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Research and Development Public Expenditure Review

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RESEARCH AND DEVELOPMENT PUBLIC EXPENDITURE REVIEW

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INTRODUCTION

Research and Development (R&D) spending plays an important role in knowledge accumulation and technological innovation that can increase productivity and foster economic growth. R&D activities and projects generate new knowledge that can be used to meet national needs and improve societal well-being (OECD, 2015). A study[1], in the United States shows that R&D has significant positive effects on the state gross domestic product (GDP) and on long-run productivity (Blanco, et. al., 2015).

Studies also show that public R&D spending is seen to induce an increased R&D investment from the private sector as it is considered risky and does not guarantee returns. Fiscal incentives and subsidies from the government lessen the risk perceived by the private sector. These findings reinforce the government's role in promoting R&D to improve social welfare and explain the growing interest of governments and various international organizations in measuring R&D spending. The global average spending for R&D is about 2% in 2018 (Rao, 2020) while the United Nations Education, Scientific, and Cultural Organization suggests that R&D expenditures for developing countries should be at 1% of their GDP (Albert, et. al., 2015).

According to the Frascati Manual, a defining feature of R&D is that its activities are intended to create new, or improve on existing knowledge. R&D activities can be classified into three types: basic research, applied research, and experimental development. Basic research is experimental or theoretical work intended mainly to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view. In contrast, applied research is intended to meet specific or practical aims or to solve actual problems. Finally, experimental development draws on available knowledge and practical experience to produce additional knowledge for possible use in improving policies or programs or new products and products (OECD, 2015).

There are two main approaches of measuring government spending on R&D: (1) the *performer-based* approach, and (2) *funder-based* approach. In the performer-based approach, a survey is conducted among the R&D performers from the government, business, non-profit and academic

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[1] The study covers data from 50 states from 1963 to 2007.

sectors within the economy, to gather data on their intramural[2] R&D activities in a given year. The aggregate R&D expenditures generated from this survey is called the Gross Domestic Expenditures on R&D (GERD) which is a primary indicator used in international comparisons of R&D spending of countries. While the survey-based approach can generate data on how much the government spends for intramural R&D as a fraction of the GERD, the data takes time to produce.

Meanwhile, the complementary funder-based approach, using data from government budgets, identifies all budget items that may support R&D activities (OECD, 2015). It enables timely reporting of government R&D funding. Consistent with the International Monetary Fund's Government Finance Statistics, this approach referred to as "government budget appropriations or outlays for R&D (GBAORD) makes it possible to analyze R&D spending by policy considerations through classification of budget allocations by socioeconomic objectives. Note, however, that GBAORD data provide no breakdown of government spending by R&D type (i.e., basic and applied research and experimental development).

Developed countries have recognized the significant role of higher levels of public R&D spending to spur economic growth with European Union (EU) setting a public R&D expenditure target at 1% of GDP. According to the 2019 Global Competitiveness Ranking, the Philippines' R&D expenditure only amounts to 0.1% of its GDP which garnered it a rank of 102[3] in this criterion – three places lower from the previous report. The country also lags behind most of its ASEAN counterparts in R&D spending and is at par with Indonesia and Cambodia. Note that spending level is just one aspect of making R&D expenditures work for economic growth and development. The quality of R&D spending also matters a lot. Thus, this paper probes not only the level of R&D spending by government, but also the types of R&D programs being funded and prioritized.

Given the gaps in Philippine R&D performance, limited funds, and the dearth of studies on Philippine R&D budgetary spending, the expenditure review seeks to examine the levels of allocation, distribution, and utilization of R&D funds. Further, it traces the funding mechanisms and the fund flows for different sectoral priorities/areas and R&D programs.

I. KEY POLICIES ON R&D

The Philippine government recognizes the contribution of innovation towards growth and development. As written in the 1987 Constitution, "Science and Technology (S&T) are essential for national development and progress"[4]. The Constitution also acknowledges the role of research in the development of certain sectors such as agriculture and health. The State is mandated to prioritize research & development, invention, and their utilization, to promote and encourage the participation of the private sector in innovation, and to protect the exclusive rights of scientists, inventors, and other gifted citizens to their intellectual property. Additionally, Congress is given

[2] Intramural R&D expenditures are all current expenditures (including labor and other costs) plus gross fixed capital expenditures (for land, buildings, machinery and equipment) for R&D performers during a reference period, regardless of the sources of R&D funding (OECD, 2015:30).
[3] Out of 141 countries
[4] Article 14, Section 10

the power to provide incentives such as tax deductions to foster private R&D investment and to grant aid and incentives to S&T students and workers.

In order to pursue this constitutional mandate, through the Executive Order (EO) No. 128, the National Science and Technology Authority was reorganized in 1987 to the present Department of Science and Technology (DOST). The main objectives of this was: (1) support and encourage local scientific and technological efforts that address national and local problems and contribute to national development, (2) promote the development of local capability in S&T to achieve technological self-reliance in vital sectors and to support public and private sector partnership in this regard, and (3) encourage and support private sector initiatives in S&T and provide the necessary incentives and assistance for the private sector to take on a greater role in the country's R&D efforts.

The EO authorizes the Office of the Secretary (OSEC) to provide central direction, leadership, and coordination of the S&T efforts. It also establishes sectoral planning councils in the sectors of Industry and Energy, Health, Agriculture and Natural Resources, Aquatic and Marine Resources, and Advanced Science and Technology. Currently, there are three sectoral councils: the Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development (PCAARD), the Philippine Council for Health Research and Development (PCHRD), and the Philippine Council for Industry, Energy, and Emerging Technology Research and Development (PCIEERD). The sectoral councils are tasked to formulate strategies and policies as well as program, allocate, and monitor government and external funds for the R&D of its sector.

EO No. 128 also creates research institutes such as the Food and Nutrition Research Institute (FNRI), the Advanced Science and Technology Institute (ASTI), and the Philippine Textile Research Institute (PTRI). The Research Institutes are given the responsibility to undertake applied research and development to develop technologies and technological innovation in their respective field of science.

The government also provides incentives to encourage the private sector to invest in R&D. One of these is stipulated in the National Internal Revenue Code. Corporations and businesses enjoy tax deductions for their R&D expenditure[5]. In the newly-passed Corporate Recovery and Tax Incentives for Enterprises (CREATE) law that amended the Tax Code, R&D activities that result to breakthroughs in Science and Health are considered Tier 3 investments that are given the longest income tax holiday, special corporate income tax, and enhanced deductions[6].

As support to the increased technological innovation of the Micro, Small, and Medium Enterprises (MSMEs), the Philippine Innovation Act (PIA) was passed in 2019 while its implementing rules and regulations (IRR) was approved in 2020. A key objective of the Act is "to generate and scale up the education, training, research, and development towards promoting innovation, internalization, and digitalization activities of MSMEs as driver of sustainable and inclusive

[5] *Section 34 (I) of the National Internal Revenue Code*
[6] *Section 296 of RA 11534 (CREATE Law)*

growth." It helps the MSMEs become a part of the domestic and global supply chain through innovation, with the technical and financial support from the government.

One of the salient features of PIA is the institution of a National Innovation Council (NIC) which held its first meeting on February 4, 2022. The Council is tasked to develop the National Innovation Agenda and Strategic Document containing the country's vision and long-term goals for innovation, as well as the strategies and a ction plans for improving innovation governance. Current goal-setting documents in R&D such as the Harmonized National Research & Development Agenda (HNRDA) must be consistent with the strategic document. The NIC will also manage the Innovation Fund, a revolving fund in the initial amount of P1 billion to fund innovative entrepreneurial solutions benefitting the poorest of the poor. It will screen and approve qualified proposals, and administer the Fund.

The HNRDA was devised by the DOST, National Research Council of the Philippines (NRCP), and the Sectoral Councils in 2017 to determine the priority areas for public R&D as part of the General Provisions of the 2018 General Appropriations Act (GAA). Subsequently, the 2019-2022 GAAs contain sections requiring government agencies to align their R&D programs under the HNRDA for funding amounting to P10 million and above. These provisions mandate the DOST, in coordination with government research institutions and other agencies, to disseminate the output programs and projects under the HNRDA to appropriate government agencies, LGUs, academe, industry and communities.

The updated Philippine Development Plan (PDP) 2017-2022 acknowledges the need to advance innovation as a way to build a healthy and resilient Philippines especially after the COVID-19 pandemic. This includes the rollout of technologies that will help address the pandemic. The government's mid-term strategy to vigorously advance (S&T) is two-pronged. *First,* a scale-up of technology adoption through increased S&T application in agriculture, industry, services, and health as well as increased investments in S&T-based startups and enterprises. *Second,* an innovation acceleration through enhanced creative capacity for knowledge and technology and strengthened collaboration among S&T stakeholders. Some identified bills to be passed to support the S&T sector are Science for Change Act and the Establishment of the Philippine Virology Science and Technology Institute.

II. PHILIPPINES' R&D SPENDING

Despite policy efforts, the country lags behind in its R&D spending especially when examined in contrast to other countries' R&D spending. Table 1 shows the Gross Domestic Expenditure on R&D (GERD) of selected East and South East Asian (SEA) countries that have available GERD data in 2011, 2013, and 2015. All countries' GERD levels have consistently grown over the years. While this is so, East Asian countries like China, Japan, and Korea have a noticeably higher GERD compared to the SEA countries. Singapore, the SEA nation with the highest spending, has a

GERD of PPP$[7] 9.5 billion which is seven times less than Korea's GERD level of PPP$ 69.3 billion.

This gap in expenditure levels is more apparent when the Philippines is measured against other SEA countries. The Philippines' GERD level is only at PPP$ 1 billion in 2015 – only a tenth of Singapore's R&D expenditure. The Philippines' expenditure level amounts to only half of Vietnam, the country with the second lowest GERD level. Moreover, the Philippines' spending only takes up less than 1% of China or Japan's R&D spending levels. In terms of R&D spending as % of GDP, the Philippines also lags at 0.2% in 2015 while Vietnam and Thailand posts 0.4% and 0.6%, respectively. This illustrates how low the country's GERD is versus its neighboring nations.

TABLE 1
GROSS DOMESTIC EXPENDITURE ON R&D (GERD)
(2011-2015, IN PPP$ MILLIONS)

Country	2011		2013		2015	
	PPP Millions	% of GDP	PPP Millions	% of GDP	PPP Millions	% of GDP
China	219.604.9	1.8	286,454.3	2.0	339,143.1	2.1
Japan	131,765.5	3.2	139,361.6	3.3	140,171.6	3.2
South Korea	55,822.9	3.6	64,871.3	4.0	69,299.1	4.0
Singapore	7,655.7	2.1	7,787.7	1.9	9,457.3	2.2
Malaysia	5,725.8	1.0	no data available		8,720.6	1.3
Thailand	2,939.7	0.4	3,955.4	0.4	5,746.7	0.6
Viet Nam	682.1	0.2	1,484.6	0.4	1,982.0	0.4
Philippines	560.4	0.1	752.7	0.1	1,010.9	0.2

Source: UNESCO Institute of Statistics

Lower R&D spending has placed the SEA countries (except for Singapore) in the middle of global innovation rankings. Table 2 summarizes the standings of selected ASEAN countries in the 2019 Global Competitiveness Ranking. Out of 141 countries, the Philippines ranked 64th overall but ranked worse in Innovation Capability at 72nd and in R&D at 87th. While the Philippines fared better than Vietnam overall, and ranked better than Indonesia and Vietnam in Innovation Capability, it ranked last in R&D among the selected countries.

Out of the R&D components, the Philippines' standings in R&D expenditure, patent applications, and research institutions prominence are much lower than its rank for scientific publications. In contrast to other ASEAN nations, the Philippines is far behind Singapore, Malaysia, and Thailand as the three countries' R&D expenditure are fairly high with Singapore ranking 14th, Malaysia 24th and Thailand 48th. However, it is worthy to note that Indonesia ranked slightly higher (83rd) than the Philippines in R&D despite posting a lower R&D expenditure rank of 116.

[7] *Purchasing Power Parity $ – standardizes different countries' currencies through a basket of goods approach*

TABLE 2
GLOBAL COMPETITIVENESS RANKING
OUT OF 141 COUNTRIES, 2019

Indicator	PH	Singapore	Thailand	Indonesia	Malaysia	Vietnam
Overall Ranking	**64**	**1**	**40**	**50**	**27**	**67**
Innovation Capability	**72**	**13**	**50**	**74**	**30**	**76**
Research and Development	87	21	56	83	39	72
Scientific Publications	55	23	39	56	44	59
Patent Applications	79	15	66	101	41	91
R&D Expenditure	102	14	48	116	24	70
Research Institutions Prominence	72	21	43	45	38	58

Note: Other indicators aside from R&D are Interaction and Diversity and Commercialization
Source: World Economic Forum

Table 3 shows the ranking based on the 2021 Global Innovation Index for the same selected ASEAN countries. The Philippines ranked 51st out of 132 countries overall. In the ASEAN region, the Philippines only surpassed Indonesia and is lagging behind Singapore, Malaysia, Thailand, and Vietnam. Philippines ranked the best in Knowledge and Technology Outputs at 24th and Business Sophistication at 33rd—besting the selected countries except Singapore.

In contrast, Philippines did not do as well in Infrastructure and Market Sophistication as it ranked the lowest amongst the six countries. Consistent with the competitiveness ranking, its worst standing is in Institutions at 90th. This suggests that Philippines should ensure that its R&D institutions are provided with proper support, both in terms of human capital and technological improvements.

TABLE 3
GLOBAL INNOVATION INDEX
OUT OF 132 COUNTRIES, 2021

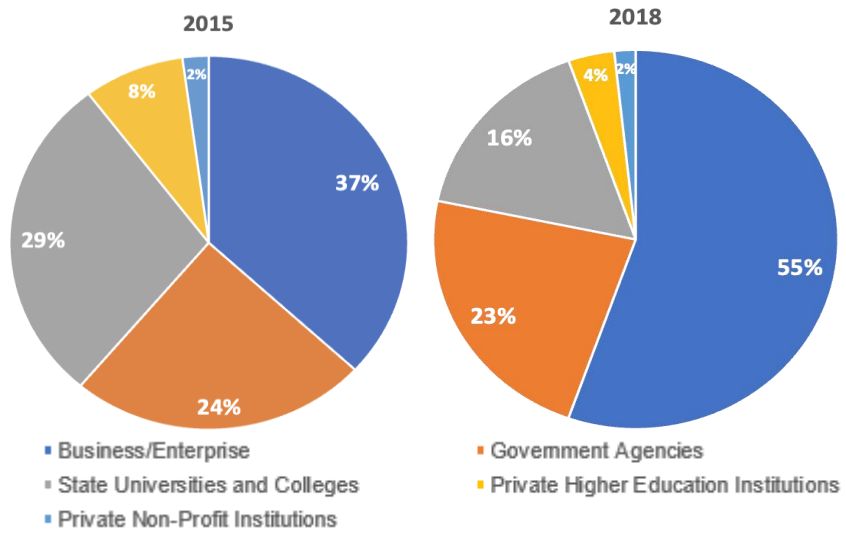
Indicator	PH	Singapore	Thailand	Indonesia	Malaysia	Vietnam
Overall Ranking	**51**	**8**	**43**	**87**	**36**	**44**
Institutions	90	1	64	107	41	83
Human Capital & Research	80	9	63	91	39	79
Infrastructure	86	15	61	68	51	79
Market Sophistication	86	5	27	57	30	22
Business Sophistication	33	3	36	110	39	47
Knowledge & Technology Outputs	24	13	40	74	31	41
Creative Outputs	65	17	55	91	37	42

Source: Global Innovation Index

Distribution of R&D Expenditures

With its mandate to monitor the country's science, technology, and innovation, particularly its R&D activities, DOST conducts nationwide surveys[8] to collect data on financial and human resources devoted to R&D. The latest statistics gathered are compiled in the Compendium of S&T Statistics which is updated every three years. Data sources of the Compendium include the DOST's National Survey of R&D expenditures and Human Resources covering government, higher education, and private non-profit institutions. R&D data for the private business and industry sector from the Philippine Statistical Authority (PSA) is also included.

FIGURE 1
R&D EXPENDITURE BY PERFORMING SECTOR[9]
(IN PERCENT SHARE)



Source of basic data: DOST Compendium 2015, 2018

Total R&D Expenditures in 2018 based on the DOST Compendium amounts to P58.9 billion. Figure 1 shows the breakdown of R&D expenditures as follows: Business/Enterprise sector at P32.6 billion (55.4%), Government Agencies at P13.5 billion (22.9%), State Universities and Colleges (SUC) at P9.6 billion (16.3%), Private Higher Education Institutions (HEIs) at P2.2 billion (3.7%), and Private Non-Profit Institutions at P1.0 billion (1.7%). The 2018 spending of all sectors went up from their 2015 levels. The Business sector also had increased share in overall R&D spending compared to 2015 while the share of SUC expenditures went down.

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[8] The 2018 R&D Survey commissioned by the DOST to UPLB INSTAT had a sample size of 795 with breakdown of respondents as follows: government agencies (262), private non-profit institutions (67), and higher education institutions (466). PF the national sample size (795), 81% responded. Meanwhile, the data on business enterprises was drawn from the Annual Survey of Philippine Business and Industry (ASPBI) of the Philippine Statistics Authority.

[9] The GERD data covers four R&D performing sectors: government agencies, higher education institutions (SUCs and private HEIs), business enterprises, and private non-profit institutions. Data reported include the spending of these sectors from all fund sources.

By Socioeconomic Objectives.[10] Total R&D expenditures net of business amounted to P26.2 billion in 2018 with more than one-third (36.8%) or P9.7 billion spent on Agricultural Production and Technology which covers all research on agriculture, forestry, fisheries, and food production. Spending on Agriculture went up from P3.6 billion (+166.9%) in 2015, pushing its funding share by 10.5 percentage points from 26.3% in 2015.

Spending on the Control and Care of the Environment which covers research on the identification of the sources and causes of pollution and its effects grew by 110.6% from P1.8 billion in 2015 to P3.9 billion in 2018. Similarly, the expenditure on the Exploration and Exploitation of the Earth (EEE) (i.e., research on the exploration and exploitation of the earth's crust and mantle, seas, oceans, and atmosphere, including climatic and meteorological research) posted fast growth in 2018 as it tripled to P2.8 billion, recovering from its 52.0% decline in 2015.

The huge spending increase for Environment and EEE overtook the expenditure on the Protection and Improvement of Human Health which covers R&D on health, including nutrition and food hygiene, despite its 17.0% increase to P2.3 billion in 2018. This has brought the share of spending on Health R&D to fourth highest (from second highest in 2015 as its share went down to 8.8% in 2018).

