Researchers (Headcount)	7,203	8,866	10,690	11,490	13,091	14,169	26,495
No. of Researchers **(FTE)**	4,373	5,860	6,897	6,955	7,506	8,083	18,257
Population Size (in Million People)	80.16	81.88	85.26	88.57	92.2	94.8	98.2
No. of R&D Personnel per million population (based on	116	165	165	165	181	191	372
No. of R&D Personnel per million population **(based on FTE)**	72	115	110	106	112	117	268
No. of Researchers per million population (based on Headcount)	90	108	125	130	142	149	270
No. of Researchers per million population **(based on FTE)**	55	72	81	79	81	85	186
GDP (current prices/ in million pesos)	3,963,873	4,316,402	5,444,038	6,648,619	7,678,917	9,708,332	11,548,191
Total R&D Expenditures (current prices/ in million pesos)	5,769.75	5,909.75	6,362.32	7,556.36	8,779	11,384	15,915
R&D Expenditures as % of GDP	0.15	0.14	0.12	0.11	0.11	0.12	0.14
Public R&D Expenditures* (current prices/ in million pesos)	1,615.59	1,584.73	2,268.20	2,660.39	3,138	5,153	9,543
% share of public to total RDE	*28%*	*27%*	*36%*	*35%*	*36%*	*45%*	*60%*
Private R&D Expenditures** (current prices/ in million pesos)	4154.16	4,325.01	4,058.54	4,895.97	5,641	6,231	6,372
% share of private to total RDE	*72%*	*73%*	*64%*	*65%*	*64%*	*55%*	*40%*
RDE per R&D Personnel (current prices, in thousand pesos)	619	438	449	516	527	629	436
RDE per Researcher (current prices, in thousand pesos)	801	667	592	658	671	803	601

* Public RDE includes expenditures of government agencies and state universities and colleges;
** Private RDE includes expenditures of private industries, private universities and private non-profit institutions

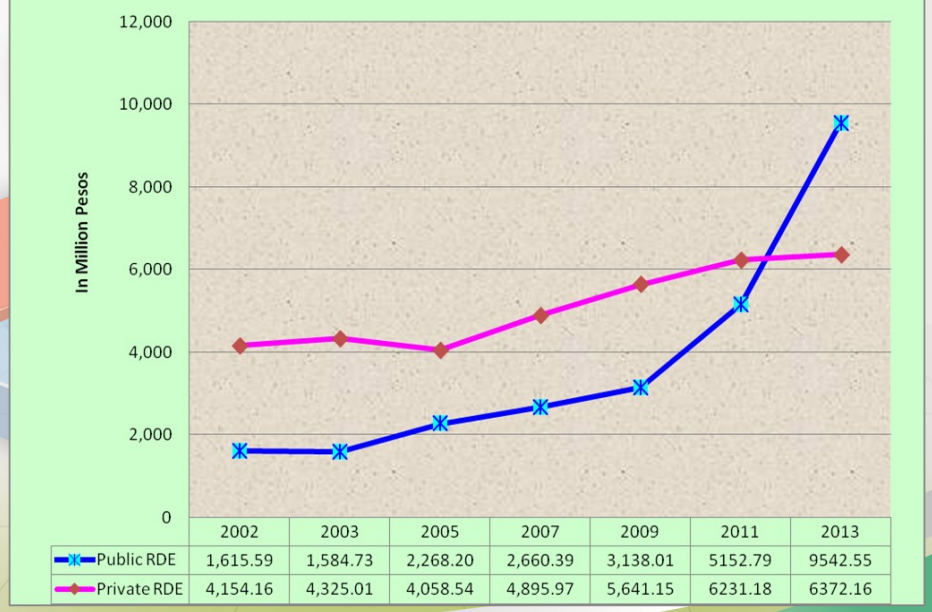
R&D Indicators

Figure 10. Trends of R&D Personnel and Researchers per Million Population



	2002	2003	2005	2007	2009	2011	2013
Researchers	90	108	125	130	142	149	270
R&D Personnel	116	165	165	165	181	191	372

Figure 11a. Trends of Public and Private R&D Expenditues



	2002	2003	2005	2007	2009	2011	2013
Public RDE	1,615.59	1,584.73	2,268.20	2,660.39	3,138.01	5152.79	9542.55
Private RDE	4,154.16	4,325.01	4,058.54	4,895.97	5,641.15	6231.18	6372.16

R&D Indicators

Figure 11b. Distribution of Public to Private R&D Expenditues

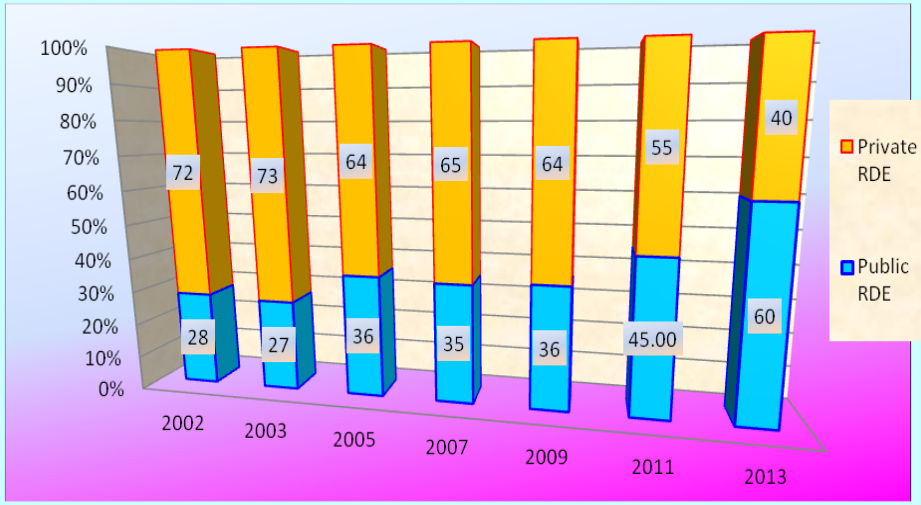
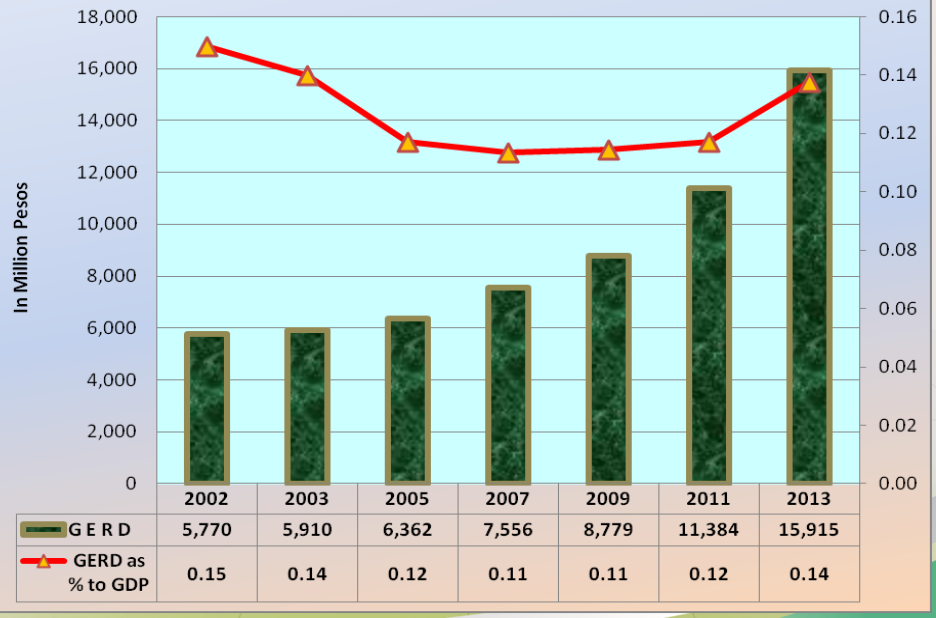


