

**EVALUATION OF
INNOVATION EXCELLENCE
INDICATORS OF
PUBLIC FUNDED R&D
ORGANISATIONS**

Round 2.0

**A MANUAL FOR PARTICIPATING
ORGANISATIONS**

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INTRODUCTION

At the behest of the Prime Minister's office, the Office of the Principal Scientific Adviser to the Govt of India (o/PSA) in July 2019, initiated a first of its kind exercise for capturing and evaluating the innovation indicators of public funded R&D organisations. On completion of the exercise in March 2022, a two-part report titled "Evaluation of Innovation Excellence Indicators of Public Funded R&D organisations" was prepared.

The reports were submitted to the Prime Minister's office (PMO) in Feb 2022 and were duly considered. PMO directed o/PSA to convene a meeting with stakeholder ministries / departments to (i) sensitise them to the findings of the study and (ii) request more active participation in Round 2 of the study.

With this background, and consequent to the direction of the PMO and envisaging wider participation of public funded R&D organisations, round 2 of the study has been initiated. The purpose of this study is to capture in much more granularity the innovation indicators and the research being undertaken by various public funded R&D organisations to help gauge the performance of these labs with respect to their socio-economic contribution, STI excellence, and organisational capabilities and practices as well as to cover a wider number of public funded R&D labs.

This framework has been further developed into appropriate survey instruments for online data collection through a web portal (<http://www.indiascienceindicators.gov.in/>). The purpose of this manual is to provide information and context of this framework and guidance on survey instruments to members of participating organisations.

The Office of the Principal Scientific Adviser is the main implementing body for this research, with the Confederation of Indian Industries (CII) as designated knowledge partner. The Centre for Technology, Innovation and Economic Research (CTIER) is providing knowledge support.

ABOUT THE FRAMEWORK

Although various R&D labs work on diverse areas, they can be grouped into three categories i.e. Basic Research Labs, Applied Research Labs, and Service Labs. It is hoped that for the organisations themselves, the framework provides an opportunity to benchmark their performance against other organisations in their respective category and identify interventions that may be required to improve their performance. The framework also provides an opportunity for these labs to identify areas of untapped potential and discover interventions to improve their performance in their respective areas.

The framework (see Table 1 below) has three main pillars common to all three categories, wherein each sub-pillar has a number of indicators and a matrix of scoring parameters with different weights to capture relevance under the three categories of R&D Labs.

Table 1: Overview of the Framework

	Outcomes	Outputs	Inputs
Pillar	Socio-Economic Impact	Science, Technology and Innovation Excellence	Organisation Effectiveness
Sub-Pillars	<ol style="list-style-type: none"> 1. Contribution to India’s SDGs and national programmes 2. Employment generation and human resources development 	<ol style="list-style-type: none"> 1. Scholarly research output and quality 2. Development and innovation output and quality 3. Commercialisation of technologies and revenue generation 4. Collaborative research 	<ol style="list-style-type: none"> 1. Resource management 2. Governance 3. Equity, diversity and inclusion 4. Internal capacity building

Based on this framework, three separate questionnaires have been developed for online deployment, one for each category. Each questionnaire differs slightly based on category relevant indicators.

NOMINATION OF DATA OFFICER

All participating organisations are required to nominate a Data Officer to coordinate this exercise

as the designated central point of contact for all future correspondence/ engagements.

The Data Officer must have a deep, overall understanding of the organisation's work. The Data Officer must be well placed to coordinate with different departments within the organisation to collect data internally as per the requirements of the framework. For example, the Data Officer will have to coordinate with the finance department to gather data related to funding and earnings or with the administrative department to gather data related to the total scientific staff present at the organisation. Similarly, for gathering IPR related data, the Data Officer may have to coordinate with more than one department within the organisation. Hence, the selection of a Data Officer who has a bird's eye view of the organisation's work and can coordinate within the organisation is critical.

Importantly, the Data Officer will also be responsible for presenting and getting data duly vetted by the Director of the organisation before final submission. It is recommended that the Data Officer attend the orientation webinar held by knowledge partners before embarking on this exercise.

