



# **SCIENCE AND TECHNOLOGY STATUS REPORT OF SRI LANKA - 2020**



**National Science and Technology Commission**  
Ministry of Education



# **SCIENCE AND TECHNOLOGY STATUS REPORT OF SRI LANKA - 2020**

**(Prepared based on the data collected from 42 Public  
Sector S&T Institutions)**

**National Science and Technology Commission**

**(Ministry of Education)**

**6th Floor, Wing D,**

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**National Science and Technology Commission**

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## **THE MESSAGE FROM THE MINISTER OF EDUCATION**

The Science and Technology Status Report of Sri Lanka is an annual document prepared by the National Science and Technology Commission (NASTEC) in accordance with the Science and Technology Development Act No. 11 of 1994. Its purpose is to provide an overview of the country's science and technology landscape, including human resources, funding, research projects, technological developments, and scholarly works of the national S&T ecosystems of the country, particularly those of public sector S&T institutions in this context.

In this regard, NASTEC has undertaken the significant task of collecting data for the year 2020 from numerous national S&T institutions to compile this report. Their diligent efforts in gathering information and analysing the status of S&T in Sri Lanka are commendable. I would like to express my gratitude to NASTEC for their hard work and dedication in successfully completing this endeavour.

Furthermore, I extend my appreciation to the Chairpersons and CEOs of the S&T institutions who cooperated by providing valuable information for the report. Their contributions have been instrumental in ensuring the success of this initiative.

The report's findings serve as a foundation for making informed decisions and formulating policies to further develop science and technology in Sri Lanka. By identifying areas that require additional support, investment, or policy interventions, the report's recommendations play a crucial role in maximizing the economic development and societal well-being that can be derived from the research conducted by national S&T institutions.

Dr. Susil Premajayantha  
Hon. Minister of Education  
Leader of House, Sri Lanka Parliament

September 01, 2023

## **FOREWORD**

The National Science and Technology Commission (NASTEC) operates under the Ministry of Technology and was established through the Science and Technology Development Act No. 11 of 1994. One of its primary responsibilities is to annually compile and present a comprehensive report on the Science and Technology (S&T) activities of the country to the government. To fulfil this obligation, a survey was conducted to gather data from 42 public-sector S&T institutions regarding their activities in 2020. This report is based on the information collected from these institutions and focuses on four key areas: the effectiveness of public spending on S&T, the utilization of S&T developments, the services provided by national S&T institutions, and the development of human resources. The data obtained through this survey serves as a valuable knowledge resource for assessing the current S&T capacity of these institutions and identifying any gaps within their respective sectors. The recommendations provided in this report aim to guide the improvement of these institutions by suggesting suitable interventions, including policies, research and development initiatives, and capacity development measures.

This report presents a distinctive document that offers valuable insights into the scientific landscape of public-sector S&T institutions. By analyzing this report, we believe that it will facilitate the identification of suitable strategies for enhancing performance and promoting knowledge creation necessary for informed decision-making within these institutions.

In addition to thanking the Chairmen, Directors, and CEOs of the Public S&T institutions who provided the necessary data and information in order to complete this report, I would like to take this opportunity to congratulate the NASTEC staff on their dedication to producing the S&T status report for the year 2020.

Prof Veranja Karunaratne  
Chairman  
NASTEC

August 18, 2023

## PREFACE

The National Science and Technology Commission (NASTEC) was established in 1998 as a result of the Science and Technology Development Act No. 11 of 1994. It operates as the primary policy-formulating and advisory body on science and technology (S&T) matters for the Government of Sri Lanka. NASTEC is mandated to submit an annual report to the government, reviewing the S&T activities in the country and focusing on various aspects such as human resource development, the performance of S&T institutions, the effectiveness of public spending, and the utilisation of S&T by public and private sector entities. In line with this mandate, NASTEC conducted a survey in 2020 to assess the status of 42 public-sector S&T institutions.

Data was gathered from the institutions in five key areas, including human resources, physical resources, research inputs, research outputs, and institute services. These data points were analysed to assess the national contribution of the institutes to the sector. The insightful findings of the report provide valuable information for identifying suitable activities that can be undertaken to enhance the sector's performance.

We are grateful to the chairpersons, director generals, and directors of the institutions that participated in the survey by contributing their institutional data and the liaison officers of each institution for their support in data gathering to compile this report. We appreciate the valuable advice and direction provided by the members of the Commission, including the Chairman, the Acting Director, and the NASTEC staff, in preparing this publication.

Seyed Shahmy  
Senior Scientist

August 18, 2023



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## ACRONYMS

ACCIMT – Arthur C Clarke Institute of Modern Technology  
ACR– Annual Project Completion Rate  
BMARI – Bandaranayke Memorial Ayurveda Research Institute  
CPD – Continues Professional Development  
COVID 19 – Coronavirus Disease 2019  
CDRD – Centre for Defense Research and Development  
CEA – Central Environmental Authority  
CBSL– Central Bank of Sri Lanka  
CRI – Coconut Research Institute  
DOM – Department of Meteorology  
DEA – Department of Export Agriculture  
DMUSS – Department of Measurement Units, Standards & Services  
DMC – Disaster Management Centre  
DNBG – Department of National Botanic Gardens  
EOLSS – Encyclopedia of Life support Systems  
FD – Forest Department  
FMRC – Farm Mechanization Research Centre  
FORD – Fields of Research and Development  
FRDI – Fruit Research Development Institute  
FUR – Fund Utilization Rate  
GDP – Gross Domestic Product  
GERD – Gross Domestic Expenditure on R&D  
GJRTI – Gem and Jewellery Research and Training Institute  
GoSL– Government of Sri Lanka  
GSMB – Geological Survey and Mines Bureau  
HARTI – Hector Kobbekaduwa Agrarian Research and Training Institute  
HORDI – Horticultural Crop Research and Development Institute  
HRD – Human Resource Development  
HRST – Human Resources in Science & Technology  
ICT – Information Communication Technology  
ID – Irrigation Department

IP– Intellectual Property  
IPHT – Institute of Post-Harvest Technology  
IPR – Intellectual Property Rights  
ISCED – International Standard Classification of Education  
IT – Information Technology  
ITI – Industrial Technology Institute  
LB – Lower Bound  
LKR – Sri Lankan Rupees  
MRI – Medical Research Institute  
NASTEC – National Science and Technology Commission  
NARDA – National Aquatic Resource Research and Development Agency  
NBRO – National Building Research Organization  
NERDC – National Engineering Research and Development Centre  
NIFS – National Institute of Fundamental Studies  
NIPM – National Institute of Postharvest Management  
NPQS – National Plant Quarantine Service  
NPD – National Planning Division  
NRC – National Research Council  
NRDF – National Research and Development Framework  
NRMC – Natural Resources Management Centre  
NSF – National Science Foundation  
NSTP – National Science and Technology Policy  
OECD – Organization for Economic Co-operation and Development  
PGRC – Plant Genetic Resource Centre  
PPP – Public Private Partnerships  
PRI – Palmyra Research Institute  
PPS – Plant Protection Service  
R&D – Research & Development  
RPO – Office of the Registrar of Pesticides  
RRDI – Rice Research and Development Institute  
RRI – Rubber Research Institute  
SAARC – South Asian Association for Region Cooperation  
S&T – Science and Technology

SCI – Science Citation Index  
SCI – Extended- Science Citation Extended  
SCPPC – Seed Certification and Plant Protection Centre  
SCS – Seed Certification Services  
SDGs – Sustainable Development Goals  
SLAB – Sri Lanka Accreditation Board for Conformity Assessment  
SLAEB – Sri Lanka Atomic Energy Board  
SLCARP – Sri Lanka Council for Agricultural Research Policy  
SLINTEC – Sri Lanka Institute of Nanotechnology (Pvt) Ltd  
SLSI – Sri Lanka Standards Institution  
SMART – Specific, Measurable, Achievable, Relevant, and Time bound  
SRI – Sugarcane Research Institute  
TTF- Technology Transfer Facilities  
TOT – Transfer of Technology  
TRI – Tea Research Institute  
UIS – UNESCO Institute of Statistics  
WB – World Bank  
WIPO – World Intellectual Property Office  
UB – Upper Bound  
UNESCO – United Nations Educational, Scientific and Cultural Organization  
UNCTAD – United National Conference of Trade and Development  
VRI – Veterinary Research Institute

## **EXECUTIVE SUMMARY**

The COVID-19 pandemic had a critical impact on economies, especially in developing nations. Sri Lanka too was not exempted from it; the nation-wide lockdowns had substantial detrimental effects on the institutions' functions, despite several exceptions that focused on ad hoc R&D-based initiatives to address pandemic implications.

Within these uncertainties, the Science and Technology (S&T) Status Report of Sri Lanka for 2020 was compiled on data collected from 42 public sector S&T institutions. The work aims to assess the S&T activities in these institutions according to the objectives set out in the S&T Development Act of 1994/11.

The survey reveals that over 95% of employees in public-sector S&T institutions are on a full-time basis. Women make up 54% of the scientific cadre, surpassing the global average of 46%<sup>1</sup>. However, women's representation in the sector of engineering and technology was comparatively lower (36%), which urges the system to address it to attract more female representation.

The results further show that the majority of researchers specialized their academic discipline in agriculture and veterinary sciences. Thirty-five researchers were staffed at each institute, with most in their mid-career stages and only 13% with a PhD. In 2020, an employee turnover rate of 3–5% was reported among the institutes, notably lower than the global average of 11.6%<sup>2</sup>. However, the Human Flight and Brain Drain Index raised concerns, indicating a significant brain drain issue with an average value of 7.00 index points for Sri Lanka. Addressing this higher-end brain drain is crucial for sustaining talented individuals within the system.

The surveyed institutions are equipped with 357 research laboratories, 37 workshops, 42 libraries, and 84 auditoriums, with some having specialized facilities like mobile labs, research incubators, technological parks, etc. All institutes have basic ICT facilities and internet access, with 41 having dedicated databases for R&D services, and the entire research staff is provided with adequate ICT facilities.

The funding for these institutions came mainly from the Government of Sri Lanka (GoSL). The major allocations were provided to infrastructure development, followed by direct R&D

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<sup>1</sup> World bank Blog ; <https://blogs.worldbank.org/governance/five-facts-gender-equity-public-sector>

<sup>2</sup> <https://explodingtopics.com/blog/employee-turnover-statistics>



activities. The total R&D fund amounted to LKR 1172.13 million, with the sector of agricultural and veterinary sciences receiving the highest share. The fund utilization rate (FUR) was 94%. However, national investment in R&D as a percentage of GDP was 0.12%, which was lower than the major economies in the South and Southeast Asian region<sup>3</sup>.

The institutions conducted 647 research projects, most of which were continued multiple-year projects with a 25% annual completion rate; the majority, 65%, of them were focused on agriculture and veterinary sciences. There were 63 products, 40 processes, and 41 technologies generated, and 1061 scholarly works were published, of which half were conference proceedings. Sri Lanka's scholarly publication per capita (per million) was 128 lower than Bhutan, India, and the Maldives in the SAARC region<sup>4</sup>. Notably, Sri Lanka's scholarly publications per unit GDP, at 30.13, closely trail the global average (49.77) and lag behind the SAARC average (67.4) in 2020. A national framework for research excellence, including financial incentives, could improve this situation, which has been a long-time desire.

For their scholarly achievements, 44 researchers affiliated with the surveyed institutions received numerous accolades, including 12 international honours. In 2020, nationally, out of 353 applications filled, 52 resident patents were approved<sup>5</sup>. It was found that 16 (30%) of these patents were from the institution studied under the survey. Targeting the initial consumer groups with 23 products and 9 processes was part of the market acceptance process. Forty-six recommendations were also accepted, and 58 technologies were transferred.

While the research projects produced many novel products, processes, and technologies within the constraints of the pandemic, overall, there was room for improvement in the scholarly publications' ability to get into indexed journals and turn the knowledge they produced into practical applications. Additionally, it would improve the work's transparency about quality.

Strategical interventions are needed to magnify R&D contributions to the national targets of SDG 2030, including commitments to gender equity, and retain researchers. To avoid practical duplication and facilitate information flow, a robust central platform to host various institutional R&D datasets within an IP framework is essential.

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<sup>3</sup>Statistical Handbook on Research and Development of Sri Lanka; <https://www.nsf.gov.lk/images/pdf/Handbook2020Final.pdf>

<sup>4</sup> Wikipedia : List of countries by number of scientific and technical journal articles;  
[https://en.wikipedia.org/wiki/List\\_of\\_countries\\_by\\_number\\_of\\_scientific\\_and\\_technical\\_journal\\_articles](https://en.wikipedia.org/wiki/List_of_countries_by_number_of_scientific_and_technical_journal_articles)

<sup>5</sup> Statistical Country Profile WIPO World: [https://www.wipo.int/ipstats/en/statistics/country\\_profile/profile.jsp?code=LK](https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=LK)

## INTRODUCTION

The National Science and Technology Commission (NASTEC), established by the Science and Technology Development Act No. 11 of 1994, is the apex policy formulating and advisory body on Science and Technology (S&T) matters for the Government of Sri Lanka. The Commission is mandated to produce an annual report to the government, assessing the country's S&T status in the preceding year per the objectives outlined in Section 2 of the Act and on, the effectiveness of the measures for the development of human resources, the performance of S&T institutions, the effectiveness of public spending on S&T, and the use of S&T by public and private sector undertakings<sup>6</sup>. Accordingly, the report intends to provide stakeholders with information in compliance with the mandate.

Research institutions, universities, knowledge-based services, innovative businesses, and other institutions that engage in activities to generate scientific knowledge, support higher education, engage in industrial innovation, generate scientific expertise, and support national strategic objectives constitute the national research and innovation ecosystem of a country<sup>7</sup>. A very important practice that helps a nation drive S & T to harvest the necessary results for socio-economic development is periodically reviewing the status of S&T<sup>8</sup>. Therefore, it is critical to assess the performance of S&T institutions because it significantly affects the overall effectiveness of the national research and innovation ecosystem.

To accomplish the task, two attributes were considered by NASTEC. The first, on the activities of major S&T institutions in Sri Lanka, was gathered through a questionnaire-based sample survey, and the rest, on related information, was gathered from the annual publications of leading global and local learned societies and agencies, such as the World Bank, UNESCO, the World Intellectual Property Office (WIPO), the University Grant Commission (UGC), and the Central Bank of Sri Lanka (CBSL).

The following methodology was adopted for the survey: A questionnaire was designed to collect data for the year 2020, and it was emailed and mailed to 65 public sector S&T institutes. Human resources, physical resources, research planning, research inputs (Funds), research

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<sup>6</sup> Science And Technology Development Act (No. 11 of 1994); [http://www.commonlii.org/lk/legis/num\\_act/satda11o1994368/s5.html](http://www.commonlii.org/lk/legis/num_act/satda11o1994368/s5.html)

<sup>7</sup> National Innovation system, OECD; <https://www.oecd.org/science/inno/2101733.pdf>

<sup>8</sup>Mormina, M. Science, Technology and Innovation as Social Goods for Development: Rethinking Research Capacity Building from Sen's Capabilities Approach. *SciEng Ethics* 25, 671–692 (2019). <https://doi.org/10.1007/s11948-018-0037-1>

outputs, and services offered to industries, peer institutions, and the general public. A liaison officer was appointed by each institution to provide the respective institution's data. The questionnaire was given a four-month deadline to complete, and in due time, 42 institutions responded with complete data.

Based on the information gathered using a descriptive and comparative methodology, the report was compiled. The institutions surveyed were divided into five disciplines as per the OECD Fields of Research and Development (FORD):

Natural Sciences (i), Engineering and Technology (ii), Medical and Health Sciences (iii), Agricultural and Veterinary Sciences (iv), and Social Sciences (v) (Annexure 01).

Table 1 shows the sectoral breakdown of the total number of institutions examined.

The findings are presented in the report in six major sections: Human Resources, Physical Resources, Research Planning, Research Funding, Research Outputs, and Institutional Services. Each section begins with a detailed description with an appropriate graphical presentation of work in the reporting year 2020, with respective trends over the period from 2012 to 2020. The run charts were extrapolated by calculating the average figure distributed per institute since the number of institutes included in the survey for 2012–2020 varied. Some of the results of the assessment cannot be authenticated with global and regional figure indices of the reporting year because only a few sets of such indices were available when the report was written. However, the report corroborates these limited claims wherever applicable. The recommendations and conclusions derived from the survey could be used as a reference to enhance the performance of the institutions.

Although NASTEC is responsible for preparing the yearly S&T status report nationally, the work has various constraints. It does not encompass the private-sector institutions' standing or provide comprehensive coverage of the higher education sector. Furthermore, while the primary objective of the report is to assess the national S&T status, it relies on data from a subset of 42 institutes, mainly focusing on R&D-related activities within the broader S&T ecosystem. It should be noted that Sri Lanka has a limited number of private-sector institutions with specialized R&D facilities among the surveyed institutions. Consequently, generalizing the findings of this report to represent the overall national S&T status may not be appropriate.

However, the public sector institutions surveyed in the report are major players in the sectors and have an impact to a great extent on the national S&T ecosystems of the country. Hence,

the report could assist in policy decisions on policy directives, strategic interventions, human resource needs, research planning, and funding priorities for the institutes.

*Table 1: Sector-wise distributions of S&T Institutes*

Sector	Number of Institutes	%
Agricultural & Veterinary Sciences	19	45%
Engineering & Technology	7	17%
Medical & Health Sciences	2	5%
Natural Sciences	9	21%
Social Sciences	5	12%
<b>Total Institutes</b>	<b>42</b>	<b>100%</b>

From the 42 S&T institutes surveyed, the highest number of institutions were included in the sector of Agricultural and Veterinary Sciences (n =19). A list of institutions belonging to each sector is given in Table 02.

*Table 2: Sector-wise categorization of public sector S&T Institutes in Sri Lanka*

Natural Sciences	Engineering & Technology	Medical & Health Sciences	Agricultural & Veterinary Sciences	Social Sciences
Central Environmental Authority (CEA)	Arthur C. Clarke Institute for Modern Technologies (ACCIMT)	Bandaranaike Memorial Ayurvedic Research Institute (BMARI)	Coconut Research Institute (CRI)	National Research Council (NRC)
Department of Measurement Units, Standards & Services (DMUSS)	Centre for Defence Research and Development	Medical Research Institute (MRI)	Department of Export Agriculture (DEA)	National Science Foundation (NSF)
Department of Meteorology (DOM)	Farm Mechanization Research Centre (FMRC)		Field Crops Research & Development Institute (FCRDI)	Sri Lanka Accreditation Board for Conformity Assessment (SLAB)
Department of National Botanic Gardens (DNBG)	Industrial Technology Institute (ITI)		Forest Department (FD)	Sri Lanka Inventors Commission (SLIC)
Disaster Management Centre (DMC)	National Building Research Organization (NBRO)		Fruit Research and Development Institute (FRDI)	Sri Lanka Standards Institute (SLSI)
Gem & Jewellery Research and Training Institute (GJRTI)	National Engineering Research & Development Centre (NERDC)		Hector Kobbekaduwa Agrarian Research and Training Institute (HARTI)	
National Institute of Fundamental studies (NIFS)	Sri Lanka Institute of Nanotechnology (SLINTEC)		Department of Irrigation (DI)	
Natural Resources Management Centre (NRMC)			National Aquatic Resources Research & Development Agency (NARA)	
Sri Lanka Atomic Energy Board (SLAEB)			National Institute of Postharvest Management (NIPM)	
			Palmyra Research Institute (PRI)	

			Plant Genetic Resource Centre (PGRC)	
			Plant Protection Service (PPS)	
			Registrar of Pesticide Office (RPO)	
			Rice Research & Development Institute (RRDI)	
			Rubber Research Institute (RRI)	
			Seed Certification Services (SCS)	
			Sugarcane Research Institute (SRI)	
			Tea Research Institute (TRI)	
			Veterinary Research Institute (VRI)	

Statutory Functions of the institutes:

The statutory functions of the institutes related to science and technology are categorized into six main sections.

1. R & D (Research and Development)
2. Research funding
3. S&T Services
4. S&T Policy Development
5. Technology Transfer
6. Science popularization

The number of institutions carrying out the functions is indicated in Table 03, and the sector-wise distribution of S&T institutions carrying out statutory functions is shown in Figure 1.1.

Table 3: Major Statutory Functions conducted by S & T Institutions

Statutory Function	Number of Institutions	%
R&D	35	83%
Research funding	5	12%
S&T Services	31	74%
Innovation	18	40%
S&T Policy formulation	9	21%
Technology Transfer	30	71%
Science popularization	19	45%
Training of Personal	26	62%

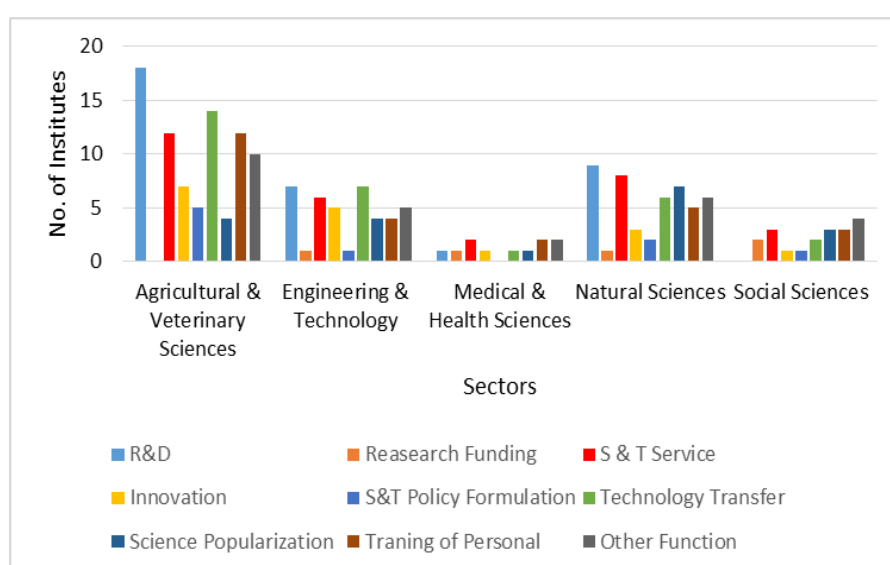


Figure 1: Sector-wise distribution of S&T institutions carrying out statutory functions

As per the OECD Frascati manual, research and experimental development (R&D) comprises creative and systematic work undertaken to increase the stock of knowledge—including knowledge of humankind, culture, and society—and to devise new applications of available knowledge. R&D constitutes the first stage of the development of a potential new service or production process. Eighty-three percent of institutions surveyed mandated R&D as one of the main statutory functions.

Research funding includes providing financial grants for R&D activities, which include basic research, applied research, and prototype development. Accordingly, five institutes (12%) carry out research funding, namely CDRD, DMC, MRI, NRC, and NSF.

Analytical testing, quality assurance, laboratory accreditation, instrument calibration, personnel training, and any other specialized S&T-related services provided by the institution are considered as one of S&T services. Of the 42 institutes surveyed, 31 (74%) carried out at least one of the aforementioned S&T services. In an era of rapid technological change, responsible policy-making institutes need to identify and prepare policies for new science, technology, and innovative developments<sup>9,10</sup>. Twenty-one percent of the institutes surveyed were involved in S & T policy formulation activities.

Technology transfer (TT) refers to the process of conveying results stemming from scientific and technological research to the marketplace and a wider society, along with associated skills and procedures, and is, as such, an intrinsic part of the technological innovation process<sup>11</sup>. Within the surveyed period, thirty (71%) institutes participated in technology transfer.

Science popularization implies bringing science to the general public, disseminating scientific knowledge, and fostering a scientific way of thinking among people. This implies public understanding of science and public communication of research projects. Of the institutes surveyed, 19 institutes (45%) take part in science popularization activities as mandated. A considerable point here is that some institutes conduct more than one statutory function.

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<sup>9</sup> THE IMPACT OF RAPID TECHNOLOGICAL CHANGE ON SUSTAINABLE DEVELOPMENT (2019); UNCTAD; [https://unctad.org/system/files/official-document/dtlstict2019d10\\_en.pdf](https://unctad.org/system/files/official-document/dtlstict2019d10_en.pdf)

<sup>10</sup> A FRAMEWORK for Science, Technology and Innovation Policy Reviews(2019); UNCTAD; [https://unctad.org/system/files/official-document/dtlstict2019d4\\_en.pdf](https://unctad.org/system/files/official-document/dtlstict2019d4_en.pdf)

<sup>11</sup> Knowledge for policy, European Commission; [https://knowledge4policy.ec.europa.eu/technology-transfer/what-technology-transfer\\_en](https://knowledge4policy.ec.europa.eu/technology-transfer/what-technology-transfer_en)

## 1. HUMAN RESOURCES

Human resources are considered an important type of resource for attaining the economic development of a country. The efficient utilization of HR depends on the government's substantial investment in its development<sup>12</sup>.

Human Resources in Science and Technology (HRST) are individuals who have completed tertiary education in an S&T field and/or those who are not formally qualified in this manner but work in an S&T occupation where such qualifications are required<sup>13</sup>. Worldwide, Countries are migrating towards knowledge-based economies, and there is a growing demand for HRST. Knowledge-driven nations must generate a critical mass of well-trained professionals while linking with tertiary education per the international standard categorization of tertiary education (ISCED), in harmony with the sectors classified in the OECD, 1995.

The report categorizes the entire staff of the S&T institutions into two categories, namely, scientific and non-scientific. The first consists of researchers, research support/technical staff, and librarians/information officers, and the latter consists of accounting, administrative, and other staff (Definitions 1.1). The researchers' fields of study, the highest level of education, age and gender compositions, staff turnover, training, and the given incentives are extensively analyzed in the section HR.

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<sup>12</sup> The Effect of Human Resource Development on Organizational productivity: (2013)  
<http://dx.doi.org/10.6007/IJARBSS/v3-i10/295>

<sup>13</sup> Guidelines for collecting and Reporting data on Research and Experimental Development (OECD 2015) ;  
[https://read.oecd-ilibrary.org/science-and-technology/frascati-manual-2015\\_9789264239012-en#page1](https://read.oecd-ilibrary.org/science-and-technology/frascati-manual-2015_9789264239012-en#page1)



## 1.1. Definition of Staff Category

Defined terms:

Scientific staff: Includes only research staff, research support staff, and librarians & information officers.

Research staff: Professionals who possess relevant qualifications and who are responsible for the conception or creation of new knowledge, products, processes, methods, and systems, and the management of the project concerned.

Research support staff: Employees with an appropriate technical qualification or diploma who support the functioning of S&T activities in the institution, but are not involved with the planning and implementation of such activities.

E.g.: computer unit, workshop, maintenance, etc.

Librarians: Considered as informative scientists who belong to the scientific staff.