Figure 11c. Trends of Gross Expenditures for R&D (GERD)



	2002	2003	2005	2007	2009	2011	2013
G E R D	5,770	5,910	6,362	7,556	8,779	11,384	15,915
GERD as % to GDP	0.15	0.14	0.12	0.11	0.11	0.12	0.14

R&D Indicators

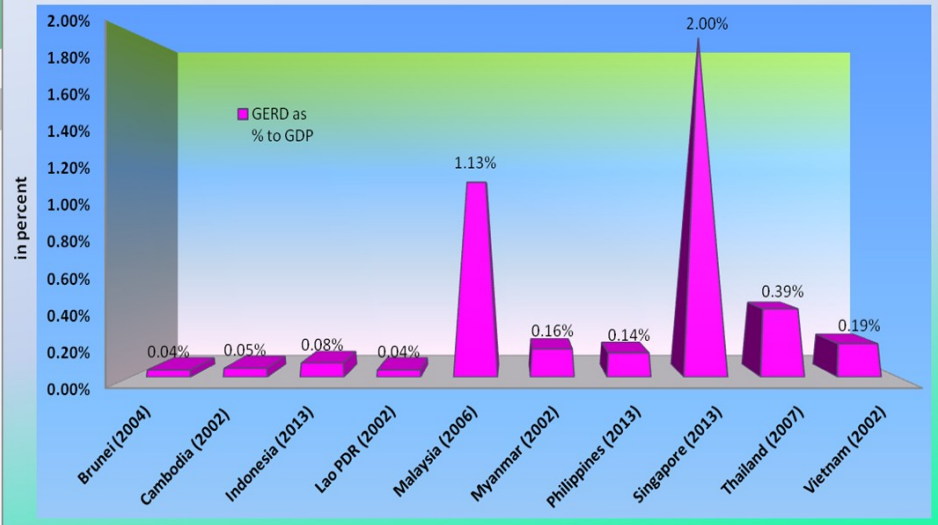
Table 14. R&D Indicators of ASEAN Member States

Country	Gross Expenditures on (GERD) (in million local currency)	GERD as % of GDP	Business-enterprise Expenditures on R&D (BERD) (in million local currency)	BERD as % of GERD	R&D Personnel (RDP)	Researchers	RDP per Million Population	Researchers per Million Population
Singapore	7,245 (2012)	2% (2012)	4,415 (2012)	61% (2012)	45,001 (2012)	38,432 (2012)	8,492 (2012)	7,252 (2012)
Malaysia	10,613 (2012)	1.13% (2012)	6,839 (2012)	64% (2012)	103,986 (2012)	75,257 (2012)	3,583 (2012)	2,593 (2012)
Thailand	40,869 (2011)	0.39% (2011)	20,684 (2011)	51% (2011)	91,472 (2011)	51,178 (2011)	1,367 (2011)	765 (2011)
Philippines	15,915 (2013)	0.14% (2013)	6,396 (2013)	40% (2013)	36,517 (2013)	26,495 (2013)	372 (2013)	270 (2013)
Indonesia	8,085,259 (2013)	0.08% (2013)	2,076,298 (2013)	26% (2013)	55,118 (2005)	41,143 (2009)	244 (2005)	173 (2009)
Vietnam	5,293,950 (2011)	0.19% (2011)	1,377,014 (2011)	26% (2011)	134,781 (2011)	41,117 (2002)	1,509 (2011)	1178 (2011)
Brunei Darussalam	2,104 (2003)	0.04% (2004)	0.049 (2003)	0.002% (2003)	n.a.	244 (2004)	n.a.	686 (2004)
Cambodia	8,357 (2002)	0.05% (2002)	1,009 (2002)	12% (2002)	1,625 (2002)	744 (2002)	128 (2002)	59 (2002)
Lao PDR	6,560 (2002)	0.04% (2002)	2,420 (2002)	37% (2002)	n.a	209 (2002)	n.a	38 (2002)
Myanmar	9,122 (2002)	0.16% (2002)	n.a	-	n.a	4,725 (2002)	n.a.	97 (2002)