TABLE 4
TOTAL R&D SPENDING (NET OF BUSINESS) BY SOCIO-ECONOMIC OBJECTIVES

Socio-Economic Objective	Amounts (in Million Pesos)			Share to Total			Growth Rates	
	2013	2015	2018	2013	2015	2018	'13-15	'15-18
Agricultural production and tech.	3,096.1	3,621.5	9,665.8	30.3	26.2	36.8	17.0	166.9
Control and care of the environment	727.7	1,831.5	3,857.2	7.1	13.3	14.7	151.7	110.6
Exploration and exploitation of the earth	2,204.6	929.9	2,799.8	21.6	6.7	10.7	-57.8	201.1
Protection and improvement of human health	572.4	1,975.3	2,312.0	5.6	14.3	8.8	245.1	17.0
Industrial production and technology	547.9	1,613.5	1,796.3	5.4	11.7	6.8	194.5	11.3
Social structures and relationships	445.2	937.4	1,196.2	4.4	6.8	4.6	110.6	27.6
Education	-	-	1,066.0	-	-	4.1	N/A	N/A
Access to information and knowledge	1,111.3	1,379.6	1,000.8	10.9	10.0	3.8	24.1	-27.5
Production, distribution, and rational utilization of energy	108.3	212.5	911.8	1.1	1.5	3.5	96.2	329.1
Infrastructure and general planning of land-use	378.2	277.3	887.1	3.7	2.0	3.4	-26.7	219.9
Culture, recreation, religion, and mass media	-	-	624.6	-	-	2.4	N/A	N/A
Defense	139.9	10.1	118.0	1.4	0.1	0.4	-92.8	1067.1
Exploration and exploitation of space	1.7	212.5	13.4	0.0	1.5	0.1	12574.2	-93.7
Others (not elsewhere classified)	881.8	802.0	-	8.6	5.8	-	-9.1	-100.0
Not Classified	13.5	-	-	0.1	-	-	-100.0	N/A
TOTAL, Net of Business	**10,228.6**	**13,803.0**	**26,249.0**	**100.0**	**100.0**	**100.0**	**34.9**	**90.2**

Source of basic data: DOST Compendium 2018

[10] *The socio-economic objectives identified in the DOST compendium refer to 'societal goals to which the research outputs will have the main influence and relevance.'*

Meanwhile, Table 5 shows that total Government R&D expenditures went up from P5.3 billion to P13.5 billion in 2018 or a 153.8% increase from its 2015 spending level. Huge increase in government R&D is accounted for by spending in agriculture in 2018 to P7.8 billion which is five times more than the 2015 figure and makes up 58.2% of total government R&D. This is a complete turn-around from the 24.7% decline in spending in 2015. R&D spending on Agriculture is followed by spending on Industrial Production and Technology which grew to P1.3 billion or by 20.7%.

The government also directed more R&D funding towards Environment and Health. Spending for the Environment sector grew by 252.9%, now amounting to P1.2 billion in 2018 from P351.6 million in 2015. The same trend is seen with Health and Energy. In 2018, Health R&D spending almost doubled (+89.4%) from P431.3 million to P816.7 million while Energy R&D expenditures went up from P37.9 million to P552.7 million. Meanwhile, R&D spending on ICT was high in 2013 and 2015 at P977.0 million and P1.1 billion but went down in 2018 by 35.7% to a level of P675.1 million.

TABLE 5
GOVERNMENT R&D SPENDING BY SOCIO-ECONOMIC OBJECTIVES

Socio-Economic Objective	Amounts (in Million Pesos)			Share to Total			Growth Rates	
	2013	2015	2018	2013	2015	2018	'13-15	'15-18
Agricultural production and technology	2,089.7	1,574.2	7,836.3	44.2	29.7	58.2	-24.7	397.8
Industrial production and technology	406.5	1,072.7	1,294.5	8.6	20.2	9.6	163.9	20.7
Access to information and knowledge	977.0	1,050.3	675.1	20.6	19.8	5.0	7.5	-35.7
Protection and improvement of human health	220.5	431.3	816.7	4.7	8.1	6.1	95.6	89.4
Control and care of the environment	43.9	351.6	1,240.8	0.9	6.6	9.2	701.5	252.9
Others (not elsewhere classified)	618.3	241.6	-	13.1	4.6	-	-60.9	-100.0
Social structures and relationships	78.9	232.2	207.8	1.7	4.4	1.5	194.4	-10.5
Exploration and exploitation of the earth	16.5	212.7	369.8	0.3	4.0	2.7	1158.4	73.9
Infrastructure and general planning of land-use	88.2	97.4	125.1	1.9	1.8	0.9	10.4	28.5
Production, distribution, and rational utilization of energy	41.5	37.9	552.7	0.9	0.7	4.1	-8.8	1359.8
Defense	139.8	1.2	68.8	3.0	0.0	0.5	-99.1	5656.0
Exploration and exploitation of space	0.5	-	4.8	0.0	-	0.0	-100.0	N/A
Not classified	9.8	-	-	0.2	-	-	-100.0	N/A
Education	-	-	191.8	-	-	1.4	N/A	N/A
Culture, recreation, religion, and mass media	-	-	77.1	-	-	0.6	N/A	N/A
TOTAL	**4,731.1**	**5,303.0**	**13,461.3**	**100.0**	**100.0**	**100.0**	**12.1**	**153.8**

Note: Government spending of P13.5 billion is net of SUCs.
Source of basic data: DOST Compendium 2018

By Type of Research. Government agencies and SUCs performing R&D spent most of their R&D funds on applied research *(Table 6)*. In particular, Government used almost three-fourth (71.5%) of its R&D funds on applied research compared to 47.9% for SUCs (Public HEIs). The focus on applied research is very pronounced in private non-profit institutions (81.1%). Note further that experimental R&D had the lowest share of spending among R&D performers from the government, academic, and nonprofit sectors.

TABLE 6
ESTIMATED SHARE OF R&D PUBLIC EXPENDITURES (%)
BY TYPE OF RESEARCH, 2018

Type of Research	R&D Performing Sector				
	Government	Public HEIs	Private HEIs	PNPI	Overall
Basic research	17.7	36.9	35.2	17.1	25.3
Applied research	71.5	47.9	44.3	81.1	62.7
Experimental development	10.8	15.3	20.6	1.8	11.9

Source of basic data: UPLB Institute of Statistics. (May 2021). 2018 R&D Survey Report

By Field of Science. Table 7 shows that among government agencies that perform R&D, over 50% of R&D spending was focused on the Agricultural Sciences, followed by Engineering and Technology (21.5%) and Natural Sciences (17.4%). In comparison, SUCs spent 39% of their R&D funds on the Natural Sciences and only around 17% was for Agricultural Sciences which is the main focus of government agencies performing R&D. Note that private non-profit institutions, which also depend largely on government funding, focused 80% of their R&D funds on the Agricultural Sciences. In contrast to the other R&D performing sectors, private HEIs focused the largest portion of their R&D funds on Engineering and Technology (28%), Social Sciences (25%) and Natural Sciences (22%).

TABLE 7
R&D EXPENDITURES BY FIELD OF SCIENCE

Type of Research	R&D Performing Sector			
	Government	SUCs	Private HEIs	PNPI
Natural sciences	17.4%	38.9%	21.5%	8.4%
Engineering and technology	21.5%	15.3%	28.2%	4.5%
Agricultural sciences	50.2%	16.7%	7.4%	80.4%
Medical sciences	2.9%	8.6%	9.6%	0.3%
Social sciences	4.5%	17.0%	24.8%	4.6%
Humanities	1.2%	2.6%	7.7%	1.0%
Others	2.3%	0.9%	0.8%	0.7%

Source of basic information: Appendix Table B4.3 Percent Distribution of R&D Expenditures by Type of Research. UPLB Institute of Statistics (May 2021). Research and Development Survey, 2018, p. 72

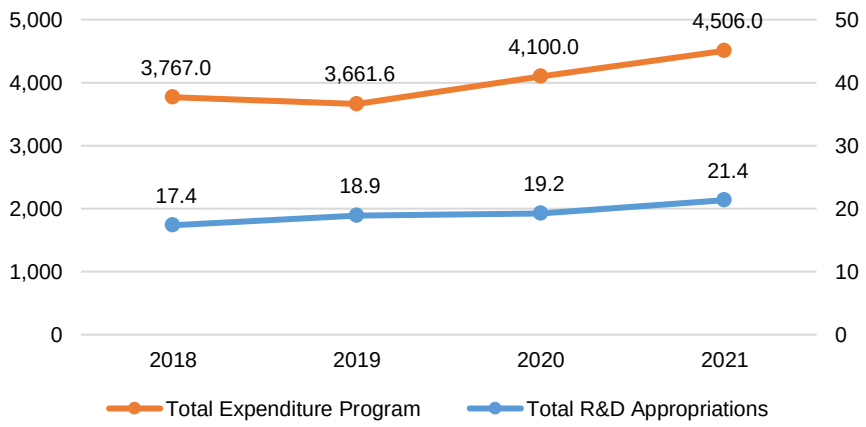
BUDGETARY ALLOCATIONS FOR R&D

As part of the budget process, the Department of the Budget of Management (DBM) submits to the Congress the Executive's proposed expenditure program through a number of budget documents. This includes the Budget of Expenditures and Sources of Financing (BESF) which presents the total expenditure program for the incoming budget year. The expenditure data used in this review are from the Table B.5.B on the Classification of the Functions of Government (COFOG) from the BESF. Expenditure classifications used in the COFOG are based on the definitions given by the Government Finance Statistics Manual (GFSM) of the International Monetary Fund (IMF), an internationally recognized statistical reporting framework.

The R&D budgetary allocations are presented to highlight the government's intended R&D spending through the years in terms of sectoral priorities, implementing agencies, and the national research agenda. Since the COFOG data is based on the approved funding levels in the yearly GAA, it should not be confused with the previously discussed GERD data from the DOST survey which reports the estimates of R&D spending of the performing sectors taking into account all fund sources (including foreign funding).

For the purpose of this study, the R&D classification of each sector in the COFOG was aggregated to get the total R&D spending of the country while the sector classification was used as is. Figures used were based on the numbers as approved in the General Appropriations Act (GAA) from 2018 to 2021. Some limitations with using the COFOG for R&D public appropriations data are: (1) high discretion is given to the agency staff in determining the inclusion of a certain item in a specific R&D sector due to the broad definitions given by the GFSM, and (2) capital outlay items (e.g., repair of certain buildings, procurement of new equipment) as well as scholarships and technical assistance items are included as part of the R&D funding. To lessen data fluctuations due to re-classification of sectors, the 2021 COFOG sector classification was adopted as the final classification of the expenditure item regardless of its sector in the previous years.

FIGURE 2
TOTAL R&D APPROPRIATIONS, 2018 – 2021
(IN BILLION PESOS)



Source of basic data: DBM BESF

Total expenditure program for 2021 is at P4.5 trillion as presented in Figure 2. Out of the P4.5 trillion national government budget, total R&D appropriations account for 0.47% at P21.4 billion. The government budget grew by 9.9% from its 2020 level of P4.1 trillion and by 19.6% from its 2018 level of P3.8 trillion. The R&D budget consistently grew from 2018 to 2021, growing double-digit in 2021 from its 2020 level of P19.2 billion. Since both the R&D sector and total expenditure program have been growing, share of the R&D sector to total budget has been steady at around 0.47%.

Looking closely into the R&D budget by sub-sector as shown in Figure 2, bulk of the funding goes to the Economic Affairs and Education sub-sectors. Out of the P21.4 billion R&D appropriations, P9.7 billion (45.6%) was allocated to Economic Affairs while P6.5 billion (30.6%) went to Education. Despite a dip in funding for the Economic sub-sector in 2020, it posted a high growth rate of 16.2% in 2021 with a budget exceeding that of 2019. On the other hand, Education funding had been consistently growing from 2018 to 2020 but declined by P870.6 million (-11.8%) in 2021.

Other sub-sectors that are also given a fairly higher funding are Health, Environmental Protection, and General Public Services. About P1.7 billion (7.9%) was appropriated for Health R&D in 2021, while Environmental Protection received P1.3 billion (6.2%) and General Public Services with P1.2 billion (5.8%). Health R&D funding has been steady at over P1 billion for the past four years but has gone up in 2021, overtaking the allocation level of General Public Services. Similarly, the funding for Environmental Protection R&D shot up in 2021 with a 65.7% growth rate, effectively surpassing the funding of General Public Services as well despite its growth of 22.6%.

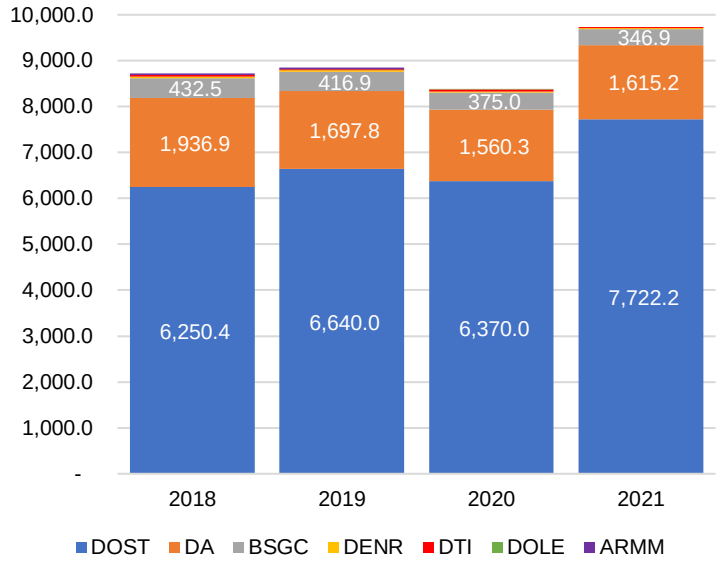
TABLE 8
R&D APPROPRIATIONS BY SUB-SECTOR, 2018-2021

Sector	Amounts (in Million Pesos)				Share to Total			
	2018	2019	2020	2021	2018	2019	2020	2021
Basic Research	250.6	342.4	261.9	361.2	1.4	1.8	1.4	1.7
Defense	630.8	84.7	140.0	258.4	3.6	0.4	0.7	1.2
Economic affairs	8,718.9	8,844.6	8,375.9	9,736.0	50.2	46.8	43.6	45.6
Education	4,566.1	5,057.9	7,408.2	6,537.5	26.3	26.8	38.6	30.6
Environmental protection	760.1	1,736.1	798.4	1,322.9	4.4	9.2	4.2	6.2
General public services	1,308.2	1,132.4	1,018.7	1,248.9	7.5	6.0	5.3	5.8
Health	1,031.6	1,202.5	1,015.1	1,685.7	5.9	6.4	5.3	7.9
Public order and safety	84.3	89.9	85.6	88.7	0.5	0.5	0.4	0.4
Recreation, culture and religion	17.3	398.7	21.4	20.9	0.1	2.1	0.1	0.1
Social protection	-	-	76.5	90.6	-	-	0.4	0.4
TOTAL	**17,368.0**	**18,889.0**	**19,201.6**	**21,350.9**	**100.0**	**100.0**	**100.0**	**100.0**

Source of basic data: DBM COFOG data

Due to their large funding share, the Economic Affairs and the Education sub-sectors were further examined. The Economic Affairs sub-sector includes applied research for economic industries such as agriculture, forestry, mining, manufacturing, energy production, transport, and communication. Figure 3 shows that DOST plays a great role in the sub-sector with a funding of P6.4 billion (76.1%) allocated to the department in 2020 and increased by 21.2% to P7.7 billion (79.3%) in 2021. The budget increase posted by the sub-sector in years 2020 and 2021 were all appropriated towards DOST as funding for DA and BSGC programs hardly changed.

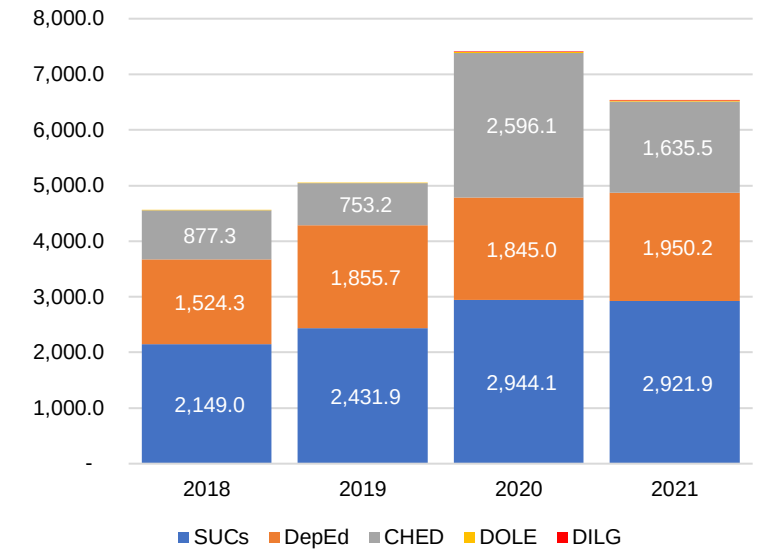
FIGURE 3
ECONOMIC SUB-SECTOR R&D APPROPRIATIONS BY DEPARTMENT
(AMOUNTS IN MILLION PESOS, 2018-2021)



Source of basic data: DBM COFOG data

Meanwhile, the Education sub-sector is mainly composed of funding for the R&D programs of SUCs, DepEd, and CHED as seen in Figure 4. All research programs under SUCs are automatically classified under the Education sub-sector regardless of its research subject. Similarly, all R&D related programs of CHED and DepEd (e.g., policy research, R&D scholarships) are also automatically included in the Education sub-sector. The sub-sector grew significantly in 2020 from 2019 from P5.1 billion to P7.4 billion (+46.5%). This growth was driven by a 21.1% increase in SUC appropriations which accounts for almost half of the sub-sector with funding levels of P2.9 billion for both 2020 and 2021. Further, CHED posted a higher allocation of 244.7% or an additional P1.8 million in 2020 due to the inclusion of the scholarships to faculty in the R&D classification.

FIGURE 4
EDUCATION SUB-SECTOR R&D APPROPRIATIONS BY DEPARTMENT
(AMOUNTS IN MILLION PESOS, 2018-2021)



Source of basic data: DBM COFOG data

The 11.8% decline in total sub-sector funding to 6.5 billion in 2021 was due to a reduction in the allocation of the CHED scholarship program due to low uptake[11]. On the other hand, DepEd's R&D lone program (Policy and Research Program) was funded in 2021 with close to P2.0 billion, or a 5.6% increase from P1.7 billion in 2020.

Table 9 shows the total R&D appropriations by department. In 2021, DOST received the highest funding in the sector at P10.9 billion. DOST's share of the sector budget has grown through the years despite a slight drop in 2020, accounting for 48.1% in 2018 and 50.9% in 2021. Most of the funding increase in the R&D sector in 2021 was allocated to DOST as it grew fastest with a double-digit growth rate. After DOST, the second highest R&D funding went collectively to the SUCs which consistently takes up more than 12% of the R&D sector during the period 2018-2021. Budget for SUCs hardly grew in 2021 and budget share went down to 13.8% from 15.3% in 2020. Finally, all the other agencies (non-DOST) only account for 35.3% (P7.5 billion) of the total R&D budget and allocation has declined by 3.5% from the 2020 level of P7.8 billion.