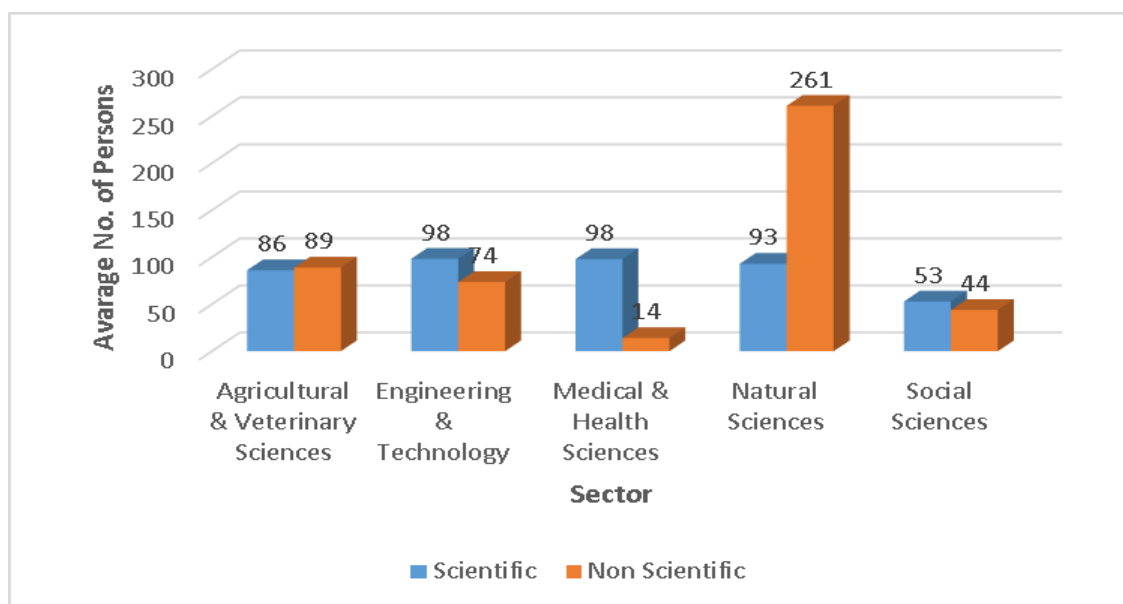
Administrative staff: All individuals who work in the institution's administration and are not directly involved in any scientific or research-related activity.

Accounting staff: All individuals employed in the institution's finance and accounting functions who are not directly involved in any science or research-related activity.

Supporting staff, non-research: secretarial, skilled/unskilled craftsmen, gardeners, animal housekeepers, etc. directly associated with or providing services to the researcher.

In 2020, a total of 8427 employees were working in the institutes surveyed, with 8286 (98.3%) being permanent, while 141 (1.7%) were on a contract basis.

The lowest number of employees reported was 16 working for Plant Protection Services and the Sri Lanka Accreditation Board for Conformity Assessment, while the highest number of employees reported was 912 who have been attached to CEA. Of the total, scientific staff accounted for 42.9%, n = 3623. Figure 1.1 depicts the distribution of scientific and non-scientific personnel by sector.



*Figure 1.1: Sectorial breakdown of scientific and non-scientific staff.*

(Note: The number of staff is given within the bar.)

Non-scientific staff outnumbered scientific staff in the Agricultural and Veterinary Sciences and Health-Medical sectors, while others reported the opposite. Because of the nature of the work carried out in the sectors, the representation of the ratio may be within the predicted range. However, they were unable to be authenticated because there were no such global estimates available during the reporting period when this report was written.

Table 4 :Staff Strength – Distribution of staff employed in S&T institutions

Sector	Scientific staff			Accounting Staff		Administrative Staff		Other staff	Total
	Research Staff	Research Support Staff	Librarian / Information Officers	Accountants	Acc. Support Staff	Executives	Support Staff		
Agricultural & Veterinary Sciences	505	1107	24	16	122	68	650	835	3327
Engineering & Technology	410	273	6	14	37	49	140	275	1204
Medical & Health Sciences	88	107	1	1	0	3	24	0	224
Natural Sciences	282	548	7	16	73	18	508	1735	3187
Social Sciences	192	63	10	8	36	10	141	25	485
<b>Subtotal</b>	<b>1477</b>	<b>2098</b>	<b>48</b>	<b>55</b>	<b>268</b>	<b>148</b>	<b>1463</b>	<b>2870</b>	<b>8427</b>
<b>Total</b>	<b>3623</b>			<b>323</b>		<b>1611</b>			

Figure 1.2 shows the distribution of the number of researchers in the institutions. The lowest number of researchers were working in the PPS (n = 1), and the highest number was 150 attached to NBRO.

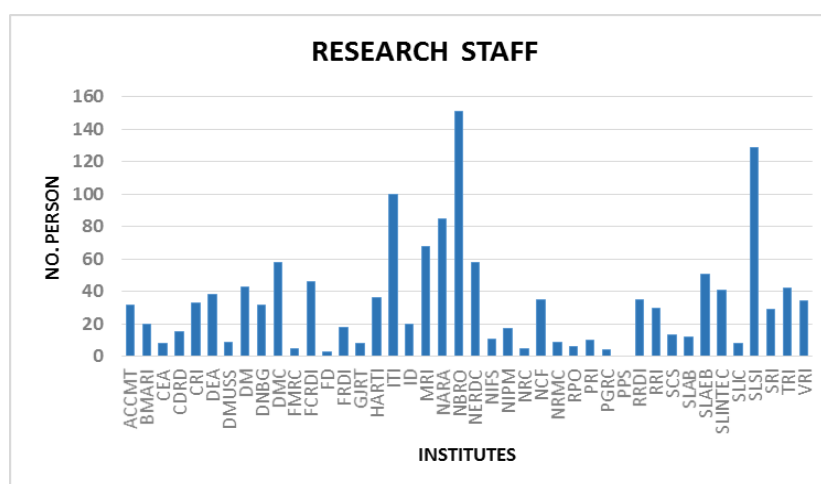
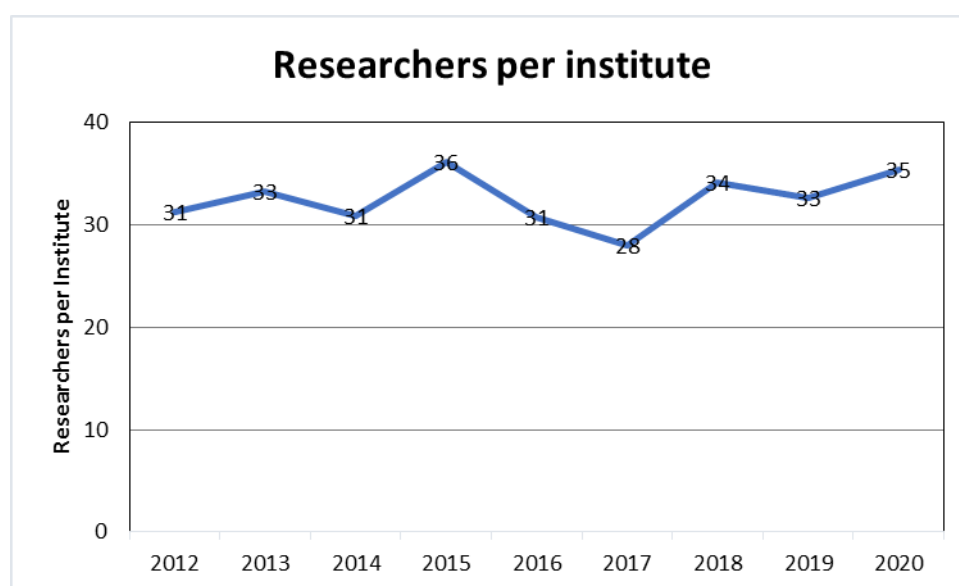


Figure 1.2: Distribution of research personnel among S&T institutions.

The average number of researchers working per institute was 35, and 11 out of 42 S&T institutions (26%) have researchers less than 11. Figure 1.2 depicts the spectrum of research staff attached to the institutes. There were nine institutes (21%) that employed more than 50 researchers. Table 1.1 provides a list of the institutions according to the number of researchers present.

Figure 1.3 shows the trend of researchers working per institute over the period 2012–2020. Generally, there is a slightly declining trend over the period specified.



*Figure 1.3: The number of researchers employed by each institute.*

The scenario is the opposite when looking at national-level norms via UNESCO statistics at a different matrix, such as researchers in R&D per million populations. From 2008 to 2013, there was an upward trend, but in 2014, there was a low number of researchers. From 2015 to 2018, the value was slightly similar. According to the UNESCO statistics, the data has been updated until 2018 only. Therefore, the values are forecasted with upper and lower confidence bounds and presented as figure 1.4 and table 05. For 2019, the forecasted number of researchers (per million people) is 106.69 (LB: 99.06, UB: 114.32), and for 2020, it is 107.05 (LB: 98.51, UB: 115.58).

Table 5: Forecasted values for 2019/2020 - Researchers in R&D per million populations.

year	No. of Researchers (per million people)	Forecast (No. of Researchers (per million people))	Lower Confidence Bound	Upper Confidence Bound
2008	98.68			
2009	102.14			
2010	105.61			
2011	107.12			
2012	108.64			
2013	110.15			
2014	98.95			
2015	105.99			
2016	106.85			
2017	106.38			
2018	103.47			
2019		106.69	99.06	114.32
2020		107.05	98.51	115.58

Source: UNESCO Institute for Statistics - 2008-2017<sup>14</sup> ; 2018<sup>15</sup>

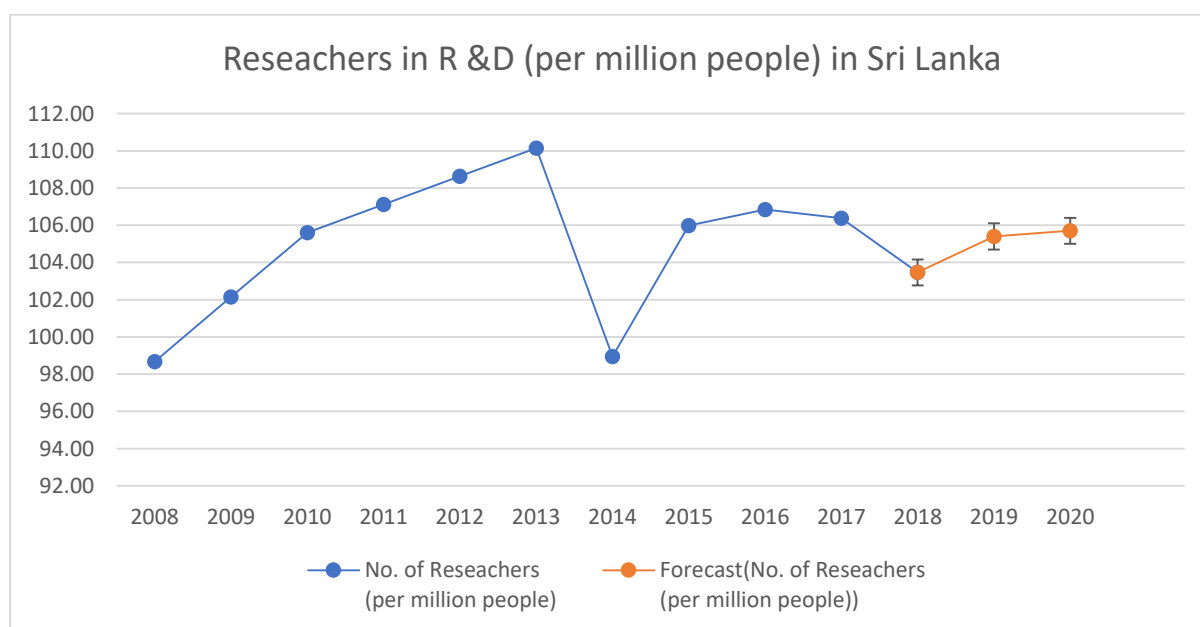


Figure 1.4: The Researchers in R&D (per million people) in Sri Lanka

<sup>14</sup>UNESCO Institute for Statistics -World bank

<sup>15</sup><http://www.nsf.ac.lk/index.php/pdf-stprd-stat-handbook-2018>

## 1.2. Gender parity in Research staff (Researchers)

When considering the whole researchers (n= 1477) of the institutes surveyed, 54% were females (n = 799) while 46% were males (n = 678), as shown in Figure 1.7. It reflects that gender parity for researchers has been achieved across the institutions, although it is slightly in favor of women. The sample survey further revealed that, in 2020, the representation of women researchers in Sri Lanka was 54%, higher than the global estimation of 33% <sup>16</sup>.

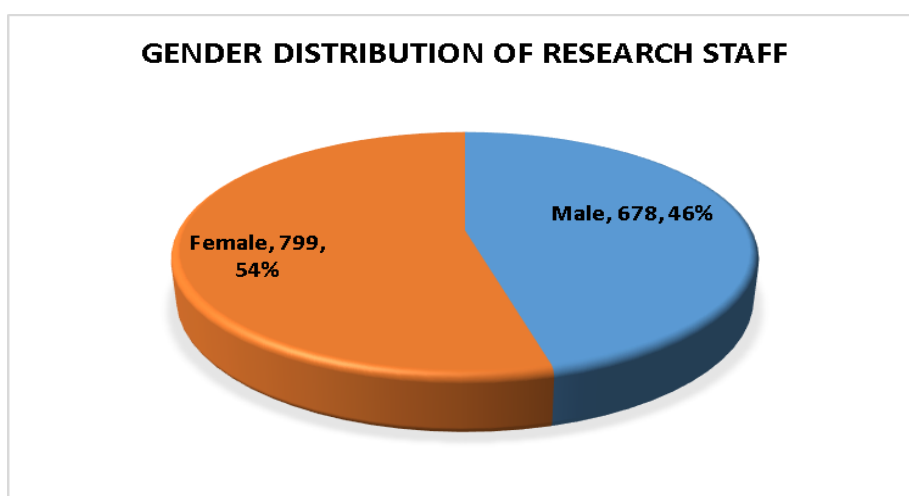



Figure 1.5: Gender distribution of research staff.



**According to UIS data, less than 30% of the world's researchers are women**

### 1.1.1.2.1 Gender distribution of research staff by sector (based on the sectoral affiliation of the institute)

From the sectoral perspective of affiliated institutes of researchers, female researchers were more prevalent in the Agricultural & Veterinary Sciences, Social Sciences, and Medical & Health Sciences. But the trend was in the reverse direction in the other two sectors, Natural

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<sup>16</sup> L'Oréal-UNESCO For Women in Science: <https://www.forwomeninscience.com/>

Sciences and Engineering & Technology, where more female representation needs to be encouraged (Figure 1.7).

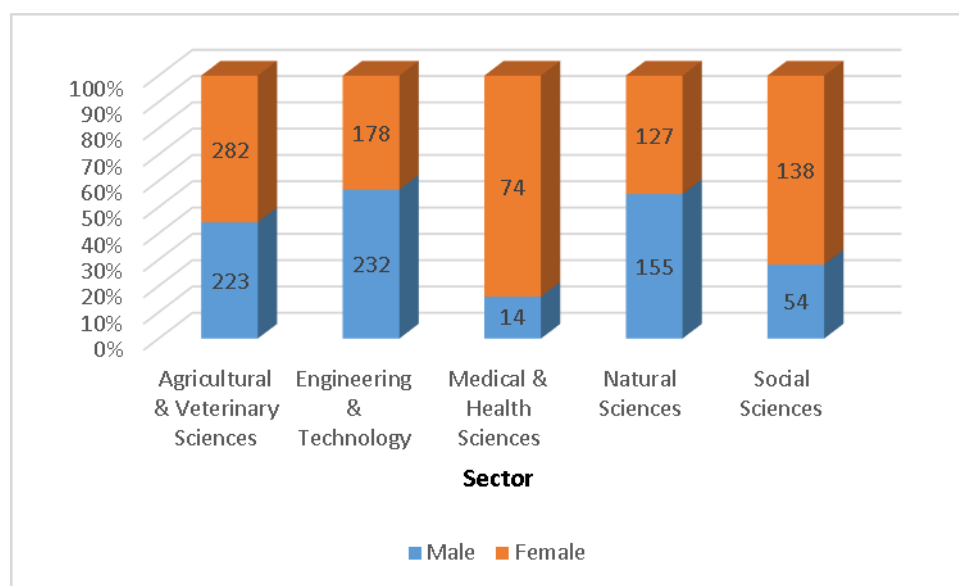


Figure 1.6: The gender distribution of research staff in different sectors.

N\*: Total number of researchers=1477


### 1.3.Areas of expertise of the Research staff (Researchers)

According to the OECD guidelines, the survey classified the fields of specialization of the researchers as Natural Sciences, Engineering & Technology, Medical & Health Sciences, Agricultural & Veterinary Sciences, and Social Sciences. Across the sectors, most of the researchers were specialized in the field of Agricultural Sciences (n = 444, 30%), while Medical and Health Sciences were the least specialized (n = 63, 4.2%) (Table 5).

Table 6: Staff distribution for research based on expertise (academic disciplines) and gender

Field of Expertise	Male		Female		Total
	Count	Percentage	Count	Percentage	
Agricultural & Veterinary Sciences	186	42%	258	58%	444
Engineering & Technology	188	64%	107	36%	295
Medical & Health Sciences	14	22%	49	78%	63
Natural Sciences	219	38%	350	62%	569
Social Sciences	61	69%	28	31%	89
Other	11	65%	6	35%	17
<b>Total</b>	<b>679</b>	<b>46%</b>	<b>798</b>	<b>54%</b>	<b>1477</b>

Other\*: Not specified



In 2020, 23% of engineering graduates in Sri Lanka were woman<sup>1</sup> (Sri Lanka University Statistics 2020-UGC).

#### 1.4. Sectorial composition of the research staff based on their highest academic qualifications

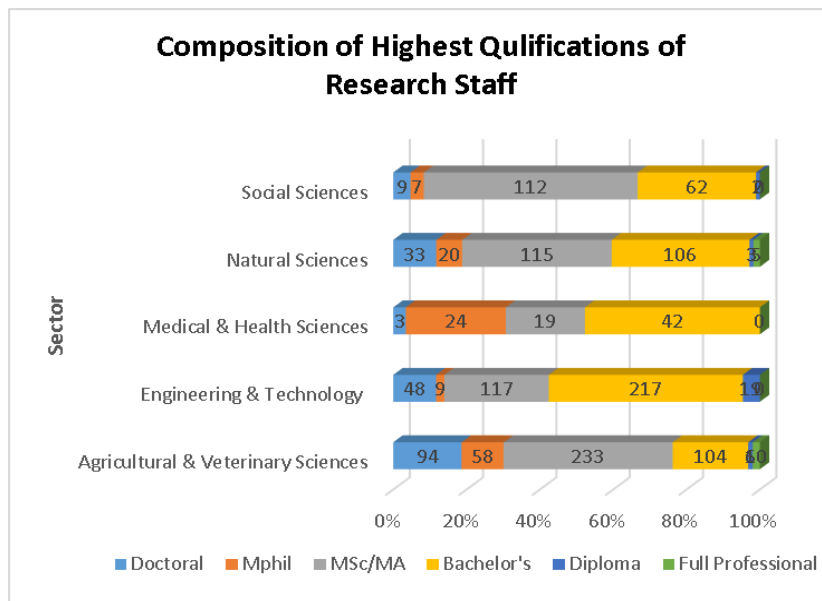


Figure 1.7: Composition of research the staff based on the highest qualifications held by them (Sectorial Distribution)

#### 1.5. Research staff Age distribution.

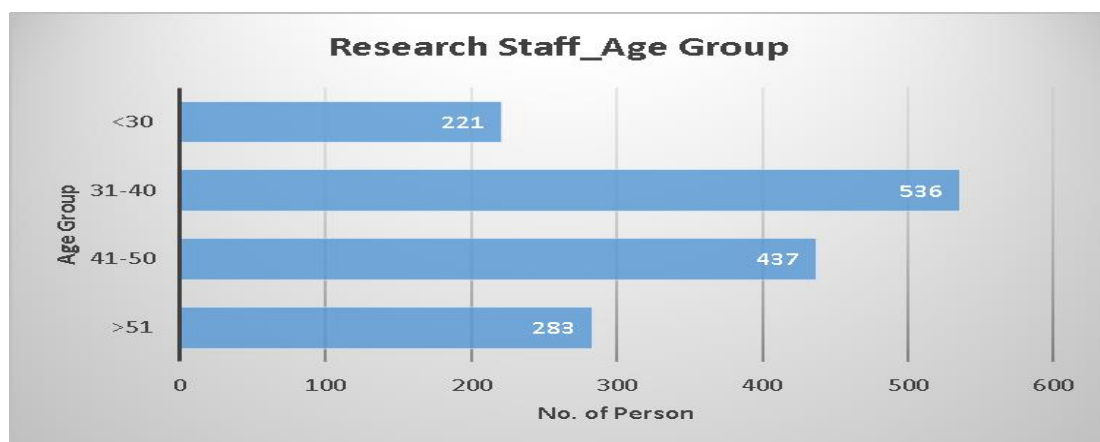


Figure 1.8: Research staff Age distribution



Young scientists and researchers are widely recognized as being among the most creative and energetic researchers. The young researchers can also be more mobile and better trained than ever before. They constitute a vast pool of global talent that stands to change the geography of knowledge in fundamental ways. These early-career researchers also play a central role in knowledge economies because they can be the key innovators and creators that provide the intellectual capital needed to grow a strong national research and innovation system. When viewed against the spectrum of emerging challenges faced by nations worldwide—rapid economic globalization, ageing populations, increased demand for highly skilled labour, and the expansion of systems of higher education—the necessity of nurturing and promoting young researchers seems more urgent than ever<sup>17,18</sup>.

The sample survey shows the majority of the researchers were in their mid-career age group 31-40 years (n = 536, 36.2%). Also, a significant representation of 19.16% was in the later career stage (age > 50), and only 14.9% of the researchers were in their early career stage, age <30 years. It urges the system to adapt sustainable recruitment and retention strategies to attract more talented young people into careers in research to ensure sustainable human resources management<sup>19</sup> (Figure 1.9).

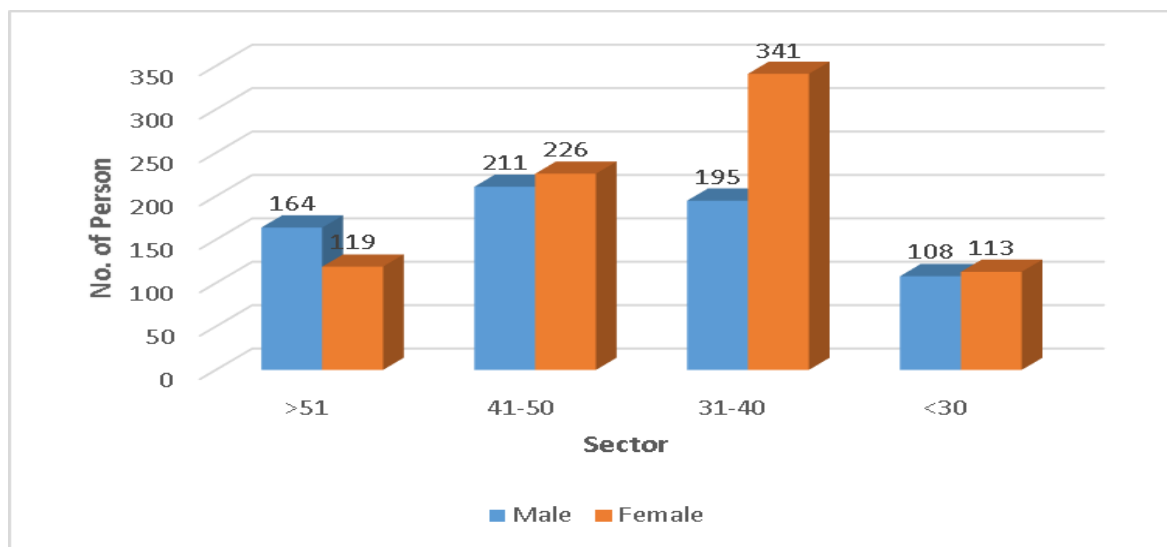


Figure 1.9: Age and gender distribution of research staff.

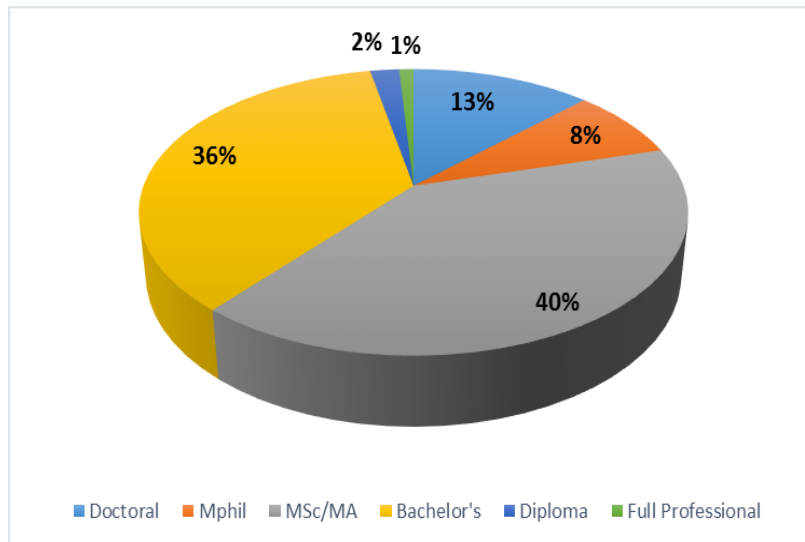
<sup>17</sup> The Global State of Young Scientists; Global Young Academy; [https://globalyoungacademy.net/wp-content/uploads/2015/06/GYA\\_GloSYS-report\\_webversion.pdf](https://globalyoungacademy.net/wp-content/uploads/2015/06/GYA_GloSYS-report_webversion.pdf)

<sup>18</sup> The Effects of Aging on Researchers' Publication and Citation Patterns; PLoS One. 2008; 3(12): e4048. 2008 Dec 29. doi: 10.1371/journal.pone.0004048

<sup>19</sup> Systematic literature review on sustainable human resource management (2019); <https://doi.org/10.1016/j.jclepro.2018.10.091>

## 1.6. Highest education qualification of research staff

In this survey, the educational qualifications of research staff that were considered Ph.D., MPhil, MSc/MA, BSc, and Diploma. Figure 1.10 depicts the distribution of research staff based on their highest educational qualifications.



*Figure 1.10: Distribution of research staff based on their highest educational qualifications.*

Most of the researchers held either a Master's Degree by course work ( $n = 596$ , 40.3%) or a Bachelor's Degree (BSc) ( $n = 531$ , 35%) as the highest qualification. Only 8% of the research-based masters (MPhil) ( $n = 118$ ) and 12.6% ( $n = 187$ ) had a doctorate. And 2% of research staff ( $n = 32$ ) had a diploma as their highest qualification. It urges a system to be put in place to offer more research-based academic programs to the researchers under support for employee development capacity building.

The gender distribution of research employees is depicted in Figure 1.12, depending on their highest educational levels.