Source: UNESCO Institute for Statistics

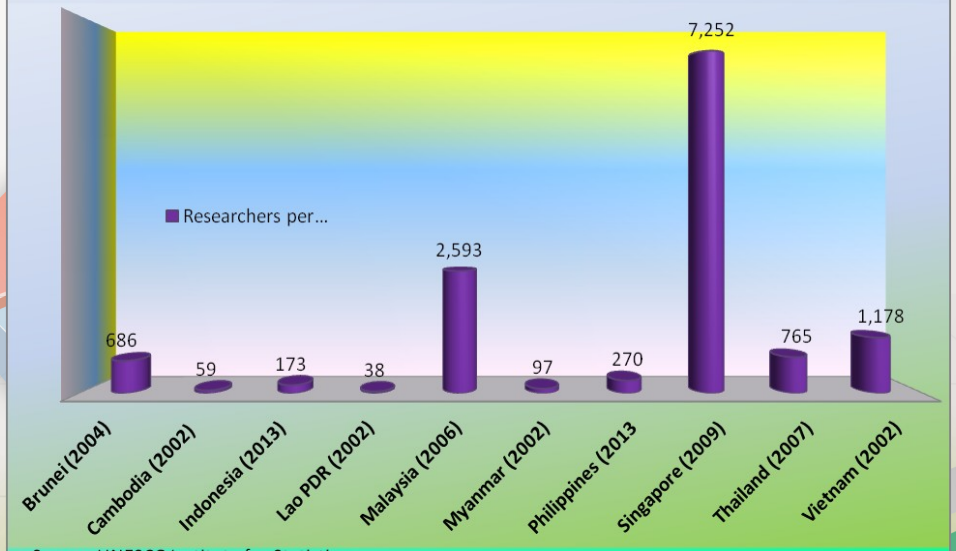
R&D Indicators

Figure 12a. GERD as % to GDP of ASEAN Member Countries

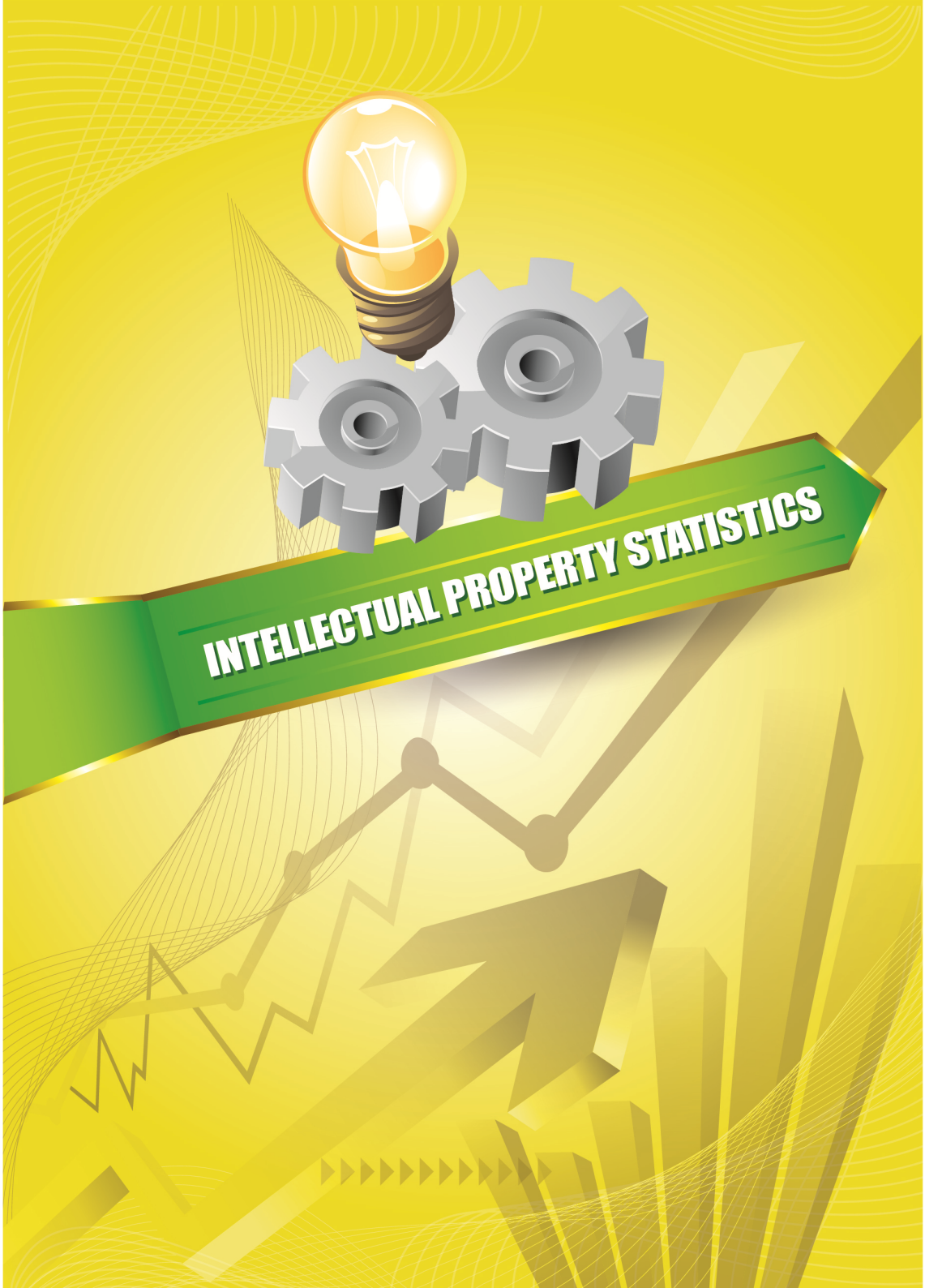


Source: UNESCO Institute for Statistics
Note: GERD - Gross Expenditures on R&D; GDP - Gross Domestic Product

Figure 12b. Numberof Researchers per Million Population of ASEAN Member Countries



Source: UNESCO Institute for Statistics


INTELLECTUAL PROPERTY STATISTICS

Intellectual Property Statistics

Table 15a. Intellectual Property Rights Applications Received from Foreign and Local Inventors by Type 2005-2015

Year	Invention		Utility Model		Industrial Design	
	Foreign	Local	Foreign	Local	Foreign	Local
2005	2,731	210	30	527	632	642
2006	3,036	227	20	527	487	472
2007	3,282	193	26	400	427	440
2008	3,099	210	30	527	571	542
2009	2,724	175	15	512	318	492
2010	3,224	167	32	594	409	435
2011	2,969	190	38	649	532	581
2012	2,803	180	29	692	474	756
2013	2,885	205	32	651	485	877
2014	3,024	263	19	758	518	815

Source: Business intelligence report dated February 12, 2016

Intellectual Property Statistics

Table 16a. Intellectual Property Rights Registered/Granted to Foreign and Local Inventors by Type 2005-2015

Year	Invention		Utility Model		Industrial Design	
	Foreign	Local	Foreign	Local	Foreign	Local
2005	1,660	15	21	287	339	425
2006	1,258	54	31	552	450	433
2007	1,988	126	36	732	860	475
2008	868	150	38	435	641	588
2009	1,685	98	20	356	404	405
2010	1,058	26	21	283	307	280
2011	1,125	26	15	373	379	366
2012	1,386	18	22	396	483	510
2013	2,039	29	21	443	500	822
2014	1,999	23	25	532	450	669

Source: Business intelligence report dated February 12, 2016


INTERNATIONAL COMPETITIVENESS RANKINGS

International Competitiveness Rankings

Table 17a. WEF's Global Competitiveness Rankings (by Factor) of Selected Countries, 2013