[11] *2021 Agency Budget Notes on CHED*

TABLE 9
R&D APPROPRIATIONS BY DEPARTMENT, 2018-2021

Department	Amounts (in Million Pesos)				Share to Total				Growth Rates		
	2018	2019	2020	2021	2018	2019	2020	2021	2019	2020	2021
DOST	**8,355**	**8,735.5**	**8,445.1**	**10,863.5**	**48.1**	**46.2**	**44.0**	**50.9**	**4.6**	**(3.3)**	**28.6**
Non-DOST	**6,864**	**7,719.5**	**7,812.4**	**7,535.5**	**39.5**	**40.9**	**40.7**	**35.3**	**12.5**	**1.2**	**(3.5)**
OEOs	968	852.7	2,750.7	2,040.4	5.6	4.5	14.3	9.6	(11.9)	222.6	(25.8)
DepEd	1,526	1,859.5	1,851.9	1,955.8	8.8	9.8	9.6	9.2	21.8	(0.4)	5.6
DA	2,021	1,750.2	1,607.4	1,664.7	11.6	9.3	8.4	7.8	(13.4)	(8.2)	3.6
DENR	780	833.9	825.2	797.2	4.5	4.4	4.3	3.7	6.9	(1.0)	(3.4)
BSGC	581	1,017.8	497.4	507.7	3.3	5.4	2.6	2.4	75.1	(51.1)	2.1
DOH	164	186.3	-	282.8	0.9	1.0	-	1.3	13.5	(100.0)	N/A
DILG	84	89.9	165.3	184.4	0.5	0.5	0.9	0.9	6.6	84.0	11.5
DOLE	34	37.3	40.1	48.6	0.2	0.2	0.2	0.2	10.2	7.3	21.3
Judiciary	30	100.0	30.9	30.9	0.2	0.5	0.2	0.1	233.3	(69.1)	-
DTI	39	28.6	43.5	23.0	0.2	0.2	0.2	0.1	(26.9)	51.9	(47.2)
BARMM	29	29.3	-	-	0.2	0.2	-	-	(0.2)	(100.0)	-
DND	556	-	-	-	3.2	-	-	-	(100.0)	-	-
ALGU	10	933.9	-	-	0.1	4.9	-	-	8,861.1	(100.0)	-
DOF	40	-	-	-	0.2	-	-	-	(100.0)	-	-
SUCs	**2,149**	**2,433.9**	**2,944.1**	**2,951.9**	**12.4**	**12.9**	**15.3**	**13.8**	**13.3**	**21.0**	**0.3**
TOTAL	**17,368**	**18,889.0**	**19,201.6**	**21,350.9**	**100.0**	**100.0**	**100.0**	**100.0**	**8.8**	**1.7**	**11.2**

Source of basic data: DBM COFOG data

Since half of total R&D funding went to DOST, the review will focus on discussing the specifics of its agency allocations, funding mechanisms and budget outcomes. The succeeding figures and tables will further present the details of the DOST R&D budget. Table 10 presents the DOST R&D appropriations by sub-sectors. Consistent with the R&D budget trend, the DOST funding mainly goes to Economic Affairs with P7.7 billion (71.1%) in 2021. This is followed by the Health sub-sector with a funding level of P1.3 billion (12.3%), General Public Services with P1.0 billion (9.3%), Environmental Protection with P554.5 million (5.1%), and Basic Research with P244.3 million (2.2%). In 2021, total DOST appropriations of P10.9 billion grew by 28.6% largely due to appropriations for Economic Affairs and Health increasing by 21.2% and 36.9%, respectively. Note that the 2020 decrease in the DOST R&D budget was brought about by the declines in funding for the Economic Affairs and General Public Services sub-sectors.

TABLE 10
DOST R&D APPROPRIATIONS BY SECTOR, 2018-2021

DOST	Amounts (in Million Pesos)				Share to Total			
	2018	2019	2020	2021	2018	2019	2020	2021
Economic affairs	6,250.4	6,640.0	6,370.0	7,722.2	74.8	76.0	75.4	71.1
Health	807.6	971.0	975.2	1,334.9	9.7	11.1	11.5	12.3
General public services	1,150.0	956.6	937.2	1,007.6	13.8	11.0	11.1	9.3
Environmental protection	-	-	-	554.5	-	-	-	5.1
Basic Research	146.6	167.9	162.7	244.3	1.8	1.9	1.9	2.2
TOTAL	**8,354.7**	**8,735.5**	**8,445.1**	**10,863.5**	**100.0**	**100.0**	**100.0**	**100.0**

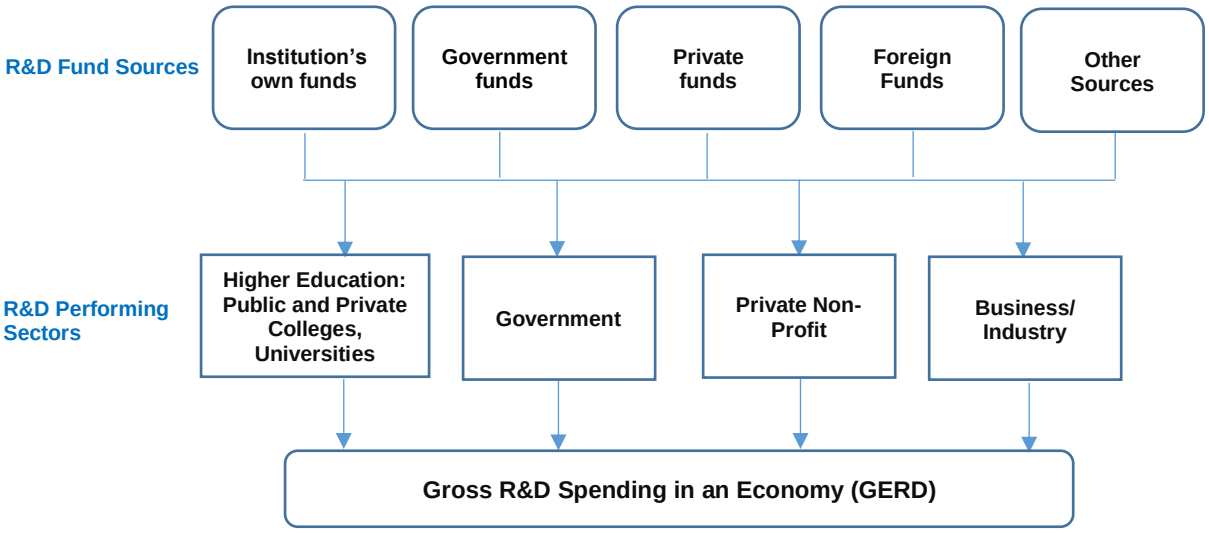
Source of basic data: DBM COFOG data

IV. R&D FUNDING MECHANISMS

An R&D funding mechanism is an arrangement for financing, and disbursing money to, research performers[12] (Jacob, 2007:9). It has three components: (1) the R&D funds, (2) the research funders, and (3) the research performers. In the context of public spending for R&D, there are government agencies that act largely as *research funders* that manage lump-sum public funds to support the R&D projects of *research performers* or government, academic, and for-profit and non-profit private sector organizations that conduct the actual research. Some organizations such as a state university may play both funding and performing roles. However, to trace the flows of public R&D funds, this paper assumes that any organizations in an R&D ecosystem play a dominant role either as R&D funder or performer.

Figure 5 is an overview of an R&D ecosystem, consisting of R&D funders and performers that influence the quantity and quality of the R&D spending in an economy. R&D performers from the government, higher-education, private non-profit and business sectors have internal and external sources of funds. Internal fund sources are the agencies' budget allocations, self-generated income, and other own funds allotted for R&D projects while external sources are the funds granted or transferred to them by government, private, foreign and other R&D funders.

FIGURE 5
R&D FUND SOURCES AND PERFORMING SECTORS



Source: Adapted from the UPLB Institute of Statistics and Department of Science and Technology. (May 2021). Research and Development Survey Report, 2018:2

Project funding is an instrument used by government R&D funders, for competitive allocation of limited research funding. It is used to promote and address priority government objectives related to science, technology and innovation (STI) including strengthening the capacity of various RDIs; production of basic and applied science research to advance specific fields or niche such biotechnology; encouraging more R&D in areas classified as national priority such as addressing

[12] *This study concept of R&D funding mechanism is based on the definition of a research-funding instrument by Jacob (2007:9).*

climate change; fostering industry-academe collaborations; and commercializing academic research and promoting science-based entrepreneurship[13] (Jacob, 2007).

To achieve the government's priority objectives in STI, project funding can also be used to support thematic R&D programs and centers of research excellence (Jacob, 2007; Hellstrom, T.).[14] Thematic research programs support a portfolio of R&D projects conducted by a collaborating group of R&D performers to upgrade knowledge and skills in specific industries or address development priorities of the government. Meanwhile, centers of research excellence are R&D performers funded for their track record in producing high-quality research, innovation or learning in specific fields. They are often geographically concentrated and focused on high potential or growth areas in science and industry.

Estimating Public R&D Spending based on GERD data

Of particular interest in this Public Expenditure Review (PER) is public spending for R&D whose level and composition affect an economy's productivity and competitiveness. Total public[15] R&D spending comprises (i) the R&D expenditures of government R&D performers including SUCs, which are funded internally (institutions' own funds); and; (ii) the R&D expenditures of government and non-government R&D performers that are funded by government financial transfers.

Table 11 shows the survey-based data on Philippine R&D expenditures by sources of funds and by R&D performing sectors. Of the total P58.9 billion spent for R&D in 2018, public spending accounted for 40% (P23.6 billion) while private firms, HEIs, non-profit organizations, and other fund sources contributed 60% (P35.2 billion).[16] The P23.6 billion public spending for R&D in 2018 consisted of the following: (i) P11.9 billion of other government funds transferred to SUCs (P7.4 billion), government agencies (P3.4 billion), private HEIs (P0.6 billion), and non-profit organizations (P0.5 billion); and (ii) close to P10 billion and P1.7 billion of institution's own funds of government agencies and SUCs, respectively (*Table 12*). Aside from this total public spending, P605 million (45%) of the combined P1.4 billion in private, foreign and other R&D funds supported the projects of SUCs (P507.9 million) and government agencies (P97.3 million).

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[13] Activities that are supported under these objectives may include the provision and strengthening of infrastructure for technology-transfer entities, entrepreneurship courses, and even venture capital for university-based technology start-ups (Hellstrom)

[14] Hellstrom, T. Centers of Excellence as a Tool for Capacity Building. Organization for Economic Cooperation and Development (OECD)

[15] Public R&D spending refers to amounts financed out of government funds. This is differentiated from "government R&D expenditure" as reported in the GERD which includes spending financed from external sources (e.g., private and foreign funds) but is net of the R&D expenditures of SUCs (which is reported separately).

Public R&D spending is more encompassing than the government R&D expenditure included in the GERD which is net of the R&D expenditures of State Universities and Colleges (SUCs).

[16] The following is the breakdown of the P35.2 billion non-government R&D expenditures in 2018: (i) business sector (P32.6 billion), (ii) private HEIs and non-profit organizations (P1.3 billion), and (iii) private, foreign and other funds (P1.4 billion).

TABLE 11
DISTRIBUTION OF R&D EXPENDITURES BY SOURCE OF FUNDS AND R&D PERFORMING SECTORS, 2018
(AMOUNTS IN MILLION PESOS)

Source of Funds	Business/ Industry	Gov't Agencies	SUCs	Private HEIs	Private nonprofit organizations	Total R&D Expenditures	
						Total	Net of Business/ Industry
Institution's own funds	32,604.6	9,972.9	1,720.3	1,132.1	148.1	45,578.0	12,973.4
Government funds	-	3,391.0	7,392.0	642.8	495.3	11,921.2	11,921.2
Private funds	-	30.3	23.3	65.8	325.6	445.0	445.0
Foreign funds	-	52.2	323.7	230.7	15.3	622.0	622.0
Other sources	-	14.8	160.9	94.7	17.0	287.5	287.5
TOTAL	**32,604.6**	**13,461.3**	**9,620.2**	**2,166.2**	**1,001.3**	**58,853.6**	**26,249.0**

Source of basic information: DOST Compendium of Science and Technology Statistics August 2021 (Table 8i)

Government agencies (excluding SUCs) relied heavily on their institutional funding which accounted for 74% (P10.0 billion) of their total R&D expenditures in 2018. Transfers from other government R&D funds were the sources of funds for 25% of their R&D expenditures while private, foreign and other funds contributed only 0.7%. In comparison, SUCs relied more on other government funds which accounted for 77% (P7.4 billion) of their total R&D expenditures (P9.6 billion) in 2018.

Overall, 36% of the combined R&D expenditures of private HEIs and private non-profit institutions (PNPIs) in 2018 came from public funding. However, within PNPIs as a group, public funding accounted for about 50% of their R&D expenditures in 2018. Conversely, it accounted only for 30% of the total R&D expenditures of private HEIs.

TABLE 12
ESTIMATES OF GOVERNMENT-FUNDED R&D EXPENDITURES, 2018

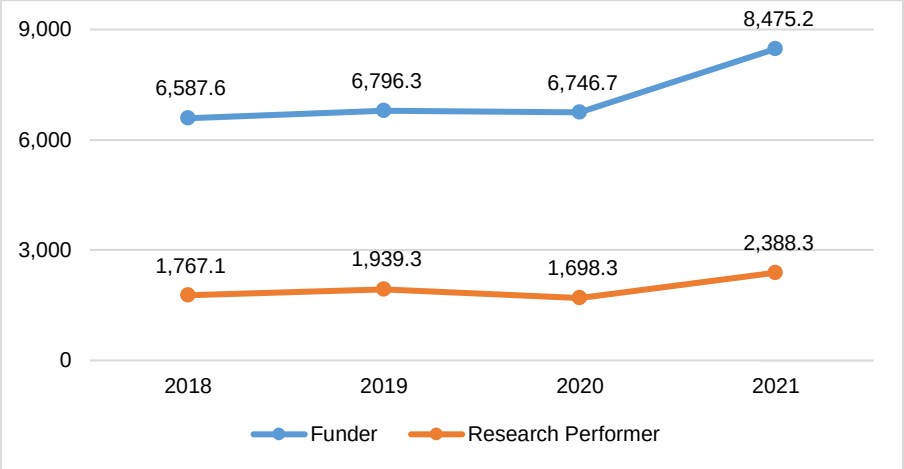
Particulars	Amounts (in Million Pesos)	% Share to Total Public R&D Expenditures
Other Government Funds Going to	***11,921.2***	***50.5***
SUCs	7,392.0	31.3
Government agencies	3,391.0	14.4
Private HEIs	642.8	2.7
Private nonprofit	495.3	2.1
Business	0.0	0.0
Institution's own funds of	***11,693.1***	***49.5***
Government agencies	9,972.9	42.2
SUCs	1,720.3	7.3
TOTAL	**23,614.3**	**100.0**

Source of basic information: DOST Compendium of Science and Technology Statistics

Public R&D Spending Based on Budgetary Data: Case Study of the DOST

Based on budgetary data published in the annual BESF, the DOST accounts for an average of 47% of the total R&D budget of the national government in 2018-2021 *(Table 9)*. Figure 6 shows that the DOST-R&D budget is largely concentrated in five R&D funders[17] with 79% share of the department's P36.4 billion R&D appropriations in the same period (*Table 13*). The remaining 21% (P7.8 billion) went to 11 DOST-R&D performers that also receive additional funding from the DOST-R&D funders during the budget execution stage.

FIGURE 6
DOST R&D APPROPRIATIONS BY FUNDING CLASSIFICATION
(AMOUNTS IN MILLION PESOS, 2018-2021)



Source of basic data: DBM COFOG data

Budget support for R&D funders. The Office of the Secretary (OSEC) has the highest budget share (49.1%) of the P36.4 billion R&D allocation of the DOST in 2018-2021. Its budget allocation supports the implementation of the harmonized national science and technology (S&T) agenda (P12.0 billion) and the diffusion and transfer of knowledge and technologies (P5.9 billion). The budget allocations of other R&D funders are for the PCAARD's development, integration, coordination, and monitoring of the national research system for agriculture, aquatic and natural resources (P4.8 billion); PCIEERD's investments for industry, energy and emerging technology (P3.0 billion); PCHRD's health R&D projects (P2.8 billion); and NRCP's basic research and research-based policy development for S&T (P0.2 billion).

Budget support for R&D performers. The DOST has 11 R&D agencies that receive institutional R&D funding through the annual GAA. Of the combined P7.8 billion allocation from 2018-2021, the top five (5) recipients were FNRI, PAGASA, ASTI, PNRI, and ITDI. While institutional funding largely supports the conduct of basic and applied research and experimental development, some portions are intended for technology transfer and other infrastructure projects and activities (*Annex 1)*. For example, P58.5 million of FNRI's P1.6 billion R&D allocation is for the expansion of its nutrigenomics laboratory while P41.7 million of PNRI's P899.1 million allocation is for the establishment of a two-storey radiation protection services facility. Projects

[17] *Composed of the OSEC, PCAARD, PCHRD, PCIEERD and NRCP*

charged to the MIRDC's R&D allocations include repair of workshop building (P34.3 million); repair of perimeter fence (P16.0 million); upgrading of water supply (P15.0 million); and IT infrastructure (P9.5 million).

TABLE 13
DOST R&D APPROPRIATIONS BY FUNDING CLASSIFICATION, 2018-2021

Agency	Amounts (in Million Pesos)				2018-2021 Total	% Share to 2018-2021 Total
	2018	2019	2020	2021		
R&D Funders	**6,587.6**	**6,796.3**	**6,746.7**	**8,475.2**	**28,605.9**	**78.6**
OSEC	3,956.6	4,377.8	4,288.2	5,249.6	**17,872.1**	**49.1**
PCAARD	1,206.2	1,096.0	1,130.0	1,342.9	**4,775.0**	**13.1**
PCIEERD	814.3	655.5	662.5	827.7	**2,960.0**	**8.1**
PCHRD	585.3	617.9	618.8	935.0	**2,757.0**	**7.6**
NRCP	25.3	49.1	47.2	120.1	**241.8**	**0.7**
R&D Performers	**1,767.1**	**1,939.3**	**1,698.3**	**2,388.3**	**7,793.0**	**21.4**
FNRI	266.1	429.6	432.8	491.0	**1,619.5**	**4.4**
PAGASA	510.4	156.3	65.6	627.6	**1,359.9**	**3.7**
ASTI	148.4	370.0	289.1	471.9	**1,279.5**	**3.5**
PNRI	188.3	196.1	299.4	215.1	**899.1**	**2.5**
ITDI	132.2	332.0	117.3	126.0	**707.5**	**1.9**
MIRDC	184.6	134.9	154.6	136.6	**610.7**	**1.7**
FPRDI	132.5	139.8	124.2	119.4	**515.8**	**1.4**
NAST	65.8	64.1	88.7	91.6	**310.1**	**0.9**
PTRI	53.9	71.6	82.3	49.5	**257.2**	**0.7**
SEI	44.4	44.8	44.3	59.6	**193.2**	**0.5**
PHIVOLCS	40.5	-	-	-	**40.5**	**0.1**
TOTAL	**8,354.7**	**8,735.5**	**8,445.1**	**10,863.5**	**36,398.9**	**100.0**

Source of basic data: DBM COFOG data

Share of R&D to Agency Budgets. National government agencies have specific programs, activities and projects (PAPs) that are tagged as R&D. However, the allocations for these PAPs constitute only a portion of the total agency budgets and the funding for agency *Programs* to address various science, technology and innovation (STI) concerns. Table 14 presents the amounts and percentage shares of R&D allocations in the agency and program budgets of key R&D funders and performers of the DOST.