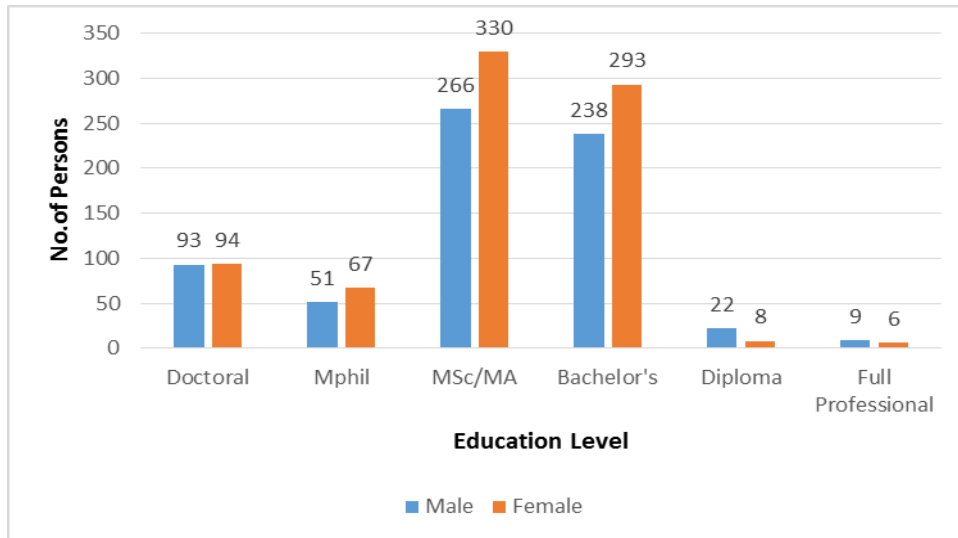


Figure 1.11: Distribution of research staff by highest level of education and gender

## 1.7. Human Resource Development (HRD)

### 1.7.1. Workshops, seminars, and conferences (local and international)

Human Resource Development (HRD) is the framework for assisting employees in developing their personal and organizational skills, knowledge, and capacities. Employee training and career development are examples of HRD opportunities. HRD of the scientific staff of the surveyed S&T institutes was carried out through workshops, seminars, and conferences. In line with this, in 2020, a total of 887 scientific staff participated in 662 local training (n = 662, 75%) and foreign training (n = 225, 25%) programs, respectively (Fig. 1.13).

### Composition of Staff Training Programs

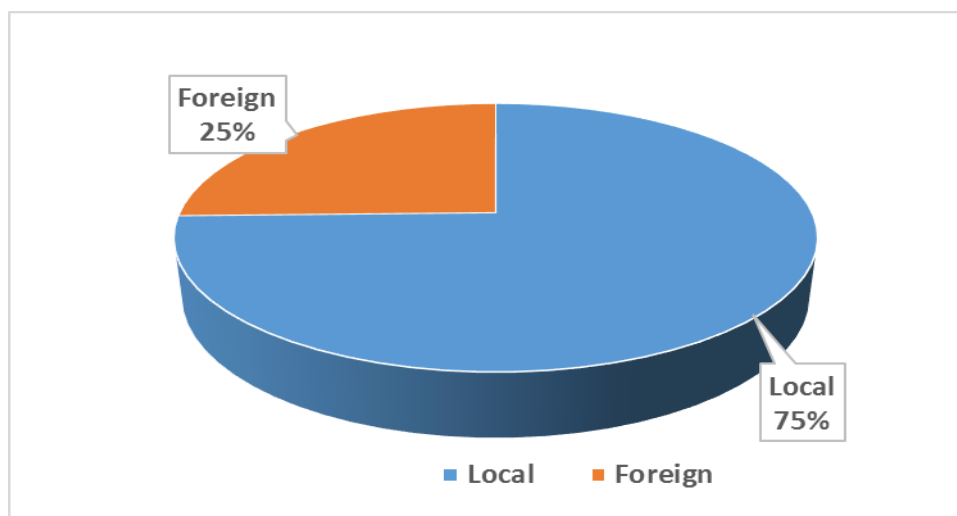


Figure 1.12: Composition of staff training programs (local and foreign)

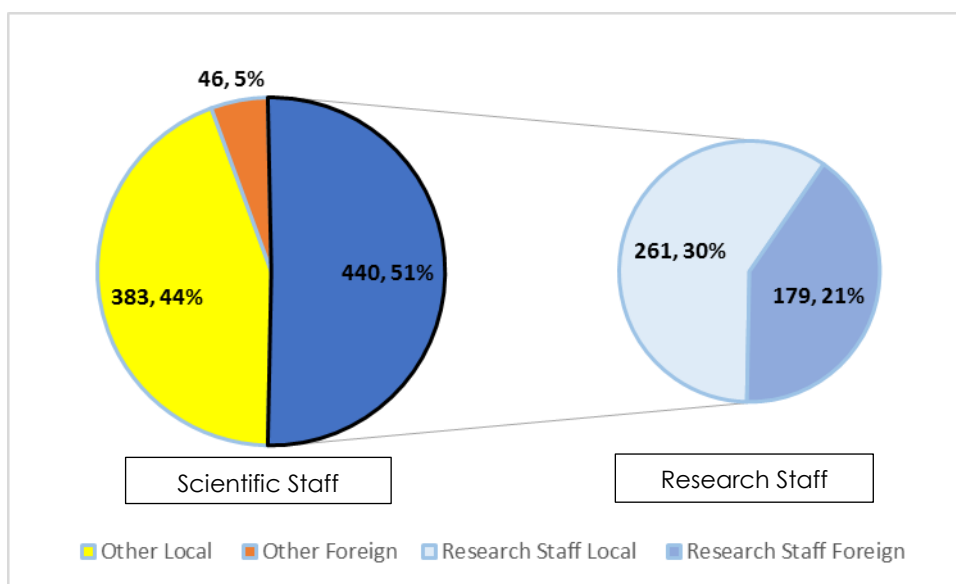


Figure 1.13: Composition of scientific staff training programs (local and foreign)

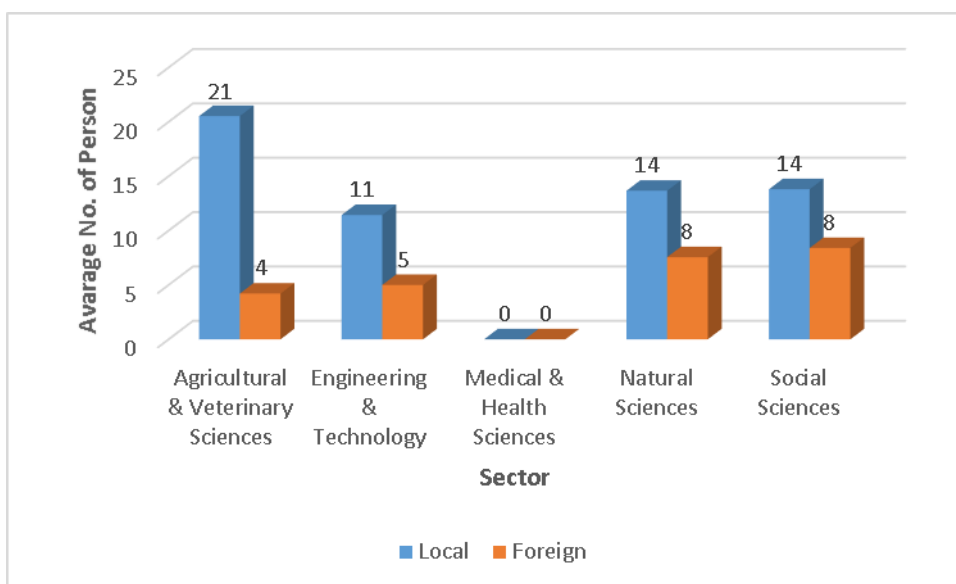


Figure 1.14: Sector-wise distribution of training programs participated by the scientific staff

Eight hundred eighty-seven scientific staff attended training programs, with 662 (75%) receiving local training and 225 (25%) receiving international training. The trained scientific staff was comprised of researchers (n = 440), research support personnel (n = 425), and librarians/information officers (n = 4) (Fig. 1.15).

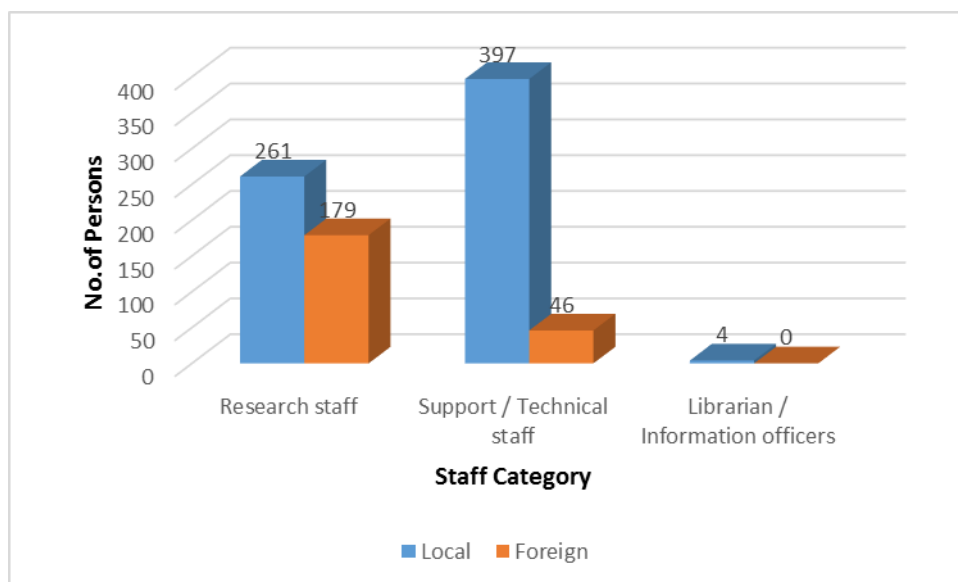


Figure 1.15: Training opportunities received by different scientific staff categories

Figure 1.16 illustrates the distribution of scientific staff attending local and international training programs by sector.

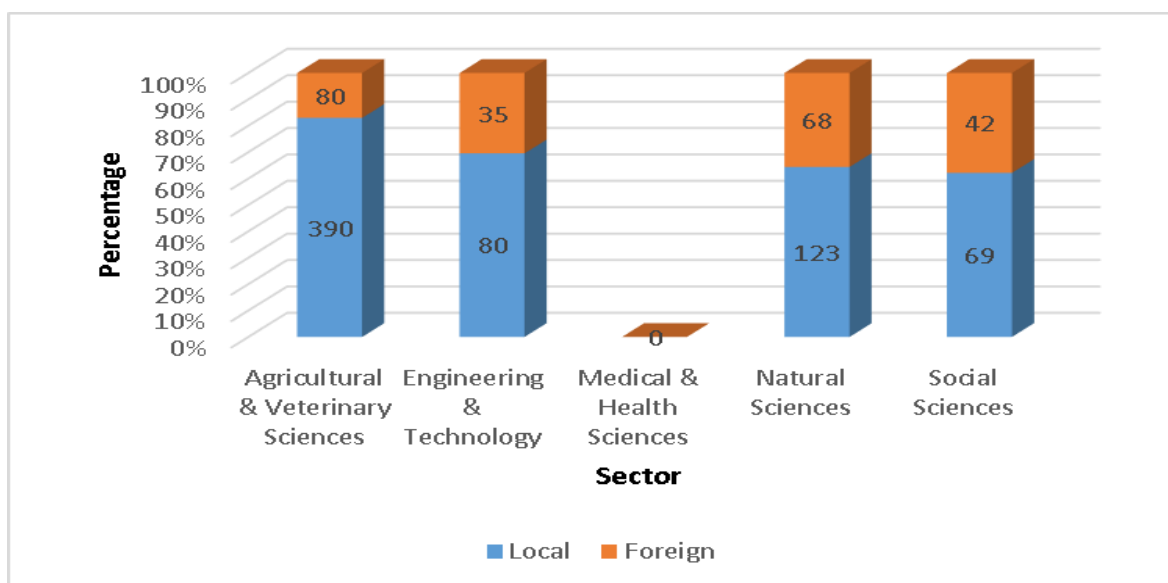


Figure 1.16: Sector-wise distributions of staff training.

### 1.7.2. Employee turnover in the scientific staff

Employee turnover refers to the number or percentage of workers who leave an organization and are replaced by new employees for a defined period of time. In 2020 alone, the S&T institutes surveyed hired 129 scientific workers, comprising 102 research staff, 6 academic staff, 20 research support staff, and one librarian/information officer. During the same period, 118 scientific staff left the S&T institutes, comprising 63 research staff, 1 academic staff, 51 research support staff, and three librarians and information officers. Switching to a new profession, pursuing higher studies abroad, and retiring are all reasons for employee turnover. In 2020, the scientific staff surveyed had an estimated turnover rate of between 3% and 5%, which was lower than the estimated average global rate of 11.6% in the same year<sup>20</sup>. According to the Human Flight and Brain Drain Index, the average value for Sri Lanka during 2020 was 7.00 index points<sup>21</sup>, which raises serious concerns about brain drain. It emphasizes the critical importance of addressing the current higher-end brain drains.

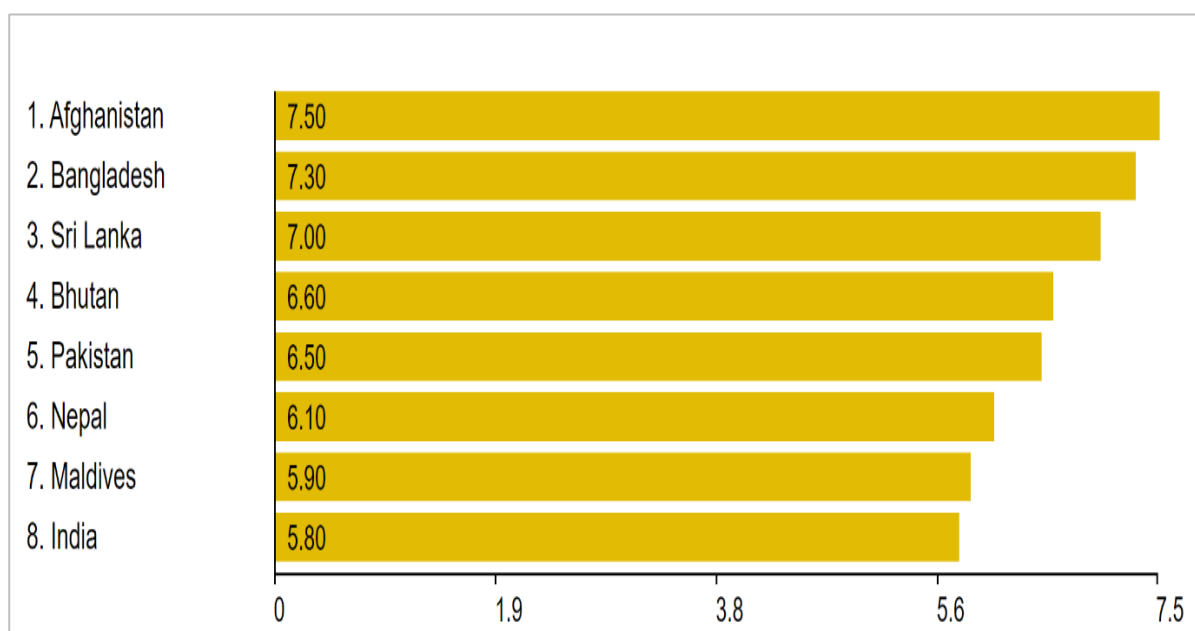
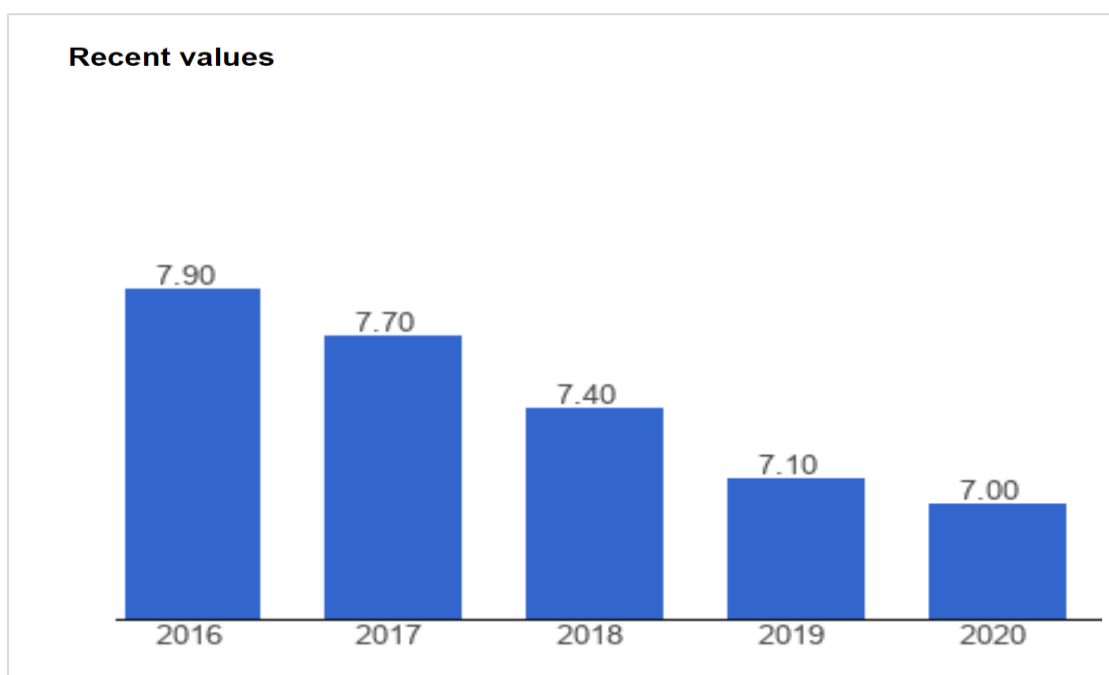


Figure 1.17 The Human Flight & Brain Drain index -2020 (comparison with SAARC countries)

<sup>20</sup> <https://explodingtopics.com/blog/employee-turnover-statistics>

<sup>21</sup> The Global Economy. Com: [https://www.theglobaleconomy.com/rankings/human\\_flight\\_brain\\_drain\\_index/SAARC/](https://www.theglobaleconomy.com/rankings/human_flight_brain_drain_index/SAARC/)



*Figure 1.18: The Human Flight & Brain Drain index 2016-2020*

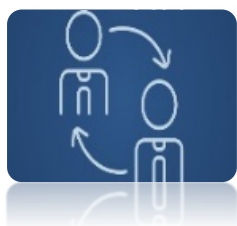
Tables 06 and 07 illustrate the number of scientific staff hired and the number of employees who left the S&T institutes surveyed in 2020.

*Table 7: Sector-by-sector description of scientific staff recruitment*

		Scientific Staff Category				Total
		Research Staff	Academic Staff	Support/Tec hnical Staff	Librarian/ IT	
<b>Sector</b>	Agricultural & Veterinary Sciences	31	0	0	0	<b>31</b>
	Engineering & Technology	37	0	17	0	<b>54</b>
	Medical & Health Sciences	20	0	0	1	<b>21</b>
	Natural Sciences	14	6	3	0	<b>23</b>
	Social Sciences	0	0	0	0	<b>0</b>
<b>Total</b>		<b>102</b>	<b>6</b>	<b>20</b>	<b>1</b>	<b>129</b>

Table 8: Sector-by-sector description of the scientific staff left

		Scientific Staff Category				Total
		Research Staff	Academic Staff	Support/ Technical Staff	Librarian/ IT	
Sector	Agricultural & Veterinary Sciences	10	0	23	1	34
	Engineering & Technology	36	0	9	1	46
	Medical & Health Sciences	2	0	1	0	3
	Natural Sciences	12	1	9	1	23
	Social Sciences	3	0	9	0	12
<b>Total</b>		<b>63</b>	<b>1</b>	<b>51</b>	<b>3</b>	<b>118</b>



**EMPLOYEE TURNOVER ESTIMATED (RESEARCHERS) RATE IN 2020= 3-5%**

\*Average global employee turnover in 2020 =11.6%  
(Source: EXPLODING TOPICS website)

### 1.7.3. Funding for higher studies

The number of scientific staff who were offered –funding for higher studies by their institutions is given in table 9.



Table 9: Sector-by-sector illustration of studies funded by the institutions.

		Degree funded by the institution					Total
		PhD	M.Phil	MSc/MA	Postgraduate Diploma	Training attachments	
Sector	Agricultural & Veterinary Sciences	15	6	7	0	6	34
	Engineering & Technology	5	1	4	0	0	10
	Medical & Health Sciences	0	0	0	0	0	0
	Natural Sciences	6	32	6	2	0	46
	Social Sciences	0	0	0	0	0	0
<b>Total</b>		<b>26</b>	<b>39</b>	<b>17</b>	<b>2</b>	<b>6</b>	<b>90</b>

In 2020, a total of 90 scientific staff were funded by their affiliated institutions to pursue postgraduate studies. These included 2 postgraduate diplomas, 17 MSc degrees, 39 MPhil degrees, and 26 Ph.D. degrees. The highest number of degrees offered to employees was from the Natural Sciences sector (n = 46).

#### 1.7.4. Incentives for the scientific staff

Incentives provided to the staff by the institution have benefits for both employees and employers. When recognized for stellar performance and productivity, employees have increased morale, job satisfaction, and involvement in organizational functions. As a result, employers experience greater efficiency and an increase in productivity. It also assists in retaining qualified employees within the institute. Table 9 indicates the incentives given to the scientific staff of the institute. Transport facility/allowance and professional allowance were the most common incentives offered by the institutions, followed by research allowance, medical insurance, and housing/quarters.

Table 10: Perks given to the scientific staff of S & T institutions.

Perks	No. of institutions
Research allowance	15
Medical insurance	27
Transport facility/allowance	29
Professional allowance	33
Housing/Quarters	20
Other	8

## 2. PHYSICAL RESOURCES

### 2.1. Infrastructure facilities

Basic infrastructure is the set of facilities essential to the functioning of an institute. It includes laboratories, libraries, auditoriums, workshops, scientific instruments, equipment, libraries, archives, and ICT facilities such as networks, databases, the internet, servers, and computers.

Table 11 : Basic infrastructure facilities available in S & T institutions

Sectors	Labs	Workshops	Auditorium/ Conference Hall	Library	Central Instrumentation Facility	Other
Agricultural & Veterinary Sciences	98	11	44	20	11	53
Engineering & Technology	143	11	11	5	13	10
Medical & Health Sciences	21	0	4	2	0	0
Natural Sciences	88	6	16	13	0	6
Social Sciences	7	9	9	2	0	3
<b>Total</b>	<b>357</b>	<b>37</b>	<b>84</b>	<b>42</b>	<b>24</b>	<b>72</b>

Common infrastructure considered in the survey included laboratories (n = 357), workshops (n = 37), auditoriums (n = 84), and libraries (n = 42). The “other” infrastructure (n = 72) included regional offices, circuit bungalows, mobile labs, instrument rooms, training rooms, pilot plants, engineering museums, technology parks, plant nurseries, cropping houses, screening houses,

insect museums, early warning centers, pest control farms, plant houses, sprinkler irrigation systems, experimental farms, feed mills, disease-free poultry houses, and animal houses.

## 2.2. IT-related facilities

All 42 S&T institutes surveyed have institutional websites and internet facilities. Only 26 of them have a database on research and services. Table 11 depicts the institutes' IT infrastructure.

From all 42 S&T institutes surveyed, only the Farm Mechanization Research Centre doesn't have institutional websites or internet facilities. Only 25 of them have a database on research and services. Table 11 depicts the institutes' IT infrastructure.

*Table 12: Number of Institutes with IT-related facilities*

Sectors	Website	DBMS	Internet	Free access to Online Journal	Other
Agricultural & Veterinary Sciences	19	10	19	4	0
Engineering & Technology	7	3	6	2	2
Medical & Health Sciences	2	1	2	0	0
Natural Sciences	8	8	8	2	0
Social Sciences	5	3	5	2	1
<b>Total</b>	<b>41</b>	<b>25</b>	<b>40</b>	<b>10</b>	<b>3</b>

## 2.3 ICT resource

Table 13 illustrates the availability of basic ICT facilities to scientific and non-scientific cadres. The total number of personal computers used by scientific and nonscientific staff was 1598 and 867, respectively. Overall, the scientific staff had access to more ICT facilities than the non-scientific staff.

Table 13: ICT facilities available in S & T institutions in 2020

Sectors	Computer_Central		Computer/Laptops		Printer		Scanners		VCQ		Other	
	Scientific	Non-scientific staff	Scientific	Non-scientific staff	Scientific	Non-scientific staff	Scientific	Non-scientific staff	Scientific	Non-scientific staff	Scientific	Non-scientific staff
Agricultural & Veterinary Sciences	274	153	560	264	337	191	76	68	22	7	83	16
Engineering & Technology	509	222	514	228	195	132	36	38	1	7	20	18
Medical & Health Sciences	21	42	11	2	15	14	2	5	0	0	0	0
Natural Sciences	101	102	455	338	192	138	28	44	6	3	75	93
Social Sciences	81	46	58	35	49	30	6	6	4	2	19	6
<b>Total</b>	<b>986</b>	<b>565</b>	<b>1598</b>	<b>867</b>	<b>788</b>	<b>505</b>	<b>148</b>	<b>161</b>	<b>33</b>	<b>19</b>	<b>197</b>	<b>133</b>

### 3. RESEARCH PLANNING

#### 3.1 The Planning of Research Projects in Relation to National Policies and Strategies

Considering the planning of R&D activities by the institutes, the source documents referred to in the preparation of the Annual Action Plan of the institute were queried. In this regard, the documents considered were the National Science and Technology Policy, the National Research and Development Framework (NRDF), developed by NASTEC, and sectoral master plans/strategies relevant to the respective line ministries/authorities.