Factor	China	India	Indonesia	Japan	Korea, Rep.	Malaysia	Philippines	Singapore	Taiwan	Thailand	Brunei Darusalam	Cambodia	Vietnam
Global Competitiveness Index Rank	29	60	38	9	25	24	59	2	12	37	26	88	70
1. Basic requirements	31	96	45	28	20	27	78	1	16	49	18	99	86
(a) Institutions	47	72	67	17	74	29	79	3	26	78	25	91	98
(b) Infrastructure	48	85	61	9	11	29	96	2	14	47	58	101	82
(c) Macro-economic Environment	10	110	26	127	9	38	40	18	32	31	1	83	87
(d) Health & primary education	40	102	72	10	18	33	96	2	11	81	23	99	67
2. Efficiency enhancers	31	42	52	10	23	25	58	2	15	40	65	91	74
(a) Higher education & training	70	91	64	21	19	46	67	2	11	66	55	116	95
(b) Goods Market efficiency	61	85	50	16	33	10	82	1	7	34	42	55	74
(c) Labor Market efficiency	34	99	103	23	78	25	100	1	33	62	10	27	56
(d) Technological readiness	85	98	75	19	22	51	77	7	30	78	71	97	102
(e) Market size	2	3	15	4	12	26	33	34	17	22	131	92	36
3. Innovation factors	34	41	33	3	20	23	58	13	9	52	54	83	85
(a) Business sophistication	45	42	37	1	24	20	49	17	15	40	56	86	98
(b) Innovation	32	41	33	5	17	25	69	9	8	66	59	91	76

Source: Global Competitiveness Report, World Economic Forum 2013-2014 (148 countries included in ranking)

Table 17b. WEF's Global Competitiveness Rankings (by Factor) of Selected Countries, 2014

Factor	China	India	Indonesia	Japan	Korea, Rep.	Malaysia	Philippines	Singapore	Taiwan	Thailand	Brunei Darusalam	Cambodia	Vietnam
Global Competitiveness Index Rank	28	71	34	6	26	20	52	2	14	31	na	95	68
1. Basic requirements	28	92	46	25	20	23	66	1	14	40	na	103	79
(a) Institutions	47	70	53	11	82	20	67	3	27	84	na	119	92
(b) Infrastructure	46	87	56	6	14	25	91	2	11	48	na	107	81
(c) Macro-economic Environment	10	101	34	127	7	44	26	15	23	19	na	80	75
(d) Health & primary education	46	98	74	6	27	33	92	3	13	66	na	91	61
2. Efficiency enhancers	30	61	46	7	25	24	58	2	16	39	na	100	74
(a) Higher education & training	65	93	61	21	23	46	64	2	12	59	na	123	96
(b) Goods Market efficiency	56	95	48	12	33	7	70	1	11	30	na	90	78
(c) Labor Market efficiency	37	112	110	22	86	19	91	2	32	66	na	29	49
(d) Technological readiness	83	121	77	20	25	60	69	7	30	65	na	102	99
(e) Market size	2	3	15	4	11	26	35	31	17	22	na	87	34
3. Innovation factors	33	52	30	2	22	17	48	11	13	54	na	116	98
(a) Business sophistication	43	57	34	1	27	15	46	19	17	41	na	111	106
(b) Innovation	32	49	31	4	17	21	52	9	10	67	na	116	87

Source: Global Competitiveness Report, World Economic Forum 2014-2015 (144 countries included in ranking)

International Competitiveness Rankings

Table 17c. WEF's Global Competitiveness Rankings (by Factor) of Selected Countries, 2015

Factor	China	India	Indonesia	Japan	Korea, Rep.	Malaysia	Philippines	Singapore	Taiwan	Thailand	Brunei Darussalam	Cambodia	Vietnam
Global Competitiveness Index Rank	28	55	37	6	26	18	47	2	15	32	na	90	56
1. Basic requirements	28	80	49	24	18	22	66	1	14	42	na	93	72
(a) Institutions	51	60	55	13	69	23	77	2	27	82	na	111	85
(b) Infrastructure	39	81	62	5	13	24	90	2	12	44	na	101	76
(c) Macro-economic Environment	8	91	33	121	5	35	24	12	13	27	na	64	69
(d) Health & primary education	44	84	80	4	23	24	86	2	14	67	na	87	61
2. Efficiency enhancers	32	58	46	8	25	22	51	2	15	38	na	101	70
(a) Higher education & training	68	90	65	21	23	36	63	1	14	56	na	123	95
(b) Goods Market efficiency	58	91	55	11	26	6	80	1	13	30	na	93	83
(c) Labor Market efficiency	37	103	115	21	83	19	82	2	22	67	na	38	52
(d) Technological readiness	74	120	85	19	27	47	68	5	28	58	na	105	92
(e) Market size	1	3	10	4	13	26	30	35	20	18	na	90	33
3. Innovation factors	34	46	33	2	22	17	47	11	16	48	na	121	88
(a) Business sophistication	38	52	36	2	26	13	42	18	21	35	na	122	100
(b) Innovation	31	42	30	5	19	20	48	9	11	57	na	122	73

Source: Global Competitiveness Report, World Economic Forum 2015-2016 (140 countries included in ranking)

Table 18. Trend of Philippine Rankings in Global Competitiveness Factors 2010 - 2015

Factor	2010	2011	2012	2013	2014	2015
Global Competitiveness Index Rank	85	75	65	59	52	47
(No. of countries included in ranking)	*(139)*	*(142)*	*(144)*	*(148)*	*(144)*	*(140)*
1. Basic requirements	99	100	80	78	66	66
(a) Institutions	125	117	94	79	67	77
(b) Infrastructure	104	105	98	96	91	90
(c) Macro-economic Environment	68	54	36	40	26	24
(d) Health & primary education	90	92	98	96	92	86
2. Efficiency enhancers	78	70	61	58	58	51
(a) Higher education & training	73	71	64	67	64	63
(b) Goods Market efficiency	97	88	86	82	70	80
(c) Labor Market efficiency	111	113	103	100	91	82
(d) Financial Market Development	75	71	58	48	49	48
(d) Technological readiness	95	83	79	77	69	68
(e) Market size	37	36	35	33	35	30
3. Innovation factors	75	74	64	58	48	47
(a) Business sophistication	60	57	49	49	46	42
(b) Innovation	111	108	94	69	52	48

Source: Global Competitiveness Report, World Economic Forum

International Competitiveness Rankings

Tbale 18.1 INNOVATION PILLAR RANKING (by Indicator) 2010-2015
Philippines

Year	2010	2011	2012	2013	2014	2015	RANKS CLIMBED
Total Number of Countries Ranked	*139*	*142*	*144*	*148*	*144*	*140*	
Overall Rank	111	108	94	69	52	48	63
Score	2.7	2.8	3.0	3.2	3.5	4.6	
Indicators							
1) Capacity for Innovation	80	95	86	48	30	33	47
	2.8	2.7	2.9	3.8	4.5	4.6	
2) Quality of scientific research	108	106	102	91	75	69	39
	2.9	3.0	3.2	3.4	3.6	3.7	
3) Company spending on R&D	85	85	58	51	42	36	49
	2.8	2.9	3.2	3.4	3.5	3.8	
4) University-industry collaboration	85	83	79	69	55	55	30
	3.3	3.4	3.5	3.6	3.8	3.8	
5) Availability of scientists and engineers	96	97	91	87	71	67	29
	3.6	3.7	3.7	3.8	4.0	4.0	
6) Government procurement of advanced technology products	129	126	107	85	53	59	70
	2.7	2.8	3.1	3.4	3.7	3.5	
7) PCT applications per million population	71	68	83	84	86	85	-14
	0.3	0.4	0.3	0.3	0.3	0.3	

