



REPUBLIC OF THE PHILIPPINES
PHILIPPINE STATISTICS AUTHORITY BOARD

**PSA Board Resolution No. 10
Series of 2021**

**ENDORISING THE ADOPTION OF THE STATISTICAL FRAMEWORK
FOR THE SCIENCE, TECHNOLOGY, AND INNOVATION SECTOR**

WHEREAS, the Philippine Development Plan 2017-2022 recognizes the importance of Science, Technology, and Innovation (STI) as a key driver of the long-term growth of the economy;

WHEREAS, STI is deemed to contribute to the achievement of the overall PDP goal of “Healthy and Resilient Philippines” by increasing the country’s growth potential through scaling-up technology adoption and accelerating innovation to address the potential challenges ushered in by the new normal;

WHEREAS, one strategy towards strengthened open collaboration among actors in the STI ecosystem is the implementation of the recommendations of the Scoping Study on STI Statistics spearheaded by the National Economic and Development Authority (NEDA);

WHEREAS, in the Scoping Study of STI Statistics where various organizations stakeholders were consulted, a statistical framework for the STI sector was formulated and recommended for adoption to systematize the development of STI statistics in the country;

WHEREAS, the STI concepts that were developed by the United Nations and the Organisation for Economic Co-operation and Development (OECD) were considered in developing the proposed STI Statistical Framework;

WHEREAS, the statistical framework for the development of STI statistics is one of the identified major activities in the Philippine Statistical Development Program (PSDP) 2018-2023 (Chapter 20, Science, Technology, and Innovation Statistics);

WHEREAS, the Interagency Committee on Science, Technology, and Innovation Statistics (IACSTIS), during its meetings on March 25, May 26, and 07 July 2021, reviewed, discussed, and provided recommendations to the Scoping Study on STI Statistics, which was turned over by NEDA during the IACSTIS meeting on 30 June 2020;

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WHEREAS, the STI Statistical Framework is a dynamic framework that shall undergo continuous process of improvement in response to future and emerging developments;

WHEREAS, the Technical Working Group on Science, Technology, and Innovation Statistics (TWGSTIS) under the IACSTIS discussed and agreed to endorse the proposed STI Statistical Framework of the Scoping Study on STI Statistics during its meetings on February 26 and 25 May 2021;

WHEREAS, the IACSTIS has endorsed the adoption of the proposed STI Statistical Framework through IACSTIS Resolution No. 01 Series of 2021 for approval of the PSA Board;

NOW, THEREFORE, BE IT RESOLVED that the PSA Board approve the STI Statistical Framework as provided in Annex BR 10-20210910-01 for adoption by the Philippine Statistical System;

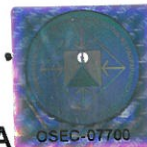
RESOLVED FURTHER, that the IACSTIS shall:

- 1) assess and classify available STI indicators based on definition, methodology, coverage, frequency of release, disaggregation, among others;
- 2) ensure that the concepts and definitions are aligned with internationally-agreed guidelines and recommendations; and
- 3) identify additional indicators that are crucial for policymaking, promotion, development, and evaluation of the STI sector.

Approved this 10th day of September 2021, in Metro Manila.



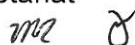
KARL KENDRICK T. CHUA
Secretary of Socioeconomic Planning
National Economic and Development Authority
Chairperson, PSA Board



Attested by:



DENNIS S. MAPA, Ph.D.
Undersecretary
National Statistician and Civil Registrar General
Philippine Statistics Authority
Chairperson, PSA Board Secretariat



Science, Technology, and Innovation Concepts Used in Developing a STI Statistical Framework

The Science, Technology, and Innovation (STI) concepts that were developed by the United Nations Educational, Scientific and Cultural Organization (UNESCO), UNESCO Institute for Statistics (UIS), and the Organisation for Economic Co-operation and Development (OECD), the 2008 System of National Accounts (SNA), and Balance of Payments and International Investment Position Manual Six Edition (BPM6) were utilized in expanding the scope of the Statistical Framework for the STI Sector.