### 3.1.1 The National Research and Development Framework (NRDF)

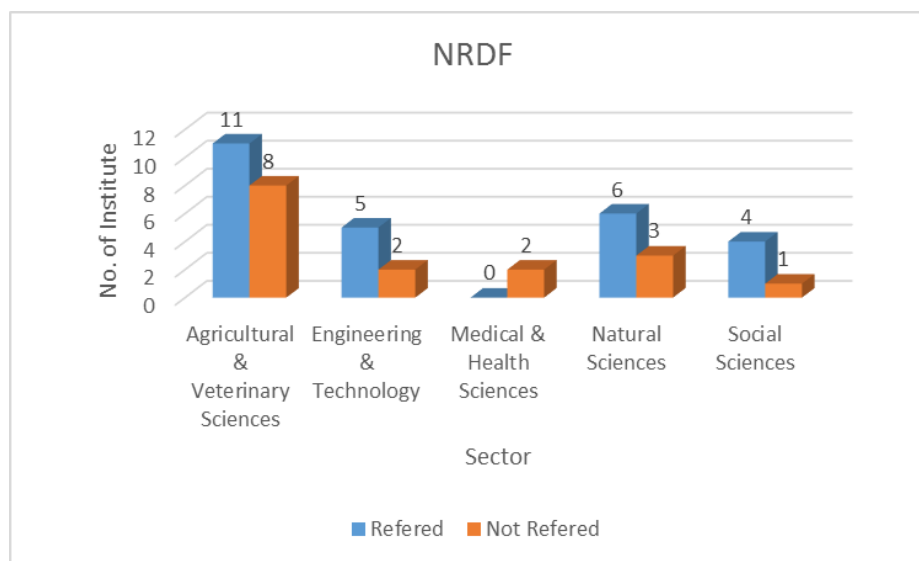


Figure 3.1: NRDF refer to the Annual Action Plan

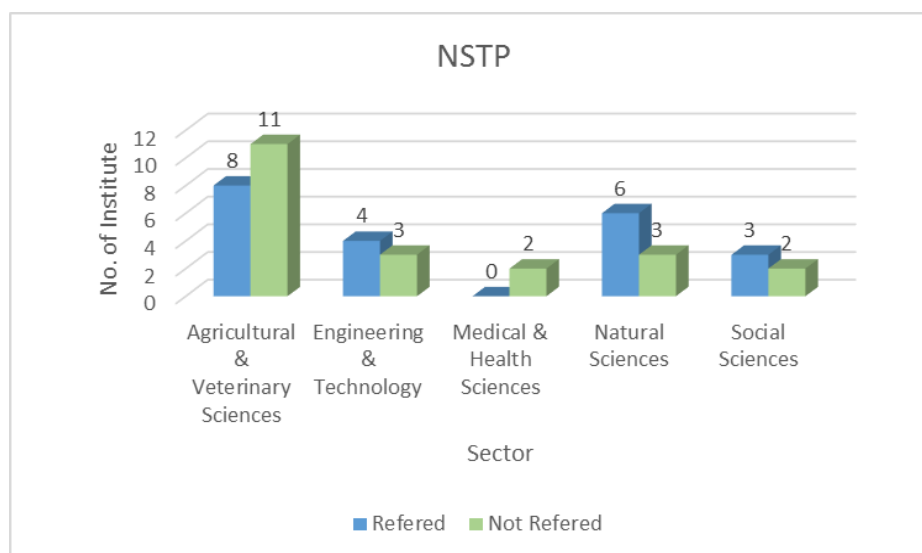


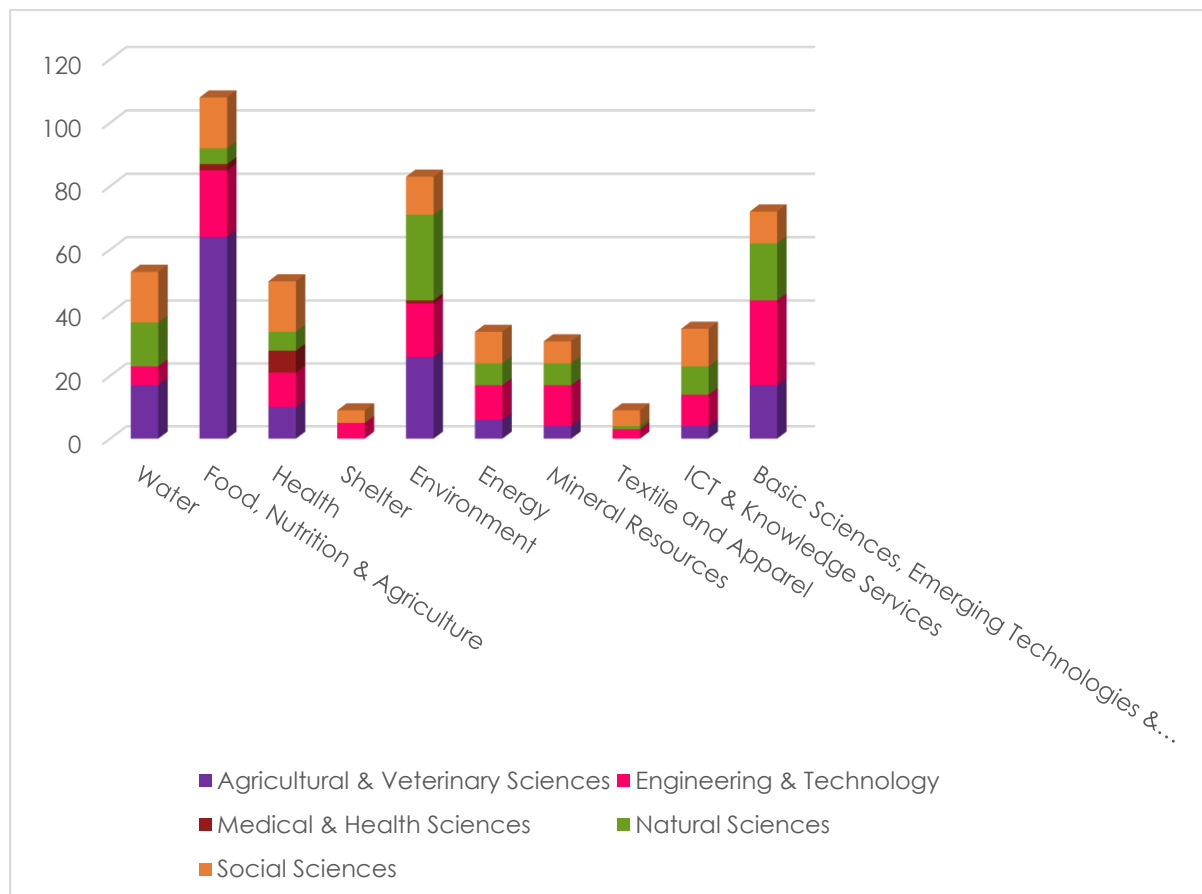
Figure 3.2: National Science and Technology Policy (NSTP) refer to the Annual Action Plan

The NRDF is a comprehensive, cabinet-approved R&D framework that guides the scientific and technological community to align their research and development activities in the country in line with national priorities. The framework identifies 10 focus areas that need immediate R&D interventions through a 10 x 10 matrix of 100 possible combinations of them. The focus areas are as follows: (1) water; (2) food, agriculture, and nutrition; (3) health; (4) shelter; (5) environment; (6) energy; (7) mineral resources; (8) apparel industry; (9) ICT and Knowledge Services; and (10) basic sciences, emerging technologies, and Indigenous knowledge. The ten interventions are: (1) policy formulation; (2) pure and applied research; (3) promotion of

innovation; (4) application of nanotechnology; (5) application of biotechnology; (6) application of indigenous knowledge; (7) testing, standardization, accreditation, and assurance of intellectual property rights (IPR); (8) capacity building; (9) application of information communication technologies (ICT); and (10) popularization<sup>22</sup>. Since 2017, many state-funded research and development institutes have widely considered NRDF programs to prioritize research fund allocation to institutes and projects.

Of the 42 institutes surveyed, 26 institutions (62%) referred to NRDF, and 21 institutes (25%) referred to National Science and Technology Policy, as one of the source documents to prepare their annual Action Plans. Figure 3.1 shows a snapshot of the number of institutes with respect to the sectors carrying out the interventions related to the focus areas of NRDF.

The highest number of institutes carrying out the interventions related to NRDF is for the focus areas of food, nutrition, and agriculture (n = 91), followed by the environment (n = 64), basic sciences, emerging technologies, and indigenous knowledge (n = 48), and water (n = 44).



<sup>22</sup> National Research and Development Framework (2016); <http://www.nastec.gov.lk/reports/nrdf>

*Figure 3.3: Institutes carrying out Interventions related to the NRDF's 10 Focus Areas*

### **3 .2. Other Source Documents**

In addition to the NRDF, the action plans of the pertinent institutes were generally guided by the policy directives and specifications of the corresponding line ministries and sectoral master plans, such as the National Agriculture Research Policy in the agriculture sector, the Forest Policy in the forest department, the Mines and Minerals Act by the Geology Survey and Mineral Resources Bureau, etc.

## **4. RESEARCH FUNDING**

Securing adequate research funding for science and technology institutes is crucial to foster innovation and drive economic growth. These institutes play a pivotal role in conducting cutting-edge research, developing new technologies, and addressing critical societal challenges. By allocating sufficient resources to research funding, governments and organizations can create an enabling environment for institutes to thrive and make significant contributions to scientific advancements.

Investing in research funding for science and technology institutes yields numerous benefits. It enables institutes to attract and retain top talent, foster collaboration with industry partners, and enhance their research infrastructure. Adequate funding allows researchers to explore new frontiers, push the boundaries of knowledge, and translate their findings into practical applications that positively impact society. Additionally, research funding facilitates the development of innovative solutions, promotes technological advancements, and creates opportunities for economic diversification and job creation. By prioritizing research funding, governments and organizations demonstrate their commitment to nurturing a vibrant and competitive scientific ecosystem that drives progress and propels societies forward.

For many nations, there is a clear correlation between R&D and economic growth. Governments often incorporate R&D incentives into their economic plans as a means to enhance productivity. Globally, R&D spending has reached a record high of approximately US \$1.7 trillion, with the United States and China leading in this aspect. When groundbreaking discoveries and innovations are made, particularly those that significantly improve the lives of disadvantaged populations, the true advantages of R&D can have a transformative impact on a global scale.

The institutes acquired funding from different sources, such as the Treasury, the National Science Foundation, the National Research Council, foreign grants, and others. Funds received were categorized into four groups based on the nature of the activities for acquisition: 01) for research projects; 02) for science popularization activities, which include conducting workshops and seminars; 02) funds for infrastructure improvement, including the purchase of laboratory equipment, construction of buildings, renovations, purchasing of land, vehicles, buildings, etc.; and 04) for other activities. In figure 4.1, the pie chart depicts the fund disbursement to the activities for utilization.

In 2020, the S&T institutes surveyed received LKR 3253.94 million from the source of funders, of which LKR 2952.1 million (91%) was spent. The highest amount was funded to improve the infrastructure facilities (LKR 1421.5 million, 44%), followed by conducting research projects with an allocation of LKR 1171.2 million (40%). The Treasury was the core funding source for research-based activities. The Engineering & technology sector received the highest funding for research projects (LKR 1199.1 million). Table 14 shows the fund utilization by different sections, and Table 15 shows funds provided by various funding sources.

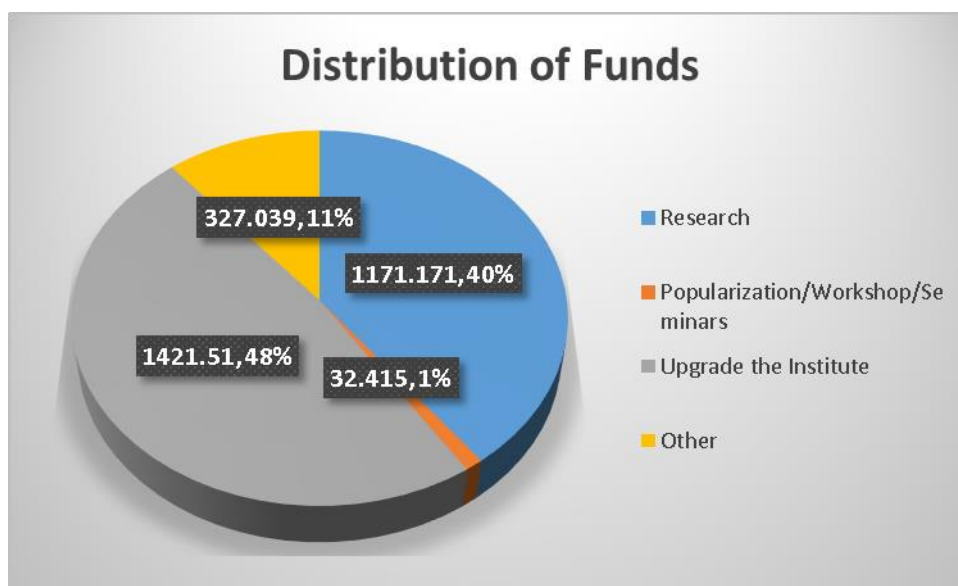


Figure 4.1: Disbursement of funds



Table 14: Funds received and spent: distribution among identified sectors

Sector	Funds Allocated / Rs. Mn.	Funds Spent / Rs. Mn.	% Utilization
Agricultural & Veterinary Sciences	1052.76	930.75	88.41%
Engineering & Technology	1199.08	1207.72	100.72%
Medical & Health Sciences	31.85	29.23	91.77%
Natural Sciences	816.80	581.79	71.23%
Social Sciences	153.44	202.65	132.07%
<b>Total</b>	<b>3253.94</b>	<b>2952.14</b>	<b>90.73%</b>

Table 15: Funds received and spent by different funding source

Funding source	Funds Allocated / Rs. Mn.	Funds Spent / Rs. Mn.	% Utilization
Foreign	151.34	114.18	75%
Multilateral	22.13	27.29	123%
NRC	123.91	145.37	117%
NSF	30.51	21.75	71%
Other	404.22	187.16	46%
Private sector	10.73	6.44	60%
Treasury	2511.10	2449.95	98%
<b>Total</b>	<b>3253.94</b>	<b>2952.14</b>	<b>91%</b>

\*The prior financial committed allocation, which the data on spending reveals is slightly larger than the received amount from the funders, accounts for a small fraction of the funds used in the reporting year.

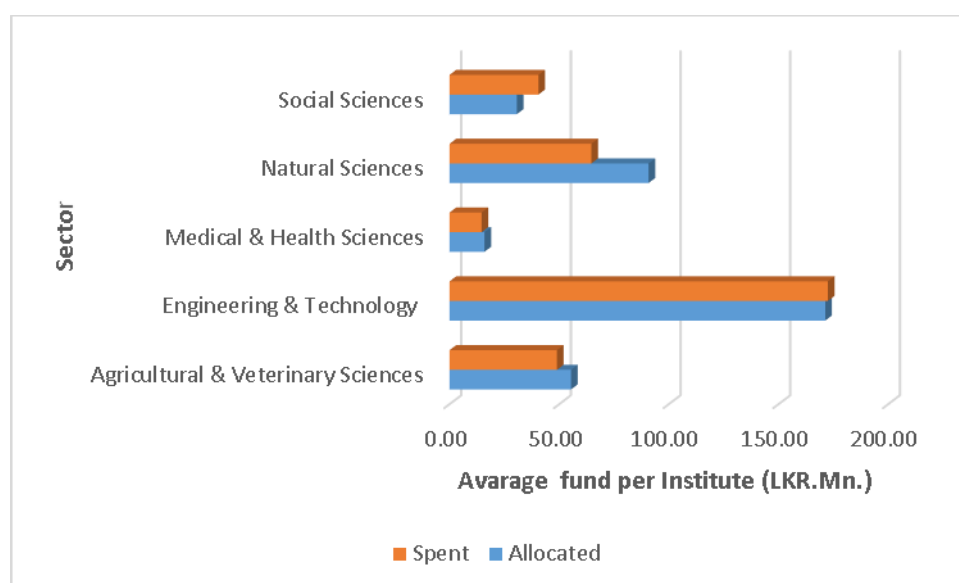


Figure 4.2: Funding for research projects, broken down by sector.

In 2020, the institutes surveyed received a sum of LKR 48.4 million for science popularization-related activities, workshops, and seminars; LKR 1421.5 million to upgrade the infrastructure facilities; and LKR 367.3 million to conduct activities other than the above, respectively. The activities related to the upgrade of the institution include the purchase of laboratory equipment, the construction of buildings, and the acquisition of land, vehicles, and properties.

Figures from 4.2 to 4.5 indicate the amounts of funding received and spent for different activities by the institutes.

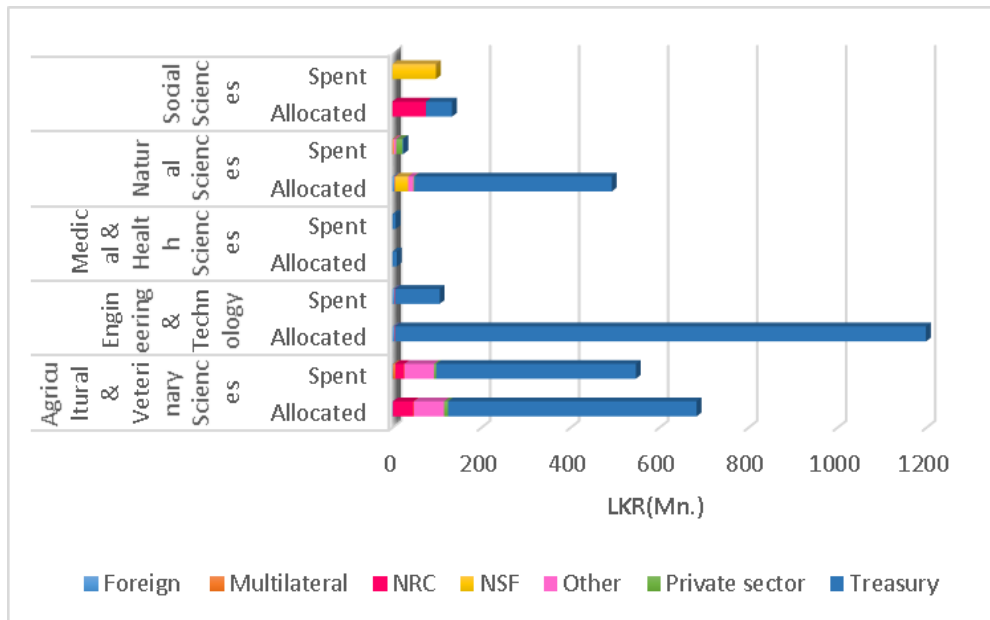


Figure 4.3: Funds received and spent by S&T institutions for research projects

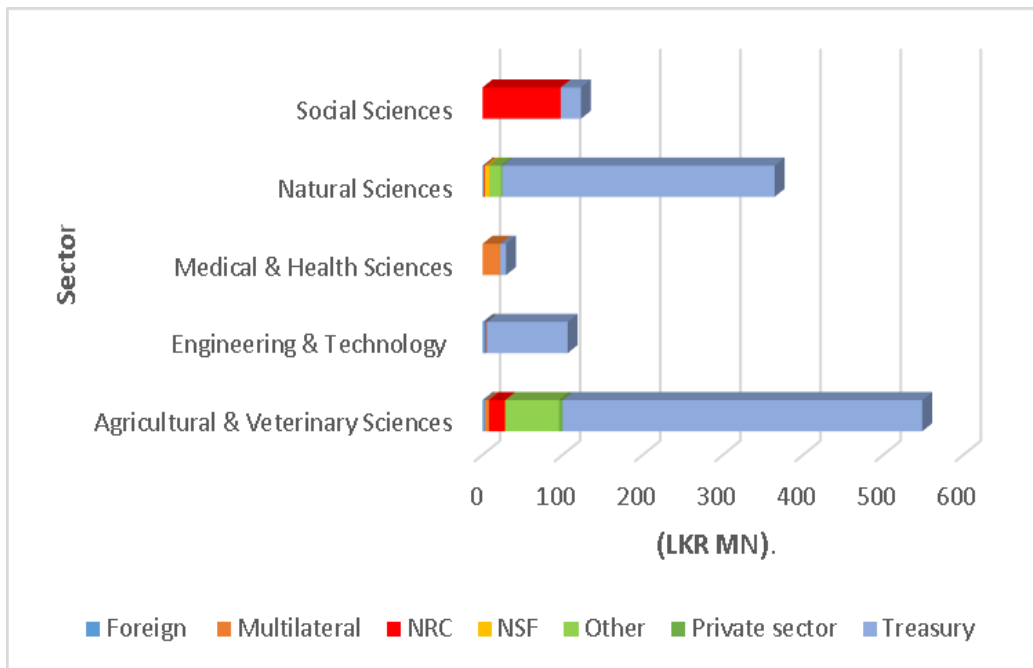


Figure 4.4: Funds received for research projects from different funding sources

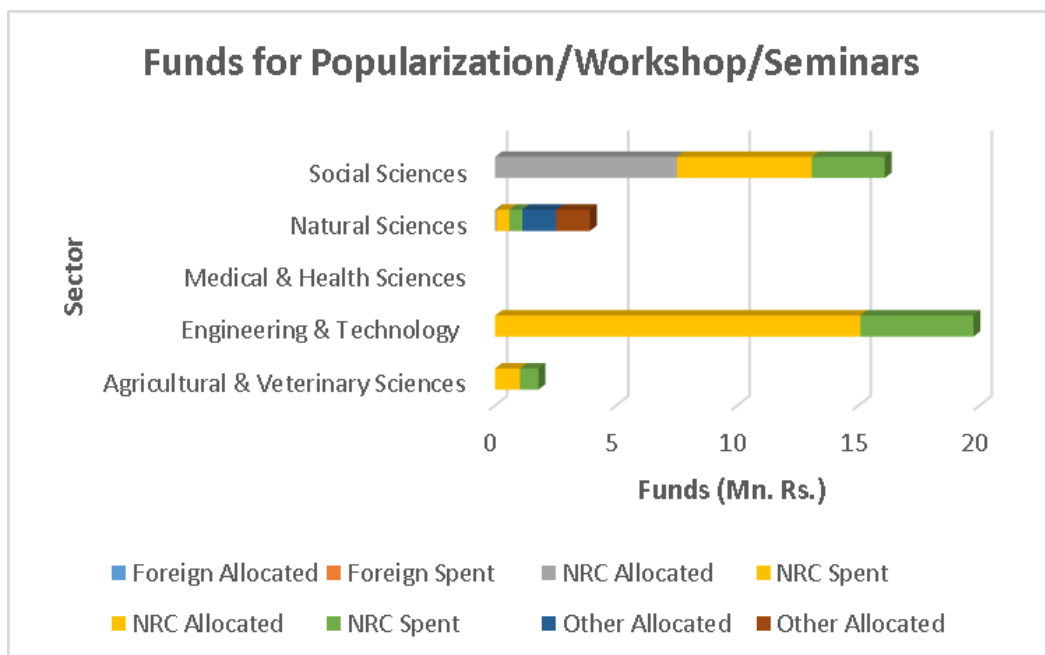


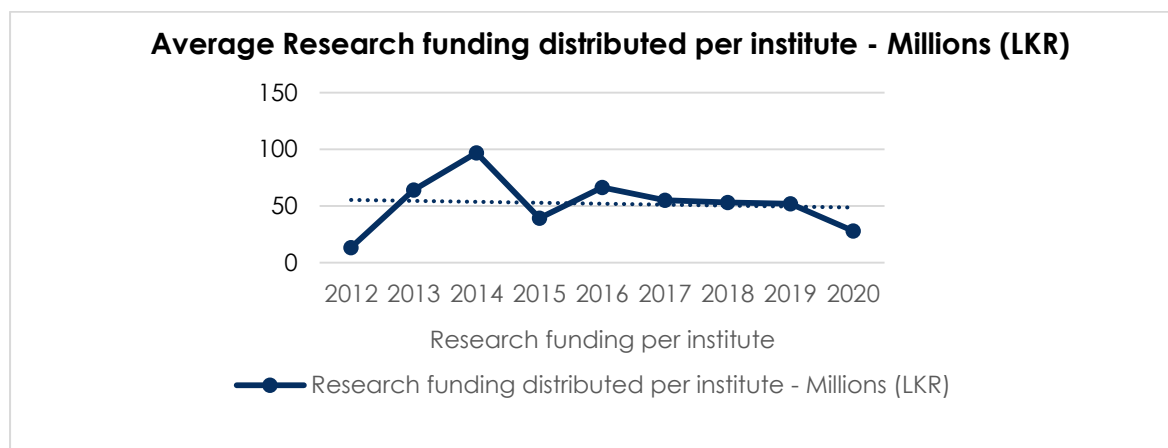
Figure 4.5: Funds received from various funding sources for science popularization, workshops, and seminars.

A sizable share of funds was not spent within the fiscal year, particularly the allocations under science popularization-related activities (33%). The reasons behind this were lack of human resources, lack of laboratory equipment, delay in receiving funds, equipment, and chemicals

associated with barriers in the government procurement-tender procedure, inefficient planning, and coordination.

### **Trends in research funding at public-sector institutes (distributed by the institute), 2012-2020**

Based on the sample survey data from 2012 to 2020, a slight upward trend in research funding per institute with a remarkable increase in 2014 and a decline after 2016 has been noted (see Fig. 4.6).



*Figure 4.6: Research funding per institute.*

### **Return on R & D Investment**

The global landscape of research and development (R&D) expenditures has witnessed significant growth over the past two decades. From 2000 to 2020, total global R&D expenditures more than tripled, reaching a staggering \$2.4 trillion in 2020<sup>23</sup>. This increase reflects a growing recognition of the importance of R&D in driving innovation and economic progress. Moreover, the proportion of global GDP invested in R&D has also risen, from 1.61% in 2010 to 1.93% in 2020, indicating a commitment to fostering scientific advancements worldwide.<sup>24</sup>

However, despite the overall upward trend, disparities in R&D investments persist across different regions. Europe and North America, and Eastern and South-Eastern Asia stand out as leaders, with spending 2.62% and 2.31% of their GDP on R&D, representing the highest levels globally<sup>25</sup>.

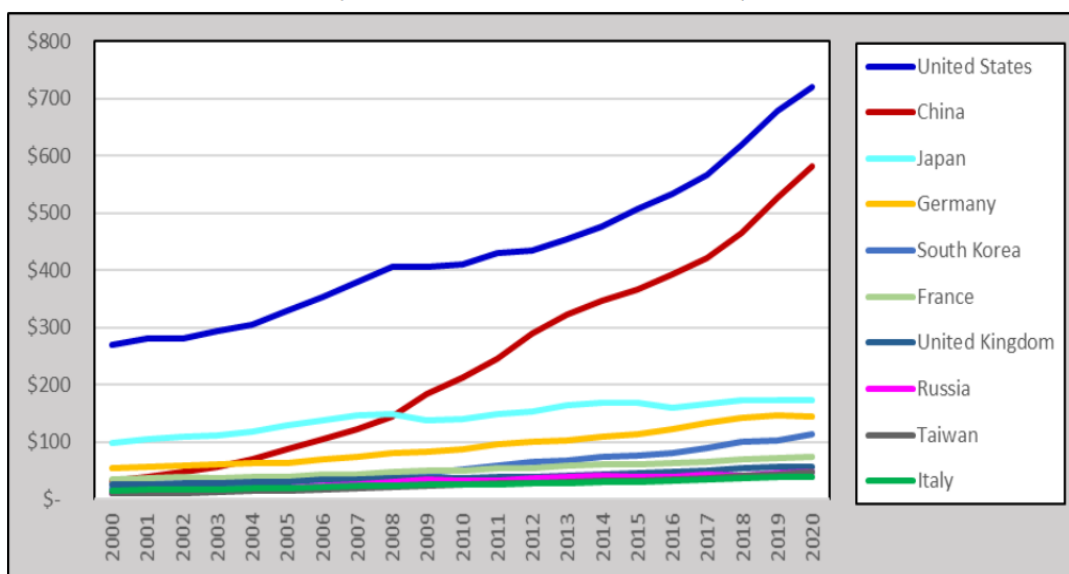
<sup>23</sup> Global Research and Development Expenditures: Fact Sheet - <https://sgp.fas.org/crs/misc/R44283.pdf>

<sup>24</sup> Institute of statistic – UNESCO - <https://uis.unesco.org/en/news/uis-releases-new-data-sdg-9-5-research-and-development>

<sup>25</sup> Institute of statistic – UNESCO - <https://uis.unesco.org/en/news/uis-releases-new-data-sdg-9-5-research-and-development>

In contrast, Sri Lanka has shown an increase in R&D spending annually according to the statistics for 2014-2018 of 51.6% and 14.0% respectively —an upward trend<sup>26,27</sup>. However, the investment per share of GDP in Sri Lanka has experienced a decline since 1996, reaching a low proportion of 0.12% in 2020, according to the latest available data<sup>28</sup>. This places Sri Lanka with the lowest R&D investment proportion among the reported countries in the region. The findings highlight the need for continued efforts to increase R&D investments in Sri Lanka to stimulate innovation and drive economic development in the country.

**Figure 2. R&D Expenditures of Selected Countries, 2000-2020**  
(in billions of current PPP dollars)



**Source:** CRS analysis of Organisation for Economic Cooperation and Development, OECD.Stat database, [https://stats.oecd.org/Index.aspx?DataSetCode=MSTI\\_PUB](https://stats.oecd.org/Index.aspx?DataSetCode=MSTI_PUB).