Source: Global Competitiveness Yearbook, World Economic Forum (WEF)

Table 19. IMD's Overall World Competitiveness Ranking

Country	2010	2011	2012	2013	2014	2015
	R A N K					
	53 Countries	55	55	57	58	59
China	18	19	23	21	23	22
India	31	32	35	40	44	44
Indonesia	35	37	42	39	37	42
Japan	27	26	27	24	21	27
Korea, Rep.	23	22	22	22	26	25
Malaysia	10	16	14	15	12	14
Philippines	39	41	43	38	42	41
Singapore	1	3	4	5	3	3
Taiwan	8	6	7	11	13	11
Thailand	26	27	30	27	29	30

Source: International Institute for Management Development (IMD) World Competitiveness Yearbook 2010-

Notes: The World Competitiveness rankings are based on four main factors: a) Economic performance, b) Government efficiency, c) Business efficiency, and d) Infrastructure. In turn, each of these factors are divided into sub-factors which highlight every facet of the areas analyzed. The technological and scientific infrastruc-

International Competitiveness Rankings

Table 20a. IMD's Ranking of World Competitiveness (by Factor) of Selected Countries, 2013

Factor	China	India	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Overall Rank	21	40	39	24	22	15	38	5	11	27
	57 countries included in ranking									
1. Economic performance	3	27	33	25	20	7	31	13	16	9
2. Government Efficiency	41	46	26	45	20	15	31	3	8	22
3. Business Efficiency	25	32	31	21	34	4	19	8	10	18
4. Infrastructure	26	54	56	10	19	25	57	12	16	48
(a) Basic infrastructure	8	51	41	27	23	12	54	16	19	25
(b) Technological infrastructure	20	27	54	21	11	13	40	3	5	47
(c) Scientific infrastructure	8	33	48	2	27	28	59	17	13	40
(d) Health & environment	54	60	58	8	28	42	51	25	30	55
(e) Education	45	60	52	28	25	34	59	4	21	51

Source: International Institute for Management Development (IMD) World Competitiveness Yearbook, 2013

Table 20b. IMD's Ranking of World Competitiveness (by Factor) of Selected Countries, 2014

Factor	China	India	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Overall Rank	23	44	37	21	26	12	42	3	13	29
	58 countries included in ranking									
1. Economic performance	5	21	39	25	20	9	37	6	14	12
2. Government Efficiency	34	47	25	42	26	15	40	4	12	28
3. Business Efficiency	28	34	22	19	39	5	27	7	17	25
4. Infrastructure	26	57	54	7	19	25	59	10	17	48
(a) Basic infrastructure	8	53	39	25	26	13	55	14	18	28
(b) Technological infrastructure	20	49	51	17	8	5	45	2	4	41
(c) Scientific infrastructure	7	32	56	2	6	28	59	17	9	46
(d) Health & environment	54	60	57	13	28	36	52	24	31	53
(e) Education	39	60	52	28	31	32	59	2	22	54

Source: International Institute for Management Development (IMD) World Competitiveness Yearbook, 2014

International Competitiveness Rankings

Table 20c. IMD's Ranking of World Competitiveness (by Factor) of Selected Countries, 2015

Factor	China	India	Indonesia	Japan	Korea	Malaysia	Philippines	Singapore	Taiwan	Thailand
Overall Rank	22	44	42	27	25	14	41	3	11	30
	59 countries included in ranking									
1. Economic performance	4	16	36	29	15	6	34	3	11	13
2. Government Efficiency	35	47	30	42	28	16	36	2	9	27
3. Business Efficiency	27	33	34	25	37	10	26	7	14	24
4. Infrastructure	25	58	56	13	21	27	57	7	18	46
(a) Basic infrastructure	4	45	47	29	23	12	58	13	25	30
(b) Technological infrastructure	14	38	53	23	13	5	36	2	9	44
(c) Scientific infrastructure	7	33	55	2	6	29	58	16	9	47
(d) Health & environment	53	61	59	15	30	36	55	21	29	54
(e) Education	45	61	57	38	32	35	60	3	21	48

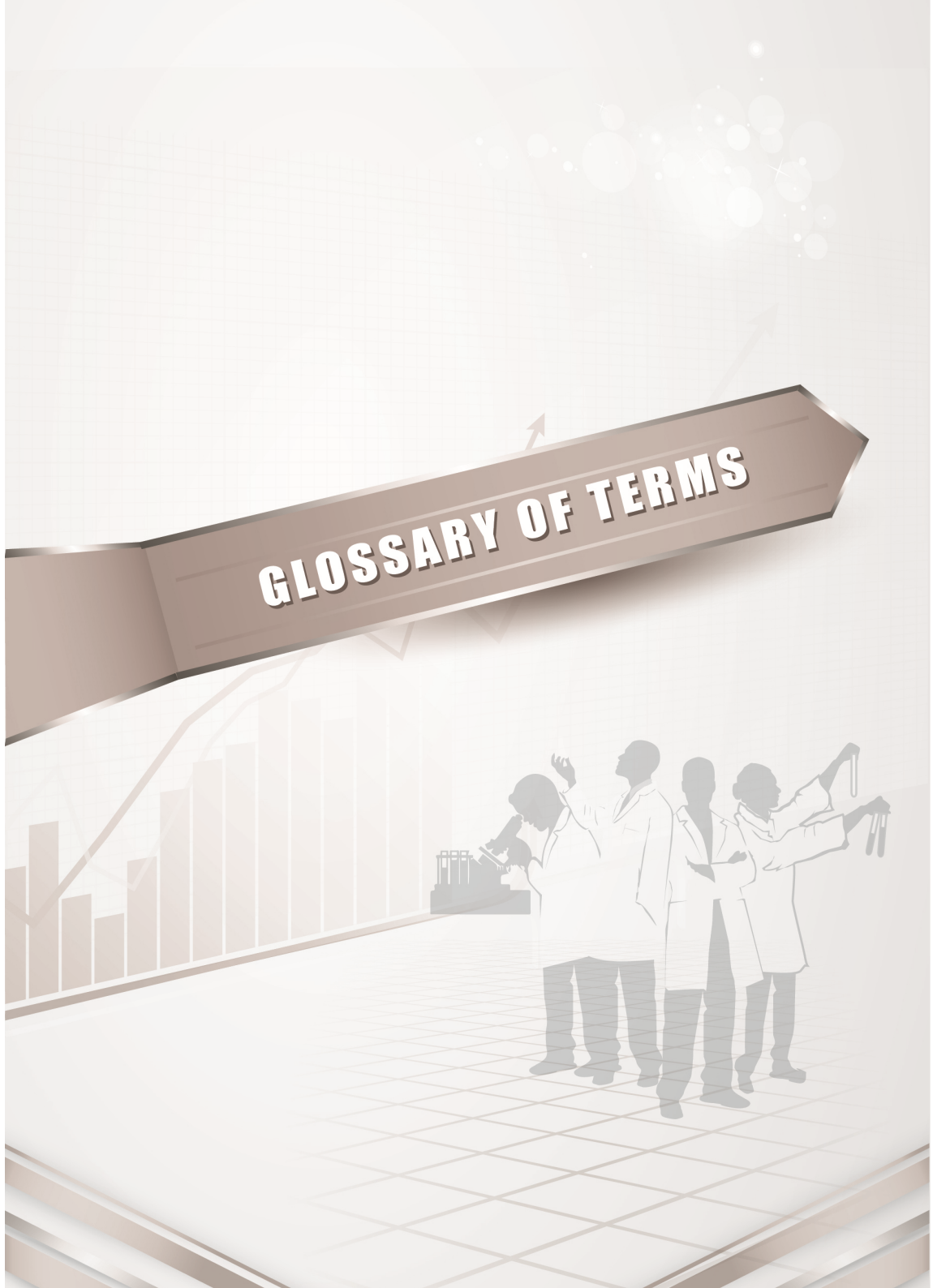
Source: International Institute for Management Development (IMD) World Competitiveness Yearbook, 2015