Among funders, the ratio of R&D allocations to total agency budget in 2021 ranged from 71.8% in NRCP to 97.6% in PCHRD. The ratio is higher for programs, ranging from 71.7% for OSEC's S&T Program for Regional and Countryside Development to over 100% in some other programs such as the National AANR Sector and Health R&D Programs. Overall, R&D allocations are 92% of the Program budget of R&D funders and 85% of their combined agency budgets. The ratios of R&D allocations to agency and program budgets of R&D performers are lower at 47.3% and 68.3%, respectively.

TABLE 14
R&D ALLOCATIONS AS PERCENTAGE OF PROGRAM AND AGENCY BUDGETS, 2021

Programs	Amounts (in Million Pesos)			% Share of R&D	
	Agency Budget	Program Budget	R&D Allocation	Program Budget	Agency Budget
Research Funders	9,924.4	9,219.5	8,475.2	**91.9**	**85.4**
DOST-OSEC	6,496.5	6,006.8	5,249.6	**87.4**	**80.8**
Strategic S&T	-	3,333.2	3,333.2	100.0	-
S&T Program for Regional and Countryside Development	-	2,673.6	1,916.4	71.7	-
PCAARD	1,437.2	1,332.9	1,342.9	**100.7**	**93.4**
National AANR Sector Research and Development	-	1,332.9	1,342.9	100.7	-
PCHRD	958.4	932.3	935.0	**100.3**	**97.6**
National Health R&D	-	932.3	935.0	100.3	-
PCCIERD	865.0	828.2	827.7	**99.9**	**95.7**
National Industry, Energy and Emerging Technology Sectors R&D	-	828.2	827.7	99.9	-
NRCP	167.3	119.3	120.1	**100.6**	**71.8**
Policy Development for S&T Advisory	-	1.7	1.8	105.8	-
Basic R&D Management	-	117.6	118.3	100.6	-
Research Performers	4,779.4	3,304.4	2,258.4	**68.3**	**47.3**
PAGASA	1,785.3	1,196.6	627.6	**52.4**	**35.2**
Weather and Climate Forecasting and Warning	-	876.5	363.8	41.5	-
Flood Forecasting and Warning	-	194.2	139.0	71.6	-
Research and Development on Atmospheric, Geophysical and Astronomical and Allied Sciences	-	125.9	124.7	99.1	-
ASTI	508.1	468.2	471.9	**100.8**	**92.9**
Advance Science and Technology Research and Development	-	136.8	140.6	102.7	-
Advance Science and Technology Transfer	-	331.4	331.4	100.0	-
FNRI	556.4	484.2	491.0	**101.4**	**88.2**
Food and Nutrition R&D	-	70.3	72.9	103.6	-
Nutritional Assessment and Monitoring	-	377.3	379.2	100.5	-
Food and Nutrition Technology and Knowledge Diffusion	-	36.7	38.9	106.2	-
ITDI	404.0	300.6	126.0	**41.9**	**31.2**
Industrial Technology R&D	-	172.0	126.0	73.3	-
Industrial Technology Transfer	-	26.7	-	-	-
Industrial Technology Technical Services	-	102.0	-	-	-
PNRI	353.4	151.7	144.8	**95.5**	**41.0**
Nuclear Research and Development	-	47.7	51.6	108.1	-
Nuclear Science and Technology Services and Advisory	-	88.3	76.2	86.2	-
Nuclear Regulations, Security and Safeguards	-0	15.7	17.1	108.8	-
MIRP	226.5	129.2	136.6	**105.7**	**60.3**
Metals Industry Research	-	82.8	86.6	104.6	-
Metals Industry Technology Transfer	-	22.8	24.6	107.9	-
Metals Industry Science and Technology Services	-	23.5	25.3	107.6	-

Source of basic data: DBM 2021 COFOG data, 2021 GAA

INSTITUTIONAL ARRANGEMENTS FOR FUNDING R&D

The adoption and use of a harmonized R&D agenda and the implementation of the Grants-in-Aid (GIA) program by the DOST R&D funders form part of the key institutional arrangements for R&D funding.

Harmonized National Research and Development Agenda

A comprehensive and harmonized R&D agenda helps ensure that R&D investments generate maximum economic and social benefit for Filipinos. Thus, in 2017, the DOST, together with its Sectoral Councils and the NRCP, crafted the HNRDA to serve as a guide in focusing the R&D PAPs of the DOST. Annex 2 shows the priority R&D areas of five priority sectors of the HNRDA: (i) basic research; (ii) agriculture, aquatic and natural resources; (iii) health; (iv) industry, energy and emerging technology; and (v) disaster risk reduction and climate change adaptation.[18] The HNRDA incorporates the priority R&D program areas outlined in the strategic plans and roadmaps of DOST Sectoral Councils.[19] It includes also the priority R&D areas of R&D funders outside the DOST such as the DA, DOH, DENR, DND, DICT, DOE, DPWH, DTI, DOTr, and CHED.

The use of the HNRDA to guide the country's R&D investments has been institutionalized as a budget policy. The General Provisions of the annual GAAs require government agencies to align their R&D programs with the HNRDA for funding amounting to P10 million and above. These provisions also mandate the DOST to disseminate the priority HNRDA outputs to government agencies, LGUs, academe, industry and communities.

The Grants-in-Aid (GIA) Program

The DOST through the GIA program provides funding to relevant S&T PAPs consistent with current DOST priorities and as authorized in the GAA.[20] The GIA program also aims to strengthen the participation of various S&T sectors in R&D, technology transfer and utilization, human resource development (HRD), information dissemination, advocacy, and linkages. DOST Administrative Order (AO) No. 9, s. 2017, as amended by AO No. 11, s. 2020, specifies the guidelines for the utilization of the GIA program funds and defines the institutional roles of the DOST agencies.

Various funding, monitoring and implementing agencies are involved in the GIA program. Their specific roles and functions are detailed in Box 1. Funding agencies (FAs), guided by the technical assessments of Monitoring Agencies (MAs) approve the project proposals of IAs (Implementing

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[18] The 2017-2022 HNRDA was formulated by the NRCP, PCAARD, PCHRD, PCIEERD, PHIVOLCS, and PAGASA in cooperation with stakeholders in the respective sectors.

[19] DOST. Briefer on the process and progress of R&D at the DOST.

[20] DOST Administrative Order (AO) No. 9, series of 2017, as amended by AO No. 11, series of 2020 defines GIA as the funds allocated to programs/projects by the DOST, its Regional Offices, Sectoral Councils and its other grant-giving agencies

Agencies)[21] ; define the grant conditions; and release funds for approved projects. IAs, with the guidance of MAs, are responsible for meeting project objectives including delivering the expected outputs, consistent with the Memorandum of Agreement (MOA).

Call for Proposals. The DOST Monitoring and Evaluation (M&E) Protocol[22] emphasizes the importance of the pre-proposal stage in engaging key stakeholders in R&D proposal formulation and making them familiar with the expected outputs, outcomes and impacts of GIA-funded projects. In the call for project proposals, the DOST and its Sectoral Councils and the NRCP set their R&D plans consistent with current DOST priorities such as in the HNRDA.

There are three types of calls for project proposals.[23] The first is *directed research calls* where the DOST identifies the topics, fields, and project proponents. The second is *solicited calls* wherein target group of HEIs/R&D Institutes are identified prior to defining the specific R&D topics or fields. The last type is *open calls* wherein R&D topics/fields are set and all eligible IAs are allowed to submit project proposals.

BOX 1
KEY INSTITUTIONAL ROLES UNDER THE GIA PROGRAM

- **Implementing Agencies (IAs)**
  - Provide technical leadership and directly implement the programs/projects;
  - Notify the MAs of significant concerns related to project implementation;
  - Submit to FAs and MAs all the required reports/documents on time.

- **Monitoring Agencies (MAs)**
  - Review project proposals and project implementation reports of IAs;
  - Ensure the efficient and timely implementation of funded projects, and the attainment of project objectives;
  - Conduct periodic field evaluation of the project to identify problems and remedial actions to avoid project delays;
  - Report to the DOST-EXECOM any failure of IAs to submit required project reports;

- **Funding Agencies (FAs)**
  - Solicit submissions of project proposals;
  - *DOST Executive Committee*: Approve proposed projects except those amounting below P5 million which may be approved by the DOST Undersecretary for R&D;
  - *DOST Secretary*: Sign the MOA/pertinent documents for projects amounting to more than P10 million;
  - *DOST Undersecretary for R&D:* Manage the implementation of the GIA program with the assistance of the all concerned DOST agencies; sign the MOA/pertinent documents for projects amounting to P1 million and below;
  - *DOST-Special Projects Division:* Issue a MOA upon approval of project proposals; coordinate with the appropriate DOST Sectoral Council related to the approved programs/projects; monitor the DOST-GIA fund status; ensure that project grant conditions are strictly followed; facilitate the conduct of assessment by the DOST-EXECOM of major completed R&D projects;
  - Release the project funds to the IA in partial or full amounts, once the DOST has received the signed MOA

Source of basic information: AO No. 9, series of 2017 and AO No. 11, series of 2020

[21] *IAs comprise government R&D performers, public and private HEIs, non-government organizations, non-profit institutions including DOST-certified science foundations, and private companies.*
[22] *DOST. Administrative Order (AO) No. 14, series of 2019 entitled "Project Monitoring and Evaluation (M&E) Protocol of the Department of Science and Technology.*
[23] *Administrative Order No. 14*

DOST Sectoral Councils disseminate call for proposals that define the eligibility of project proponents, allowed line-item budgets, and expected outputs/outcomes/impacts. They circulate their call for proposals online and/or through direct communications to eligible stakeholders. The vital months for call for proposals are: (i) April (posting of main call), (ii) June (deadline of proposal submission), (iii) October (posting of second call), and (iv) November (deadline of submission for the second call).[24] DOST offices can use staggered calls or different end dates of calls to spread the work in proposal review.[25]

The call for each fiscal year is for projects to be funded by the GAA two years after. Thus, the April 2019 call would be for projects included for funding in the 2022 GAA. However, some urgent projects (e.g., those for COVID-19 response) were implemented much earlier, subject to the availability of funds and to the discretion of the DOST Secretary.[26]

After the dissemination of call for proposals, the Project Leaders of IAs including the DOST R&D performers submit their proposals to the Special Projects Division (SPD) under the Office of the Undersecretary for R&D. The SPD endorses project proposals that are complete and compliant with all DOST requirements and format, to the appropriate Sectoral Council for review.

Project Proposal Review. DOST Sectoral Councils and the NRCP have their respective systems for reviewing project proposals which must be completed within 40 days. The reviews focus on determining whether the proposed projects are aligned with the HNRDA and the DOST's priority research areas are technically and scientifically sound; and can generate significant R&D outputs and outcomes.

Given these review objectives, technical experts, the Project Management Team (PMT), and the governing boards of Sectoral Councils subject the proposals through series of assessments before they are endorsed for deliberation by the DOST-Executive Committee (EXECOM) chaired by the DOST Secretary. The EXECOM needs to approve all new projects for GIA funding except those amounting to P5 million and below which can be approved by the Undersecretary for R&D.

A. Eligible Projects. There are four types of projects eligible for GIA funding:[27] (i) R&D for the generation of knowledge and technologies; (ii) R&D results utilization; (iii) development of human resources and R&D institutions for the S&T sector; and (iv) provision of quality S&T services *(see Box 2 for description).* Except for projects involving the generation of knowledge and technologies, other types of GIA-eligible projects do not exactly fit the definition of R&D as involving basic and applied research and experimental development.

[24] *Administrative Order No. 14*
[25] *According to SPD Chief Armela Razo, for 2022, the DOST and its Sectoral Councils/NRCP plan to synchronize the start (March) and end (June 9) of the call for proposals*
[26] *AO 14 and based on the consultation with Ms. Armela Razo, Chief of the DOST-Special Projects Division.*
[27] *DOST AO No. 9, series of 2017, as amended by AO No. 11, series of 2020*

BOX 2
TYPES OF PROJECTS ELIGIBLE FOR GIA FUNDING

A. R&D for the generation of knowledge and technologies. Projects and activities involve (i) fundamental or basic research; (ii) applied research, (iii) experimental development, and (iv) pilot testing.

B. R&D results utilization- diffusion of knowledge and technologies. Projects involve the utilization, dissemination, and transfer of knowledge and innovations generated from R&D to build the technological and innovative capacity of project beneficiaries (e.g., farmers, LGUs).

C. Development of human resources and R&D institutions. Projects include the provision of high-quality formal education at all levels, specialized training for young scientists and engineers, and the development, attraction and retention of the country's S&T talents.

D. Provision of quality S&T services. Projects aim to improve and upgrade the testing, measurement and calibration services of government laboratories and facilities; and develop information resource databases and general-purpose data collection to record natural, biological or social phenomena.

Source of basic information: DOST AO No. 9, series of 2017, as amended by AO No. 11, series of 2020

B. Project Assessment Criteria. Aside from alignment with the HNRDA, proposed projects shall not duplicate ongoing or completed R&D projects. Project review criteria emphasize the relevance of projects: (i) soundness of project proposals in addressing relevant sectoral needs; (ii) suitability of project outputs; and (iii) potential socio-economic impacts such as increasing productivity, jobs, and income. The potential adoption, use and commercialization of potential project outputs such as new technologies are also reviewed.

In addition to financial feasibility, scientific merit and technical soundness are also applied as assessment criteria, along with the capability of IAs based on their experience, training, and track record. IAs must be Filipino entities registered with appropriate government agencies. Their program or project managers must also be Filipino citizens.

C. Proposal Requirements. Project proposals must comply with the issued formats by DOST and must provide detailed line-item breakdown of the funding requested. IAs must also include required *clearances* in their project proposals. Private companies and non-government organizations are required to submit other supporting documents while private HEIs accredited by the Commission on Higher Education (CHED) and private RDIs with proven track record with DOST are exempted from these requirements.

Project Approval and Release of Funding. After the EXECOM's approval of a proposed project, the DOST-SPD issues a MOA that defines the duties and responsibilities of the funding, implementing and monitoring agencies. Once the MOA is signed by all parties, the documentary requirements for the release of funds are prepared. After receiving the validated forms from the FAs' depository banks, IAs and MAs issue official receipts for the GIA funds received. The utilization of grants received by IAs and MAs are subject to liquidation. The FAs thus require the project managers of the IAs to submit financial reports and other documentary requirements (*COA, 2018 AAR for the DOST-OSEC).*

R&D FUND FLOWS UNDER THE GIA PROGRAM

No specific items in the budgets of R&D funders under the GAA specifically refer to the GIA program. However, the budgets of R&D funders reflect financial assistance and subsidy (under MOOE) which is about 96% of their total R&D budget allocations in 2018-2020 *(see Table 15)*. While there are reports posted in the agency websites indicating the amounts granted to approved R&D projects under the GIA program, there is no clear information on the amounts programmed for GIA program spending during budget execution. This makes it difficult to assess the efficiency of budget utilization.

TABLE 15
FINANCIAL ASSISTANCE/SUBSIDY
AS PERCENTAGE OF R&D BUDGET ALLOCATIONS

R&D Performers	2018-2020 Total (in Million Pesos)		Ratio (%) (b/a)
	R&D[a/]	Financial assistance / subsidy[b/]	
DOST-OSEC	12,622.6	12,622.6	100.0
PCAARD	3,432.2	2,893.6	84.3
PCIEERD	2,132.3	2,001.7	93.9
PCHRD	1,822.0	1,721.9	94.5
NRCP	121.6	71.9	59.1
TOTAL	**20,130.7**	**19,311.7**	**95.9**

a/ Figures for R&D budget allocation are based on DBM R&D data (COFOG)
b/ Figures for financial assistance/subsidy are from the 2018-2020 GAA.

Available information indicates that the GIA program fund was at P7 billion in 2018[28] and almost P6 billion in 2017[29]. Annex 3 shows that the level of GIA R&D funding had increased from 2009-2017 (except in 2013). The level of GIA funding in 2018 was more than six times the P1-billion level in 2009.

GIA Funds to HNRDA Sectors and Other Priorities

The current policy requires that R&D spending must be aligned with the 2017-2022 HNRDA's five priority sectors: (i) basic research; (ii) agriculture, aquatic and natural resources; (iii) health; (iv) industry, energy and emerging technology; and (v) disaster risk reduction and climate change adaptation.

To assess compliance with this policy, *Annex 4* shows the flow of GIA funds to HNRDA sectors and Other Projects[30]. For the DOST-OSEC and PCIEERD, GIA fund outflows were more

[28] DOST Undersecretary Rowena Guevara shared the estimated amount of P7 billion for 2018 during the Public Dissemination of the Philippine R&D Data and Indicators (2018 Update) last November 19, 2021 via Zoom.
[29] Based on the powerpoint presentation of Undersecretary Guevara during the Inclusive Innovation Conference in 2018 (see graph in Annex 3).
[30] Other Projects include those related to diffusion and transfer of knowledge and technologies, non-R&D but may support R&D initiatives, and projects without or outside the HNRDA priority sectors.

dispersed across HNRDA sectors and "Other Projects". In comparison, the GIA funds of the PCAARD (99.8%), PCHRD (100%), and NRCP (100%) funded projects for the Agriculture, Aquatic and Natural Resources (AANR), Health, and National Integrated Basic Research Agenda (NIBRA) sectors, respectively.

For the period 2017-2020, about 57% of the GIA funds of the DOST-OSEC went to the Industry, Energy and Emerging Technology (IEET) and Health Sectors. The AANR, Disaster Risk Reduction and Climate Change and Adaptation (DRRCCA) and NIBRA sectors combined only received 13% of the DOST-OSEC's GIA funds. This is lower than the substantial share of "Other Projects" at around 30%—of which 23.5% are non-R&D projects *(i.e., for information, education, and dissemination campaigns, exhibits, conferences, and science competitions, among others)* necessary to support the science, technology, and innovation objectives of the government.

For PCIEERD, 43% of its approved project financing supported the IEET sector. The DRRCCA sector received 11% of PCIEERD's project financing or higher than the combined 7% for the AANR, Health and NIBRA sectors. However, Other Projects (particularly those without classification) received almost 40% of PCIEERD's project financing.