*Figure 4.7: surge in Global research spending 2000 -2020 (OECD)*

<sup>26</sup> Sri Lanka GDP per Capita PPP – Trading economics , World Banks; <https://tradingeconomics.com/sri-lanka/gdp-per-capita-ppp>

<sup>27</sup> Annual Reports , 2014-2018 , Ministry of Finance ; <https://www.treasury.gov.lk/p/annual-reports>

<sup>28</sup> Statistical hand book on Research and Development of Sri Lanka (by NSF) <https://www.nsf.gov.lk/images/pdf/Handbook2020Final.pdf>

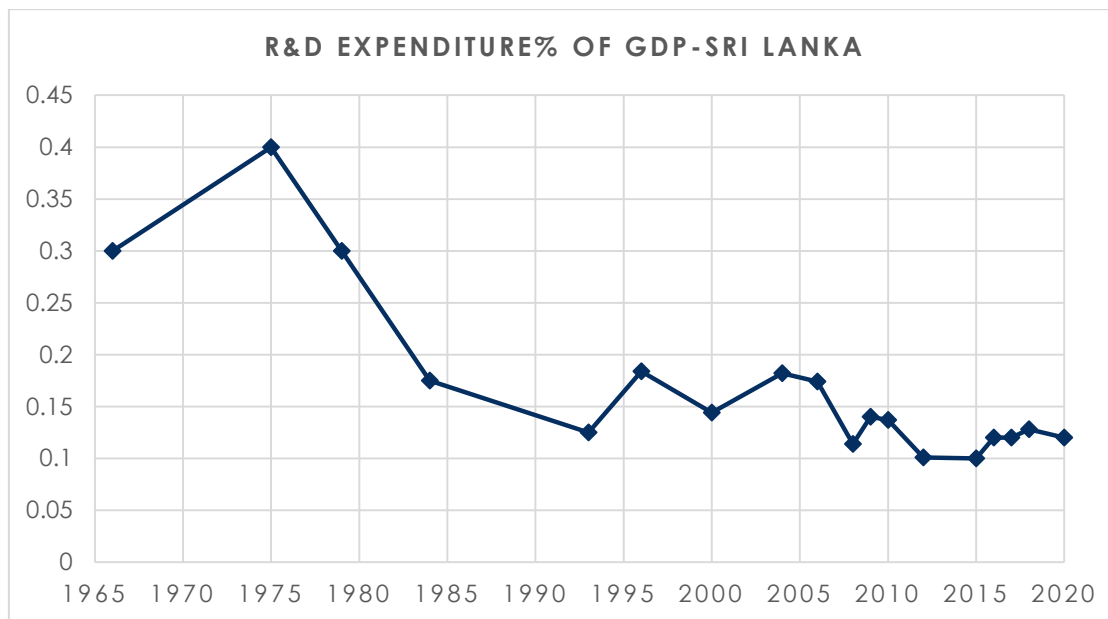


Figure 4.8: R&D Expenditure% of GDP- Sri Lanka (1965-2020)

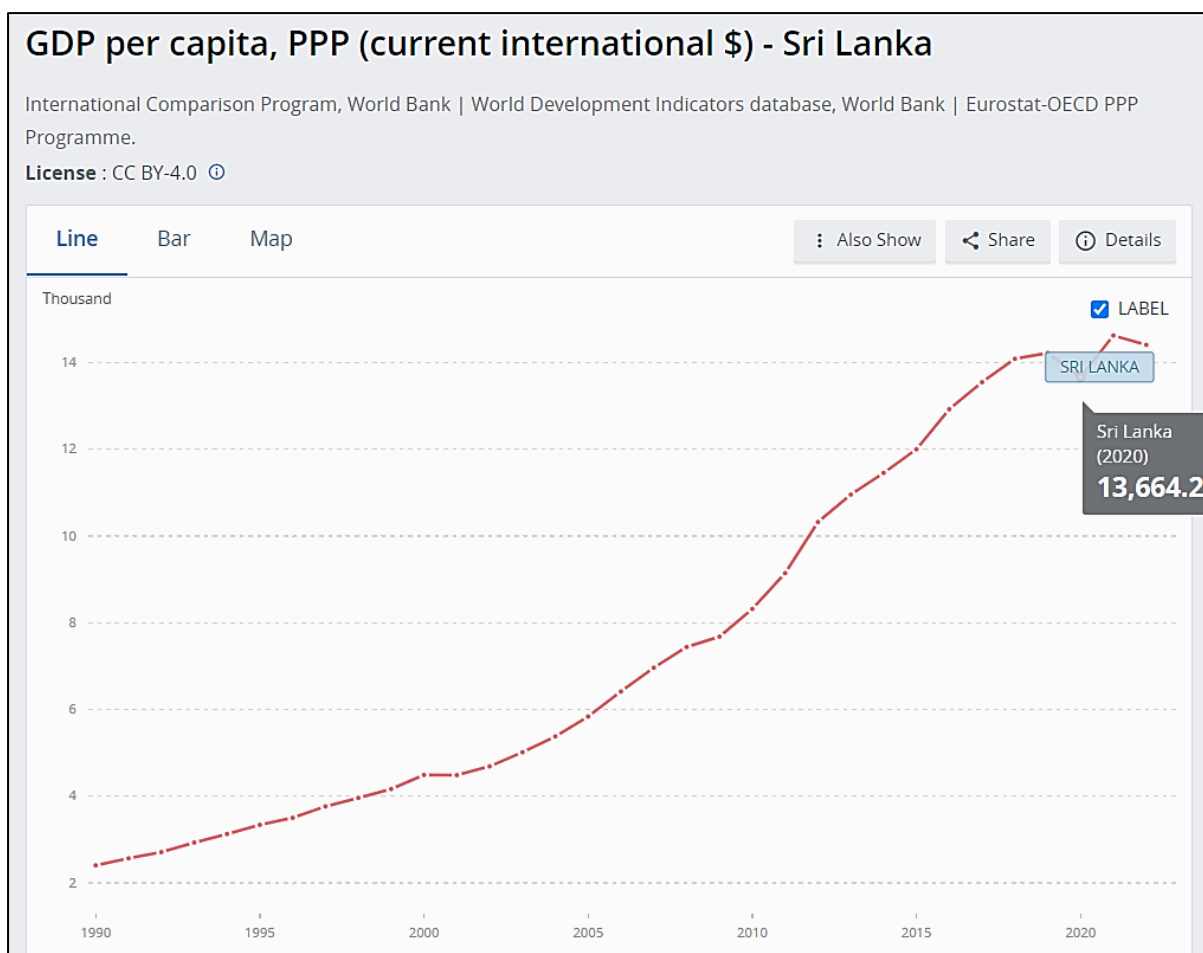


Figure 4.9: Sri Lanka GDP per capita PPP 2014-2020 (Source; World Bank)

## 5. RESEARCH OUTPUTS

### 5.1. Research projects

In 2020, the institutions surveyed carried out 647 research projects (Annexure 3), with a completion rate of 24% (n = 159), and most of them were one-year projects initiated in the year before the reporting year. Figure 5.1 depicts the sectoral representation of research projects.

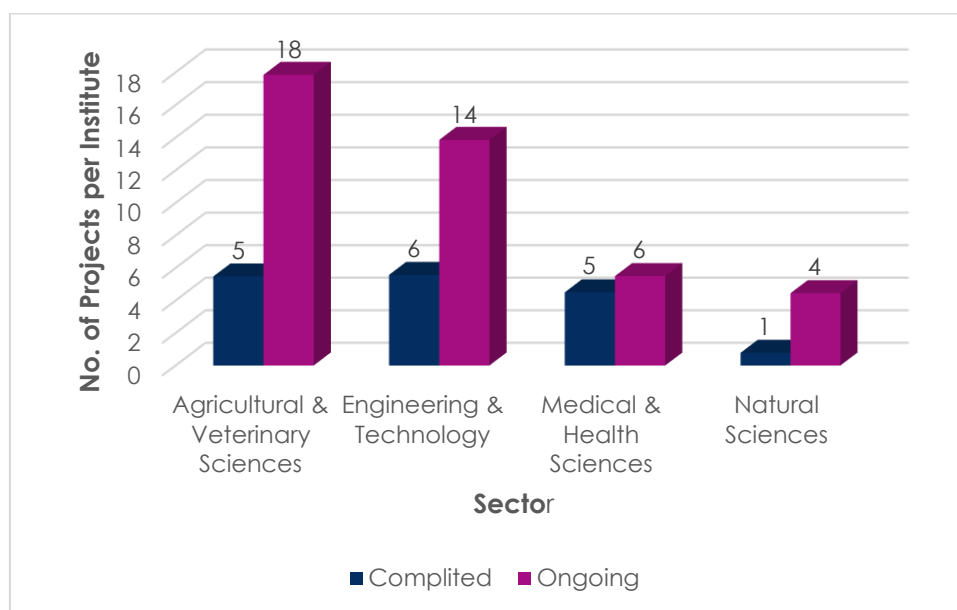


Figure 5.1: Research projects conducted by S & T institutions in 2020.

The sector of Agriculture and Veterinary Sciences carried out the highest number of research projects (n = 444, 68%), of which 339 were ongoing and 104 were completed in the fiscal year, respectively. The institutes that carried out the highest number of research projects were Rice Research & Development Institute (RRDI) (n = 167, 25%), followed by the National Aquatic Resources Research and Development Agency (NARA) (n = 46), and Rubber Research Institute (RRI) (n = 43).

### 5.2 Contributions to the UN's sustainable development agenda through intended project activities

With the world's population projected to exceed nine billion by 2050 societies are grappling with a range of complex challenges, including climate change, poverty, and rapid urbanization<sup>38</sup>. Recognizing the urgency of addressing these issues, the United Nations introduced a transformative framework known as the Sustainable Development Goals (SDGs)

in 2015. These 17 goals serve as a universal call to action, aiming to eradicate poverty, protect the planet, and ensure peace and prosperity for all by 2030.

As part of the UN agenda each member country has committed to pursuing national targets within their unique societal contexts<sup>39</sup>. This requires harnessing creativity, expertise, technological advancements, and financial resources to drive sustainable development. By aligning their efforts with the SDGs, countries strive to tackle poverty and inequality, promote inclusive economic growth, enhance environmental sustainability, and foster social well-being.

The SDGs provide a comprehensive roadmap for global cooperation and collaboration, encouraging governments, civil society organizations, businesses, and individuals to work together towards a common vision. Achieving these goals requires innovative solutions, policy reforms, and investments in key sectors such as education, healthcare, clean energy, infrastructure, and sustainable agriculture.

By implementing the SDGs, countries can address interconnected challenges holistically, ensuring a more equitable and sustainable future for present and future generations. The UN agenda fosters a shared responsibility, emphasizing the importance of international solidarity and partnerships to create a world where no one is left behind and where prosperity is achieved within the boundaries of our planet's resources.

According to the survey, a substantial number of projects planned under the R&D of the institutions were integrated to make a contribution towards SDG targets at a national level.

A snapshot of initiatives and activities proposed for implementation in S&T institutions' Action Plans in relation to the SDGs is depicted in Figures 5.2 and 5.3. The most research initiatives (n = 29, 15.4%) were integrated to make contributions towards the SDG targets set out for zero hunger, followed by industry, innovation, and infrastructure (n = 26; 14.95%), and so on.



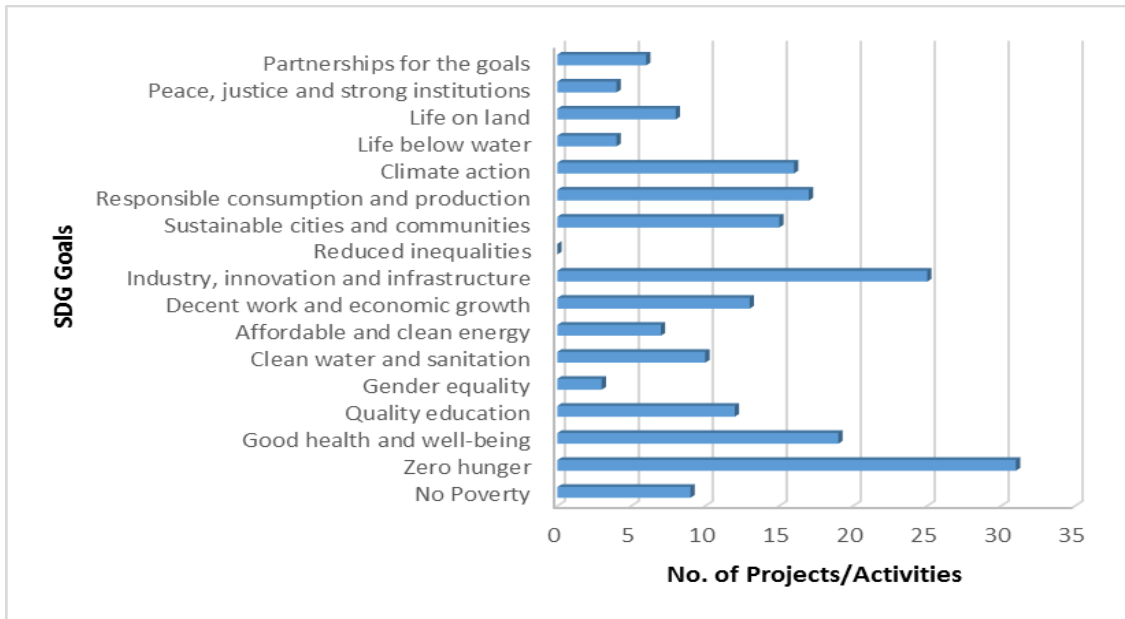


Figure 5.2: Line of Sight -Number of activities (planned) in Alignment with SDGs.

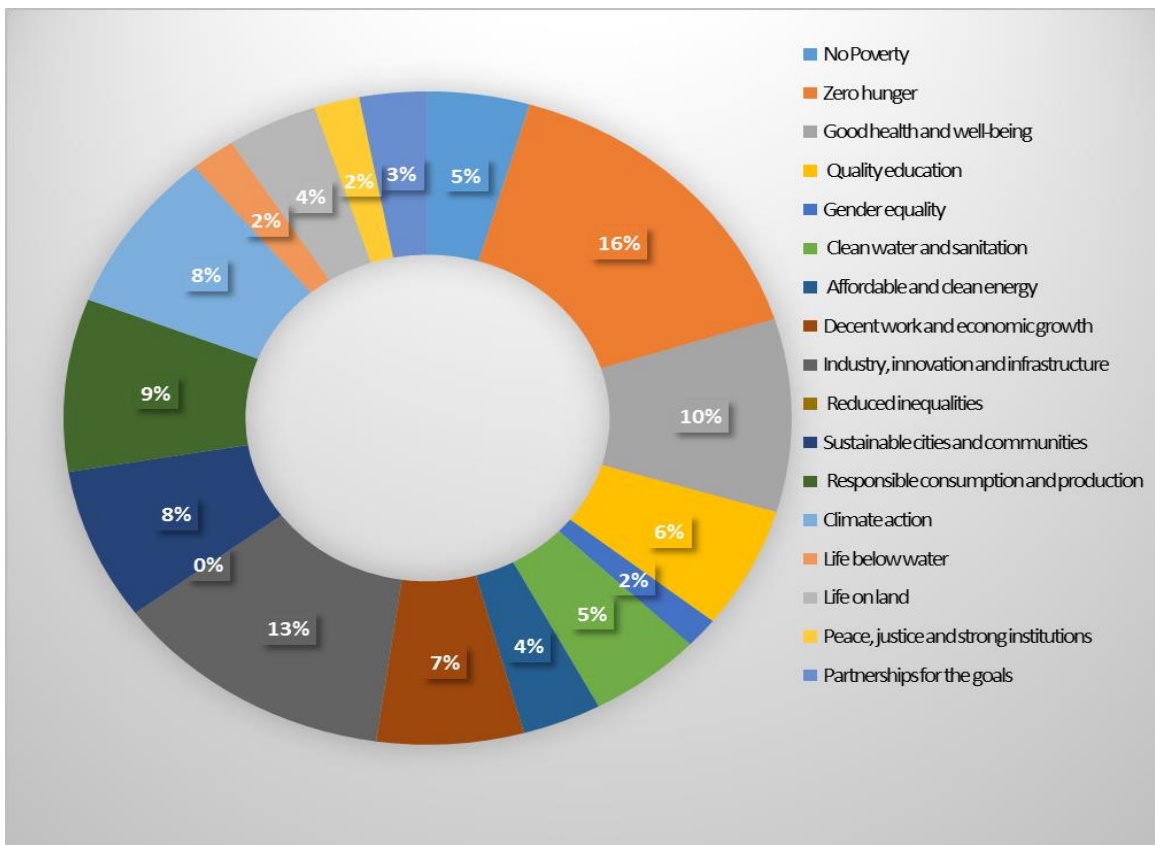


Figure 5.3: Line of Sight of Intended Project Contributions to SDGs

The Paris Agreement, adopted in 2015, is of great significance to Sri Lanka, a country vulnerable to climate change impacts. Sri Lanka actively engages in the Agreement, demonstrating its commitment to addressing climate change and promoting sustainable development. As a party to the agreement, Sri Lanka has submitted its nationally determined contributions (NDCs) to mitigate emissions and adapt to climate change. Efforts align with the Agreement's objectives, including transitioning to renewable energy, enhancing energy efficiency, and adopting sustainable land use practices, all aimed at achieving a low-carbon and climate-resilient economy.

Some of the S&T institutes have actively pursued activities aligned with the Paris Agreement on climate change, resulting in significant outcomes. These include the installation of real-time climate monitoring stations in tea plantation districts, efforts in disaster risk reduction, establishment of a Center of Excellence in environmental pollution monitoring and mitigation, research and mitigation of landslides, construction of disaster-resilient houses for resettlement, participation in a National Thematic Research Program on Climate Change and Natural Disasters, and accreditation of Green House Gas Validation and Verification Bodies. These initiatives contribute to reducing greenhouse gas emissions, enhancing adaptation and resilience, promoting sustainable practices, and addressing climate-related challenges. Through these efforts, our institutes actively support the goals and principles of the Paris Agreement, fostering a more sustainable and climate-resilient future.

### **5.3 New products, processes, or technologies created as a result of research**

Through their research projects, S&T institutes developed 63 new products, 40 new processes, and 41 new technologies during the year 2020 (Annexures 4–6). Figure 5.4 indicates the sector-wise development of products, processes, and technologies.

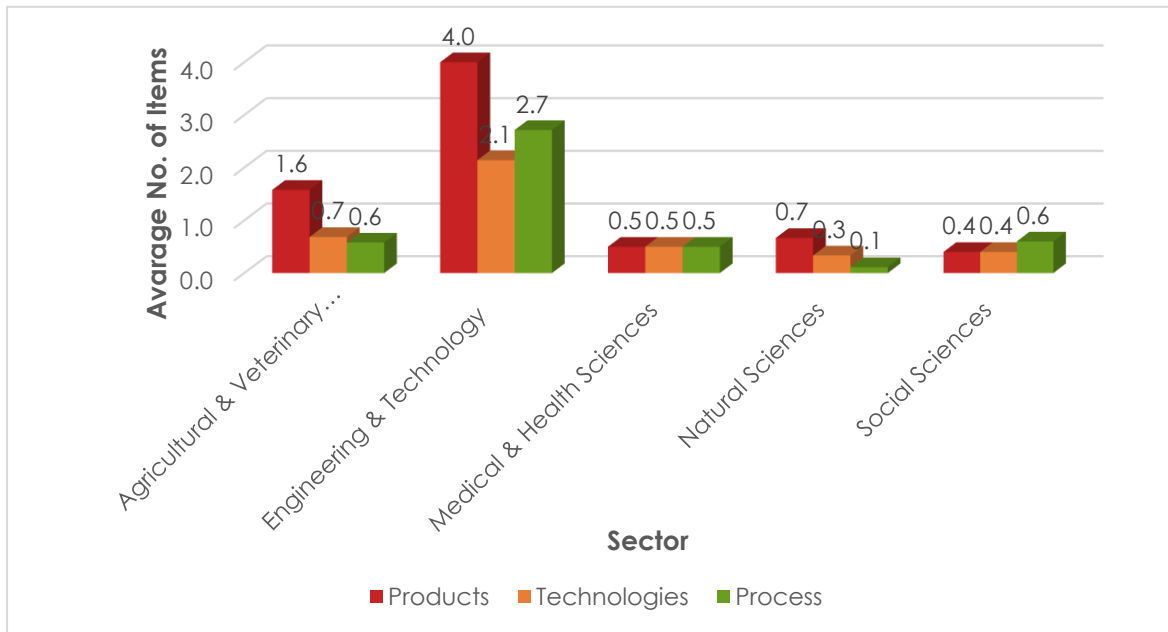


Figure 5.4: Development of new processes, technologies, and products in 2020.

#### 5.4 Trend in research output (products-processes-technologies developed) across public sector institutes (distributed per institute), 2012-2020

As shown in the graph below, the number of product-process-technologies developed per institution fell over a nine-year period from 2012 to 2020.

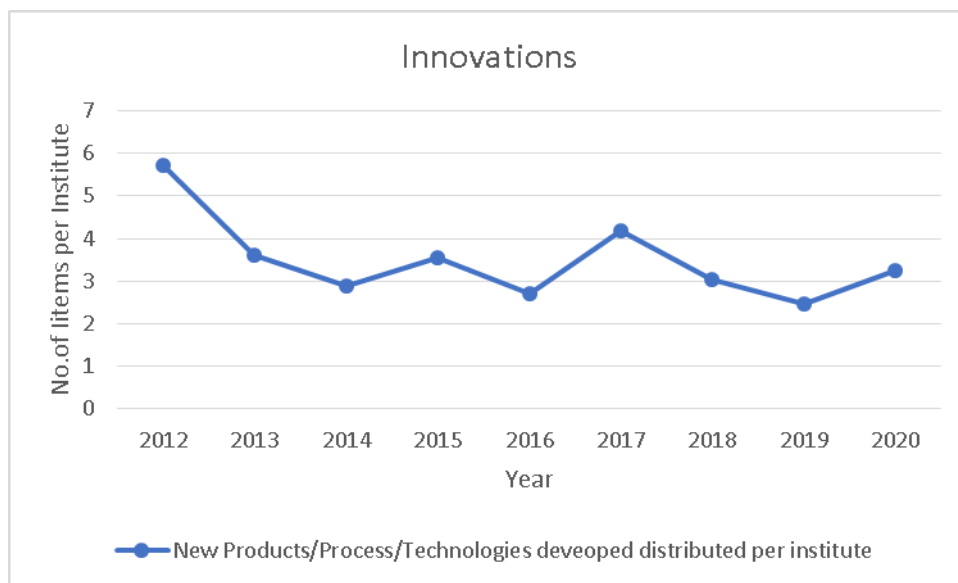


Figure 5.5: New products, processes, or technologies developed by the institutes surveyed between 2012 and 2020.

## 5.5 Number of Publications

Research findings are typically disseminated through research publications and presentations at conferences, which serve as important channels for sharing scientific knowledge. Conference presentations are often published as conference proceedings, contributing to the published research literature. The volume of published literature serves as an indicator of scientific activity and reflects the extent of global research collaborations. Furthermore, analyzing the citations received by published research provides valuable insights into the impact and influence of the research output.

In 2020, the global publication output reached an impressive 2.9 million articles, with the majority, over 90%, originating from countries classified as high-income and upper middle-income economies. Over the years, there has been a consistent growth in publication output for high-income economies like the United States, Germany, and the United Kingdom (UK), with these countries building upon an already substantial base of publications.<sup>29</sup>

The research carried out by the institutes and their subsequent outcomes were communicated (outreach and reach) to audiences via publications, which included index journals (Science Citation Index and Science Citation Index Expanded), refereed journals, abstracts, monographs, books, and chapters in books, bulletins, newsletters, magazines, working papers, etc. The number of publications by S&T institutes published in 2020 is shown in Table 16.

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<sup>29</sup> <https://nces.nsf.gov/pubs/nsb20214/publication-output-by-country-region-or-economy-and-scientific-field>

Table 16: Various scientific publications produced by S& T institutions in the year 2020

Sector	No. of Publications								Total
	SCI Journals	SCI extended journals	Refereed Journals	Abstracts of papers presented at conferences/symposia	Monographs	Books	Chapters in Books	Other	
Agricultural & Veterinary Sciences (n = 18)	23	1	43	115	0	2	5	170	359
Engineering & Technology (n = 8)	15	23	33	76	0	0	5	16	168
Medical & Health Sciences (n = 2)	0	10	6	25	5	0	1	0	47
Natural Sciences (n = 9)	46	2	37	96	1	3	12	73	270
Social Sciences (n = 5)	38	1	6	153	0	5	0	14	217
<b>Total</b>	<b>122</b>	<b>37</b>	<b>125</b>	<b>465</b>	<b>6</b>	<b>10</b>	<b>23</b>	<b>273</b>	<b>1061</b>

\*n = number of institutes

A total of 1061 publications were outreached through various scientific outlets by these institutions. The majority of them were conference proceedings abstracts (n = 465). The highest number of publications were from the Agricultural and Veterinary Sciences sector (n = 359) and the Natural Sciences sector (n = 270).

### 5.6 Trend in Research Publications (Distributed per institute), 2012-2020

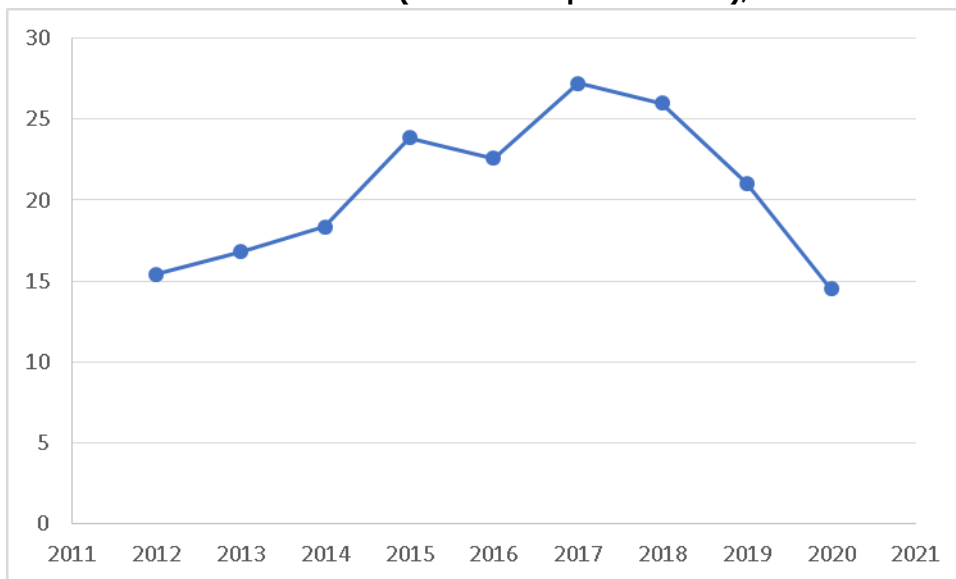


Figure 5.6: Per institute, research work is published and distributed.