Table 21. Trend in Philippine Ranking in the World Competitiveness Factors, 2010-2015

Factor	2010	2011	2012	2013	2014	2015
Overall Rank	39	41	43	38	42	41
1. Economic performance	34	29	42	31	37	34
2. Government Efficiency	31	37	32	31	40	36
3. Business Efficiency	32	31	26	19	27	26
4. Infrastructure	56	57	55	57	59	57
(a) Basic infrastructure	56	57	56	54	55	58
(b) Technological infrastructure	29	32	46	40	45	36
(c) Scientific infrastructure	56	58	58	59	59	58
(d) Health & environment	48	50	50	51	52	55
(e) Education	56	57	57	59	59	60

Source: International Institute for Management Development (IMD) World Competitiveness Yearbook 2010-2015

GLOSSARY OF TERMS



Glossary of Terms

Research and Development (R&D) is defined as comprising creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications. This definition is based on UNESCO and OECD.

The basic criterion to distinguish R&D from related activities is the presence of an appreciable element of novelty and the resolution of scientific and/or technological uncertainty, i.e. when the solution to a problem is not readily apparent to someone familiar with the basic stock of common knowledge and techniques for the area concerned. (2002 OECD Frascati Manual)

R&D Personnel is defined as all the persons employed directly on R&D as well as those providing direct services such as R&D managers, administrators and clerical staff. R&D personnel are classified in four sectors of performance: business enterprise sector, government sector, higher education sector and the private non-profit sector. The reference population is the total employment. R&D personnel are classified into three categories: researchers; technicians and auxiliary personnel.

Classification of R&D Personnel by Occupation

Researchers are professionals engaged in the conception or creation of new knowledge, products, processes, methods and systems and also in the management of the projects concerned. Managers and administrators engaged in the planning and management of scientifc and technical aspects of a researcher's work also fall in this category. Postgraduate students at the PHD level engaged in R&D should be considered as researchers. They typically hold basic university degrees while working towards the PHD.

Technicians and equivalent staff are persons whose main tasks require technical knowledge and experience in one or more fields of engineering, physcal and life sciences and humanities. They participate in R&D by performing scientific and technical staff involving the concepts and operational methods, normally under the supervision of researchers. Equivalent staff performs the corresponding R&D staff under the supervision of researchers in the social sciences and humanities. Their tasks include: carrying out bibliographic searches and selcting relevant material from archives and libraries; preparing computer programmes; carrying out experiments, tests, analyses; preparing materials and equipments for experiments, tests, analyses; recording measurements, making calculations and preparing charts and graphs; carrying out statistical surveys and interviews.

Auxiliary Personnel or Other Supporting Staff includes skilled and unskilled craftsmen, secretarial and clerical staff participating in R&D projects or directly associated with such projects. Included in this heading are all managers and administrators dealing mainly with financial and personnel matters and general administration in so far as their activities are direct service to R&D.

Glossary of Terms

Fields of Science & Technology

Natural Sciences – include mathematics [pure mathematics, applied mathematics; statistics and probability]; computer science and information sciences [computer sciences, information science and bioinformatics (software development only; hardware development should be classified with the engineering fields)]; physical sciences [atomic, molecular and chemical physics (physics of atoms and molecules including collision, interaction and radiation; magnetic resonances; Mossbauer effect); condensed matter physics (including formerly solid state physics, superconductivity); particle and field physics; nuclear physics; fluids and plasma physics (including surface physics); optics (including laser optics and quantum optics); acoustics; astronomy (including astrophysics, space science)]; chemical sciences [organic chemistry, inorganic and nuclear chemistry; physical chemistry, polymer science, electrochemistry (dry cells, batteries, fuel cells, corrosion metals, electrolysis); colloid chemistry; analytical chemistry]; earth and earth related environmental sciences [geosciences, multidisciplinary; mineralogy, palaeontology, geochemistry and geophysics; physical geography; geology, volcanology, environmental sciences; meteorology and atmospheric sciences; climatic research; oceanography, hydrology and water resources]; biological sciences [cell biology, microbiology, virology, biochemistry and molecular biology; biochemical research methods; mycology; biophysics; genetics and heredity; reproductive biology; developmental biology; plant sciences, botany; zoology, ornithology, entomology, behavioral science biology; marine biology, freshwater biology, limnology; ecology, biodiversity conservation; biology (theoretical, mathematical, thermal, cryobiology, biological rhythm), evolutionary biology and other biological topics]; other natural sciences.