REGISTRATION ON WEB PORTAL

Registration on the web portal (<http://www.indiascienceindicators.gov.in/>) is mandatory. The Data Officer may use his/her email address for the purpose of registration.

Please follow the following steps for registration:

1. Please click on 'Registration' to register your institution on the portal
2. Please enter all the information along with the lab type or category, defined as follows:

Category	Definition
Basic R&D	Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.
Applied R&D	Applied research encompasses original investigation

	undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective.
Services R&D	Service R&D is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.

3. You may choose to respond to more than one category, if it applies to your organisation
4. Please note you are required to fill in questionnaires and upload supporting documents for each lab type that you have chosen - for example, if your organisation's work covers the attributes of both basic R&D and applied R&D, then you will fill the questionnaires for basic R&D and applied R&D
5. Please verify your account from the verification link sent to you on email
6. After verification, you will receive login details on the email ID registered on the portal
7. Once you login, please click on the 'Questionnaire' tab, where you will be able to see the questionnaires for the 'category' selected by you in Step 2
8. You can save and log out of your account at any time. Your responses will be saved and you will be able to log back into the survey and complete more responses at a later time.

ABOUT THE QUESTIONNAIRE

General:

Please bear in mind the following points when filling the questionnaire:

1. Please note that all questions and the section on organisation details of the lab are mandatory
2. All data you enter will be kept confidential
3. You are required to fill in data for the financial years 2021-22 and 2022-23 except for publication related questions where data is entered for the calendar years 2021 and 2022
4. You will require access to Clarivate Analytics Web of Sciences and Incites or Scopus and

Scimago to report publications related data

5. You are required to upload supporting documents for some questions for validation of the aggregate data reported on the web portal - refer to next section for more details on supporting documents
6. The actual time taken for completing the questionnaire on the portal is between 45 minutes to an hour. However, time taken to collect data within the organisation may vary depending on existing systems within the organisation
7. It is recommended that the Data Officer first go through the PDF versions of the questionnaires, identify questions where support will be required from other departments within the organisation and then proceed to the online questionnaires
8. Refer to the definitions and explanations given under questions before formulating responses
9. You will be able to check all your responses at one go before final submission/ You will be able to save a copy of the responses for your records at the time of submission.

SUPPORTING DOCUMENTS

Please note that it is mandatory to upload all supporting documents for the system to accept your final submission.

1. Please upload all supporting documents for each category if responding to more than one category
2. Supporting documents are templates in downloadable format and will provide the responses to be filled in the questionnaire for the relevant questions
3. Microsoft Excel 2021 is required for filling in the templates
4. Note that one template may cover multiple questions - refer to section III 'Templates for Supporting Documents' for questions that are covered by a corresponding template
5. While filling out the templates please read the instructions provided within the

templates before filling in any data

6. You will see a checkbox below the questions that are covered by templates to confirm the response matches the data entered in the template
7. Please note that there are a total of 19 templates in downloadable format, of which 16 are the same for all 3 categories - please refer to section III 'Templates for Supporting Documents' for these 16 common templates
8. You will see a pop-up reminder to upload the supporting documents. You can also come back later to the question to upload the supporting documents

Important Note:

1. All data entered on the supporting documents is used for data validation, hence it is advisable that you enter data on the templates **before** entering corresponding responses to reduce manual error
2. All templates are coded to provide you with the required response once you enter the data
3. Kindly do not tamper with the format of the template.