Table 16 shows the overall distribution of GIA project financing. Of the total P18.6 billion approved project financing from 2017 to 2020, 77% (P14.4 billion) went to the five HNRDA sectors, while the remaining 23% (P4.2 billion) were for Other Projects. Suggesting the increasing alignment of R&D investments with the HNRDA, the share of approved project financing for the five HNRDA sectors increased from 73% (P3.2 billion) in 2017 to 83% (P3.8 billion) in 2020. On the other hand, GIA funding share for Other Projects has been decreasing from 27% (P1.2 billion) in 2017 to 17% (P0.8 billion) in 2020.

TABLE 16
DISTRIBUTION OF 2017-2020 GIA FUNDS BY HNRDA SECTORS

HNRDA/Other Priority Sectors	Number of Projects	Total Approved Grants (in Million Pesos)	Percent Share	
			Number of Projects	Approved Funds
Health	469	5,101.7	20.3	27.5
Industry, Energy, and Emerging Technology (IEET)	325	4,715.1	14.1	25.4
Agriculture, Aquatic, and Natural Resources (AANR)	797	3,588.7	34.5	19.3
Disaster Risk Reduction and Climate Change Adaptation (DRRCCA)	74	702.8	3.2	3.8
National Integrated Basic Research Agenda (NIBRA)	101	250.8	4.4	1.4
Sub-total (HNRDA)	**1,766**	**14,359.1**	**76.5**	**77.4**
Other Projects	**541**	**4,201.1**	**23.5**	**22.6**
Non-R&D	*137*	*2,540.5*	*5.9*	13.7
No Classification	*205*	*1,121.4*	*8.9*	6.0
Diffusion and transfer of knowledge & technologies	*199*	*539.2*	*8.6*	2.9
TOTAL	**2,307**	**18,560.2**	**100.0**	**100.0**

Source of basic information. DOST Data on GIA-Funded Projects of the DOST-Central Office, PCAARD, PCIEERD, PCHRD, and NRCP

Health as the top focus of R&D investments. The biggest chunk (P5.1 billion or 28%) of the approved P18.6 billion GIA funds during the period 2017-2020 went to the Health sector. A quarter (P4.7 billion) of the approved GIA grants supported the IEET sector. By number of projects, the AANR sector had the highest share (34.5%) of the 2,307 approved projects although its funding share was only at 19% (P3.6 billion). The DRRCA and NIBRA sectors combined had the lowest funding share (5%) or less than a billion pesos. Note that the funding share of the AANR sector rose from 16% in 2017 to 26% in 2020, while the DRRCA sector's share decreased from 7% to 2%.

Drug Discovery and Development received the biggest share (31%) of the P5.1 billion R&D investments in Health in 2017-2020, followed by the development and application of Omic[31] technologies (17%) and Diagnostics (14%) (*Annex 5).* These three (3) priorities accounted for 61.8% of the total R&D investments in the Health sector. Health sector R&D areas that received less than 5% each in funding shares were nutrition, food quality and safety (2.3%); disaster risk reduction (2.4%); dengue (1.2%), and mental health (0.05%).

While *drug discovery and development* had the biggest funding overall, its 2020 funding was P199 million lower than the 2017 level. Other R&D areas with highest decreases in funding in 2020 compared to 2017 levels were (i) ICT for health (-P170 million); and regional health research (-P7 million). Those with the five highest increases were: (i) diagnostics (+P236 million); (ii) health research projects with no HNRDA area classification (+P130 million); (iii) omic technologies for health (P122 million); (iv) health and climate change adaptation (P37 million); and (v) hospital equipment and biomedical devices (P26 million).

IEET Sector. Close to half of the number of funded projects and 71% (P3.3 billion) of approved P4.7 billion GIA financing in the IEET sector were related to *competitive industries* (*Annex 6).* About P1.9 billion were for "competitive industries" in general, while other investments were linked to specific sub-areas of *competitive industries* including space technology application (P735 million), country side development (P341 million), food (P57 million), transportation (P14 million), and ICT (P14 million). A number of projects related to *competitive industries* addressed multiple sub-areas (e.g., P251 million was invested for projects linked to several sub-areas such as national security, space technology application and ICT).

R&D investments in renewable energy and energy storage solutions received a very small share (1.4%) of the IEET investments. Other IEET areas such as *mining and minerals, alternative energy*, and *construction* also received less than 1% share each. Some funded projects tagged under the IEET sector do not strictly fit the definition of R&D in the Frascati Manual (i.e., the conduct of basic and applied research and experimental development). These include the support for the establishment of a national space agency (P2 million) under *emerging technology,* and support for the Young Innovators' Program (P11 million) and the Philippine Startup Challenge (P1 million) under the *support for science and technology activities.*

[31] *"Omic" technologies include genomics, epigenomics, proteomics, metabolomics.*

Some IEET sector areas appear similar to some priority areas in Health. For instance, there are various IEET projects on *food and nutrition security* (P347 million) and *disaster risk reduction and climate change adaptation (*P50 million). These R&D areas are also present in the Health sector, raising questions on the proper delineation of funded projects in the IEET and the Health sectors.

AANR Sector. Out of the total P3.6 billion approved grants for the AANR sector in 2017-2020, aquatic R&D received the largest share (22%), followed by funding support for *crops* (21%), *technology transfer* (14%), *livestock* (10%), *natural resources/environment* (9%), and *agriculture* (9) (*Annex 7).* Projects related to forestry (7), cross-cutting concerns (4%), and socioeconomics and policy (4%) received the three lowest shares. However, there is marked increase in 2020 investments compared to 2017 levels in forestry (at 404%), crops (237) and natural resources/environment (165%).

DRRCCA Sector. Total R&D investment for DRRCA sector in 2017-2020 amounted to P703 million—of which the biggest funding share (P32%) went to the area of *hazards, vulnerability and risk assessment*. Other R&D areas with funding shares exceeding 10% included the following: *observation and monitoring networks (18%); modelling and simulation for improvement of monitoring and forecasting (13%), and technology development and application for monitoring (13%).* Projects related to technology development and application had a combined funding of P169 million which is 24% of the total R&D investments in this sector *(Annex 8).*

Despite the country's high and increased exposure to disaster risks, overall R&D investments in this sector had been generally decreasing. Investments for R&D in the DRRCA sector went down from P287 million in 2017 to P105 million in 2020, with three largest decreases in the areas of *technology development (P81 million), warning and communication of information (P49 million),* and *hazards, vulnerability and risk assessment* (P46 million).

NIBRA Sector. The NIBRA sector comprises six (6) program areas. In 2017-2020, three program areas received 72% of the total GIA funding for this sector: (i) *inclusive nation building* or ATIN Program (32%), (ii) *sustainable communities* or SAKLAW Program (21%), and (iii) *food and nutrition security* or SAPAT Program (19%) (*Annex 9).* The combined funding for projects related to water security (TUBIG Program), health sufficiency (LIKAS Program) and clean energy (ALERT Program) amounted to P48 million or 19% of the GIA funding for the NIBRA sector. Around 9% (P23) of the GIA funding (P251 million) supported projects outside the six program areas.

"Other Projects" outside the HNRDA. The current R&D spending policy emphasizes the alignment of R&D investments with the HNRDA. However, it also allows for the use of GIA funding for "Other Projects" which are not directly related to R&D but support human resource development, S&T services, technology transfers and other interventions crucial to improving R&D and innovation performance. Funding for "Other Projects" was substantial at P4.2 billion or 23.6% of total approved grants in 2017-2020. Projects tagged by the DOST-OSEC as non-R&D amounted to P2.5 billion while those without specific HNRDA classification received P1.2 billion in funding. Lastly, projects promoting technology transfer and diffusion received P0.5 billion or 3% of total GIA funding in 2017-2020 *(see Table 16).*

Flow of GIA Funds by Type of Eligible Projects

The GIA program funds are lump-sum appropriations whose specific purpose, exact amount, and time of use cannot be determined in advance since they are not itemized in the GAA. Critical to the use of lump-sum appropriations is balancing flexibility and accountability (CPBRD, 2016:10-11) and the proper reporting of budget utilization for Congress to properly exercise its functions of budget authorization and oversight.

Available data show that 62% of the P10.8 billion approved GIA funding of the DOST-OSEC and more than half of the approved projects (435 out of 824) from 2017 to 2020 supported projects on the *generation of knowledge and technologies including research-capability building (Table 17)*. The second biggest share (27%) of the DOST-OSEC's GIA funding went to projects *providing S&T services*. These projects aim to improve and upgrade the testing, measurement and calibration services of government laboratories and facilities, and to develop information resource databases (including the collection of data to record natural, biological or social phenomena).

TABLE 17
DISTRIBUTION OF GIA PROJECT FUNDING BY FUNCTIONS
DOST-CENTRAL OFFICE, 2017-2020

Functions	Number of Projects	2017-2020 Total	% Share	
			Number of Projects	2017-2020 Total
Generation of new knowledge and technologies and research capability building in priority areas identified as strategic to national development	435	6,724.5	52.8	62.3
Provision of quality S&T services including promotion of science and technology and other related services	192	2,897.5	23.3	26.8
Development of human resources for the S&T sector and other initiatives including incentives for research and faculty development in science and technology	21	667.8	2.5	6.2
Diffusion and transfer of knowledge and technologies including other related technology transfer activities	176	502.5	21.4	4.7
TOTAL	**824**	**10,792.2**	**100.0**	**100.0**

Source of basic information: DOST-CO data on GIA-funded projects, 2017-2020

The third largest share (6%) of the GIA funding went to projects on the *development of human resources for the S&T* sector. Funded interventions include specialized training for young scientists and engineers, and the development, attraction and retention of the country's S&T talents. Lastly, the lowest funding share (5%) was for the diffusion and transfer of knowledge and technologies to enhance the innovative capacities of industries and end-users of R&D outputs.

Generation of New Knowledge and Technologies. The 824 GIA-funded projects of the DOST-OSEC were grouped into 130 programs and 11 project groupings (i.e., those projects with unspecified programs). Within the function of *generating knowledge and technologies* alone, there were 435 projects under 93 programs (with names) and two groups (with no program names), attesting to the complexity and diversity of funded R&D interventions. Without reclassifying these numerous programs, the top five (5) in funding were the following: (i) sustained support for local

space technology and applications mastery, innovation and advancement or *Stamina4Space* (P735 million); (ii) advanced additive manufacturing R&D (P450 million); (3) projects with no program names (P394 million); (iv) support to national COVID-19 initiatives (P362 million); and (v) discovery and development of health products: bridging efficacy and safety (P256 million).

Reclassifying the 95 R&D programs/groupings by thematic areas shows a large number of 36 programs, with *Space Technology* receiving the highest GIA budget of P1.2 billion (18%) for nine projects *(Annex 10)*. This is followed by *Discovery and Development of Health Products* (P1.2 billion for 74 projects), and *Support to COVID-19 initiatives* (P362 million for 6 projects). Projects not linked to specific programs also account for a large part (9%) of the GIA funding with an allocation of P574.0 million for twenty-nine (29) projects. The existence of many and diverse programs suggests the need for a more strategic and differentiated approach to R&D investments among DOST R&D funders.

Science for Change Program (S4CP). A number of existing R&D programs of the DOST-OSEC belong to the Science for Change (S4CP), a banner program under the Duterte administration to foster a regionally-inclusive STI. The S4CP comprises four programs: (i) the Niche Centers in the Regions for R&D (NICER), (ii) the R&D Leadership (RDLead); (iii) the Collaborative R&D to Leverage the Philippine Economy (CRADLE); and (iv) the Business Innovation through S&T (BIST).[32] In the streamlined list of 36 programs on *generating knowledge and technologies*, 95 projects were linked to the NICER, CRADLE and BIST Programs with a total funding of P694 million or 10% of the approved funds for this function. The NICER had the largest funding share among the S4CP programs, receiving P541.1 million for 55 approved projects *(Annex 11)*.

The NICER program builds the research capacities of HEIs by focusing projects on niche areas and abundant commodities in the regions. The CRADLE program makes the publication-centric research practice to be more responsive to industry. It facilitates the transfer of new technologies developed by R&D institutions, to business and industry. The BIST program aims to increase the R&D capacities of Filipino-owned companies and promote R&D-based ind;ustries by assisting companies to acquire new and relevant technologies for research. Meanwhile, the RDLead program addresses the problems of lack of facilities and the country's low ranking in the quality of R&D institutions and scientific publications by engaging R&D experts in research-capacity building.

Provision of quality S&T services. A total of 192 projects across 22 program areas on the *provision of quality S&T services*, received P2.9 billion or 27% of the total grant of the DOST-OSEC. Five program areas accounted for 81% of the GIA grants under this function: (i) S&T innovations for innovations for productivity and competitiveness (P1,343 million); (ii) projects with no programs (P395 million); (iii) community empowerment thru S&T or CEST (P275 million); (iv) S&T promotion (P208 million); and (v) capacity building for the national metrology laboratory (P121 million).

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[32] De la Peña, F. (2020). "Filipinnovation: Financing Science for the People". In Cornell University, INSEAD, and WIPO (2020). The Global Innovation Index 2020: Who Will Finance Innovation? Ithaca, Fontainebleau, and Geneva.

Human resource development (HRD) for S&T. During the period 2017-2020, 21 HRD projects received P668 million or 6% of the DOST-CO's GIA project financing. Five (5) projects on the *development of S&T human resources* received P478 million or 72% of GIA funding for HRD. These projects included the *Balik Scientist Program* (P242 million); DOST staff development program (P199 million); and data analytics R&D training and adoption (P20 million), among others. Three HRD programs related to the *provision of S&T services* include: the ASEAN STI partnership contributions; Newton Agham Program; and the community empowerment thru S&T (CEST). The pilot implementation of the RDLead (a component of the S4CP) received P29 million in GIA funding. Finally, the DOST-CO also granted P47 million to develop the DOST's capacity in *artificial intelligence* through training and acquisition of high-performance computing device.

Diffusion and transfer of knowledge and technologies. A total of 176 non-R&D projects related to *diffusion and transfer of knowledge and technologies* received P502 million in GIA funding from the DOST-CO in 2017-2020. The Small Enterprise Technology Upgrading (SET-UP) Program received P245 million in funding for 158 of these projects to encourage micro, small and medium enterprises to adopt technology innovations. Another substantial funding (P148 million) went to the *Technology Innovation for Commercialization or TECHNICOM* project which aims to lessen the gap between R&D and commercialization through technical and financial support to inventors and innovators for their pre-commercialization activities.

Fund Flows by Implementing Agencies

Table 18 presents the flow of the DOST-OSEC GIA funds to different implementing agencies. The largest funding share (37% or P3.9 billion) of the P10.8 billion GIA funding in 2017-2020 went to projects of "other implementing agencies" that include DOST regional offices (P875 million); DOST attached non-R&D agencies (P849 million); (iii) other DOST R&D funders (P807million); (iv) joint DOST regional offices/RDIs (P462 million); and (v) joint RDIs/SUCs (P547 million). State Universities and Colleges (SUCs) and government RDIs got the 2nd and 3rd largest budget shares at 31% and 25%, respectively. In particular, the UP System accounted for P2.5 billion or 75% of the total P3.3 billion funding for projects of SUCs. Meanwhile, out of the total P2.7 billion worth of GIA-funded projects for government RDIs, the top three recipients were as follows: the ITDI (P869 million); MIRDC (P459 million); and the ASTI (P388 million).

TABLE 18
IMPLEMENTING AGENCIES OF GIA-FUNDED PROJECTS
DOST-CENTRAL OFFICE, 2017-2020

Types of Implementing Agencies	Number of Projects	Approved GIA Funding	% Share	
			Number of Projects	Approved GIA Funding
Other Implementing Agencies	321	3,936.0	39.1	36.5
State Universities and Colleges (SUCs)	305	3,346.8	37.0	31.0
Government R&D Institutes (RDIs)	113	2,691.2	13.7	24.9
Private Higher Education Institutions (HEIs)	65	564.7	7.9	5.2
Private Non-Profit Institutions (PNPIs)	8	132.7	1.0	1.2
Private firms	11	120.7	1.3	1.1
TOTAL	**824**	**10,792.2**	**100.0**	**100.0**

Source of basic information: DOST-Central Office data on GIA-funded projects, 2017-2020

A comparative analysis for PCIEERD, using the financial statements found in the 2018-2020 Annual Audit Reports, similarly show the dominant share of SUCs (55%) in GIA fund releases (*Annex 12)*. Government RDIs and private HEIs were closer in shares of fund releases at around 14% each. Private firms and non-profit institutions also received 5% and 2% shares, respectively, of PCIERRD fund releases to various IAs.

"Other Implementing Agencies" had dominant funding shares in three functions: 88% in the *development of human resources for the S&T sector*; 80% in the *diffusion and transfer of knowledge and technologies* and 63% in the *provision of quality S&T services*. However, the funding share of "Other Implementing Agencies" went down to 17% in the *generation of knowledge and technologies* where basic and applied researches, experimental development, and pilot testing are conducted (*Annex 13)*.

The SUCs (48%) and government RDIs (25%) had the two largest funding shares in the *generation of knowledge and technologies*. However, SUCs played minor roles in implementing projects on the *provision of* S&T *services* and *development of human resources* for the S&T sector. Across the four R&D functions, private HEIs played a more active role in *generating knowledge and technologies (with 8% share)* while private non-profit institutions are more involved in the diffusion and transfer of knowledge and technologies (i.e., with a 7% share).

R&D Projects by Outputs

The performance indicators of DOST R&D funders under the 2018-2020 GAA focus on these key results: (i) percentage of priorities in the HNRDA addressed; (ii) number of projects evaluated, approved, funded, and monitored; (iii) number of local and international partnerships with the public and private sectors; and (iv) percentage of completed projects published in peer-reviewed journals, presented in conferences, and with intellectual patents (IP) filed or approved.

The DOST has been using the *6Ps Project Output Guide* to focus its funded projects in delivering the following key outputs:[33]

- ***Publication*** or contribution to the general body of knowledge through local or international scientific publication or conference presentations;
- ***Patent*** which is a tangible measure of innovation through submitted patent application, or the grant of a utility model or intellectual property (IP) patent;
- ***Product/***invention whose commercial value depends on the production of a prototype; the presence of a licensing agreement; or whether the product is commercialized.
- ***People Services*** include the number of trained personnel in specialized fields of studies and the number of bachelor's, master's or doctor's degree holders that are added to the country's scientific workforce.