Engineering and Technology – include civil engineering [civil engineering; architecture engineering; construction engineering, municipal and structural engineering; transport engineering]; electrical engineering, electronic engineering, information engineering [electrical and electronic engineering; robotics and automatic control; automation and control systems; communication engineering and systems; telecommunications; computer hardware and architecture]; mechanical engineering [mechanical engineering; applied mechanics; thermodynamics; aerospace engineering; nuclear related engineering; audio engineering, reliability analysis]; chemical engineering [chemical engineering (plants, products); chemical process engineering]; materials engineering [materials engineering; ceramics; coating and films; composites (including laminates, reinforced plastics, cements, combined natural and synthetic fibre fabrics; filled composites); paper and wood; textiles; including synthetic dyes, colors, fibres]; medical engineering [medical engineering; medical laboratory technology (includes laboratory samples analysis]; environmental engineering [environmental and geological engineering; geotechnics; petroleum engineering (fuel, oils), energy and fuels; remote sensing; mining and mineral processing; marine engineering, sea vessels; ocean engineering]; industrial biotechnology [industrial biotechnology; bioprocessing technologies (industrial process relying on biological agents to drive the process) biocatalysts, fermentation; bioproducts (products that are manufactured using biological materials as feedstock) biomaterials, bioplastics, biofuels, bio-derived bulk and fine chemicals, bio-derived novel materials]; nano-technology [nano-materials (production and properties); nano-processes

(application on nano-scale)]; other engineering and related technologies [food and beverages; other engineering and technologies].

Agricultural Sciences – include agriculture, forestry, and fisheries [agriculture; forestry; fishery; soil science; horticulture, viticulture; agronomy, plant breeding and plant protection]; animal and dairy science [animal and dairy science; husbandry and pets]; veterinary science; agricultural biotechnology [agricultural biotechnology and food biotechnology; GM technology (crops and livestock), livestock cloning, marker assisted selection, diagnostics (DNA chips and biosensing devics for biopharming; agricultural biotechnology related ethics]; other agricultural sciences.

Medical Sciences – include basic medicine [anatomy and morphology; human genetics; immunology; neurosciences (including psychophysiology); pharmacology and pharmacy; medicinal chemistry; toxicology; physiology (including cytology); pathology]; clinical medicine [andrology; obstetrics and gynecology; pediatrics, cardiac and cardiovascular systems; peripheral vascular disease; hematology; respiratory systems; critical care medicines and emergency medicine; anesthesiology; orthopedics; surgery; radiology, nuclear medicine and medical imaging; transplantation; dentistry, oral surgery and medicine; dermatology and venereal diseases; allergy; rheumatology; endocrinology and metabolism (including diabetes; hormones); gastroenterology and hepatology; urology and nephrology; oncology; ophthalmology; otorhinolaryngology; psychiatry; clinical neurology; geriatrics and gerontology; general and internal medicine; other clinical medicine subjects; integrative and complementary medicine (alternative practice system)]; health sciences [health care sciences and services (including hospital administration, health care and financing); health policy and services; nursing, nutrition, dietetics; public and environmental health; tropical medicine; parasitology; infectious diseases; epidemiology; occupational health; sports and fitness sciences; social biomedical sciences (includes family planning, sexual health, psycho-oncology, political and social effects of biomedical research); medical ethics; substance abuse]; medical biotechnology [health related biotechnology; technologies involving the manipulation of cells, tissues, organs or the whole organism (assisted reproduction); technologies involving identifying the functioning of DNA, proteins and enzymes and how they influence the onset of disease and maintenance of well-being (gene-based diagnostics and therapeutic interventions (pharmacogenomics, gene-based therapeutics); biomaterials (as related to medical implants, devices, sensors); medical biotechnology related ethics]; other medical sciences.

Social Sciences – include psychology [including human – machine relations); psychology, special (including therapy for learning, speech, hearing, visual and other physical and mental disabilities]; economics and business [economics, econometrics; industrial relations; business and management]; educational sciences [education, general; including training, pedagogy, didactics; education, special (to gifted persons, those with learning disabilities)]; sociology [sociology; demography; anthropology, ethnology; social topics (women's and gender studies; social issues; family studies, social work)]; law [law, criminology, penology]; political science [political science; public administration; organization theory]; social and economic geography [environmental sciences (social aspects); cultural and economic geography; urban studies (planning and development); transport

planning and social aspects of transport)]; media and communication [journalism; information science (social aspects); library science; media and socio-cultural communication]; other social sciences [social sciences, interdisciplinary; other social sciences].

Humanities – include history and archaeology; languages and literature [general language studies; specific languages; general literature studies; literary theory; specific literatures; linguistics]; philosophy, ethics and religion [philosophy, history and philosophy of science and technology; ethics (excepts ethics related to specific subfields); theology; religious studies]; arts (arts, history of arts, performing arts, music) [arts, art history, architectural design; performing art studies (musicology, theater science, dramaturgy); folklore studies; studies on films, radio and television].

R&D Expenditure - is defined based on the "accrual" approach as expense or cost incurred by a particular R&D institution or unit in implementing the R&D project/activity during a specific reference period. It includes all expenses or costs that are paid/payable/committed/obligated, whatever the source of funds. R&D expenditures are classified into: personal services; maintenance and other operating expenses; and capital outlay.

Source of Funds

Institution's Own Funds – refer to institution's own budget

Government Funds – refer to funds provided by government institutions/agencies

Private Funds – refer to funds provided by private institutions/individuals

Foreign Funds – refer to funds provided by international organizations and bodies, foreign firms or individuals

Distribution by Socio-economic Objectives

Exploration and exploitation of the earth - covers research with objectives related to the exploration of the earth's crust and mantle, seas, oceans and atmosphere, and research on their exploitation. It also includes climatic and meteorological research, polar exploration and hydrology. Not included: research on pollution, soil improvement and land use and fishing.

Infrastructure and general planning of land-use - covers research on infrastructure and land development, including research on the construction of buildings. More generally, this covers all research relating to the general planning of land use. This includes research into protection against harmful effects in town and country planning but not research into other types of pollution.

Control and care of the environment - covers research into the control of pollution, aimed at the identification and analysis of the sources of pollution and their causes, and all pollutants, including their dispersal in the environment and effects on man, species (fauna, flora, micro-organisms) and biosphere. Development of monitoring facilities for

the measurement of all kinds of pollution is included. The same is valid for the elimination and prevention of all forms of pollution in all types of environment.

Protection and improvement of human health - covers research aimed at protecting, promoting and restoring human health, broadly interpreted to include health aspects of nutrition and food hygiene. It ranges from preventative medicine, including all aspects of medical and surgical treatment, both for individuals and groups, and the provision of hospital and home care, to social medicine and pediatric and geriatric research.

Production, distribution and rational utilization of energy - covers research into the production, storage, transportation, distribution and rational use of all forms of energy. It also includes research on processes designed to increase the efficiency of energy production and distribution, and the study of energy conservation. Not included: research relating to prospecting; research into vehicle and engine propulsion.