TEMPLATES FOR SUPPORTING DOCUMENTS

Template Name	Basic (Q.No.)	Applied (Q.No.)	Services (Q.No.)
1 - Technologies and SDGs	Q1	Q1	Q1
2 - Projects Executed	Q2, Q33, Q34, Q36, Q37	Q2, Q33, Q34, Q36, Q3	Q2, Q35, Q36, Q38, Q39
3 - Workforce	Q7, Q40, Q56, Q57	Q7, Q40, Q56, Q57	Q8, Q42, Q58, Q59
4 - Startups Support and Exit	Q8, Q9, Q10, Q11, Q12	Q8, Q9, Q10, Q11, Q12	Q9, Q10, Q11, Q12, Q13
5 - Spinouts	Q13	Q13	Q14
6 - Human Resources Generated	Q14	Q14	-
7 - Awards and Fellowships	Q16, Q17	Q16, Q17	Q18, Q19
8 - Publications	Q18a, Q35, Q38	Q18a, Q35, Q38	Q20a, Q37, Q40
9 - Commissioned Reports	Q18b	Q18b	Q20b
10 - Recognitions	-	-	Q21
11 - Report Leading to Designs and Products	-	-	Q22
12 - IPR Filed	Q21	Q21	Q23
13 - IPR Granted	Q22, Q23	Q22, Q23	Q24, Q25
14 - Technology Transfer	Q24a, Q24c, Q24d, Q24e, Q24f, Q24g, Q26	Q24a, Q24c, Q24d, Q24e, Q24f, Q24g, Q26	Q26a, Q26c, Q26d, Q26e, Q26f, Q26g, Q28
15 - Non-worked patents	Q24b	Q24b	Q26b
16 - New Services and Products	Q27	Q27	Q29
17 - Open Research and Testing Facilities	Q52	Q52	Q54
18 - Career Development Programmes	Q61	Q61	Q63
19 - Support to Researchers	Q62	Q62	Q64

TYPE OF QUESTIONS

The questionnaires for basic and applied labs have a total of 62 questions while the questionnaire for services labs has 64 questions. Some questions may have sub-questions. Some questions allow for choosing more than one option. Relevant explanatory notes, instructions and FAQs have been provided for each question.

There are three types of questions:

1. **Numeric** : These questions require either a response in percentage terms or absolute numbers.
2. **Binary** : These questions require a Yes/No response
3. **Qualitative** : A few questions are subjective in nature and require description. These questions will be assessed by a Committee of domain experts.

KEY DEFINITIONS AND EXPLANATIONS

A preliminary list of key terms and respective definitions and explanations is included below. This list will be updated periodically on the web portal to aid users based on frequently asked questions.

Terms	Definitions
Basic labs	Basic research is experimental or theoretical work undertaken primarily to acquire new knowledge of the underlying foundation of phenomena and observable facts, without any particular application or use in view.
Applied labs	Applied research is original investigation undertaken in order to acquire new knowledge. It is, however, directed primarily towards a specific, practical aim or objective.
Services labs	Service R&D is systematic work, drawing on knowledge gained from research and practical experience and producing additional knowledge, which is directed to producing new products or processes or to improving existing products or processes.
Projects Executed	Projects executed in a particular year would include projects started in the relevant year or completed in the relevant year. They would also include multi-year projects that may have started in a previous financial year and are on-going in the relevant year. Please include all projects that have been undertaken either as a standalone project or those falling under particular themes or programmes.
Researchers/ Scientific Staff	Researchers include the following positions: - Scientific staff (Scientist B or equivalent and above) in

Terms	Definitions
	permanent positions - Scientific staff (Scientist B or equivalent and above) in contract positions - Project scientists (Scientist B or equivalent and above)
Start-ups incubated in the premises of your organisation	An incubated startup will have access to all incubator facilities like land, equipment, research support, mentoring, auxiliary/technical support such as marketing, accounting, legal help etc.
Section 8 company	According to the Companies Act 2013, a Section 8 company is defined as an organisation whose objectives are to promote arts, commerce, science, research, education, sports, charity, social welfare, religion, environmental protection, or other similar activities goals. These entities utilise their profits to achieve their mission and do not distribute dividends to their shareholders.
Deep science and deep tech startups	Deep science and deep tech startups refer to startups focusing on disruptive innovations founded on advanced scientific and technological breakthroughs.
Incubated startups successfully exited	Successful exits are those that have graduated from the incubation program of the organisation under organisation's policy, except those that are compulsorily retired/ removed/ terminated under the organisation's policy.
Commissioned technology development/design /project reports prepared by your organisation	These reports include technology trends, patent searches, patent analysis, material data sheets, test methods and reports, toxicological studies, manufacturing standards, system requirements, system architecture, system design documents, etc, commissioned by the Government of India, state governments, public sector enterprises, and private sector enterprises.
Number of citations received by papers published	Please consider papers published in the previous three years, (eg, when reporting data for the year 2021 use citation counts of papers published in 2018, 2019 & 2020)
Percentage of publications in top 10% of journals as per Impact Factor by Subject Category	Please consider the top 10% Journals as per Impact Factor by subject category - for each subject that your organisation publishes in. Report the percentage of your publications in these top 10% journals as a share of your total publications.
Spin-out companies	Spin-out companies are startup companies that are created based on intellectual property (IP) generated through a university/lab's research.
Quantum Technologies	Quantum technologies could include technologies like quantum radar, quantum computing, quantum biology, quantum cryptography, quantum devices & networks, etc.