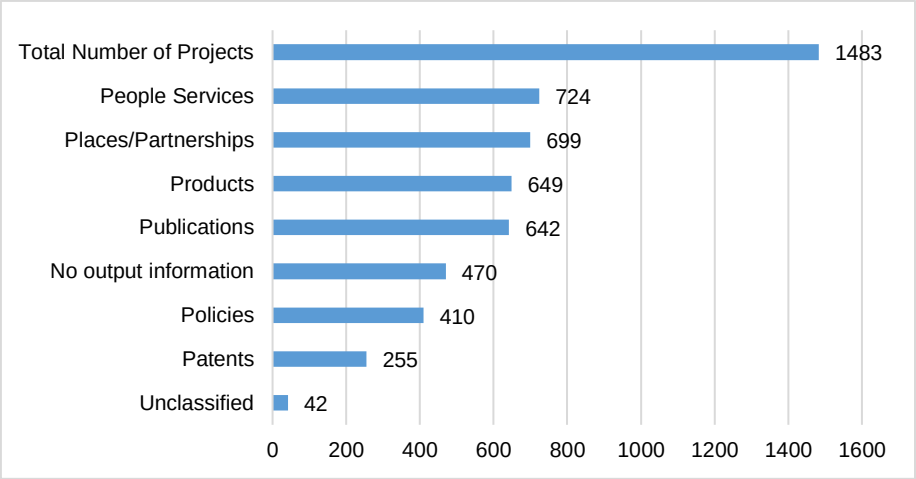
[33] The 6Ps output framework of the DOST is broader than the focus of the Frascati Manual, an internationally recognized guide on the reporting of R&D statistics. The manual focuses on the reporting of expenditures related to the generation of new knowledge and technologies which are the outputs of basic and applied research, and experimental development activities.

- ***Places and Partnerships*** that include laboratories, technology business incubators, testing facilities, and other institutions supported to increase the production of 6Ps outputs (e.g., publications, patents);
- ***Policies*** or science-based policies/guidelines adopted as laws, executive and administrative orders, and policy guidelines in the use of GIA funding.

Expected Project Outputs. Figure 7 summarizes the presence of expected outputs in 1,483 funded projects of the NRCP, PCAARD, PCIEERD, and PCHRD in 2017-2020. *People services* was the most dominant output, which was present in 724 projects. Projects with outputs related to *places/partnerships* (699) and *products* (649) were the second and third most dominant among the GIA-funded projects of the NRCP and the three DOST Sectoral Councils.

GIA-funded projects with *publications* as output constituted 43% (642) of the 1,483 projects. In comparison, *patents* as expected outputs were subdued—present in only 17% (255) of the total number of GIA-funded projects of the NRCP, PCAARD, PCHRD and PCIEERD. Close to 28% or 410 of total GIA-funded projects promised to deliver *policies* as outputs. Meanwhile, there was no expected output for 470 GIA-funded projects while 42 projects (unclassified) had expected outputs outside the 6Ps output framework.

FIGURE 7
PRESENCE OF EXPECTED OUTPUTS IN GIA-FUNDED PROJECTS OF DOST-R&D FUNDERS* 2017-2020



Source of basic information: Data from Usec. Rowena Guevara on 2017-2020 GIA-Funded Projects
** The R&D funders covered in this analysis are PCAARD, PCIEERD, PCHRD, and NRCP*

Intensity of expected project outputs among funders. Table 19 shows the *intensity*[34] or presence of expected outputs in the projects of R&D funders. In PCAARD, at least 64% of the projects promised people services, places and partnerships, products and publications as project outputs. While policies were promised as an output in 40% of its projects, only 25% stated patents as an expected output. Meanwhile, NRCP substantially focused on publications with 73% of its

[34] *Intensity of expected project output is the ratio of the number of projects manifesting an expected output divided by the total number of projects of an R&D funder. It measures the relative priorities given by an agency to the expected outputs in the 6Ps framework of the DOST.*

projects promising to deliver this output. In comparison, lower percentage of PCIEERD (34%) and PCHRD (6%) projects promised to deliver publications as an output. Consistently across the four R&D funders, patents were the least emphasized project output, constituting only 17% of the total number of projects. A substantial share of projects (32%) provided no information on their expected output.

TABLE 19
PRESENCE OF EXPECTED OUTPUTS IN GIA-FUNDED PROJECTS 2017-2020

Agency	No. of Projects	Percentage Share of Output to Total Number of Projects						Others	
		People Services	Places/ Partnerships	Products	Publications	Policies	Patents	No information provided	Unclassified
PCAARD	**671**	78.7	72.4	72.0	64.8	40.2	25.2	0.1	0.7
PCIEERD	**428**	35.3	39.3	34.8	33.9	23.1	18.0	35.0	8.4
PCHRD	**325**	5.2	3.7	3.1	5.8	3.4	1.2	93.2	0.3
NRCP	**59**	47.5	55.9	11.9	72.9	50.8	8.5	27.1	0.0
TOTAL	**1,483**	**48.8**	**47.1**	**43.8**	**43.3**	**27.6**	**17.2**	**31.7**	**2.8**

Note: Percentages do not add up to 100% since projects can have multiple outputs.
Source of basic information: Data from Usec. Rowena Guevara on 2017-2020 GIA-Funded Projects of PCAARD, PCIEERD, PCHRD, and NRCP

Actual project outputs. *Places/partnerships* was the most emphasized actual project output, as reported in 39% of the total number of 1,483 GIA-funded projects *(Annex 14)*. On the other hand, *patent* was reported as an actual output only in 10% of the total number of projects. By agency, PCAARD reported *people services, places/partnerships* and *products* as actual outputs in over 60% of its projects. Publication was a pronounced actual output in 55% of PCAARD projects and 46% of NRCP projects. In each of the R&D funders, *patent* as an actual output were reported in only between 0.4% to 18.5% of the total number of GIA-funded projects of each agency.

Under the GAA, the "percentage of completed projects published in peer-reviewed journals, presented in national/international conferences, and with intellectual patents (IP) filed or approved", is one of the key performance indicators of the DOST-R&D funders. The following are the average targets for this performance indicator in 2018-2020: 100% for the Basic R&D Management Program (NRCP); 90% for the National AANR Sector R&D Program (PCAARD); 47% for the National Health R&D Program (PCHRD); and 52% for the National Industry, Energy and Emerging Technology Sectors Program (PCIEERD).

Of the 909 completed projects overall from 2017 to 2020, only 39% and 12% reported *publications* and *patents* as actual outputs, respectively (*Annex 15)*. Compared to the 100% target in the GAA, only 63.6% and 6.1% of completed NRCP projects had *publications* and *patents* as actual project outputs. For PCAARD, the corresponding ratio was 54.4% and 16.1%, respectively, vis-à-vis a 90% target in the GAA. PCHRD's 47% target was unmet as only 26.7% and 6.7% produced *publications* and *patents*, respectively. Actual performance of PCIEERD was also low at 15.9% for publications and 6.0% for patents compared to average GAA target of 52%.

Overall, only 477 (53%) and 176 (19%) of the 909 completed projects specified *publications* and *patents* as expected project outputs, respectively. Except for PCHRD, the ratio of the number of projects with either *publications* or *patents* as expected outputs to the total number of completed projects, were already below GAA performance targets.

V. BUDGET UTILIZATION

The key policies governing the utilization of R&D funds released to various implementing agencies (IAs) are summarized in Box 3. Consistent with the MOA, funding agencies (FAs) release project funds to IAs in partial or full amounts. The IAs need to submit liquidation and other financial reports as requirements for subsequent fund releases. Funds released to IAs must be used within the approved project duration and extension, subject to government accounting and auditing rules and regulations. The disbursement of GIA funds by IAs shall be in accordance with the approved projects' line-item budget. To track the utilization of fund releases, the IAs have to submit to the monitoring agencies (MAs) within a month after the end of each semester the following: semi-annual financial report, report of checks issued, report of disbursements, and equipment purchased.

The Commission on Audit (COA) has the power to audit GIA-funded projects implemented by GA. Those implemented by non-government IAs shall be audited by an independent Certified Public Accountant. The authorized representative of FAs can also inspect the activities, operation, books of accounts, and records of GIA-funded projects of non-government IAs to further ensure proper usage of the grant. Funding agencies remain accountable for funds transferred to CSOs in accordance with government accounting and auditing rules and regulations.[35]

[35] *These include the governing policies identified in the 2018 Annual Audit Report for the DOST-Office of the Secretary.*

BOX 3
KEY POLICIES PERTINENT TO GIA PROGRAM FUNDS

- **Sec. 4(6), Presidential Decree No. 1446** provides that claims against government funds shall be supported with complete documentation.
- **COA Circular No. 94-013** specifies the guidelines in the grant, utilization and liquidation of funds transferred to NGAs. Within 10 days after the end of each month of the agreed project duration, the IA shall submit the Report of Checks Issued and the Report of Disbursements/actual project expenses (Item 4.6). The IA shall return to the FA any unused balance upon completion of the project (Item 4.9).
- **COA Circular No. 2007-001** provides the guidelines in the granting, utilization and accounting of funds released to NGOs/POs. Within 60 days after project completion, the NGO/PO shall submit to the Government Office (GO), the Fund Utilization Report certified by its accountant and approved by its President/Chairman (Sec. 5.4).
- **Section 3.0 of COA Circular No. 2012-011** specifies the documentary requirements on fund transfers and liquidation, to ensure that transfers of public funds are properly taken up in the books of the funding and implementing agencies, used only for the intended purpose, and properly accounted and reported.
- **Section 2.0 of COA Circular No. 2012-001** specifies the documentary requirements on the fund transfers and liquidation of funds released to NGOs/POs. GO funds transferred to NGOs/POs shall retain their character as public funds (Sec. 4.1).
- **AO No. 9 (2017), as amended by AO 11 (2020)**, provides for the procedures for proposal submission, review, approval, and discontinuance of GIA assistance. Items 2 and 3 of Section VIII sets the policies for technical and financial monitoring of GIA projects. Item 3.3 of Sec. VIII provides that FAs shall send demand letter to Project Leaders/Head of IAs who did not submit required financial and technical reports within the prescribed deadlines.
- **The 2018-2022 General Appropriations Acts** provides that a government agency (GA) may transfer public funds to Civil Society Organizations (CSOs) under these conditions:
  - The CSO is either implementing a government program or project jointly with the GA, or a beneficiary of the government program/project;
  - There is a specific appropriation in the GAA or some other appropriations for such program or project;
  - The GA has accredited the CSO in accordance with its guidelines;
  - The CSO has liquidated, in accordance with COA regulations, all fund transfers due for liquidation;
  - The CSO has proven absorptive capacity and good track records are implementing multiple projects; and
  - The GA selected the CSO in accordance with RA 9184 and such other rules/regulations.

2018 COA Annual Audit Report; AO No. 9, as amended by AO 11, s. 2020

Budget Utilization Trends

This section examines the budget utilization of DOST R&D funders and performers. In general, R&D funders were able to obligate and disburse more of their available appropriations compared to R&D performers in 2018-2020. Some caution, however, is needed in interpreting the higher disbursement performance of R&D funders that provide financial assistance/subsidy to various government and non-government agencies implementing R&D and non-R&D projects. Transferred funds may be recorded already as disbursements in the R&D funders' financial accountability reports although some fund transfers are still unused for payments by the IAs—thus are not considered technically as disbursements or actual spending.

R&D Funders. Table 20 shows the budget utilization for six (6) select programs of DOST research funders.[36] These programs have high R&D content or an allocation share of at least 50% of a program's budget. For the period 2018-2020, total available appropriations for these six programs amounted to P16.0 billion—of which 95% (P15.1 billion) was obligated and 85% (P12.9 billion) was disbursed.

TABLE 20
BUDGET UTILIZATION RATES BY PROGRAMS OF DOST R&D FUNDERS

Program/Implementing Agency	Obligation Rate (%) a/			Disbursement Rate (%) b/		
	2018	2019	2020	2018	2019	2020
Strategic S&T (OSEC)	100.0	89.5	93.0	60.3	87.0	82.7
National AANR Sector Research and Development (PCAARRD)	99.9	78.8	95.9	88.2	62.8	71.7
National Health R&D (PCHRD)	99.9	100.0	100.0	99.2	98.8	98.8
National Industry, Energy and Emerging Technology Sectors R&D (PCIEERD)	99.8	99.9	92.3	89.0	93.1	80.4
Basic R&D Management (NRCP)	99.4	100.0	99.2	96.2	58.9	40.6
Policy Development for S&T Advisory (NRCP)	99.9	100.0	91.6	98.5	91.1	91.2
Overall	**99.9**	**89.9**	**94.3**	**76.2**	**84.0**	**81.3**

a/ Obligation rate – ratio of obligations to appropriations
b/ Disbursement rate – ratio of disbursements to appropriations
Source: 2018-2019 SAAODB (FAR No. 1 in Transparency Seal)

In 2018, the overall *obligation rate* (or the ratio of obligated program funds to available appropriations) for these six programs exceeded 99%. The following year (2019), however, it decreased substantially to 90% when total appropriations was actually higher at P5.4 billion. Four programs had obligation rates exceeding 99%, but two programs (Strategic S&T Program and the National AANR Sector R&D Program) posted rates lower than 90%. Conversely, the overall obligation rate for the six programs increased to 95% in 2020 even with almost the same funding level. While the obligation rates for PCIEERD's National IEET Sectors R&D Program and NRCP's Policy Development for S&T Advisory Program decreased, other programs performed the same or better.

Total disbursements for the six programs increased from P3.9 billion in 2018 to P4.6 billion in 2019, and then slightly decreased to P4.4 billion in 2020. The overall *disbursement rate* (or the ratio of disbursed funds to available appropriations) in 2020 was 81%-which means that only P4.4 billion of the P5.4 billion available appropriations was spent for delivered goods/services. The 2020 disbursement rate was lower compared to 2019 but higher than the 2018 level (76%). Four programs had disbursement rates lower than 90% in the first year (2020) of the COVID-19 pandemic, compared to three (3) in 2018 and in 2019. The Basic R&D Management Program of the NRCP posted the lowest disbursement rate (41%) in 2018-2020.

R&D Performers. Table 21 summarizes the obligation and disbursement rates for 21 select programs of R&D performers, with total appropriations of P5.7 billion in 2018-2020. Overall obligation rate for these 21 programs was 94% (P5.4 billion) while disbursement rate was 68%

[36] *The select programs have high R&D content or a share of at least 50% of the total program budget.*

(P3.9 billion). Available appropriations for these 21 programs declined for two consecutive years from P2.3 billion in 2018 to P1.5 billion in 2020. Obligated funds also dropped continuously, from P2.3 billion in 2018 to P1.4 billion in 2020. Disbursements were almost at same level (P1.4 billion) in 2018 and 2019, but dropped to P1.1 billion in 2020 or the first year of the COVID-19 pandemic.

The *overall obligation rate* for 21 select programs of R&D performers was 96% in 2018 and 95% in 2019. It dropped to 91% during the first year of the pandemic. In 2018, 15 of the 21 programs posted high obligation rates, ranging from 97% to 100%. Meanwhile, five programs had obligation rates ranging from 90% to 96% while the S&T Recognition and Policy Advisory Program was the only program with obligation rate below 90%.

TABLE 21
BUDGET UTILIZATION RATES BY SELECT PROGRAMS, DOST R&D PERFORMERS

Program (Implementing Agency)	Obligation Rate (%) a/			Disbursement Rate (%) b/		
	2018	2019	2020	2018	2019	2020
Advance Science and Technology R&D (ASTI)	97.2	92.6	97.9	52.6	90.2	74.9
Advance S&T Transfer (ASTI)	92.8	89.7	98.0	60.2	77.9	79.4
Forest Products R&D (FPRDI)	97.8	91.3	67.2	79.0	80.9	66.6
Forest Products Technology Transfer (FPRDI)	100.0	98.9	98.3	100.0	98.9	97.5
Forest Products S&T Services (FPRDI)	91.3	78.3	70.3	82.0	71.8	56.5
Metals Industry Research (MIRDC)	99.8	97.4	99.1	64.0	80.0	77.1
Metals Industry Technology Transfer (MIRDC)	100.0	100.0	100.0	97.8	99.5	98.5
Metals Industry S&T Services (MIRDC)	100.0	100.0	100.0	95.8	98.1	68.3
Flood Forecasting and Warning (PAGASA)	93.2	98.2	81.6	74.2	84.1	63.8
R&D on Atmospheric, Geophysical and Astronomical and Allied Sciences (PAGASA)	93.3	96.1	87.8	9.6	39.4	65.0
Nuclear R&D (PNRI)	100.0	99.9	100.0	98.3	95.5	90.4
Nuclear S&T Services and Advisory (PNRI)	100.0	99.9	100.0	94.4	78.1	88.1
Nuclear Regulations, Security and Safeguards (PNRI)	100.0	100.0	100.0	99.1	97.2	89.5
Food and Nutrition R&D (FNRI)	98.1	98.9	99.7	92.0	87.0	82.8
Nutritional Assessment and Monitoring (FNRI)	99.3	96.2	82.8	93.5	76.3	58.4
Food and Nutrition Technology and Knowledge Diffusion (FNRI)	99.7	99.8	99.8	94.4	97.7	95.1
Industrial Technology R&D (ITDI)	95.9	99.7	97.1	71.5	74.8	61.9
S&T Recognition and Policy Advisory (NAST)	88.3	89.3	86.5	79.8	86.0	82.4
Textile and other Textile-related R&D (PTRI)	99.9	99.9	86.8	78.8	92.4	51.6
Textile S&T Services (PTRI)	99.6	99.9	100.0	97.7	95.1	98.6
Textile Technology Transfer (PTRI)	100.0	98.3	100.0	98.6	64.7	88.3
Overall	**95.9**	**95.3**	**91.1**	**58.1**	**77.6**	**71.6**
Minimum	*88.3*	*78.3*	*67.2*	*9.6*	*39.4*	*51.6*
Maximum	*100.0*	*100.0*	*100.0*	*100.0*	*99.5*	*98.6*

a/ Obligation rate – ratio of obligations to appropriations
b/ Disbursement rate – ratio of disbursements to appropriations
Source: 2018-2019 SAAODB (FAR No. 1 in Transparency Seal)

Even though the overall obligation rate declined from 95% in 2019 to 91% in 2020, the same number of programs (14) posted high obligation rates (97% to 100%) in these two consecutive years. However, there was a marked increase in the number of programs with obligation rates falling below 90%, from three (3) in 2019 to seven (7) in 2020. The lowest obligation rate occurred in the following programs: NAST's S&T Recognition and Policy Advisory Program (88 in 2018; FPRDI's Forest Products and S&T Services Program (78%) in 2019, and Forest Products R&D Program (67%) in 2020.

The *overall disbursement rates* for the 21 programs of R&D funders rose from 58% in 2018 to 78% in 2019, but slightly decreased to 72% the following year. Six (6) programs posted high disbursement rates in 2018, ranging from 97% to 100%. The bulk of the programs (10 out of 21) had disbursement rates below 90%. PAGASA's R&D on Atmospheric, Geophysical and Astronomical and Allied Science Program had the lowest at around 10%. Meanwhile, five programs posted high disbursement rates of at least 97% in 2019, with the Metals Industry Technology Transfer Program posting the highest at 99%

In 2020, only three (3) programs posted high disbursement rates: PTRI's Textile S&T Services (99%), MIRDC's Metal Industry Technology Transfer (99%), FPRDI's Forest Products Technology Transfer (98%). The number of programs with low disbursement rates (below 90%) increased from 12 in 2019 to 16 in 2020. PTRI's Textile and Other Textile-Related R&D Program posted the lowest disbursement rate (52%). The 2019-2020 disbursement rates had worsened in 16 of the 21 programs, with largest drops (of at least 20 percentage points) in three programs.[37]

Clarifying the utilization of budget allocation for R&D. Table 22 shows the utilization of the R&D budget allocation of R&D funders, to finance approved GIA projects. Of the P16.1 billion R&D budget allocation, only 88% (P14.1 billion) was provided as funding support to approved GIA projects. The ratio of approved project financing to R&D budget allocation exceeded 96% each for DOST-OSEC and the PCHRD while it was lower than 90% in the case of the PCAARD (62%), NRCP (71%), and PCIEERD (85%).