(\*Only the number of published articles in the Journals and the Conference proceedings were considered in this analysis)

### 5.7 Number of Scholarly publications per unit GDP and GERD- Regional, world comparison with Sri Lanka (2020)

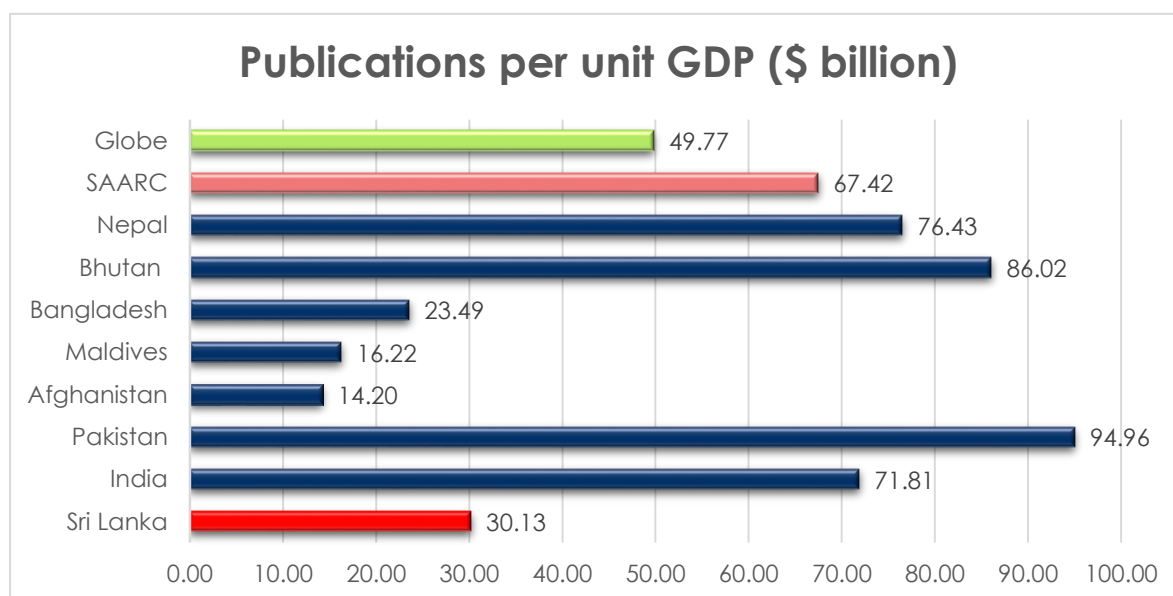
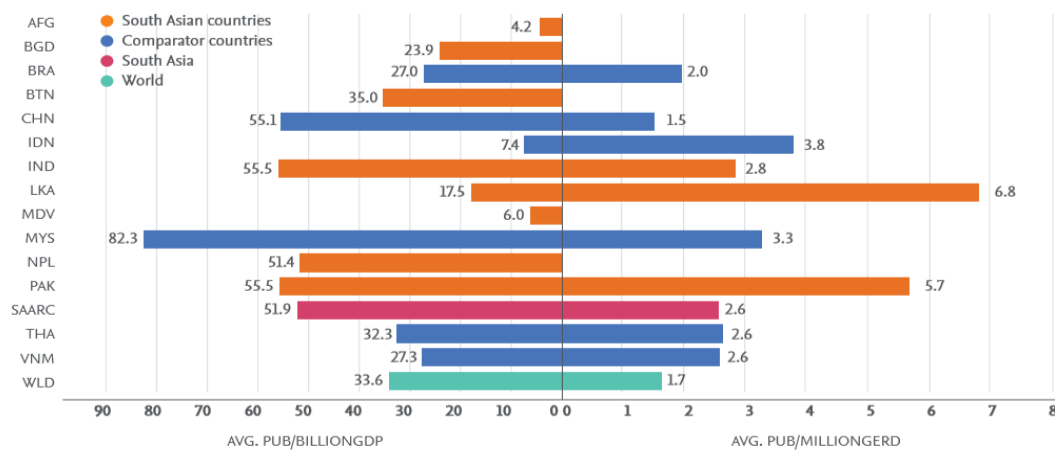


Figure 5.7: Scholarly publication per unit GDP (Regional, world comparison with Sri Lanka)

Figure 5.7 depicts the scholarly publications per unit GDP in South Asian countries in comparison to the globe (2020). Sri Lanka (30.13) generates just below the global (49.77) and SAARC averages (67.42).

However, the comparison in per-unit gross domestic expenditure on R&D (GERD) in South Asian countries is limited to the published data from 2012–2016.



**Figure 2**  
Number of scholarly publications per unit GDP (lhs) and GERD (rhs), South Asian countries and global comparator countries, 2012-2016. Sources: World Bank, UNESCO, and Scopus®

*Figure 5.8: Number of scholarly publications per unit GDP and GERD. Regional, world comparison with Sri Lanka 2012-2016*

*(Image Credit: South Asia; Challenges and benefits of Research collaboration in a diverseregion<sup>30</sup>)*

Figure 5.8 illustrates the per-unit gross domestic expenditure on R&D (GERD) in South Asian countries in comparison to the globe in terms of scholarly publications (2012–2016). Sri Lanka (6.8) and Pakistan (5.7) generate a considerably higher number of articles per unit GERD than the global (1.7) and SAARC averages (2.6).

<sup>30</sup>Marmolejo F, Nagashima Y, Lothrop SC, Alborta SX, Aedo C, Miwa K, et al. South Asia: Challenges and Benefits of Research Collaboration in a Diverse Region. The World Bank, 2019

### 5.8 Number of Scholar publications by population Size and number of Full Time Equivalent (FTE) Researchers - Comparison of Sri Lanka with Global and regional statistics (2020)

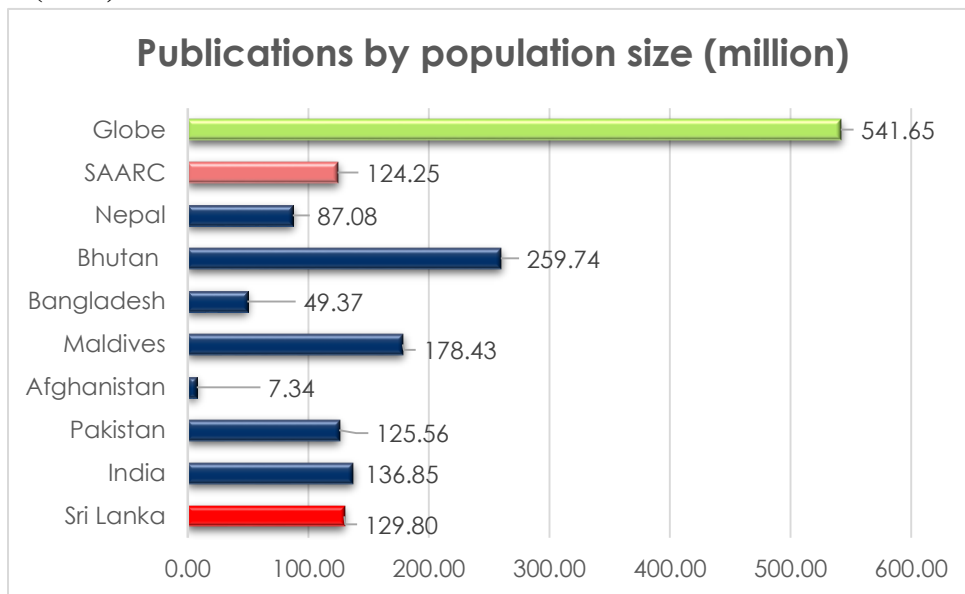


Figure 5.9: Scholarly Comparison of Sri Lanka with Global and Regional Statistics

Only data from 2012 to 2016 are available for the comparison of the number of scholarly publications by the number of FTE researchers.

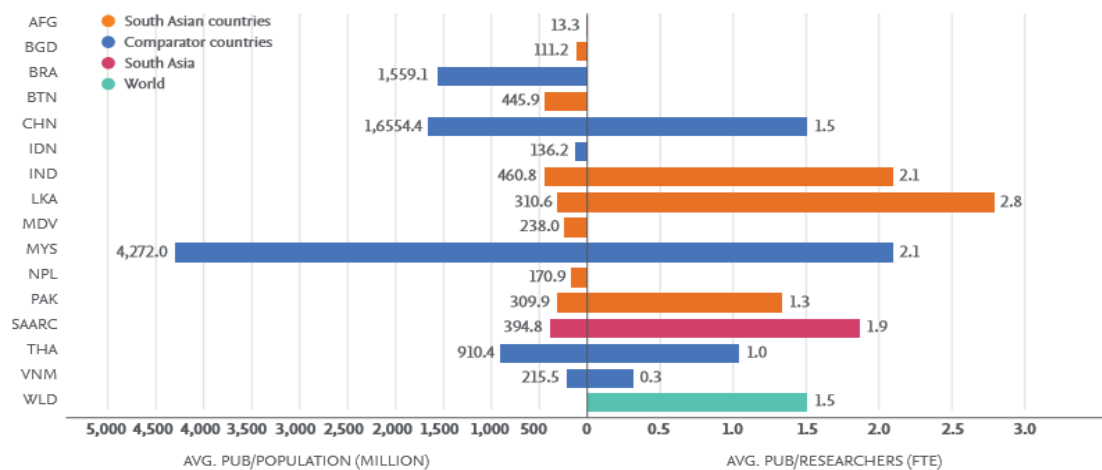


Figure 4  
Number of scholarly publications by population size (lhs) and number of FTE researchers (rhs), South Asian countries and global comparator countries, 2012-2016. Sources: UNESCO and Scopus®

Figure 5.10: Comparison of Sri Lanka with Global and Regional Statistics (Image Credit: South Asia; Challenges and benefits of Research collaboration in a Diverse region<sup>31</sup>)

<sup>31</sup>Marmolejo F, Nagashima Y, Lothrop SC, Alborta SX, Aedo C, Miwa K, et al. South Asia: Challenges and Benefits of Research Collaboration in a Diverse Region. The World Bank, 2019



Sri Lanka generates more scholarly papers per full-time equivalent (FTE) for the researchers than any other South Asian or comparative country, as seen in Figure 5.8. While China matches the global norm, Sri Lanka, India, the SAARC region, and Malaysia all outperform the global average in terms of academic papers per FTE researcher (2012–2016).

### 5.9 Patents filed by S & T institutions

The number of patents filed per one million inhabitants largely reflects the economic strength of a country<sup>32</sup>. As per the survey, a total of 16 patents, including 15 national patents and 1 foreign patent, were granted to the institutes. Nine of them were put into practice (Table 16). The institutes that acquired the patents with respect to the numbers are SLINTEC (6 patents), NBRO (1 patent), PRI (2 patents), NSF (02 patents), ITI (1 patent), NERDC (1 patent), NRC (1 patent), GJRTI (1 patent), and ACCIMT (1 patent).

Table 17: The number of patents granted to scientists/institutions by sector.

Sector	National			International			Total
	Implemented	Not Implemented	Sold	Implemented	Not Implemented	Sold	
Agricultural & Veterinary Sciences	0	2	0	0	0	0	2
Engineering & Technology	6	2	1	1	0	0	10
Medical & Health Sciences	0	0	0	0	0	0	0
Natural Sciences	1	0	0	0	0	0	1
Social Sciences	1	2	0	0	0	0	3
<b>Total</b>	<b>8</b>	<b>6</b>	<b>1</b>	<b>1</b>	<b>0</b>	<b>0</b>	<b>16</b>

<sup>32</sup><https://www.patent-pilot.com/en/industry-studies/worldwide-industry-study-patent-law-firms-2016/patents-filed-per-one-million-inhabitants/>

### 5.9.1 IP Fillings in Sri Lanka

Year	Patent	Trademark (class count)	Industrial design (design count)	GDP (Constant 2015 US\$)
2011	214	5165	686	67.95
2012		7211	678	73.82
2013	445	6899	295	76.81
2014				81.7
2015	265	7440	405	85.14
2016	316	9351	309	89.44
2017	331		485	95.22
2018	382	9161	487	97.42
2019	412	7990	606	97.21
2020	412	1669	459	92.71

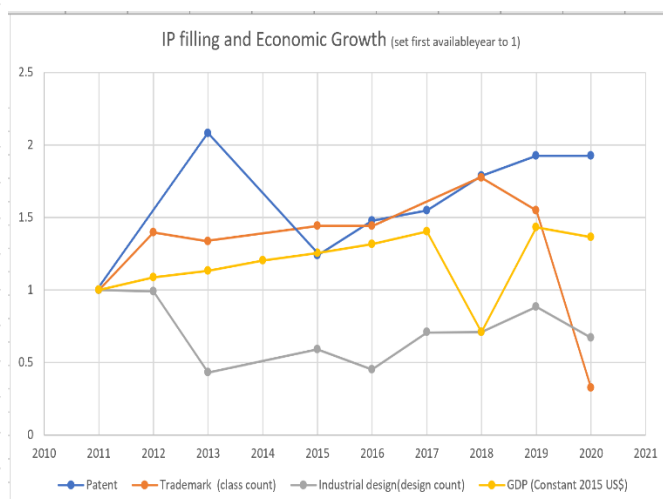


Figure 5.9: IP Filling & Economic Growth (2011-2020)

Data Source: Statistical Country Profile WIPO World<sup>33</sup>

### 5.9.2 The Patents filed and granted between 2011 to 2020

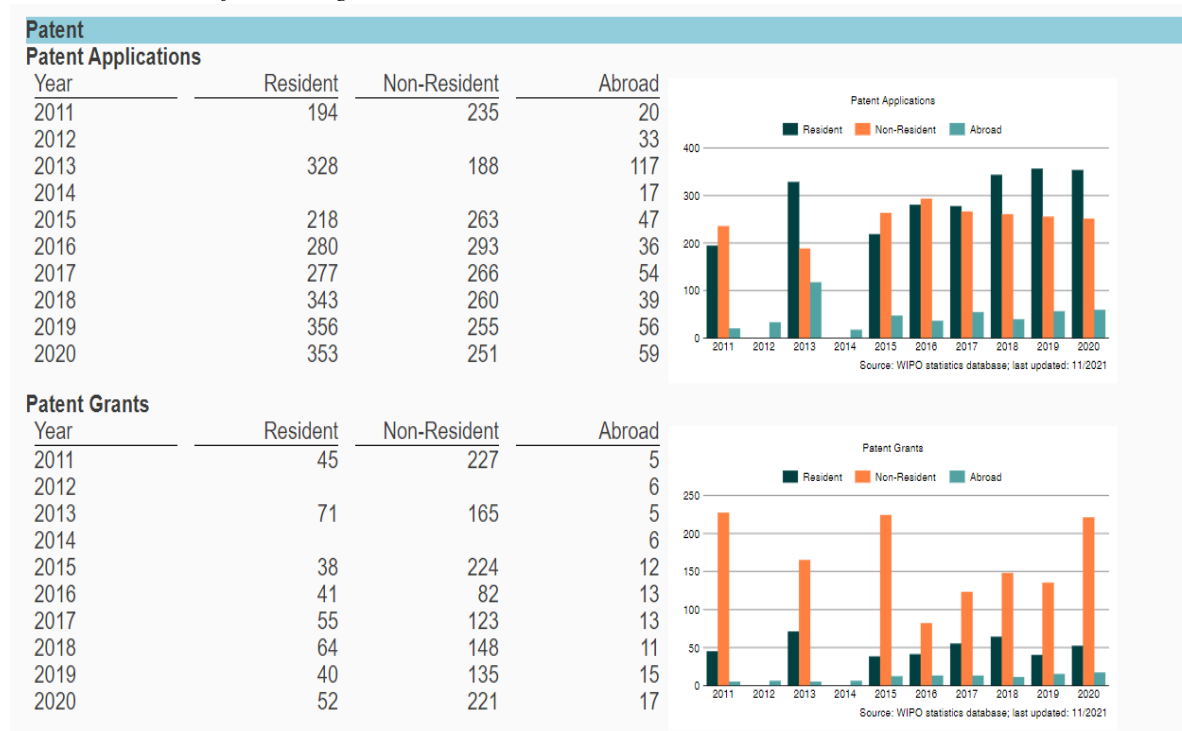


Figure 5.10: Source: Statistical Country profile WIPO world

In 2020, 52 resident patents were granted against 353 applications filed (Figure 5.10). Our sample survey captured 16 (30%) of them.

<sup>33</sup>[https://www.wipo.int/ipstats/en/statistics/country\\_profile/profile.jsp?code=LK](https://www.wipo.int/ipstats/en/statistics/country_profile/profile.jsp?code=LK)

## 5.10 Awards received by scientific staff / institution

There were 44 accolades honored by scientists affiliated with surveyed institutions, which includes 32 national and 12 international awards (Table 18).

*Table 18: Awards received by scientists/institution*

Sector	International	National	Total
Agricultural & Veterinary Sciences	9	13	22
Engineering & Technology	3	8	11
Medical & Health Sciences	0	8	8
Natural Sciences	0	1	1
Social Sciences	0	2	2
<b>Total</b>	<b>12</b>	<b>32</b>	<b>44</b>

## 5.11 Products and processes commercialized by the institution

In 2020, 9 processes and 23 products were sought to attract possible primary consumer groups through various activities such as demonstrations, exhibits, mass media, and direct dialogues as part of taking research outputs into the market. Tables 19 and 20 represent the number of products and processes commercialized by the surveyed S&T institutes, respectively, and Figure 5.11 demonstrates their sectorial contribution.

*Table 19: Products that have been commercialized by S&T institutions.*

Sector	Institute	Number of Products Commercialized
Agricultural & Veterinary Sciences	PRI	4
	RRDI	3
Engineering & Technology	ACCIMT	2
	ITI	4
	NBRO	1
	NERDC	2
	SLINTEC	5
Natural Sciences	-	0
Medical & Health Sciences	-	0
Social Sciences	NSF	1
	SLAEB	1
<b>Total</b>		<b>23</b>

Table 20: Processes that have been commercialized by S&T institutions.

Sector	Institute	Number of Process Commercialized
Engineering & Technology	ITI	3
	NBRO	1
	NERDC	3
	SLINTEC	1
Agricultural & Veterinary Sciences	-	0
Natural Sciences	SLAEB	1
Medical & Health Sciences	-	0
Social Sciences	-	0
<b>Total</b>		<b>9</b>

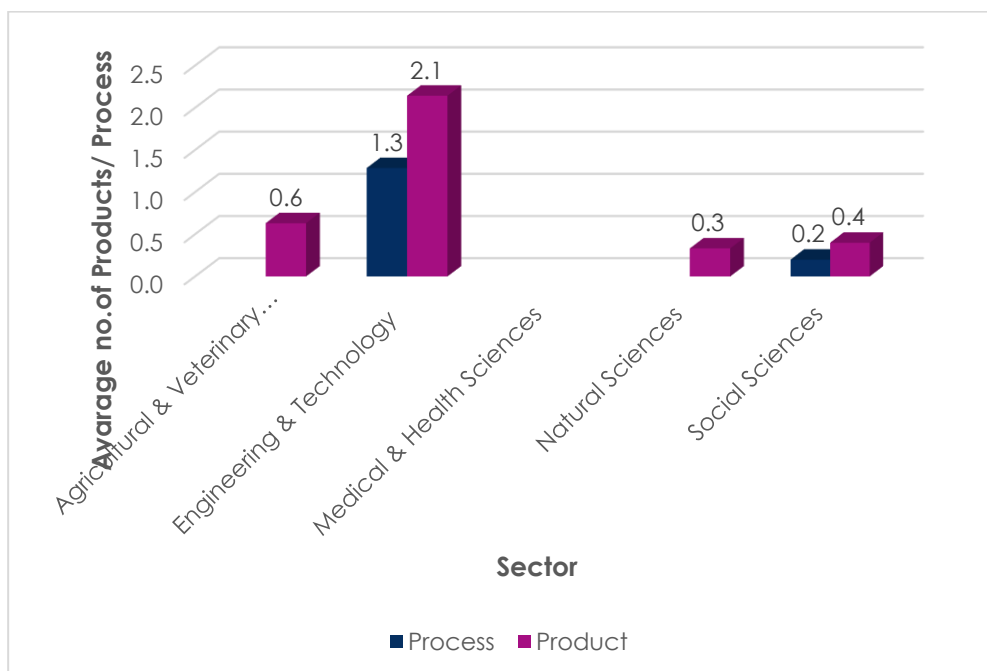


Figure 5.11: Commercialized products and processes in each sector

## 5.12 Technology Transfers, and implemented recommendations.

Technology transfer (TT) is the movement of scientific methods of production or distribution from one enterprise, institution, or country to another, such as through foreign investment, international trade, licensing of patent rights, technical assistance, or training. The process of commercially exploiting research varies widely. It can involve licensing agreements or setting up joint ventures or partnerships to share both the risks and rewards of bringing new technologies to market. Other corporate vehicles, e.g., spin-outs, are used when the host organization does not have the necessary resources or skills to develop a new technology<sup>34</sup>.

Within the year 2020, 58 technologies were transferred (31 in the engineering and technology sector, 16 in the agricultural and veterinary sciences sector, 5 in the natural sciences sector and in the medical and health sciences sectors, and 1 in the social sciences sector), and 46 recommendations were adopted (19 in the engineering and technology sector, 16 in the agricultural and veterinary sciences sector, 4 in the natural sciences sector, 2 in the medical and health sciences sector, and 5 in the social sciences sector). Figure 5.12 indicates the number of technologies transferred and recommendations adopted in each sector.

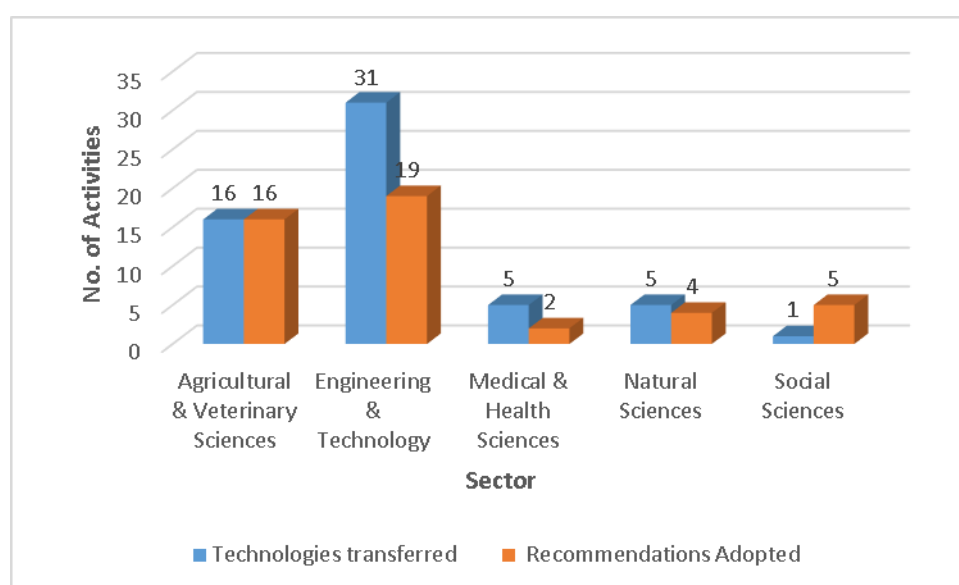


Figure 5.12: Technologies transferred and recommendations adopted in each sector

Several barriers have been faced by institutions during technology transfer processes, such as poor linkage between R&D institutes and the industry, lack of trained staff for technology

<sup>34</sup><https://www.globalnegotiator.com/international-trade/dictionary/technology-transfer/>

transfer, lack of funds and inputs, low priority given due to not being included in the institutional mandate, unwillingness of investors, technology acceptance by the industry, etc.

### 5.13 Sectorial comparison of S & T Output Indicators

Figure 5.13 depicts a sector-by-sector comparison of the three output indicators developed by the five sectors: agriculture and veterinary sciences, engineering and technology, natural sciences, social sciences, and medical and health sciences: product, process, and technologies per researcher. Accordingly, the Engineering and Technology sector has the most products, processes, and technologies per researcher (0.042, 0.03, and 0.028, respectively).

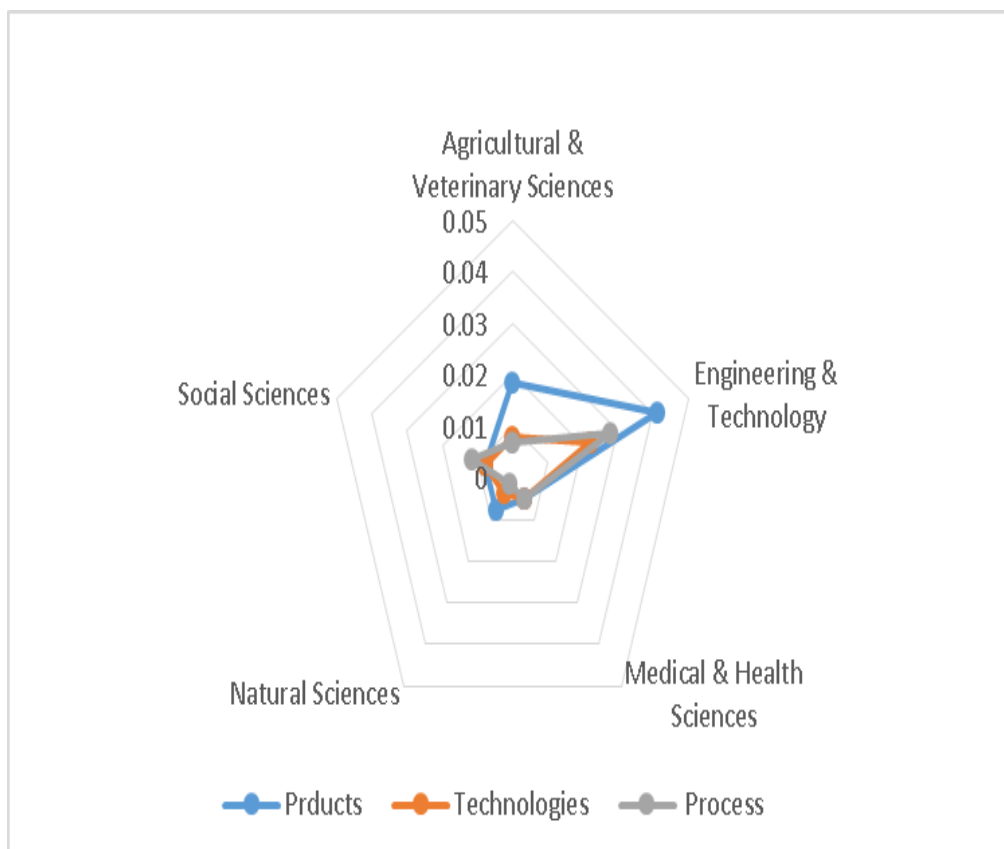


Figure 5.13: Radar chart comparing product, process, and technologies per scientist by sector in 2020.