The UNESCO developed the concept of scientific and technological activities (STA) that includes:

- Research and experimental development (R&D);
- Scientific and technical education and training (STET);
- Scientific and technological services (STS).

From the Frascati Manual, R&D covers creative work undertaken on a systematic basis in order to increase the stock of knowledge, including knowledge of man, culture and society, and the use of this stock of knowledge to devise new applications.

UNESCO defines scientific and technological education and training (STET), broadly at the tertiary level, as all activities comprising specialized non-university higher education and training, higher education and training leading to a university degree, post-graduate and further training and organized lifelong training for scientists and engineers.

Scientific and technological services (STS) are defined as any activities concerned with scientific research and experimental development and contributing to the generation, dissemination, and application of scientific and technical knowledge.

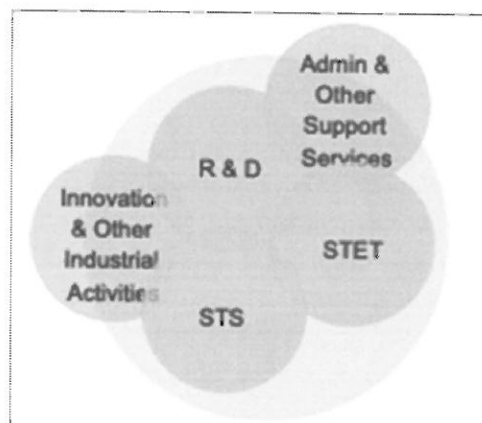


Figure 1: Scientific and Technological Activities (STA) and its three main components

Source: UNESCO

Figure 1 illustrates the relationship of the three main components of science and technology activities. Theoretically, these three components are mutually exclusive but in reality, they have some overlaps or are linked with one another to some extent. Two other categories or components should be considered: the innovation activities, and the administrative and other support services that are related to these science and technology activities.

Following the release of the Frascati Manual in the 1980s, the framework for S&T Statistics is composed of the major Science and Technology Activities: Research and Development (R&D), S&T Services (STS), and S&T Education and Training (STET). Moreover, it was also suggested that the scope of S&T activities be extended gradually on the basis of the state of progress of national and international experience.

Thus, with the recent discussions of the IAC-STIS, components such as Innovation and Admin and Other Support Services were proposed to be added in the framework.

Innovation, as defined in the OSLO Manual, is the implementation of a new or significantly improved product (good or service), or process, a new marketing method, or a new organizational method in business practices, workplace organization or external relations.

Administrative and other support services are those directly related to R&D and innovation activities. It also includes the indirect supporting activities, which cover a number of activities which are not themselves R&D but which provide support for R&D such as transportation, storage, cleaning, repair, maintenance and security activities. Usually, these types of activities are included under overheads in R&D expenditure.

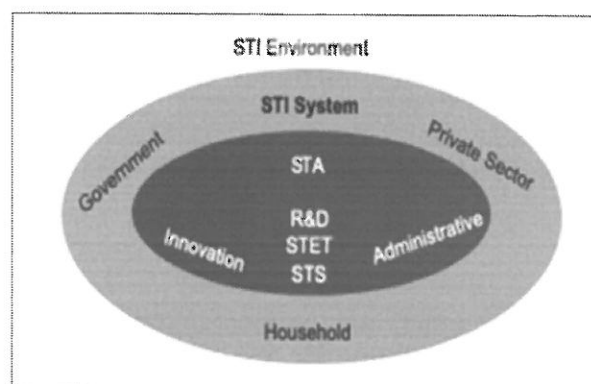


Figure 2: Factors Influencing the STI System

To further understand the STI sector, Figure 2 shows the factors (STI system, government, private sector, household, and STI environment) that influence the dynamics in the STI sector.