Agricultural production and technology - covers all research on the promotion of agriculture, forestry, fisheries and foodstuff production. It includes: research on chemical fertilizers, biocides, biological pest control and the mechanization of agriculture; research on the impact of agricultural and forestry activities on the environment; research in the field of developing food productivity and technology. Not included: research on the reduction of pollution; research into the development of rural areas, the construction and planning of buildings, the improvement of rural rest and recreation amenities and agricultural water supply; research on energy measures; research for the food industry.

Industrial production and technology - covers research on the improvement of industrial production and technology. It includes research on industrial products and their manufacturing processes, except where they form an integral part of the pursuit of other objectives (e.g. defense, space, energy, agriculture).

Social structures and relationships - covers research on social objectives, as analyzed in particular by social and human sciences, which have no obvious connection with other socioeconomic objectives. This analysis includes quantitative, qualitative, organizational and forecasting aspects of social problems.

Exploration and exploitation of space - covers all civil space research and technology. Corresponding research in the defense field is classified under defense. Although civil space research is not in general concerned with particular objectives, it frequently has a specific goal, such as the increase of general knowledge (e.g. astronomy), or relates to particular applications (e.g. telecommunications satellites).

Defense - covers research (and development) for military purposes. It also includes basic research and nuclear and space research financed by ministries of defense. Civil research financed by ministries of defense, for example in the fields of meteorology, telecommunications and health, should be classified in the relevant socioeconomic objectives.

Glossary of Terms

Intellectual Property Rights:

Intellectual Property – refers to any creation of the human mind or intellect.

Patent - is a grant issued by the government for an invention. The invention may be a product or a process that offers a new technical solution to a problem or a new way of doing something. To be patentable, the invention (1) must be new, (2) should involve an inventive step, and (3) must be industrially applicable. *(Source: IP Code of the Phil)*

Utility Model – is a protection given for machines, implements or tools, products or their composition, or an improvement of any of these that offer technical solution to a problem in any field of human activity. Any utility model may be registered provided that it is novel and industrially applicable. Protection over utility model is 7 years. *(Source: IP Code of the Phil)*

Industrial Design – Industrial Design - is a protection given to handicrafts or products known for their distinctive and aesthetic designs. The design should be new and could be used in industry. The design may two-dimensional, such as patterns, lines or colors, or three-dimensional, like the shape or surface of an article. The owner of an industrial design has the right to prevent others from making, selling, or importing for commercial purposes articles bearing or embodying a design which is a copy of the protected design. The design is protected for five (5) years, renewable for two consecutive five-year terms. *(Source: IP Code of the Phil)*

World Competitiveness Ranking is measured based on the following four main competitiveness factors:

Economic performance – refers to the macro-economic evaluation of the domestic economy: domestic economy, international trade, international investment, employment and prices.

Government efficiency – refers to the extent to which government policies are conducive to competitiveness: public finance, fiscal policy, institutional framework, business legislation and societal framework.

Business efficiency – refers to the extent to which the national environment encourages enterprises to perform in an innovative, profitable and responsible manner: productivity and efficiency, labor market, finance, management practices and attitudes and values.

Infrastructure – refers to which basic, technological, scientific and human resources meet the needs of business: basic infrastructure, technological infrastructure, scientific infrastructure, health and environment and education.

Competitiveness as defined in the Global Competitiveness Report of the World Economic Forum (WEF) is the set of institutions, policies, and factors that determine the level of productivity of a country.

The WEF's Global Competitiveness Index is measured based on the following 12 pillars organized into three subindexes, each critical to a particular stage of development:

Glossary of Terms

Basic requirements – refer to countries in the factor-driven stage.

Institutions – is the first pillar determined by the legal and administrative framework within which individuals, firms, and governments interact to generate wealth.

Infrastructure – is the second pillar critical for ensuring the effective functioning of the economy, as it is an important factor determining the location of economic activity and the kinds of activities or sectors that can develop in a particular instance.

Macroeconomic environment – is the third pillar important for business and, therefore, is important for the overall competitiveness of a country.

Health and primary education – is the fourth pillar vital to a country's competitiveness and productivity. This pillar takes into account the quantity and quality of the basic education received by the population, which is increasingly important in today's economy. Basic education increases the efficiency of each individual worker.

Efficiency enhancers – refer to countries in the efficiency-driven stage.

Higher Education and Training – is the fifth pillar which is crucial for economies that want to move up the value chain beyond simple production processes and products.

Goods Market Efficiency – is the sixth pillar in which countries with efficient goods markets are well positioned to produce the right mix of products and services given their particular supply-and-demand conditions, as well as to ensure that these goods can be most effectively traded in the economy.

Labor Market Efficiency – is the seventh pillar which is critical for ensuring that workers are allocated to their most efficient use in the economy and provided with incentives to give their best effort in their jobs. Labor markets must therefore have the flexibility to shift workers from one economic activity to another rapidly and at low cost, and to allow for wage fluctuations without much social disruption.

Financial Market Development – is the eight pillar in which an efficient financial sector allocates the resources saved by a nation's citizens, as well as those entering the economy from abroad, to their most productive uses.

Technological Readiness – is the ninth pillar which measures the agility with which an economy adopts existing technologies to enhance the productivity of its industries, with specific emphasis on its capacity to fully leverage information and communication technologies (ICT) in daily activities and production processes for increased efficiency and competitiveness.

Market size – is the tenth pillar which affects productivity since large markets allow firms to exploit economies of scale.

Innovation and Sophistication factors – refer to countries in the innovation-driven stage.

Business Sophistication – is the eleventh pillar which is conducive to higher efficiency in the production of goods and services. It concerns two elements that are intricately

linked: the quality of a country's overall business networks and the quality of individual firms' operations and strategies. These factors are particularly important for countries at an advanced stage of development, when, to a large extent, the more basic sources of productivity improvements have been exhausted.

Innovation – is the final pillar which is important for economies as they approach the frontiers of knowledge and the possibility of integrating and adapting exogenous technologies tends to disappear.

Full-time equivalence (FTE) R&D data are a measure of the actual volume of human resources devoted to R&D and are especially useful for international comparisons. One full-time equivalent may be thought of as one person-year. In other words, 1 FTE is equal to 1 person working full-time on R&D for a period of 1 year, or more persons working part-time or for a shorter period, corresponding to one person-year. Thus, a person who normally spends 30% of time on R&D and the rest on other activities (such as teaching, university administration and student counselling) should be considered as 0.3 FTE. Similarly, if a full-time R&D worker is employed at an R&D unit for only six months, this results in an FTE of 0.5

Source Definition

OECD (2002), Frascati Manual: Proposed Standard Practice for Surveys on Research and Experimental Development, §331-333.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