## 5.14 The impact of published scholarly works on the Relative Activity Index (RAI) and Field-weighted Citation Impact (FWCI) of SAARC regional perspectives

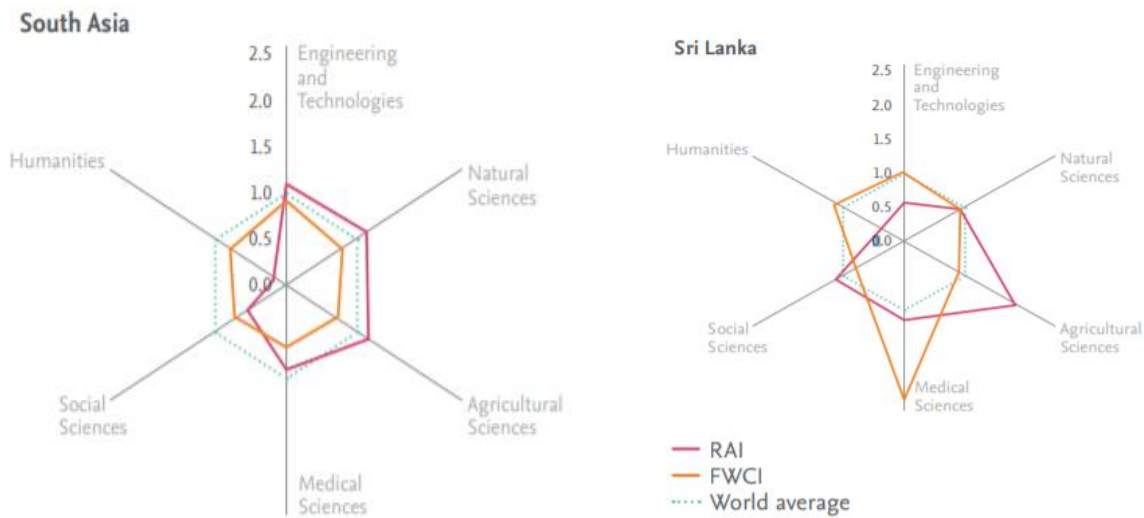


Figure 5.14: RAI and rebased FWCI for the world, South Asia, and Sri Lanka that published over 1,000 publications between 2012 and 2016. Source: Scopus00AE

Based on the most recent data available (2012–2016), the SAARC region has outlined specific areas of emphasis for regional cooperation, notably in agriculture, rural development, environmental management, natural disaster risk reduction, and biotechnology. These priorities are evident in the academic specialization within South Asia. Sri Lanka, at the national level, predominantly directs its focus towards agriculture, with medical sciences being a notable secondary area of concentration. In terms of citation impact, South Asia aligns closely with the global average in engineering and technology, while exhibiting comparatively lower citation impact in other fields. Interestingly, Sri Lanka demonstrates a relatively higher citation impact in agriculture and medical sciences when compared to the global average.

### 5.15 Trends in Product-Processes-Technologies developed per institute, between 2012-2020

Figure 5.15 depicts the overall trajectory of new goods, processes, and technologies developed at each institute from 2012 to 2020. The graph illustrates that the trend has been decreasing over time.

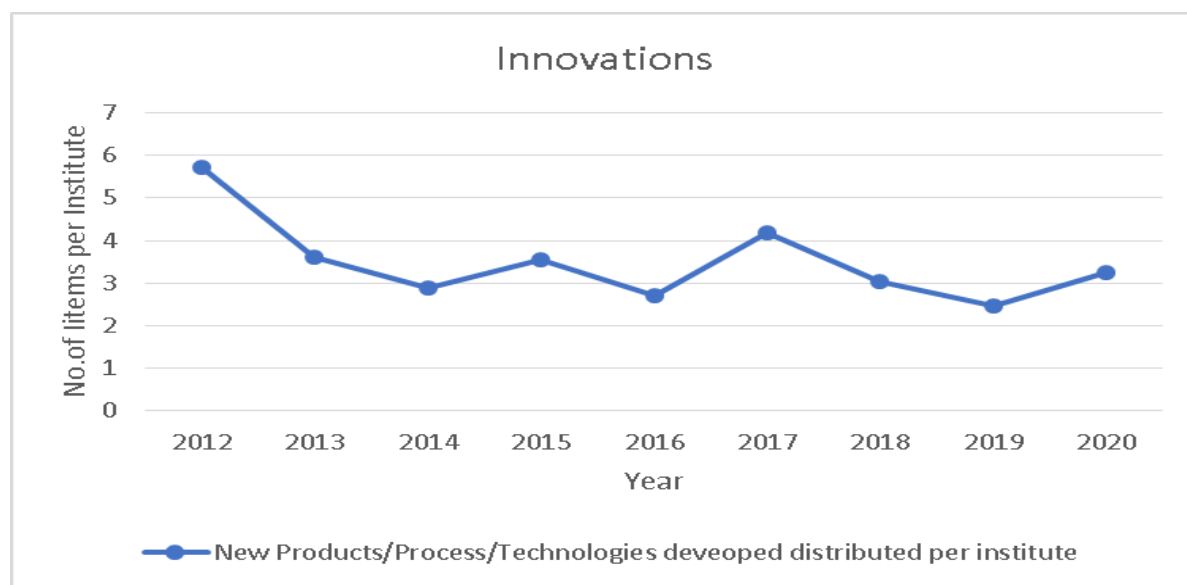


Figure 5.15: New Products-Processes-Technologies developed and distributed per institute  
Source: NASTEC S & T Data platform

## 6. SERVICES PROVIDED BY S&T INSTITUTIONS

Most of the S&T institutes surveyed are mandated to provide different technical services to different target groups, such as industries, farmers, other S&T institutions, and the general public. The services provided by S&T institutions include testing, calibration of equipment, training, product and process certification, accreditation services, and consulting. The number of clients served by S&T institutions for different services and the total revenue earned by each sector for these services are given in Table 21.



Table 21: Number of clients served with different services by S&T Institutions

Sector	Testing	Calibration of equipment	Calibration standards calibrated by DMUS S	Training	Product and Process Certification	Accreditation Services	Consultancies	Other Services	Revenue Earned (Rs. Mn.)
Agricultural & Veterinary Sciences	5443	0	0	10263	419	67	1105	17720	14.641
Engineering & Technology	8331	6343	0	405	1	0	4789	897	694.928
Medical & Health Sciences	10	0	0	200	2	0	17749	0	0.5
Natural Sciences	4421	743	0	16892	0	0	246	531756	424.6835
Social Sciences				403					36.96
<b>Total</b>	<b>18205</b>	<b>7086</b>	<b>0</b>	<b>28163</b>	<b>422</b>	<b>67</b>	<b>23889</b>	<b>550373</b>	<b>1171.7125</b>

The highest number of clients were served by the other services (n =550373), followed by consultancies (n =23889). The Natural sciences sector served the highest number of clients (n = 554058), but the highest revenue was earned by the engineering and technology sector (LKR 694.928 million). The S&T institutes of all the sectors served a total of 628,205 clients in the year 2020, and a total revenue of LKR1171.7125 million was earned through client-based services. It should be noted that some S&T institutes provide their services free of charge (n = 23). Table 22 indicates the levels of revenue generated by different S&T institutes.

Table 21: Revenue generated by S&T Institutes in 2020.

Revenue Generated			
Rs. Mn. 0-9	Rs. Mn. 10-20	Rs. Mn. 21-100	Rs. Mn. >100
FMRC	GJRTI	SLAEB	ITI
MRI	CEA	SLAB	DMUSS
RPO		NERDC	NBRO
PRI			
NIPM			
NARDA			
SLINTEC			
VRI			
DOM			
SCS			
ACCIMT			

### 6.1 Revenue Generation Trends by Institute, 2012-2020

Since 2012 until 2018, the revenue generated per institution has been on an upward trend, but since 2019, it has fallen to 31 million from 40 million. In 2020, it further declined to LKR 28 million per institute. This may be due to the consequences of the COVID-19 lockdowns and the economic hardship of the country, which touched the bottom line of the institutions' functions.

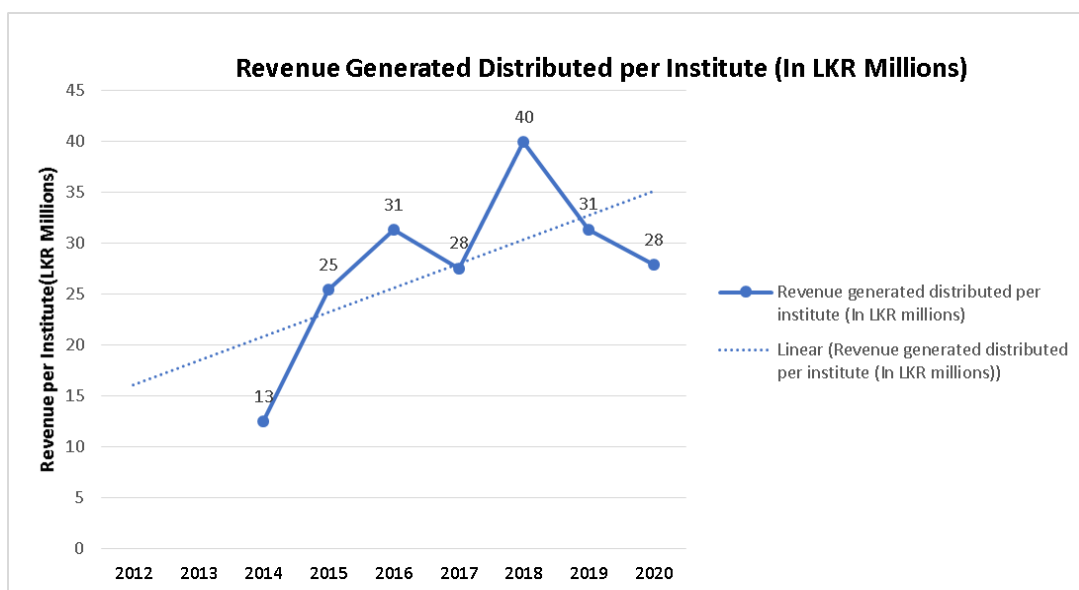


Figure 6.1: Distribution of revenue generated per institute, 2012-2020

## RECOMMENDATIONS

Based on the analysis of the data, the report proposed the following recommendations: While some of these recommendations may already be familiar to the system, they are intended to be recollected here to emphasize their importance in implementing them. Undoubtedly, that would have a positive impact on the country's S&T ecosystem as a whole.

The recommendations in the report are divided into five categories of thrust: human resources, physical resources, research input, research output, and S&T institution services.

### **Thrust 01: Human Resources: Investment in Human Capital Development**

- i. Sustain gender equality and promote women's empowerment.

Promoting and maintaining gender equality across all sectors must continue. It is necessary to support mentorship programs that empower women researchers, such as flexible work schedules and leadership development opportunities. To enhance female representation, special attention must be paid to the natural sciences, engineering, and technology

- ii. Foster Early Career Research Opportunities:

Provide attractive incentives for early-career researchers to nurture their talent and stay in the system. A system that could offer special research grants, scholarships, and training opportunities targeting them is a viable option. As spillover, there system might create a foster innovation culture.

- iii. Support lifelong learning and career progression:

Establish a continuous professional development scheme (CPD) for researchers to advance research-based higher degrees and programs. The scheme can create conducive environments for lifelong learning and career progression through a win-win situation between researchers and institutes.

- iv. Mitigate employee turnover.

A centralized system is to be placed for developing and tracking effective retention strategies. The strategies could be linked to competitive remunerations and incentives, creating a positive work environment, offering career advancement opportunities, and supporting work-life balance.

- v. Regularly monitor and address employee concerns through surveys and interviews to improve job satisfaction. It has the potential to create an employee engagement culture at a strategic level to retain talented scientific staff within the system.

### **Thrust 02: Physical Resources: Optimizing the Physical Resources for R&D Development**

- vi. Maximizing Productivity through Advanced IT Infrastructure:

To optimize information flow within and across institutions and systems, a strategic data management system and guidelines are to be placed at the institutional level. The institutes are encouraged to invest in developing modern and efficient IT infrastructure to support such activities that could enhance the overall productivity of the institutes.

- vii. Develop Comprehensive Data archive:

Establish a comprehensive data archive to order and mine the relevant information to support evidence-based decision-making. The institutions across the sectors could be linked via this platform while enabling secure access.

- viii. Empowering Staff Through IT Proficiency:

Priorities comprehensive training programs for the entire staff on enhancing IT tools effectively. The training focused on digital literacy, data management, and information retrieval will be instrumental.

### **Thrust 03: Research funding: Enhance Research Funding for R&D Development**

ix. Efficient Planning and Coordination:

Enhance the planning and coordination processes within the institutes to ensure effective utilization of funds. This includes developing comprehensive project proposals while adhering to SMART goals.

x. Human Resource Management:

Ensure that the institutes have an adequate number of skilled staff to handle the implementation of multiple activities. This can be achieved through targeted recruitment strategies, routine training programs, and establishing links with universities and research institutions to tap additional expertise.

xi. Enhancing Procurement Efficiency and Financial Oversight:

Tackle barriers within government procurement-tender procedures by streamlining processes and identifying bottlenecks for expedited acquisition of necessary equipment and laboratory chemicals. Consider alternative procurement methods, like pre-qualified supplier lists, to minimize delays. Improve the system by establishing robust tracking system.

xii. Prioritize Science Popularization Activities:

Promote adequate resources for science outreach programs to maximize their societal impact. And continue the funding for such activities without interruption. Strengthen collaboration with educational institutions, media organizations, and other relevant stakeholders to effectively disseminate knowledge to the public.

xiii. Regular Monitoring and Evaluation:

Implement a system for regular evaluation of fund utilization to identify any inefficiencies, bottlenecks, or areas requiring improvement. It will enable institutes to make informed decisions, optimize resource allocation, and ensure accountability.

#### **Thrust 04: Research Outputs: Research to business**

- xiv. Ensure the timely completion of research projects by implementing effective SMART project management strategies. Also, a system is to be implemented to assign the projects the necessary expertise and resources for their efficient execution. Ideally, a resource pool of experts composed of public and private sector entities, academics, etc. could assist.
- xv. Foster a culture of collaboration and knowledge sharing among institutes by promoting interdisciplinary research and facilitating collaborations between different sectors. Encourage researchers to engage in joint projects and share resources, expertise, and data to maximize the impact of research projects.
- xvi. Allocate adequate funding and resources to support research activities in sectors with sectoral project representation, such as agricultural and veterinary sciences, medical and health sciences, etc. This will enable researchers to address sector-specific challenges, develop innovative solutions, and contribute to the advancement of their respective fields in light of addressing national issues.
- xvii. Promote the publication of full research journal articles in addition to the conference proceedings to strengthen the dissemination of research findings. Increase the funding available to assist researchers' attendance at national and international conferences that could enable wider networking opportunities
- xviii. Foster an innovative culture that culminates in commercialization through the provision of technical assistance and incentives, funding support for the filing of patents, technology transfer, and the commercialization of R & D outputs. Create technology transfer facilities (TTF) within institutes to link the steps in the process to a national system, ideally to a platform.

**Thrust 05: Services provided by the S&T Institutions: Ensure the delivery of quality services**

- xix. Develop a comprehensive marketing and outreach strategy to promote the services offered by S&T institutes. This can be adopted with modern tools and applications to reach not only wider audiences but also niche markets.
- xx. Conduct regular market research to identify trends in the respective sectors and formulate market-oriented strategies. It could be strengthened through public and private industry partnerships to develop new products and services.
- xxi. Having staff with the right expertise and abilities will improve service delivery, boost customer happiness, and encourage repeat business.
- xxii. Streamline the invoicing process to ensure transparency. Clearly communicate the pricing structure, payment terms, and applicable discounts or incentives to clients. It will help build trust and credibility with clients, which will boost the business.
- xxiii. Continuously evaluate and improve the effectiveness and efficiency of product and service delivery processes. Get client feedback on them, which could integrate with the activities in the product value chains.

**Limitations:**

The report's conclusions are subject to a number of limitations. These include restrictions on the lack of private-sector organizations' representation and information from the higher education system of the country at the time of the survey. Therefore, extrapolating the results to the status of S&T at the national level may not be appropriate. However, it's important to note that the information of the public-sector S&T institutions that were evaluated makes substantial contributions in their respective fields and has a high impact on the S&T ecosystem of the country as a whole. For greater context and relevance, the results have also been cross-referenced with national statistics and global standard indices when appropriate.

**Conclusions:**

Despite the limitations, the S&T institutions have made substantial contributions to improving the performance of the national S&T ecosystem, particularly in the period of the COVID-19 pandemic. There is a pressing need for increased funding for research and development, and a systematic evaluation should be implemented to track the long-term impact of state-funded R&D and ensure its alignment with national goals and commitments to uplift the economy.



## **Annexures**

### **Annexure 01 – OECD classification by field of R&D (FORD) (OECD, 2015)**

#### **Natural sciences**

- Mathematics
- Computer and information sciences
- Physical sciences
- Chemical sciences
- Earth and related environmental sciences
- Biological sciences
- Other natural sciences

#### **Engineering and technology**

- Civil engineering
- Electrical engineering, electronic engineering, information engineering
- Mechanical engineering
- Chemical engineering
- Materials engineering
- Medical engineering
- Environmental engineering
- Environmental biotechnology
- Industrial biotechnology
- Nano-technology
- Other engineering and technologies

#### **Medical and health sciences**

- Basic medicine
- Clinical medicine
- Health sciences
- Medical biotechnology
- Other medical science

#### **Agricultural and veterinary sciences**

- Agriculture, forestry, and fisheries
- Animal and dairy science
- Veterinary science
- Agricultural biotechnology
- Other agricultural sciences

#### **Social sciences**

- Psychology and cognitive sciences
- Economics and business
- Education
- Sociology
- Law
- Political science
- Social and economic geography
- Media and communications
- Other social sciences

**National Review of the Status of Science and Technology in Sri Lanka – Year  
2020**

**Questionnaire Survey**

**Objective of the Survey:**

The National Science and Technology Commission (NASTEC) is mandated to submit an annual report to the Government of Sri Lanka on the status of Science and Technology (S&T) in the country. The information provided by your organization will be used only in the preparation of this report.

The instructions and definitions attached to this questionnaire should be read carefully before you fill the questionnaire and the format given in the questionnaire should be adhered to when replying. Please ensure that **all the responses are limited to activities carried out during year 2020.**

**(I) GENERAL INFORMATION**

1. Name of the Institution :
2. Postal Address :
3. Telephone :
4. E-Mail :
5. Web:
6. Fax :
7. Ministry/ Department :
8. Statutory functions : *(Please select relevant cage/s by a “x” )*

*You may select more than one cage depending on the nature of your mandate*

R & D		S&T policy formulation	
Research funding		Technology transfer	
S&T services		Science popularization	
Innovation		Training of personnel	

9. Please list any other major functions of your institution.
10. Does the Institution have a Corporate Plan/ Strategic Plan?

## (II) HUMAN RESOURCES

(Please provide information on both permanent staff and staff on contract basis for more than 6 months in year 2019)

### A) Staff Strength

#### i) Scientific, accounting & administrative staff (head count)

Staff	Total Approved Cadre Positions (Permanent staff)	Filled Cadre Positions (Permanent staff)	Staff on contract basis
<b>Scientific</b>			
1. Research Staff*			
2. Support Staff			
3. Librarians, Information Officers			
<b>Accounting</b>			
1. Accountants			
2. Support Staff			
<b>Administration</b>			
1. Executives			
2. Support Staff			
<b>Other</b>			
<b>TOTAL</b>			

\* Research staff should include research officers, scientific officers, engineers and research scientists. Total filled number of permanent cadre positions and staff on contract basis in Research staff in (i) should tally with the total values of (ii), (iii) and (iv).

**ii) a) Research staff\* based on areas of expertise & gender (head count)**

Area	Male	Female	Total
Natural Sciences			
Engineering & Technology			
Medical & Health Sciences			
Agricultural & Veterinary Sciences			
Social Sciences			
Other ( <i>specify</i> )			
TOTAL			

**ii) b) Public Research Profile of researchers**

Research Profile	Number
Google Scholar Profile	
Research Gate Profile	
Others	

**iii) Highest level of qualification of research staff\* based on gender (head count)**

Area	Male	Female	Total
Doctoral Degree			
MPhil Degree			
MSc/MA Degree			
Bachelor's Degree			
Diploma			
Full professional qualifications			
TOTAL			

**iv) Research staff\* by age group and gender (head count)**

Age (years)	Male	Female	Total
> 51			
41 – 50			
31 – 40			
< 30			
TOTAL			

**v) Staff remunerations**

**Institutions**

Categories of scientific staff	Salary scale	Minimum qualification specified at recruitment
Research Fellow		
Senior Research Officer		
Research Officer		
Scientific Officer		
Information Officer		
Research Assistants (PhD students)		
<i>other</i>		

**Universities**

Categories of Academic staff	Salary scale	Minimum qualification specified at recruitment
Senior Professors		
Professors		
Senior Lecturers		
Lecturers		
Librarian		
Research Assistants (PhD students)		
<i>other</i>		

## B) HR Development

### i) Scientific staff trained at workshops, seminars and conferences (local and international)

(Head count) (Please attach a separate sheet if necessary)

Titles of training programmes	Duration (In Days)	Number Participated			Local / Foreign
		Research/ academic staff	Support / Technical staff	Librarian / Information officers	

### ii) Postgraduate degrees/research training funded by institution for scientific staff within 2019 (head count)

Degree program	Research staff	Support / Technical staff	Librarian / Information officers	Duration
Doctoral Degree				
Mphil Degree				
MSc/MA Degree				
Postgraduate Diploma				
Training attachments				

### iii) Scientific staff recruited by the institution within the year (excluding transfers among regional centers of the same institution)

Category	Highest qualification	Number
Research staff		
Academic Staff		
Support / Technical staff		
Librarian / Information officers		

**iv) Scientific staff that left the institution within the year (excluding transfers among regional centers of the same institution)**

Category	Reasons for leaving	Number
Research staff	Retirement	
	Obtained a new Job – local	
	Obtained a new Job – Foreign	
	Personal	
	Higher Studies	
	Other .....	
Academic staff	Retirement	
	Obtained a new Job – local	
	Obtained a new Job – Foreign	
	Personal	
	Higher Studies	
	Other .....	
Support / Technical staff	Retirement	
	Obtained a new Job – local	
	Obtained a new Job – Foreign	
	Personal	
	Higher Studies	
	Other .....	
Librarian / Information officers	Retirement	
	Obtained a new Job – local	

	Obtained a new Job – Foreign	
	Personal	
	Higher Studies	
	Other .....	

**v) Benefits given to research staff**

Perks	Research/Academic staff (Yes/No)	Support / Technical staff (Yes/No)	Librarian / Information officers (Yes/No)
Research allowance			
Medical insurance			
Transport facility / allowance			
Professional allowance			
Housing / Quarters			
<i>Other (specify)</i>			

### (III) PHYSICAL RESOURCES

**i) Infrastructure Facilities**

Infrastructure facility	Number
Laboratory units	
Workshops	
Auditorium/Conference Hall	
Library	
Central instrumentation facility	
<i>other</i>	



**ii) other facilities**

Facility	Availability (Yes/No)
Institutional website	
Database on research / services	
Internet with free access to Journals	
<i>other</i>	

**iii) Major equipment available (please attach a separate sheet if required)**

Name of Equipment	Percentage time utilized	Number		Year of purchase	Reason if not in working order
		Total	In working order		

**iv) IT facilities**

Facility	Number	
	Scientific staff	Administration staff
Computers, Central		
Computers, Personal and Laptop		
Printers		
Scanners		
<i>other</i>		

**v) Specialized Software relevant to research**

Specialized Software Package			
	Cost of purchase	Last renewal date	License Fee

**(IV) RESEARCH PLANNING**

**I. Whether reference made to the following documents in the preparation of Annual action plan of the institute**

National Research and Development Framework (NRDF)

YES		NO	
-----	--	----	--

National Science and Technology Policy

YES		NO	
-----	--	----	--

Other Documents  
(Please List)

**II. NRDF based activities identified / implemented (10 focus areas & 10 interventions)  
(Please select relevant cage/s by a "x")**

Interventions →	Policy Formulation	Pure & Applied Research	Promotion of Innovation	Application of Nanotechnology	Application of Biotechnology	Application of Indigenous Knowledge	Testing, Standardization & Accreditation and Assurance of IPR	Capacity Building	Application of ICT	Popularization
Focus Areas ↓										
Water										
Food, Nutrition & Agriculture										

Health										
Shelter										
Environment										
Energy										
Mineral Resources										
Textile and Apparel										
ICT & Knowledge Services										
Basic Sciences, Emerging Technologies & Indigenous Knowledge										

### III. State future activities/projects identified by your institution to address UN Sustainable Development Goals (SDGs)

SGD Goal	Future activities/projects planned	Time frame		Expected outcome
		Year if initiation	Year of completion	
1. No Poverty				
2. Zero hunger				
3. Good health and well-being				
4. Quality education				
5. Gender equality				
6. Clean water and sanitation				
7. Affordable and clean energy				
8. Decent work and economic growth				
9. Industry, innovation				

and infrastructure				
10. Reduced inequalities				
11. Sustainable cities and communities				
12. Responsible consumption and production				
13. Climate action				
14. Life below water				
15. Life on land				
16. Peace, justice and strong institutions				
17. Partnerships for the goals				

## (v) RESEARCH INPUTS

### i) Funds received during the year 2020

Funds received for	Source of funding	Amount requested (Rs. Mn)	Amount received (Rs. Mn)	Amount spent (Rs. Mn)
Research projects	Treasury			
	NSF			
	NRC			
	Multilateral (e.g. UN Agencies, GEF etc)			
	Foreign (e.g. JICA, MRC UK, USAID etc)			
	Private sector			
	Other			
Science popularization, Workshops, Seminars	Treasury			
	NSF			
	NRC			

	Foreign			
	Other			
Upgrade of the institute *	Treasury			
	NSF			
	NRC			
	Foreign			
	Other			
Other <i>(please specify)</i>	Treasury			
	NSF			
	NRC			
	Foreign			
	Other			

\* Include purchase of laboratory equipment, construction of buildings, renovations, purchasing of land, vehicles, buildings etc. relevant to research

ii) If the funds received are not spent (there is a balance) what are the reasons? *(Please select relevant cage/s by a "x")*

Reason	Yes	No
Lack of human resources (researchers, technical staff, support staff)		
Lack of research equipment		
Delay in receiving funds		
Delay in receiving equipment, chemicals etc.		
Delay in procurement		
Inefficient planning and coordination		
Administrative issues		
Other <i>(please specify)</i> ..... .....		

## (VI) RESEARCH OUTPUTS

### i) Research Projects *(Please attach a separate sheet if required)*

Broad area of the research projects	Name of the research project	Collaborations if any <i>(International, other organizations, universities)</i>	Expected output/outcome	Start date & End date	Duration	Ongoing / completed
<i>e.g. :</i>						
1. Food science						
2. Engineering						
3. Biotechnology						

### ii) New products/ processes/ technologies developed through research during year 2019 *(Please list and attach a separate sheet if required)*

*(Please refer section VI of Guidelines)*

	Processes	Technologies	Products
Total			

### iii) No. of publications

Publications	Number of publications
SCI Journals	
SCI extended journals	
Refereed Journals	
Total number of citations	
Abstracts of papers presented at conferences/symposia etc.	
Monographs	
Books	

Chapters in Books	
Others <i>(Please specify)</i> <i>(e.g. Bulletins, Newsletters, Magazines, Working papers)</i>	
Total	

**iv) Patents received by scientists/ institution *(Please list)***

Item patented	Whether Patented by individual/institute	Whether National/International	Whether implemented or sold

**v) Awards received by scientific staff / institution**

Award received	Whether received by individual/institute	For what <i>(eg: Research, Science Popularization)</i>	Whether National/International

**vi) What are the products/ processes commercialized by the institution?**

*(Please list)*

Processes	Products
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

**vii) How was the commercialization initiated?**

*(Please select relevant cage/s by a "x")*

<b>Commercialization Process</b>	<b>Yes</b>	<b>No</b>
Demonstrated to private sector		
Through exhibitions		
Through *mass media		
Direct discussion with interested parties		
Other <i>(please specify)</i> .....		