A sizeable gap of around P2 million (P16.1 billion minus P14.1 billion) existed between available R&D budget allocation (P16.1 billion) and the approved financing for GIA projects (P14.1 billion). The low ratios of project financing-to-available R&D budget allocation at the agency level suggests the need to further maximize the use of limited R&D funds.

[37] *The three (3) programs are the following: Metals Industry Science and Technology Services Program (MIRDC), Flood Forecasting and Warning (PAGASA), and Textile and other Textile-related R&D Program (PTRI).*

TABLE 22
RATIO OF PROJECT FINANCING TO R&D BUDGET ALLOCATION
DOST R&D FUNDERS, 2018-2020

R&D Funders	Amounts (in Million Pesos)		Ratio (%) (b/a)
	R&D Budget Allocation (COFOG) a/	Total Approved Funds under the GIA Program b/	
DOST-OSEC	8,631.80	8,349.3	96.73
PCAARD	3,432.10	2,124.2	61.89
PCIEERD	2,132.30	1,818.8	85.30
PCHRD	1,822.00	1,762.8	96.75
NRCP	121.7	86.0	70.70
TOTAL	**16,139.90**	**14,141.1**	87.62

Source of basic information. DOST Data on GIA-Funded Projects of the DOST-Central Office, PCAARD, PCIEERD,

Key Factors Affecting Efficient Budget Utilization

A study by Razo et al.[38] (2019) identified the key factors constraining the efficient implementation of the GIA funded projects. Delayed budget releases and slow procurement adversely affected the efficiency of 69% of 498 randomly-drawn sample of GIA-funded projects of the DOST-OSEC. The lengthy period to complete the signing of the Memorandum of Agreement (MOA) was another constraint that affected 51% of the sampled projects.

Delayed budget release affected 99% of sampled PCAARD projects and 69% of NRCP projects. Prolonged MOA signing affected 51% of sampled NCRP projects, and likewise contributed to projects delays for PCAARD (74%), PCIEERD (54%) and PCHRD (21%). Meanwhile, procurement processes affected the most number of projects of the PCHRD (82% of sampled projects) and PCIEERD (68%).

Liquidation of GIA Funds. Various COA Annual Audit Reports (AARs) on DOST R&D funders have identified the persisting issue of long-outstanding, unreconciled and unliquidated fund transfers to various implementing agencies including national government agencies (NGAs) and their regional offices, SUCs, LGUs, NGOs/POs, and private sector organizations *(2018-2021 COA Annual Audit Reports).*

A perennial problem reiterated in COA's annual audit reports is the non-submission by a number of IAs of required liquidation reports despite the completion of the projects (*2020 AAR for the DOST-OSEC, p.59*). This has resulted in the accumulation of unliquidated fund transfers and the non-reporting of expenses incurred in project implementation, casting doubts on the proper implementation of projects and the timely delivery of expected research outputs (*Ibid., p. 22, 59).*

In 2018, DOST central and regional offices had an outstanding balance of GIA fund transfers amounting to P7.1 billion (*2018 AAR for DOST-OSEC, p.43-44).* NGAs (including SUCs) as IAs

[38] *Razo, A.K., Santos, E.M., and Ayson, A.J.G. Analysis of Factors Affecting the Efficiency of Department of Science and Technology (DOST) Grants-in-Aid (GIA) Program, 2019.*

of GIA-funded projects accounted for the 92% (P6.5 billion) of the unreconciled receivables, followed by private sector entities (P422 million).[39] Of the P7.1 billion receivables, P646 million (9%) was past due for liquidation for over 1 to 20 years *(Ibid.)*. By year-end of 2020, the outstanding balance of unreconciled fund transfers had increased to P10.5 billion (*2020 AAR, p.*59). About 47% (P4.9 billion) of this amount was not yet due for liquidation within the year while 53% (P5.6 billion) was past due for liquidation for one year to 10 years (*Table 23).*

TABLE 23
BREAKDOWN OF DOST-OSEC UNLIQUIDATED GIA FUND TRANSFERS, AS OF 31 DECEMBER 2020 (AMOUNTS IN MILLION PESOS)

Receivables Account	Offices/Source Agency	Outstanding Balance	Not yet due for liquidation		Past Due
			Less than 30 days	91 to 365 days	Over 1 year to 10 years
Due from NGAs	CO, CAR, NCR, I, II, IV-B, VI, X	9,457.8	4,172.7	215.0	5,070.1
Due from LGUs	NCR, II, IV-B, VI, X	83.2	8.0	41.3	34.0
Due from Regional Offices	NCR	1,168.4	-	-	1.2
Due from NGOs/POs	NCR, CO, II, IV-B, VI, X	136.5	4.2	65.1	67.2
Other Receivables	NCR, CO, IV-B, IX	859.2	55.8	410.0	393.4
TOTAL		10,538.0	4,240.7	731.3	5,565.9
Share to Total (%)		**100%**	**47.2% (4,972.0)**		**52.8%**

Source of basic data: 2020 Annual Audit Report for the DOST-OSEC, p.59

While a number of IAs of GIA-funded projects had unliquidated balances for projects already completed, DOST R&D funders continued to release funds to them. In 2018, for instance, PCAARD released a total of P498 million grant to 51 IAs, mostly SUCs, with unliquidated fund transfers amounting to P854 million (*2018 AAR for PCAARD*).

There were also lapses in preparing the required liquidation reports. In the case of the DOST-OSEC GIA funds, some liquidation reports for fund transfers to NGOs/POs and private-owned entities were not adequately supported with invoices, official receipts, and other documents showing disbursement. These lapses prevented COA audit teams from verifying the regularity and propriety of fund transfers and liquidations *(2018 Annual Audit Report for DOST-OSEC).*

The non-submission of terminal project reports creates an impression that GIA-funded projects were not completed or the funds were misused. However, some COA auditors in regional offices of the DOST pointed out that the main reason for non-submission of liquidation reports especially NGOs/POs/private entities was the lack of funds to pay for an independent Certified Public Accountant *(Ibid.)*.

Across Sectoral Councils, lapses in monitoring the financial aspects of projects; laxity in requiring the submission of required technical and financial reports; and non-inclusion of sanctions in the MOA on the failure to submit project reports, were among the contributory factors to the

[39] *Other Receivables are fund transfers for other agencies not falling under any specific receivables account, such as fund transfers to private sector not classified as NGOs/POs (2018 AAR for DOST-OSEC, p.42).*

accumulation of unliquidated fund transfers (*COA, 2018-2021 AAR for the PCHRD, PCIEERD, OSEC*). Some NGAs, NGOs, POs and private entities also failed to report the fund utilization of long-standing receivables.

In 2018, COA sent 291 demand letters to concerned Project Leaders of GIA-funded projects of the PCHRD. The replies of Project Leaders confirmed the lack of close monitoring of project implementation. COA underscored the key finding that the PCHRD lacked knowledge on the real status of some projects (i.e., projects reported as completed were still on-going even beyond the original project duration) (*COA, 2018).*

VI. KEY ISSUES AND RECOMMENDATIONS

- R&D has an important role in improving the country's capacity for technological innovation, higher productivity and economic growth. However, the Philippines continues to lag behind in R&D expenditures (at P58.9 billion or 0.3% of GDP in 2018), pulling down its performance in global innovation and competitiveness surveys. There is a need to increase overall levels of public R&D spending which must be made responsive to industry needs and inducive to private sector R&D investment.

- The latest data (2018) show that public R&D spending accounts for 40% (P23.6 billion) while private firms, HEIs, non-profit organizations, and other non-government sources contributed 60% (P35.2 billion) to the Gross Expenditures for R&D (GERD) in the Philippines. Government research and development institutes (RDIs) including SUCs are largely supported by public R&D funds but must be able to find other fund sources such as private firms. Meanwhile, public R&D funds account for 36% of the R&D expenditures of private HEIs and non-profit institutions. To maximize the value of public R&D funding, it must flow more to RDIs/SUCs including private HEIs and firms with demonstrated capacity to conceptualize and execute high-impact R&D projects. With around 75% of R&D funds for SUCs going only to the UP System, it also implies the need to strengthen the research capacity of other SUCs to foster more competition in accessing limited R&D funding.

- Different types of RDIs have different incentives and directions for pursuing R&D projects. The 2018 GERD data shows that government agencies and private non-profit institutions focus more on agriculture R&D while SUCs conduct more R&D in the natural sciences. Private HEIs tend to focus on engineering and technology. To extract more value from limited public R&D spending, government grants-in-aid must harness the distinct focus, expertise, and incentives of different types of R&D performers, towards achieving the key result highlighted in the 2017-2022 Philippine Development Plan and the Harmonized Research and Development Agenda, to strengthen the country's foundation for a globally competitive knowledge economy through accelerated technology adoption and stimulation of innovation.

- There is a need to improve the R&D tagging for the COFOG budget data by providing definitions that are more specific than what was stipulated in the COFOG manual to avoid

confusion in agencies when tagging budget items. Similarly, there must also be a clearer delineation of R&D and non-R&D expenditures in S&T agencies. This is important in the analysis of the government's R&D spending and its sectoral priorities.

- Existing R&D budget allocations barely keeps up with the funding requirements for ongoing R&D projects. The Special Projects Division of the DOST estimated that the budget allocation for approved R&D projects due for implementation in 2021 was short by P170 million. Not much new R&D projects are approved and implemented due to budget constraints.

- The DOST's Grants-in-Aid (GIA) program is the largest funding vehicle for R&D projects of implementing agencies from government, non-government or private sectors. However, there is scant public information on the annual level of GIA funding within and across DOST R&D performers. What is made publicly available, however, are the amounts given to approved GIA-funded projects. This gap makes it difficult to assess the efficiency of budget utilization of GIA funds.

- Current government and budget policies require that GIA funds be directed towards the five HNRDA priority sectors. Each sector, however, has broad coverage in terms of priority research areas, which often intersect with the priority research areas of the other sectors. There is a need to harmonize and sharpen the focus of the priority R&D areas in each sector. It is suggested that the DOST R&D funders embark on convergence budgeting to harmonize and sharpen the focus of their respective R&D programs. R&D funders must be clear in terms of the market failures and other gaps that justify the government's involvement in these R&D areas.

- The use of the HNRDA has largely been effective in aligning the R&D investments of the government. An analysis of the GIA-funded projects of DOST R&D funders shows that a large portion of the GIA funds went to the five HNRDA sectors. However, the share of "Other Projects" outside these five HNRDA sectors remained substantial (although declining since 2017). Current GIA policies allow for the use of GIA funds for other projects which may not be directly related to R&D, but supports the production of more quality R&D outputs (e.g., human resource development). While such support is needed, it raises questions on the utilization of existing R&D budget allocations for purposes that are not directly or purely R&D.

- "People services" was the most dominant output expected in funded projects followed by "places/partnerships" and "products". Traditional R&D outputs such as publications and patents were less emphasized in these projects, the ratio of which is below GAA performance targets. A substantial number of projects also had no information provided on expected outputs. For R&D budget allocations to be translated as valued R&D outputs, there is a need for projects to focus more on producing publications and patents as project outputs.

- Low disbursement rates generally affect various projects of DOST R&D funders and performers. The delayed completion of project agreements among project funders, implementors and monitors, along with delays in budget releases and slow procurement, are

constraints to efficient budget utilization. These absorptive capacity issues need to be addressed before substantially increasing R&D budget allocations of R&D funders and performers.

- Another issue that needs to be addressed is the accumulation of unreconciled and unliquidated fund transfers. This issue prevents a realistic assessment of how much the government is actually spending for R&D. Stronger mechanisms are needed to ensure the proper liquidation by various implementing agencies of limited R&D funds.

- Monitoring agencies such as the DOST Sectoral Councils may need to increase their capacity to monitor and evaluate the actual outputs and outcomes of R&D projects, especially in terms of how these projects contribute to the actual generation and utilization of new knowledge and technologies critical to the Philippine economy's competitiveness.

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ANNEX 1
SAMPLE PROJECTS AND ACTIVITIES FUNDED BY R&D BUDGET ALLOCATIONS OF SELECT DOST-R&D PERFORMERS, 2018 – 2021

R&D Performers	2018	2019	2020	2021	2018-2021 Total
Food and Nutrition Research Institute, *of which:*	266.1	429.6	432.8	491.0	**1,619.5**
Expanded National Nutrition Survey	187.6	320.0	313.8	348.9	**1,170.3**
Scientific Research and Development Services on Basic and Applied Researches on Food and Nutrition	43.8	40.8	39.8	52.2	**176.5**
Technical Services on Food and Nutrition	-	35.7	36.7	38.9	**111.3**
Nutritional Assessment and Monitoring on Food and Nutrition	24.7	23.1	24.8	30.3	**102.8**
Expanding the FNRI's Nutrigenomics Laboratory	10.0	10.0	17.8	20.7	**58.5**
Advanced Science and Technology Institute, *of which:*	148.4	370.0	289.1	471.9	**1,279.5**
Technical transfer through diffusion and commercialization	-	305.9	187.1	331.4	**824.3**
Scientific R&D in microelectronics, IT and other advanced fields of studies	148.4	64.2	102.1	140.6	**455.2**
Philippine Nuclear Research Institute, *of which:*	188.3	196.1	299.4	215.1	**899.1**
Nuclear and Allied Services	69.3	68.0	70.4	76.2	**283.8**
Establishment of a Two-Storey Radiation Protection Services Facility	15.0	6.7	17.0	3.0	**41.7**
Upgrading of ARC Building	10.0	10.0	15.0	14.7	**49.7**
Upgrading of Entomology Modular Laboratory	3.0	4.2	3.0	-	**10.2**
Metals Industry Research and Development Center, *of which:*	184.6	134.9	154.6	136.6	**610.7**
Prototype and process development through metal casting, metal working and surface engineering processes	142.2	55.3	52.4	56.7	**306.6**
Technical assistance and technology transfer through consultancy, training and information awareness program	26.4	25.1	23.8	24.6	**99.9**
Testing, analysis and calibration services	-	24.2	34.5	25.3	**84.1**
Rehabilitation of Mechanical Workshop II Building	-	18.3	-	-	**18.3**
Rehabilitation of Mechanical Workshop II Building	16.0	-	-	-	**16.0**
Advancement of Information and Communication Technology (ICT) and Implementation of Information Security Management System (ISMS) in MIRDC-(AIM)	-	-	-	10.0	**10.0**
Construction of New Cistern Tank and Upgrading of the Center's Water Supply	-	-	15.0	-	**15.0**
Repair of perimeter fence (90,000 square meters)	-	-	8.0	8.0	**16.0**
Upgrading of MIRDC Laboratory and Administration Building	-	12.0	15.0	12.0	**39.0**

Source of basic information: DBM R&D data based on COFOG

ANNEX 2
HARMONIZED NATIONAL R&D AGENDA, 2017-2022
PRIORITY AREAS AND PROGRAMS

National Integrated Basic Research Agenda (NIBRA)

WATER SECURITY
- Watershed studies, water quality, accessibility and availability

FOOD AND NUTRITION SECURITY
- Food safety, biodiversity studies

HEALTH SUFFICIENCY
- Fundamental studies on potential sources of natural products, basic veterinary studies, social dimensions on health

CLEAN ENERGY
- Alternative energy

SUSTAINABLE COMMUNITIES
- Vulnerable ecosystems, data analytics on natural phenomena, environmental and anthropogenic activities

INCLUSIVE NATION-BUILDING
- Documentation of indigenous knowledge, data collection on social phenomena, education, national security and sovereignty, arts, history and culture

Health

- **Drug Discovery and Development**
- **Diagnostics**
- **Functional Foods**
- **Hospital Equipment and Biomedical Devices**
- **Information and Communication Technology for Health**
- **Dengue**
- **Nutrition and Food Safety**
- **Disaster Risk Reduction-Health**
- **Climate Change Adaptation-Health**
- **Omic Technologies for Health**

Agriculture and Natural Resources Sector (AANR)

AGRICULTURE

Crops
- Germplasm research; Varietal improvement and selection; Good quality planting materials (QPMs); Cultural management and crop production systems; Postharvest processing and product development

Livestock
- Animal improvement; Improved reproduction, feeding and nutrition; Conservation and improvement of native animals; Vaccine, biologics and diagnostics; Detection of chemical residues and antimicrobial resistance; Decision support systems, Product development and processing

FISHERIES AND AQUACULTURE
- Applied genomics; Culture systems; Culture of new cultivable species; Fish health, disease diagnostics and management; Nutrition, feeds and feeding systems; Postharvest handling, processing and product development, Automation of feeding, water and culture management and post production; Fishkill warning and mitigation systems and environmental management; Management of fisheries

FORESTRY
- Development and sustainable management of tree plantations; HYV development of priority timber species; Production protocols for the production of QPM; Sustainable cultural management practices harvesting and postharvest techniques and marketing strategies

NATURAL RESOURCES AND ENVIRONMENT
- Biodiversity; Watershed management and utilization; Soil management and rehabilitation; Agricultural and forest waste-based product development; Climate change strategies and decision support tools; Resource assessment and monitoring; Habitat management; Marine environmental management; Innovative systems for unique landscapes and ecosystems

TECHNOLOGY TRANSFER
- Upscaling of technology transfer and commercialization; New and innovative extension modalities; Technology business incubators

SOCIO-ECONOMICS AND POLICY RESEARCH

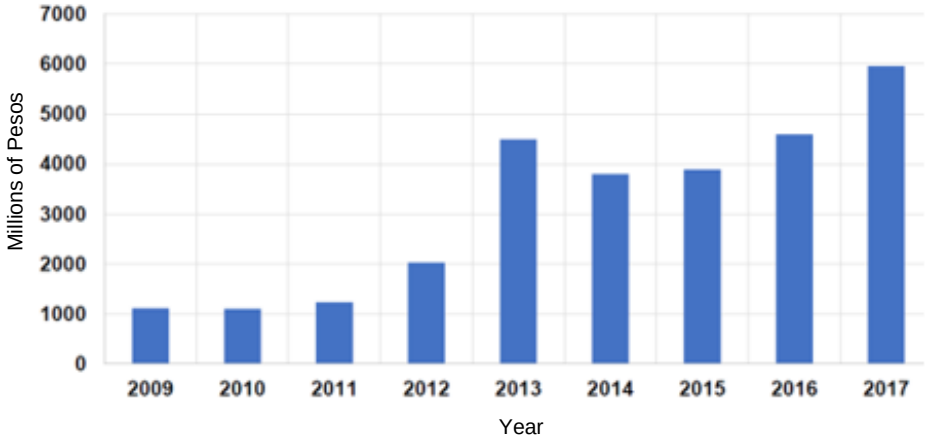
Industry, Energy and Emerging Technology

- **Food and Nutrition Security**
- **Countryside Development**
- **Competitive Industries**
- **Delivery of Social Services**
- **Intelligent Transportation Solutions**
- **Renewable Energy and Energy Storage Solutions**
- **Human Security**

Disaster Risk Reduction and Climate Change Adaption (DRR CCA)

- **Observation and Monitoring Networks**
- **Technology Development and Application for Monitoring**
- **Modelling and Simulation for Improvement of Monitoring and Forecasting**
- **Hazards, Vulnerability and Risk Assessment**
- **Warning and Risk Communication**
- **Technology Development and Application for Climate Change Mitigation and Adaptation**
- **Technology Development and Application for Disaster Risk Management**
- **Policy Research**

ANNEX 3
LEVEL OF GIA PROGRAM FUNDING, 2009 TO 2017



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ANNEX 4
PERCENTAGE SHARE OF HNRDA SECTORS TO GIA APPROVED PROJECT FUNDING, 2017-2020 TOTAL

R&D Funders	Approved Project Funding (in Million Pesos)	Percentage Share of HNRDA Sectors to Approved Project Funding of the Agency (%)					Percentage Share of Other Projects to Approved Project Funding of the Agency (%)		
		Health	IEET	AANR	DRRCCA	NIBRA	Non-R&D	No classification	Diffusion and Transfer of Knowledge/ Technologies
DOST-OSEC	10,792.2	23.3	33.8	8.0	3.9	1.3	23.5	1.2	5.0
PCAARD	2,629.2	-	-	99.8	-	-	-	0.2	-
PCHRD	2,532.4	100.0	-	-	-	-	-	-	-
PCIEERD	2,506.9	2.0	42.7	4.3	11.4	0.3	-	39.3	-
NRCP	99.5	-	-	-	-	100.0	-	-	-
TOTAL	**18,560.2**	**27.5**	**25.4**	**19.3**	**3.8**	**1.4**	**13.7**	**6.0**	**2.9**

Source of basic information. DOST Data on GIA-Funded Projects of the DOST-Central Office, PCAARD, PCIEERD, PCHRD, and NRCP; and DBM R&D data based on COFOG.