The STI System refers to the complex and interactive web of knowledge flows and relationships between industries, government and households and making them work systematically to sustain innovation and science and technology development efforts. The government, the private sector, and the households are considered as the key players in the STI system that carry out the different science and technology activities in the environment that exists in the society it belongs.

The academe can be identified either as public or private colleges/ universities. On the other hand, the non-profit institutions (NPIs) are classified according to the sector they are servicing (2008 SNA) such that there are NPI's serving the private sector, the government and the households.

STI Statistical Framework

The above STI concepts are used to develop a statistical framework for STI. Table 1 integrates these concepts into a framework for the data collection activities of STI statistics. The first column relates to the factors that shape the STI sector. The influence of these factors is shown under the component/sub-component, particularly in the STI activities they are involved. Correspondingly the key indicators are identified for each of these activities.

The fourth column pinpoints the variables needed to develop the indicator. The column on disaggregation indicated in column 5 can be by geographic disaggregation, by sector, by field, among others. Column 6 on frequency denotes the time frame that the statistics or indicators is compiled such as biennial, annual, semestral, or even quarterly. The last column identifies the agency/ies that will be able to provide the necessary statistics for a particular indicator.

Table 1. STI Statistical Framework

Factors	Components / Sub-Components	Key Indicators	Definition	Disaggregation	Frequency	Data Source
1. STI System	STI Impact Indicators					
	S&T Competitiveness & Innovation Indicators					
	SDG indicators related to S&T					
	A. Scientific and Technological Activities					
	Research & Development (R&D)					
	Scientific & Technical Educ. & Trg.					
	Scientific & Technological Services					
	B. Innovation					
2. Private Sector	A. Scientific and Technological Activities					
	Research & Development (R&D)					
	Scientific & Technical Educ. & Trg.					
	S&T Services					
	STI Collaboration					
	B. Innovation					
3. Government	A. Scientific and Technological Activities					
	Research & Development (R&D)					
	Scientific & Technical Educ. & Trg.					
	S&T Services					
	STI Collaboration					
	B. Innovation					
4. Household	A. Scientific and Technological Activities					
	Research & Development (R&D)					
	Scientific & Technical Educ. & Trg.					
	S&T Services					
	STI Collaboration					
	B. Innovation					
5. STI Environment	E-commerce					
	Innovation Hubs					
	Trade					
	Patents, Utility Models, Industrial Designs, Trademarks, etc.					
	Mobile Telephone Cellular Usage					
	Internet Usage					
	Investments in STI					

STI Key Indicators and Data Sources by Component

Global Competitiveness Ranking

Global Competitiveness refers to how our country measure up with selected countries, particularly our ASEAN neighbors. The main tables in this section covers those published in the Global Competitiveness Report (GCR), the Global Innovation Index (GII), and the "World Competitiveness Yearbook" published by the International Institute for Management Development (IMD).

The GCR, published by the World Economic Forum (WEF), ranks countries based on the Global Competitiveness Index (GCI) developed by Xavier Sala-i-Martin and Elsa V. Artadi. The GCI integrates the macroeconomic and the micro/business aspects of competitiveness into a single index. The report "assesses the ability of countries to provide high levels of prosperity to their citizens". This in turn depends on how productively a country uses available resources. Therefore, the GCI measures the set of institutions, policies, and factors that set the sustainable current and medium-term levels of economic prosperity. The report has twelve pillars of competitiveness:

1. Institutions
2. Appropriate infrastructure
3. Stable macroeconomic framework
4. Good health and primary education
5. Higher education and training
6. Efficient goods markets
7. Efficient labor markets
8. Developed financial markets
9. Ability to harness existing technology
10. Market size—both domestic and international
11. Production of new and different goods using the most sophisticated processes
12. Innovation

The GI is published by Cornell University, INSEAD (Institut Européen d'Administration des Affaires; French for "European Institute of Business Administration" (an international business graduate school), and the World Intellectual Property Organization. It relies on two sub-indices—the Innovation Input Sub-Index and the Innovation Output Sub-Index—each built around key pillars.