Terms	Definitions
Artificial Intelligence - Enabled Technologies	Artificial intelligence - enabled technologies could include technologies like consumer or social robots, augmented reality, virtual reality, autonomous vehicles, intelligent transportation systems, etc.
Bio-engineering Technologies	Bio-engineering technologies could include technologies like neural engineering, tissue engineering, bioinformatics, genetic engineering, clinical engineering, etc.
Sustainable Technologies	Sustainable technologies could include technologies like vertical farming, precision agriculture technologies, synthetic meat, hydroponics, electric vehicles, battery technologies, net-zero-energy buildings, etc.
Semiconductor Technologies	Semiconductor technologies could include technologies like integrated circuits, 2D and 3D chips, flexible electronics, display technologies, e-textiles, spintronics, etc.
Industrial Technologie	Industrial technologies could include technologies like smart and digital manufacturing, advanced industrial robotics, Industrial Internet of Things (IIoT), 3D printing, distributed manufacturing technologies, etc.
High Performance Computing Technologies	High performance computing technologies could include technologies like big data computing, edge computing, containerisation, intelligent computing systems, cyber security, etc.
Blockchain Technologies	Blockchain technologies could include technologies like enterprise solutions, intelligent supply-chain systems. cryptocurrencies, smart business applications like FinTech, EduTech, etc.
Data & Communications Network	Data & communications network technologies could include technologies like 5G, 6G, advanced wireless networks, communication hardwares, etc.
Licensed out	Licensing of any intellectual property is an agreement between the owner of the intellectual property and another party wherein the owner grants the other party the intellectual property rights enjoyed by the owner in exchange for an agreed payment, without any transfer of ownership.
Non-worked patents	A non-worked patent is one in which the claimed invention is not actively being used, manufactured, or implemented.
Technologies transferred	These include technologies that may be transferred through direct sale, licence, or transfer for use at cost or free of cost.
Total Staff	Total Staff at Laboratory includes scientific staff (permanent and contractual), project scientists, project staff, administrative staff.
R&D and S&T	These include R&D and scientific budget related costs whereas

Terms	Definitions
Budget	running costs or recurring costs (for example electricity, rent etc.) that would constitute administrative costs would be excluded. If any of the costs mentioned are directly project related (for example travel for research, conferences, seminars and workshops) ,they would be included as R&D budget.
Green technologies	Green technologies may include technologies on renewable energy, waste management, sustainable packaging, etc.
Sustainable sourcing of materials	Sustainable sourcing of materials refers to the integration of social, ethical and environmental factors into the process of selecting suppliers for materials.
E-waste	This includes discarded computer monitors, motherboards, mobile phones and chargers, compact discs, headphones, television sets, air conditioners, refrigerators, etc.
Hazardous waste	This includes any waste or combination of wastes with the potential to damage human health, living organisms or the environment.
Medical waste	This includes waste generated by health care activities, ranging from used needles and syringes to soiled dressings, body parts, diagnostic samples, blood, chemicals, pharmaceuticals, medical devices and radioactive materials.
Industrial waste	This includes manufacturing waste from a wide range of different processes, such as sludges, product residues, kiln dust, slags, and ashes.

FEEDBACK

As task of this nature is being undertaken on a national scale, there are bound to be challenges and useful feedback from the participating organisations.

You may use the comment box provided on the web portal to convey any suggestions or pertinent comments regarding your responses.

Additionally, if you wish to raise a query regarding specific questions or submit your feedback, please contact Dr. Rahul Katna (rahul.katna@cii.in).