ANNEX 5
DISTRIBUTION OF 2017-2020 GIA FUNDS FOR THE HEALTH SECTOR

Health Sector Priority Areas	Number of Projects	Total Approved Grants (in Million Pesos)	Percent Share	
			Number of Projects	Approved Funds
Drug discovery and development	157	1,590.1	33.5	31.2
Omic technologies for health	43	844.6	9.2	16.6
Diagnostics	49	716.5	10.4	14.0
No classification	42	588.5	9.0	11.5
ICT for health	31	378.8	6.6	7.4
Other priorities	54	208.9	11.5	4.1
Regional health research	1	199.5	0.2	3.9
Disaster risk reduction	12	122.6	2.6	2.4
Nutrition and food quality and safety	12	117.7	2.6	2.3
Hospital equipment and biomedical devices	20	111.8	4.3	2.2
Functional foods	20	98.1	4.3	1.9
Health and climate change adaptation	17	64.4	3.6	1.3
Dengue	10	59.4	2.1	1.2
Mental health	1	0.8	0.2	0.0
TOTAL	**469**	**5,101.7**	**100.0**	**100.0**

Source of basic information. DOST Data on GIA-Funded Projects of the DOST-Central Office, PCAARD, PCIEERD, PCHRD, and NRCP

ANNEX 6
DISTRIBUTION OF 2017-2020 GIA FUNDS FOR THE IEET SECTOR

IEET Priority Areas	Number of Projects	Total Approved Grants (in Million Pesos)	Percent Share	
			Number of Projects	Approved Funds
Competitive industries	155	3,348.4	47.7	71.0
Food and nutrition security	37	346.5	11.4	7.3
Countryside development	43	314.2	13.2	6.7
Delivery of social services	28	174.9	8.6	3.7
Intelligent transport solutions	21	145.0	6.5	3.1
No classification	9	100.4	2.8	2.1
Environment and water	8	71.4	2.5	1.5
Renewable energy and energy storage solutions	7	64.0	2.2	1.4
National security	6	60.6	1.8	1.3
Disaster risk reduction and climate change adaptation	3	49.6	0.9	1.1
Facilities upgrading	1	15.8	0.3	0.3
Support for S&T activities	3	12.4	0.9	0.3
Alternative energy	1	4.0	0.3	0.1
Mining and minerals	1	3.1	0.3	0.1
Construction	1	2.7	0.3	0.1
Emerging technology	1	2.2	0.3	0.0
TOTAL	**325**	**4,715.1**	**100.0**	**100.0**

Source of basic information. DOST Data on GIA-Funded Projects of the DOST-Central Office, PCAARD, PCIEERD, PCHRD, and NRCP

ANNEX 7
DISTRIBUTION OF 2017-2020 GIA FUNDS FOR THE AANR SECTOR

AANR Priority Areas	Number of Projects	Total Approved Grants (in Million Pesos)	Percent Share	
			Number of Projects	Approved Funds
Aquatic R&D	112	777.4	14.1	21.7
Crops	154	761.5	19.3	21.2
Technology Transfer	160	499.4	20.1	13.9
Livestock	59	348.3	7.4	9.7
Natural Resources and Environment	48	319.9	6.0	8.9
Agriculture	34	309.6	4.3	8.6
Forestry	60	256.4	7.5	7.1
Crosscutting	122	162.0	15.3	4.5
Socioeconomics and Policy	48	154.2	6.0	4.3
TOTAL	**797**	**3,588.7**	**100.0**	**100.0**

Source of basic information. DOST Data on GIA-Funded Projects of the DOST-Central Office, PCAARD, PCIEERD, PCHRD, and NRCP

ANNEX 8
DISTRIBUTION OF 2017-2020 GIA FUNDS FOR THE DRRCCA SECTOR

AANR Priority Areas	Number of Projects	Total Approved Grants (in Million Pesos)	Percent Share	
			Number of Projects	Approved Funds
Hazards, vulnerability and risk assessment	21	227.3	28.4	32.3
Observation and monitoring networks	6	127.3	8.1	18.1
Modelling and simulation for improvement of monitoring and forecasting	7	89.2	9.5	12.7
Technology development and application for monitoring	21	93.2	28.4	13.3
Warning and communication of information	2	62.1	2.7	8.8
Technology development and application	7	50.3	9.5	7.2
Technology development and application for disaster risk management	4	19.4	5.4	2.8
Countryside development	1	5.5	1.4	0.8
Geology, geochemistry, geochronology	2	11.5	2.7	1.6
Environment and disaster management	1	10.7	1.4	1.5
Technology development and application for climate change mitigation and adaptation	2	6.4	2.7	0.9
TOTAL	**74**	**702.8**	**100.0**	**100.0**

Source of basic information. DOST Data on GIA-Funded Projects of the DOST-Central Office, PCAARD, PCIEERD, PCHRD, and NRCP

ANNEX 9
DISTRIBUTION OF 2017-2020 GIA FUNDS FOR THE NIBRA SECTOR

AANR Priority Areas	Number of Projects	Total Approved Grants (in Million Pesos)	Percent Share	
			Number of Projects	Approved Funds
Inclusive nation building (ATIN Program)	29	79.7	28.7	31.8
Sustainable communities (SAKLAW Program)	28	51.8	27.7	20.7
Food and nutrition security (SAPAT Program)	8	47.8	7.9	19.1
Water security (TUBIG Program)	11	27.6	10.9	11.0
Mixed	1	16.5	1.0	6.6
Health sufficiency (LIKAS Program)	13	15.2	12.9	6.1
NIBRA studies	2	6.8	2.0	2.7
Clean energy (ALERT Program)	9	5.4	8.9	2.2
TOTAL	**101**	**250.8**	**100.0**	**100.0**

Source of basic information. DOST Data on GIA-Funded Projects of the DOST-Central Office, PCAARD, PCIEERD, PCHRD, and NRCP

ANNEX 10
DISTRIBUTION OF 2017-2020 GIA FUNDS FOR THE GENERATION OF KNOWLEDGE AND TECHNOLOGIES BY THEMATIC PROGRAM AREAS, DOST-OSEC

R&D Programs	Number of Projects	2017-2020 Approved Funds	% Share	
			Number of Projects	2017-2020 Approved Funds
1. Space technology and its applications	9	1,205.0	2.1	17.9
2. Discovery and development of health products	74	1,157.6	17.0	17.2
3. Projects with no programs	29	574.0	6.7	8.5
4. Niche Centers in the Regions for R&D (NICER)	55	541.1	12.6	8.0
5. Additive manufacturing	2	449.5	0.5	6.7
6. Omic technologies	15	391.3	3.4	5.8
7. Support to COVID-19 initiatives	6	361.6	1.4	5.4
8. Agricultural productivity	29	208.8	6.7	3.1
9. Natural resource assessment/mapping/conservation	35	203.6	8.0	3.0
10. Disaster risk reduction	23	335.6	5.3	5.0
11. Electronics product development	2	189.9	0.5	2.8
12. S&T and innovations for productivity and competitiveness	10	174.8	2.3	2.6
13. Diagnostics	8	155.6	1.8	2.3
14. Transport/mobility	6	145.9	1.4	2.2
15. Collaborative Research and Development to Leverage Philippine Economy (CRADLE)	39	141.2	9.0	2.1
16. Duck industry	3	84.8	0.7	1.3
17. Bamboo musical instruments	4	81.3	0.9	1.2
18. Food/water safety	8	41.3	1.8	0.6
19. MECO-TECO joint research	11	38.6	2.5	0.6
20. Halal S&T	9	38.1	2.1	0.6
21. Grants for outstanding achievements in S&T	29	36.7	6.7	0.5
22. Health sufficiency	1	29.7	0.2	0.4
23. Water quality monitoring/treatment	3	26.5	0.7	0.4
24. Information systems	1	21.9	0.2	0.3
25. Functional foods	2	19.1	0.5	0.3
26. Forest products	4	18.0	0.9	0.3
27. Materials science	7	17.3	1.6	0.3
28. Music database of Philippine indigenous instruments	1	14.1	0.2	0.2
29. Business innovation through S&T (BIST)	1	11.7	0.2	0.2
30. Ecotourism	2	4.4	0.5	0.1
31. DOST-Japan Society for the Promotion of Science (JSPS)	1	2.5	0.2	0.0
32. Scientific understanding, attitude and practices	1	1.3	0.2	0.0
34. Development of bioactive cyclotides from Philippine biodiversity	3	1.0	0.7	0.0
35. Natural rubber R&D	1	0.5	0.2	0.0
36. International collaboration on strategic R&D	1	-	0.2	0.0
TOTAL	**435**	**6,724.5**	**100.0**	**100.0**

ANNEX 11
GIA-FUNDED NICHE CENTERS IN THE REGIONS FOR R&D
DOST-OSEC, 2017-2020

NICERS	Number of Funded Projects	GIA Funding (in Million Pesos)
Center for Innovations for Cost-Effective Disaster Risk Reduction and Management in Health	3	63.3
Center For Mollusk R&D (UP Visayas)	1	50.9
Mindanao Renewable Energy R&D Center	2	47.3
Mindanao Sea Cucumber R&D Center	4	46.4
Center for Applied Modeling, Data Analytics, and Bioinformatics for Decision-Support Systems in Health	4	39.1
Center on Environmental Informatics for Central Visayas (UP Cebu)	1	31.8
Center for Astronomy R&D in NCR (Rizal Technological University)	1	29.3
Seaweed Research and Development Center In Tawi-Tawi	3	27.9
Pili R&D Center	7	25.5
Halal Goat Science and Innovation Center	4	24.3
Central Visayas R&D Center For Biodiversity	3	22.4
Freshwater Fisheries Center for Cagayan Valley	2	20.0
Eastern Visayas Center for Crustacean R&D	2	19.9
Potato Quality Seed R&D Center in Cordillera Administrative Region	3	19.4
Tamarind R&D Center	3	18.3
Center for Cave Ecosystems Research	4	18.0
Sweet potato R&D Center in Central Luzon	3	15.3
Philippine Native Pig Center	1	10.9
Industrial Tree Plantation Species R&D Center	3	10.4
Queen Pineapple R&D Center	1	0.9
TOTAL	**55**	**541.1**

Source of basic information: DOST-Central Office data on GIA-funded projects, 2017-2020

ANNEX 12
SHARES OF IMPLEMENTING AGENCIES
TO THE 2018-2020 GIA FUNDS, PCIEERD

Implementing Agencies	GIA Funding Outflows (in Million Pesos)	% Share
SUCs	3,620.4	55.1
Government RDIs	947.1	14.4
Private HEIs	886.7	13.5
Other Implementing Agencies	649.6	9.9
Private firms	325.5	5.0
Private Non-Profit Institutions	143.0	2.2
Foreign HEIs	1.0	0.0
TOTAL	**6,573.4**	**100.0**

Source of basic information: Financial Statements, 2018-2020 Annual Audit Report for PCIEERD

ANNEX 13
2017-2020 GIA FUND FLOWS BY FUNCTION AND IMPLEMENTING AGENCIES
DOST-OSEC

Function	2017-2020 GIA Funding	% Share of Implementing Agencies to Total GIA Funding by Function					
		Other IAs agencies	SUCs	Gov't. Agencies	Private HEIs	PNPIs	Private firms
Generation of knowledge and technologies	**6,724.5**	16.5	48.4	25.0	7.8	0.9	1.4
Provision of quality S&T services	**2,897.5**	63.4	0.8	33.5	0.0	1.4	0.9
Development of human resources for the S&T sector	**667.8**	87.9	2.6	5.2	4.3	-	-
Diffusion and transfer of knowledge and technologies	**502.5**	79.8	10.3	0.6	2.6	6.7	-
TOTAL	**10,792.2**	**36.5**	**31.0**	**24.9**	**5.2**	**1.2**	**1.1**

Source of basic information: DOST-Central Office data on GIA-funded projects, 2017-2020

ANNEX 14
PRESENCE OF ACTUAL OUTPUTS IN GIA-FUNDED PROJECTS 2017-2020

R&D Funder	Number of Projects	Percentage Share of 6Ps Output to the Total Number of Agency Projects						Others	
		Places/ Partnerships	People Services	Products	Publications	Policies	Patents	No information	Unclassified
PCAARD	671	65.4	68.3	62.4	54.5	27.3	18.5	6.0	2.4
PCIEERD	428	26.2	18.9	16.6	15.0	10.3	5.1	58.6	6.3
PCHRD	325	1.6	1.1	0.9	1.8	1.0	0.4	28.7	0.1
NRCP	59	45.8	42.4	6.8	45.8	28.8	3.4	25.4	1.7
TOTAL	**1,483**	**39.3**	**38.1**	**33.5**	**31.1**	**16.5**	**10.0**	**41.3**	**3.5**

Source of basic information: DOST-Central Office data on GIA-funded projects, 2017-2020

ANNEX 15
DELIVERY OF PROJECT OUTPUTS IN GIA-FUNDED PROJECTS, 2017-2020

Agency	Number of completed projects	Publications		Patents as Project Output	
		Actual number of projects	Actual/Total number of completed projects (%)	Actual number of projects	Actual/Total Number of completed projects (%)
NRCP	33	21	63.6	2	6.1
PCAARD	496	270	54.4	80	16.1
PCHRD	15	4	26.7	1	6.7
PCIEERD	365	58	15.9	22	6.0
TOTAL	**909**	**353**	**38.8**	**105**	**11.6**

Source of basic information: DOST-Central Office data on GIA-funded projects, 2017-2020

LIST OF ACRONYMS

AANR	Agriculture, Aquatic and Natural Resources
ASTI	Advanced Science and Technology Institute
BESF	Budget of Expenditures and Sources of Financing
BIST	Business Innovation through S&T
BSGC	Budgetary Support to Government-Owned and -Controlled Corporations
CHED	Commission on Higher Education
CRADLE	Collaborative R&D to Leverage the Philippine Economy
CO	Central Office
COFOG	Classification of the Functions of Government
DA	Department of Agriculture
DBM	Department of Budget and Management
DDHP	Discovery and Development of Health Products
DepEd	Department of Education
DENR	Department of Environment and Natural Resources
DICT	Department of Information and Communications Technology
DND	Department of National Defense
DOH	Department of Health
DOST	Department of Science and Technology
DOTr	Department of Transportation
DPWH	Department of Public Works and Highways
DRRCA	Disaster Risk Reduction and Climate Change
DV	Disbursement Vouchers
EO	Executive Order
EU	European Union
EXECOM	DOST-Executive Committee
FA	Funding Agency
FNRI	Food and Nutrition Research Institute
GAA	General Appropriations Act
GBAORD	Government Budget Appropriations or Outlays for Research & Development
GERD	Gross Domestic Expenditure on R&D
GFSM	Government Finance Statistics Manual
GIA	Grants-in-Aid
GMOs	Genetically-Modified Organisms
GPs	General Provisions
HEIs	Higher Education Institutions
HNRDA	Harmonized National Research & Development Agenda
HRD	Human Resource Development
IA	Implementing Agencies
IEET	Industry, Energy and Emerging Technology
IMF	International Monetary Fund
IRR	Implementing Rules and Regulations
IT	Information Technology
ITDI	Industrial Technology Development Institute

LDDAP	List of Due and Demandable Accounts Payable
LGUs	Local Government Units
M&E	Monitoring and Evaluation
MA	Monitoring Agency
MIRDC	Metals Industry Research and Development Center
MOA	Memorandum of Agreement
MOOE	Maintenance and Other Operating Expenses
MSMEs	Micro, Small, and Medium Enterprises
NAST	National Academy of Science and Technology
NCA	Notice of Cash Allocation
NEDA	National Economic and Development Authority
NGO	Non-Governmental Organization
NIBRA	National Integrated Basic Research Agenda
NIC	National Innovation Council
NICER	Niche Centers in the Regions for R&D
NRCP	National Research Council of the Philippines
PAPs	Programs, Activities and Projects
OEOs	Other Executive Offices
OSEC	Office of the Secretary
ORS	Obligation Request and Status
PAG-ASA	Philippine Atmospheric, Geophysical and Astronomical Services Administration
PCAARD	Philippine Council for Agriculture, Aquatic, and Natural Resources Research and Development
PCHRD	Philippine Council for Health Research and Development
PCIEERD	Philippine Council for Industry, Energy, and Emerging Technology Research and Development
PDP	Philippine Development Plan
PIA	Philippine Innovation Act
PMT	Project Management Team
PNPIs	Private Non-Profit Institutions
PNRI	Philippine Nuclear Research Institute
PS	Personal Services
PTRI	Philippine Textile Research Institute
R&D	Research and Development
S4CP	Science for Change Program
S&T	Science and Technology
SEA	South East Asia
SET-UP	Small Enterprise Technology Upgrading
SPD	Special Projects Division
STI	Science, Technology and Innovation
SUCs	State Universities and Colleges
TECHNICOM	Technology Innovation for Commercialization