Five input pillars capture elements of the national economy that enable innovative activities: (1) Institutions, (2) Human capital and research, (3) Infrastructure, (4) Market sophistication, and (5) Business sophistication. Two output pillars capture actual evidence of innovation outputs: (6) Knowledge and technology outputs and (7) Creative outputs.

Each pillar is divided into sub-pillars and each sub-pillar is composed of individual indicators (80 in total in 2019). Sub-pillar scores are calculated as the weighted average of individual indicators; pillar scores are calculated as the weighted average of sub-pillar scores.

Four measures are then calculated:

- Innovation Input Sub-Index is the average of the first five pillar scores
- Innovation Output Sub-Index is the average of the last two pillar scores

The overall GII score is the average of the Input and Output Sub-Indices.

World Competitiveness Yearbook is an annual report published by the Swiss-based International Institute for Management Development (IMD) on the competitiveness of nations and has been published since 1989. The yearbook benchmarks the performance of 63 countries based on 340 criteria measuring different facets of competitiveness. It uses two types of data:

- 2/3 hard statistical data (international/national sources) and
- 1/3 survey data (Executive Opinion Survey)

Research and Development (R&D)

The statistics for R&D include national accounts estimates both at current and constant prices. The Gross National Income (GNI) and the Gross Domestic Product (GDP) are presented by industrial origin and by expenditure shares. The per capita GDP or per capita GNI is simply dividing GDP or GNI by the total population estimate. National accounts variables are used to develop STI indicators.

R&D statistics, specifically the resources devoted to R&D in terms of expenditures and human resources, are among the standard statistical indicators that are used worldwide to measure the state of science and technology in any country. R&D statistics serve as one of the bases for setting R&D directions and priority areas as well as for formulating better science and technology policies and programs. Policymakers demand for timely, reliable and accurate R&D statistics for policy decisions on S&T.

In the Philippines, the Department of Science and Technology (DOST) is tasked to monitor the country's S&T activities, including research and development efforts. This is carried out through the conduct of nationwide surveys to collect data on financial and human resources in research and development from government, higher education institutions and private non-profit institutions.

To complete the national R&D picture of the country, the DOST has collaborated with the Philippine Statistics Authority for the collection of R&D expenditures in the private industry or business sector.

The past DOST nationwide surveys already included financial and human resources on R&D, STS and STET.

As cited in the Scoping Study on STI Statistics in the Philippines, most of the statistics collected are sourced from DOST's Compendium of Science and Technology Statistics including the following:

- 1) Human Resources disaggregated by:
 - Headcount (national) by sector
 - By position category
 - By region, by sector
 - By profile
 - Fulltime equivalence of R&D personnel by sector
- 2) Researchers disaggregated by:
 - Headcount (national) by sector
 - By profile
 - By region, by sector
- 3) Financial Resources (National R&D Expenditures) disaggregated by:
 - By sector performance
 - By funding sources
 - By funding sources, by sector of performance
 - By socio-economic objective
 - By region, by sector
 - By private industry sector
- 4) R&D intensity (regional expenditure to gross regional value added)
 - By region
- 5) R&D indicators for ASEAN member countries
 - R&D human resources, expenditure

Scientific and Technical Education and Training

The set of indicators on Scientific and Technical Education and Training (STET) includes data on Higher Education Institutions (HEIs), both public and private, disaggregated by region with the following variables:

- Comparative STET variables across ASEAN countries
- Number of HEIs;
- Enrollment by discipline group;
- Graduates by discipline group;
- Number of faculty, including their highest educational attainment;
- Number of Students;
- Student-Faculty Ratio;
- Budget of State Colleges and Universities (SUCs);
- Cost per student of SUCs;
- Tuition Fee per unit in SUCs;
- Professional Regulation Commission (PRC) national passing percentage by discipline; and
- Number of BAR passers and applicants.

The indicators on STET also includes data on the number of enrollees and graduates of technical- vocational education and training (TVET), the number of TVET providers, the beneficiaries of CHED student financial assistance of program, and the number of enrollees and graduates of various educational assistance provided by government agencies, particularly the Technical Education and Skills Development Authority (TESDA).

Scientific and Technological Services

Most of the data for Scientific and Technological Services (STS) were sourced from the establishment surveys of PSA, including the rider surveys in the ASPBI such as the R&D Expenditure Survey, the Survey of Information and Communication Technology, among others. This set of STS statistics include:

From PSA:

- Employment data disaggregated by gender for major industries, sector and by region;
- Capital Expenditures for Intangible Assets including R&D for major industries, sector and by region;
- Capital Expenditures for Tangible Assets including R&D for major industries, sector and by region;
- Percentage of Employees Using Computer for the Information Economy (IE) Sector. The IE is used to describe the economic and social value created through the ability to rapidly exchange information at anytime, anywhere to anyone. The IE is composed of the ICT sector and Content and Media Sector;
- Percentage of Establishment by:
 - type of network accessibility
 - type of network connectivity
 - type of E-commerce platforms
 - type of office use for internet
 - type of information-based use for internet
 - type of E-government service
 - type of online transactions
 - with computer hardware and internet access and;
- Sales from E-Commerce for Major Industries.

From Other Source Agencies:

- Types of Scientific and Technological Services Rendered by the public and private sector (includes FDA accredited laboratories).

Innovation Activities

Most of the statistics on innovation activities comes from the Survey of Innovation Activities (SIA) of the Philippine Institute for Development Studies (PIDS) such as:

- Key Innovation Statistics
- Innovation-active Establishments, by Industry and by Size of Establishment;
- Proportion of Innovation Active and Collaborative Firms by Cooperation Partners;
- Capital Participation Share Across Nationality, by Size of Establishment and Major Area;
- Percentage of Establishments that filed for Intellectual Property Rights, by Innovation Activity;
- Proportion of Innovation-Active Establishments that rated the following variables:
 - effect of product and process innovation as 'High' (%), by Major Sector and by Size of Firm;
 - information sources as of 'High' importance;
 - potential barriers to innovation as "High".
- Proportion of Establishments that are Aware of any Government Innovation Policy or Intervention and of which, Proportion that are Provided Government Support or Assistance in Innovation, by Size and by Industry.

STI Environment

The indicators on STI environment refer to the dynamics of STI activities in the country. These include indicators on patents, technology flows, and indicators on technology transfer, among others.

Statistics on Intellectual Property Rights (IPR) are derived from the IPOPHL and includes data on application and its approval/grants on patents, utility models, industrial designs, and trademarks.

Statistics on telecommunication provides a picture on how our country is developing in this area. It includes information on the number of subscribers for telephone cellular mobile telephone, internet, internet service providers, and number of broadcast and CATV stations. Similarly, statistics in this area for selected Asian countries are also included.

The table on the State of Web Presence of National Government Agencies provides information on the effort of the government in reaching out to their client using information technology.

STI environment also encompasses the country's relationship with the rest of the world (ROW). Philippine foreign trade statistics (exports/imports) both for goods and services are included in this section. Similarly, statistics on approved and actual Foreign Direct Investments (FDI) by sector is included. FDI is a key element in international economic integration because it creates stable and long-lasting links between economies. FDI is an important channel for the transfer of technology between countries, promotes international trade through access to foreign markets, and can be an important vehicle for economic development.

The data on deployed overseas Filipino workers (OFW) and Filipino emigrants by profession can be used to develop indicator on the movement of STI professionals and the existing employment opportunities for this type of professionals. The table on Special Temporary Permits to Practice issued to Foreign Nationals by citizenship and profession is another supporting data on our relationship with ROW.