*\*broadcasting (TV, radio, film), digital (internet & mobile) & printing (newspapers, magazines, pamphlets & books)*

**viii) If the institution was unable to commercialize the product/process what are the reasons/ barriers?**

<b>Reasons/ Barriers</b>	<b>Yes</b>	<b>No</b>
No proper popularization mechanism		
Lack of trained staff		
Lack of funds		
Administrations issues		
Other <i>(please specify)</i>		

**ix) What are the technologies transferred or recommendations developed** *(Please list)*

<b>Technologies transferred</b>	<b>Recommendations developed</b>
<i>e.g.: New method of water filtering</i>	<i>e.g. New fertilizer mixture</i>
1.	1.
2.	2.
3.	3.
4.	4.
5.	5.

**x) What are the barriers faced in technology transfer?**

<b>Barriers</b>	<b>Yes</b>	<b>No</b>
Poor linkage between R&D sections and the industry		
Lack of trained staff in technology transfer		
Lack of funds and inputs		
Low priority		
Unwillingness of Investors		



Not included in the existing institutional mandate		
Other (please specify).....		

### (VII) SERVICES (FOR INDUSTRIES, S&T INSTITUTIONS, GENERAL PUBLIC)

Types & Area of services	Number of clients served	Revenue earned (Rs. Mn)
Testing facilities <i>Eg: Water</i> <i>Fertilizer</i>		
Calibration of equipment		
Whether calibration standards calibrated by Department of Measurement Units, Standards & Services		
Training <i>(list the training programmes conducted to outside sources and indicate the number participated)</i>		
Product/Processes Certification		
Accreditation of Services		
Consultancies		
Others		

## VIII) CONSTRAINTS EXPERIENCED

Issue	Yes/No	Causes
Funding		
Recruitment/retention of staff		
Lack of cadre		
Procurement of equipment		
Overseas travel restrictions for scientific staff		
Training of scientific staff		
Other- please specify		

## Annexure 03: Research Projects

Arthur C. Clarke Institute for Modern Technologies		
S_No	Project	Expected output/ Outcome
1	Nano Satellite developments-KITSUNE	A 6U nano satellite developed with engineers from ACCIMT for payload services for future benefits
2	Carbon fiber multi copter for surveillance and training	Used for mapping of tea land for the requirements of tea research institute of Sri Lanka
3	Vertical Takeoff Landing UAV	Capacity development of engineers, development for defense sector purposes
4	Material Development to Reduce Grounding Resistance	A low cost material to reduce Grounding resistance, Paper publication
5	Low cost solution to Improve Systems through PdM	Machine fault simulator, Software tool to analyze vibration data
6	Design and fabrication of a Smart Phone based ECG Trace Analyzer	To design a low cost device to analyze the ECG trace
7	Temperature Monitoring / Controlling System for Poly tunnel	Temperature Monitoring and Controlling System and a research paper
8	Alarm wear-Handheld / LED Strip device with mobile interface	Design & develop a personal security/alarm device against crime for European countries (Alarmwear)- Handheld/LED Strip device with mobile interface
9	Xilinx Tea Colour Separator	Locally designed developed machine for tea factory tea processing
10	Real-time climate monitoring automatic weather stations	Installation of weather stations designated by TRI and commissioned them in the tea plantation areas (8 units)

11	ADCS Testing system	Simulation model for Nano satellites
12	Real-time river water level information system (IoT product)	Information system to Irrigation Department
13	Covid-19 viral testing system based on LAMP assay	Demonstrable system
14	MIS Development	Efficient System for Decision Making
15	Mobile App Development	Few mobile Apps
16	Design and Construct a Long Wave Antenna System for e-CALLISTO Network	observation system for the measurements of polarization of solar radio bursts
17	Research on Cataclysmic Variable Stars - Collaboration Project with Yunan Observatory China	Research Paper publications
18	Characterizing the possible interior structures of the nearby Exoplanets Proxima Centauri b and Ross-128 b	Research Paper publications
19	Study the possibility of remotely controlled the 14 inch Meade telescope	Design and Develop the telescope facility
20	Cultivated Paddy Area Identification and Rice Yield Prediction Using Free Remote Sensing Data- For major paddy cultivation districts	Research Paper publications
21	Estimation of Mangrove above Ground Biomass using free SAR data	Research Paper publications
22	Assessing the soil erosion rate based on Rusle model for sustainable land use management	Research Paper publications
23	Groundwater exploration using remote sensing and geographic information systems in a semi-arid area of Mullaitivu	Research Paper publications
<b>Bandaranaike Memorial Ayurveda Research Institute</b>		
1	An indigenous poly herbal drug compound is effective in reducing inflammation in SARS-CoV-2 infection	
2	Post covid Survey on Ayurveda Practices	
<b>Central Environmental Authority</b>		

1	Assessment of impacts of Mini Hydro Power Projects, giving special reference to biodiversity, for selected mini hydro projects in Kalawana Divisional Secretariat Division	<ul style="list-style-type: none"> <li>• Generate species check lists for Mudalige kanda and handuwelkanda forests in Kalawana Divisional Secretariat Division</li> <li>• Preparation of forest conservation plan for Kalawana Divisional Secretariat Division"</li> </ul>
2	Study of BOD and COD ratio in different industry sector with a view to utilize one measurement	<ul style="list-style-type: none"> <li>• Identification and categorization of the industries into toxic, biodegradable and acceptable or stable zones using BOD/COD ratio</li> <li>• By zonation of the BOD/COD ratio, the treatment strategy could be identified to achieve the safe level of organic matter in an environment</li> </ul>
3	Survey on Environmental awareness level of the community in Kegalle	<ul style="list-style-type: none"> <li>• Promoting environmental communication among the community</li> <li>• Reduce the level of negative impact of human activities on the environment</li> </ul>
4	Impact of direct discharge of uncontrolled wastewater from tourism industry to tributary of Kirindioya and aquatic life health quality assessment of the stream with respect to selected physico-chemical parameters and bio indicators (Odonate larvae)	<ul style="list-style-type: none"> <li>• Identification of significant relationship of the diversity and abundance of freshwater macro invertebrates (Odonate larvae) with selected environmental parameters</li> </ul>
5	Study of water quality in vegetable wash water at selected locations of commercial vegetable washing by Checking COD, BOD and TSS	<ul style="list-style-type: none"> <li>• Preparation of a chemical profile</li> <li>• Make aware the responsible agency to avoid the contamination of drinking water sources with pesticide residue and heavy metals</li> </ul>
6	A comparative study on Environmental awareness, and attitudes among the secondary level school students in Rathnapura district	A comparative study on Environmental awareness, and attitudes among the secondary level school students in Rathnapura district
<b>Centre for Defence Research and Development</b>		
1	Development Smart Jacket with Tracking System (GPS/GPRS)	This system is aimed at identifying and tracking routs and the locations of soldiers in the battle field operations. The system will empower the traditional combatant with the smart technology.
2	Train Tracking and Operating Information System	The control center of Maradana can manage the trains efficiently. Furthermore, the passengers can view the location of train at real time.
3	Food Procurement Management System	To increase the efficiency of service, minimize the paper waste and workload of the end-users.

4	Land Acquisition and Management System	To increase the efficiency of service, minimize the paper waste and workload of the end-users.
5	Document Management System for Defence Branch	To increase the efficiency of service, minimize the paper waste and work load of the end users.
6	MOU Management System	To increase the efficiency of service, minimize the paper waste and work load of the end users.
7	Officers' Database for National Cadet Corps	To increase the efficiency of service, minimize the paper waste and work load of the end users.
8	Hi Tech Soldier - III	This software helps to succeed the mission training of the military exercises by using the modern technology. The software consist as follows: a. Live tracking system. b. Incident report system. c. Conversion of the grids according to the maps. d. Monitoring facility of the battlefield soldiers from operational room. e. Analyzing the situational reports and special concentration.
9	Electronic Alarm System for Border Villages to Prevent Wild Elephant Intrusions - Phase II	Use electronic alarm systems to deter wild elephants. This system will help villages to protect from wild elephant attacks. Further system enhanced to capture truck, monitor and maintain information on Elephants in the Sri Lanka.
10	SLCORSNET Integration to CDRD Projects	To minimize the errors of the GIS mapping projects.

11	Mobile Phone Jammer for Prisons	A cell phone jammer is a device that blocks transmission or reception of signals, usually by creating some form of interference at the same frequency ranges that cell phones use. As a result, a cell phone user will either lost the signal or experience a significant loss of signal quality.
12	Drone Jammer	The equipment is highly mobile and can be used in any part of the country with minimum time. It disturbs the electromagnetic and GPS frequency ranges of Drones.
13	Development of VHF/UHF Transceiver	<ol style="list-style-type: none"> <li>1. To enhance the military radio communication capability by using amateur radio technology.</li> <li>2. Project first phase will be aimed at VHF radio set which focus on VCO environment while the second phase aimed at software define radio sets by DDS environment. For transceiver, following steps are produced. <ol style="list-style-type: none"> <li>a. Dual channel VHF Transceiver prototype.</li> <li>b. Programmable VHF Transceiver prototype.</li> </ol> </li> </ol>
14	Development of Secure Voice Encryption Module	<ol style="list-style-type: none"> <li>1. To enhance the security of existing analog radio sets with an easily pluggable module.</li> <li>2. Planned to use 16 bit encryption keys which can be programmed through the keypad or using the software.</li> <li>3. Integration of complete system with ongoing transceiver.</li> <li>4. Integration of complete system for existing military radio setup.</li> </ol>
15	Brain Control Robotic Limb	<ol style="list-style-type: none"> <li>1. To get the real hand experience for amputees by brain controlled robotic arm.</li> <li>2. Design a prototype that response to specific hand movements for a selected amputee.</li> <li>3. To develop the prototype that can be implement to any amputee</li> </ol>
16	Smart Target for Jungle Lane Firing	<ol style="list-style-type: none"> <li>1. To create a system which is capable of providing a real experience for lane firing without live ammunitions.</li> <li>2. Comply the double tap requirement.</li> <li>3. To have maximum range of 50m to 60m with the targets.</li> </ol>
17	BTR80A Armored Tank Simulator	These units are highly expensive and require advanced technologies for maintenance and training. The main objective of this project is to acquire required technology for simulation. BTR

		Simulator has been completed. Currently the units are evaluating by the respective regiments in the Army.
18	T55 Armored Tank Simulator	These units are highly expensive and require advanced technologies for maintenance and training. The main objective of this project is to acquire required technology for simulation. 25% of T55 Simulator has been completed
19	81mm Mortar Simulator	Provide basic training to 81mm Mortar Fire Controllers (MFC) and mortar controllers.
20	Vehicle Simulator	Provide Basic Driving training for driver's and reactions while driving.
21	Guided Rocket & Missile System	1. To establish rocket and missile technology within the Sri Lanka. 2. To commence production of Hi-Tech weaponry required for the purpose of the National Security. 3. To save and earn foreign exchange to the country.
22	Nano Paint Development Project	Ships requirement. Anti-corrosive paints and anti- befouling paints against the ocean water conditions around Sri Lanka. Paint has been developed based on sea conditions and the production can be done locally.
23	Customizable Fire Control System Project	This involve designing the resurgent of a fire control system which can be use as per the respective service`s requirement. This is s common platform and the cost for production of independent units for different systems can be cut down.

24	Underwater Robotic Vessel - Phase I and Phase II	This is a mini submarine which controlled remotely and can be used for under water explorations and underwater repairs.
25	Under Water Acoustic Sensor Array (UASA) - Phase I	The system will enable to detect activities in under the sea surface in support of naval Surveillance operations. As the accuracy of this eqpt is based on the conditions of the sea water, the local research and production is essential. The project also aims to create a data a data bank indicating different changes of sea water during the year.
26	UAV Lihiniya MK I - E	1. Tactical UAV System for the national defense requirements with following payload capabilities. Dual axes Gyro stabilized Day / Night camera with 10X optical zoom with following features: <ul style="list-style-type: none"> <li>• Target Tracking.</li> <li>• Geo Location.</li> <li>• Motion Tracking.</li> </ul>
27	Production of Ballistic Blankets for VIP Security	Protective shield to easily install inside VIP vehicles.
28	Production of Ballistic Rubber Sample	Low cost and effective ballistic rubber for training purposes by the military.
29	Indoor Live Firing Range Project	Pistol rated mobile live firing range, installed inside a 40 ft long shipping container which is fully protected with ballistic rubber.
30	Assault Shield Project	Protection devices which can be pushed by the special operation ground troops.



31	Blue Gun Development Project	Non-functional detailed replicas of actual weapons with the same weight and dimensions for military training purposes.
32	Fully Automatic, Self-Operated, 12ft Walkthrough Disinfection Corridor	Fully automated and self-function disinfection corridor which is suitable to deploy at public place entrances.
33	Mobile Firing Range	Pistol vated mobile live firing rang inside a 40ft shipping container.
<b>Department of Export Agriculture</b>		
1	Investigation of the feasibility of expanding Vanilla cultivation in Central Province, Sri Lanka	Identifying the feasibility of expanding Vanilla as a cultivation in Central province
2	Design a trap for Coffee Berry Borer	Ethanol : Methanol 1:1 solution is the best to catch the coffee berry borer female insects
3	Investigations of biological control agents of coffee berry borer	One of hymenopteran insect was identified as a Eulophid parasitoid) Phymastichus coffea LaSalle.
4	In-vitro propagation of Garcinia and wallapatta	Mass plant production using tissue culture technology and new variety development
5	Pepper canopy improvement through different planting material originated from different cutting types and canopy training.	Identification of suitable cutting types to pepper canopy improvement
6	A comparative Study of growth, yield and quality of Half-Sib progenies of Sri Gemunu& Sri Vijaya Cinnamon varieties	Identification of efficient method to replace existing seedling cultivations with improved genetic material
7	Growth and yield performance of Macadamia VP plants at different spacing levels	Introduction of Macademia VP cultivation to Sri Lanka
8	Determination of pollination behavior of wild cinnamon based on flower morphology, floral behavior and molecular markers: A case study on mother plants of Cinnamomum dubium (Nees), Cinnamom	Determination of factors affecting pollination behavior of Genus Cinnamomum litseaefolium (Thwaites) and Cinnamomum capparucoronde (Blume), and their progenies at mid country research station, Dalpitiya, Sri Lanka

9	Comparative Study of the effectiveness of using alternative potting media for propagation of black pepper	Identification of alternative potting media for black pepper
10	In-vitro propagation of wallapatta	Mass plant production using tissue culture techniques
11	In-vitro propagation of Alovera	Mass plant production using tissue culture techniques
12	Investigation of etiology, disease development and management of rough bark disease of cinnamon	Identification of causal agent, investigation on disease development and integrate management of RBD of cinnamon
13	Studying the ecology of cinnamon wood borer (Ichneumenopteracinnamomumi)	To find out the seasonal abundance of cinnamon wood borer
14	Identification and studying the biology, ecology and management of cinnamon thrips	To identify the thrips taxonomically & to identify the biology and the ecology
15	Study the white root disease infection, its pathogenicity and ecological factors that enhance the disease in cinnamon	To confirmation of the pathogen To find out the disease development pattern in host
16	Study the disease progressive pattern and yield loss by canker incidences in cinnamon	To study the symptom development of canker in cinnamon stem with different maturity levels.
17	Establishment and evaluation of electric fence and ultra-sonic audio devices to manage vertebrates pests in cinnamon	To find out the avoidable vertebrate pests from the electric fence. To find out the recoverable yield loss from the pests due to fence.
18	Taxonomy of Cinnamon Thrips	Identification of Cinnamon thrips
19	Cinnamon quality with Agro ecological variations	
20	Cinnamon shelf life with different packaging materials	
21	Quality of cinnamon quills at three levels in value chain	
22	Anti-fungal and anti-bacterial activity of true cinnamon	
23	Effect of Cinnamon Leaf compost and inorganic fertilizer and their combinations on growth and yield of Cinnamon	evaluate the effect of compost on growth, yield and disease resistance of cinnamon
24	Effect of dolomite application on growth and yield of cinnamon grown in acid soil	To find out the effect of dolomite on growth and yield of cinnamon
25	Effect of applied sulfur containing fertilizers on growth and yield of	To find out the effect of Sulphur addition on growth and yield of cinnamon

26	Determination of Optimum pH level for growth of Cinnamon	Find the best dolomite dose for optimize the soil pH that maximize the growth of Cinnamon
27	Identification of visible indicators of cinnamon (CinnamomumzeylanicumBlume) to monitor major and minor soil nutrients	Identify the cinnamon deficiency symptoms
28	Effect of biofilm-bio fertilizer on growth and yield of cinnamon	Identify the effective dose of biofilm bio- fertilizer
29	Effect of market available Cinnamon fertilizer mixtures on growth and yield of Cinnamon (CinnamomumzeylanicumBlume)	evaluate the effect of available fertilizer with compared to current Cinnamon fertilizer recommendation on
30	Effect of type of planting materials and different rate of inorganic and organic fertilizer on growth and yield of cinnamon	To compare growth and yield performances between vegetatively propagated plants (Sri Gamunu& Sri Wijaya) and cinnamon seedling plants.
31	Effect of different levels N, P and K fertilizers on growth, yield and quality of the cinnamon	To find out a suitable level of N, P and K nutrients
32	Evaluation and comparison of superior quality characteristics of accession A1 (Pieris cinnamon) with selected cinnamon accessions (Sri Gemunu and Sri Wijaya)	To identify and evaluate the superior quality characteristics of accession A1
33	Multiplication and evaluation of selected hybrid cinnamon plants under recommended agronomic practices for quality, growth, and yield performance	To identify superior quality cinnamon accessions
34	Identification of chemical and element composition of sandy textured cinnamon bark	To identify the effect of sandy textured cinnamon on chemical composition.
35	Evaluation of seasonal variation in rooting ability of shoot cuttings of cinnamon varieties "Sri Gemunu" and "Sri Wijaya"	To estimate the trend for cutting germination and sprouting of released cinnamon varieties according to the months of year Coco-peat pellets as a nursery media for cinnamon
<b>Farm Mechanization Research Centre</b>		
1	Groundnut harvester	To modify imported harvester to suit to the local condition
2	4W Tractor coupled vacuum seeder	To introduce precise seeding method and seeder for small seeds such as seasami, finger millet
3	Tiller for boggy land	To introduce tiller machine to land preparation for boggy land
4	Cowpea thresher	To introduced two wheel tractor driven thresher for cowpea
5	8'' paddy transplanter	To introduce trans-planter with 8'' planting space

6	Pulse processing machine	To introduce new pulse processing machine to remove husk and split pulse grain
<b>Forest Department</b>		
1	Tree improvement & seed /genetic improvement	Supply of quality forestry seed
2	Tissue culture	
<b>Fruit Research and Development Institute</b>		
1	Characterization of flowering behavior and floral biology of Beli, wax apple, Ceylon olive, soursop ,sapota for improvement of productivity and quality	
2	Genetic improvement and varietal development of mandarin through hybridization	
3	Development of high yielding and good quality varietal hybrids of pineapple	
4	Identification of bioactive compounds of selected underutilized fruit crops	
5	Management of guava wilt through biological control agents	
6	Regulation of Fruit set and postharvest life and investigation of variability of bioactive compounds in edible Annona muricata accessions found in Sri Lanka	
7	Development of promising pomegranate lines through in vitro mutation induction	
8	Development of hybrids and open pollinated varieties and seed production (Fruit crops)	
9	Climate Resilient green technological improvement for food crop production and smart dissemination of technology to ensure food security in Sri Lanka	
10	Increasing Farmers income of Sri Lanka by improving quality and productivity of Mandarin (Kopia)	
11	Agri Business supporting scheme for farmers.	
12	Urban landscape development using under-utilized fruit trees.	
<b>Gem and Jewellery Research and Training Institute</b>		
1	Exploration and assessment of Gem deposits in Sri Lanka	Six Maps and Final reports

2	Study on other economic minerals in the gem bearing layer	1 final report
3	1). Heat treatment of low quality Spinel (Kirinchi) in Sri Lanka, 2). Identification of Possible Red geuda, Deguna and Yellow Sapphire to obtain Padmaraga  3). Special study on opaque Spinel species found in Kolonna area that can be turned into blue color after heat treatment  4). Study on Flux Healing by solvents. A study of mercury exposure by goldsmiths in jewellery production	4 final reports and 4 publications
4	A study of mercury exposure by goldsmiths in jewellery production	1 final report and 1 publication
5	Awareness Programs And Publishing Books	
<b>Hector Kobbekaduwa Agrarian Research &amp; Training Institute</b>		
1	Analysis of Potato Value Chain in Sri Lanka*	Make policy recommendation to strengthen potato value chains
2	Seed Sector in Sri Lanka: Performance, Potentials and Strategies to Way Forward*	Improving the seed sector and crop productivity in Sri Lanka.
3	Export Potentiality of Major Fruits in Sri Lanka: An Economic Analysis*	policy measures to enhance the fruit export industry in Sri Lanka
4	User-centric Mobile based Solution for Pest and Disease Management in Food Crop Sector (R- 549)	Farmers' awareness of pest and disease problems
5	Production and Marketing of Big onion in Sri Lanka: A Value Chain Analysis*	identify onion value chain actors, their respective roles and to draw up value chain map of in the study area
6	Maize Value Chain Analysis: Status, Constraints and Opportunities in Feed and Food Industry	comprehensive value chain analysis of maize
7	Land Consolidation in Smallholder Agriculture Sector of Sri Lanka: Farmer Perception and Level of Acceptance	enhance efficiency of agricultural lands utilization through successful implementation of land consolidation among rural smallholder farmers with their favorable attitudes and positive Contribution
<b>Industrial Technology Institute</b>		

1	Biodiversity and technological potential of micro-flora from selected Sri Lankan dairies	Isolation of probiotic bacteria from bovine milk with potential industrial applications
2	Studies in surface sterilization of spices using non-thermal processes	Cold plasma/UV treatment for elimination of microorganisms
3	Enhancing the nutritional stages of people by introducing healthy food products from jack, pumpkin, banana and fish while reducing postharvest losses of these commodities.	innovative value-added products developed will contribute to full fill the nutritional gaps of the local community while increase the foreign exchange by strategic marketing
4	Screening of Anti-Nutritional factors (ANFs) and activity of bio active proteins in locally grown edible legume varieties.	<ul style="list-style-type: none"> <li>• Development food products from Horse gram</li> <li>• Method development for Trypsin inhibitory assay</li> <li>• Booklet on Nutrition properties of legumes and pulses</li> </ul>
5	Screening and assessment of Lactic Acid Bacteria from Sri Lankan dairies as source of functional ingredients for the industry	Development of functional ingredients for the Industry
6	Study on the use of sugar substitutes for food products, their detection and the development of low-calorie foods Curing of bamboo culm that suit to tropical environment and bamboo products development	Development of low-calorie food
7	Curing of bamboo culm that suit to tropical environment and bamboo products development	Development of products from bamboo
8	Development of a data base on nutritional, chemical, molecular and morphological characteristics of selected traditional and widely consuming improved rice varieties of Sri Lanka: suitability to use as chemical and molecular finger prints in identifying rice varieties at grain level	Database on widely consuming rice varieties in Sri Lanka
9	Development and scaling up of technologies of value-added products from selected underutilized fruits and investigation of their functional properties	Preparation of healthy foods with bio active components including juices/drinks from underutilized fruits not available in the current local market
10	Spray drying of selected fruits, vegetable juices and yam pulps and innovative spray dried powder-based product development	Development of carrier agent parameters to control stickiness, anti-caking and drying agents to produce free flowing fruit / vegetable juice powders
11	Development of technologies to utilized waste whey in local dairy bio processing industries for the production of value added / functional beverages	Development of value-added whey based functional beverages to Sri Lankan consumers

12	Establishment of a facility for thermal process validation of canned food and low moisture processed food operations in Sri Lanka	Establishment of a facility for thermal process validation of canned food and low moisture processed food
13	Development of plant-based fungicide formulation to control anthracnose disease of mango and papaya	Development of a bio fungicide for the control of postharvest pathogens
14	Development of Nutritious and Healthy Food Corners for the Children/ Adolescents	Development of nutritious and healthy food products for children /adolescents
15	Comprehensive utilization of Sri Lankan Moringa oleifera in developing health food herbal medicinal products to start up Moringa oleifera industry in Sri Lanka	Startup Moringa oleifera industry in Sri Lanka Development of Herbal tea, Chewable Moringa capsule, burn cream and Anti-inflammatory ointment
16	Development of new value-added health products incorporating underutilized bio medicinal plants to address life style diseases in Sri Lanka	Development of new value-added health products incorporating underutilized bioactive medicinal plants
17	Investigation on natural fragrances and other volatiles from Sri Lankan flora and their industrial applications	Identification and isolation of new natural fragrances from Sri Lankan flora for industrial applications
18	Value addition to essential oils by fractional distillation under vacuum	Value added essential oils
19	Pharmacognostical, chemical characterization and selected bioactive properties of <i>Canarium zeylanicum</i> and development of value-added products	Development of marketable products such as joss powder, mosquito repellents, flies repellent, perfumes, anti-inflammatory products
20	Selected chemical, nutritional and functional health benefits of Sri Wijeya and Sri Gemunu high yielding Cinnamon varieties	Physio-chemical and bio active properties of new cinnamon varieties
21	Fabrication of low-cost graphite-based composite electrode for electrochemical applications (at high-temperature) as a value addition to local minerals	Fabrication of low-cost stable graphite based composite electrode with enhanced electrical and mechanical properties
22	Development of red clay-based water filter /apparatus for removal of hardness in drinking water	Red clay-based water filter to remove hardness in drinking water
23	Conversion of Sri Lankan natural quartz to solar grade silicon for applications in electronic industries	Development and upgrading lowcost electrochemical method for silicon production from quartz

24	Cost-effective removal of synthetic organics (SOCs) and heavy metals from pesticides in aqueous phase using TiO <sub>2</sub>	Development of a method to remove SOC <sub>s</sub> and heavy metals from pesticides
25	Improvement of thermal conductivity of rubber using graphite-based nanocomposite as a value addition	Development of graphite based nano-composite to improve the thermal conductivity of rubber
26	Development of low cost, ecofriendly domestic system to compost bio degradable food waste	Development of a domestic system to compost food waste in 24 hours
27	Development of Lubricant products from local graphite	Local business startup with local graphite
28	Production of polylactic acid (PLA) based low cost bio degradable plastic film as a replacement for polythene shopping bag and “Lunch sheet”	Development of a process to produce comparatively low-cost biodegradable plastic film to be used in lunch sheet and shopping bags
29	Design of production process equipment and wastewater treatment plant for Graphene production process	wastewater treatment system for the purification of wastewater discharge from Graphene production process
30	Development of a MI temperature tunnel control system	temperature tunnel control system
31	Amino acid profiling of selected Sri Lankan rice varieties using liquid chromatographic techniques	Amino acid profiles of selected Sri Lankan rice varieties
32	Investigation of calcium, magnesium and heavy metals uptake efficiency of Terminalia arjuna (Kumbuk Tree) as a Phyto-remediation species for water quality improvement of CKDu affected areas	To use roots of T. arjuna as a Phyto-remediation species for water quality improvement of CKDu affected areas
<b>Irrigation Department</b>		
1	Soil & Land use survey in Kantale irrigation project	Soil map of Kantale Irrigation Scheme
2	Major tanks in Hambantota area	Database and report
3	Morana reservoir project Mawadiodai Anicut	Solutions for erosion Hydraulics solutions
4	Restoration of ancient village tank systems in SL	Methodology for sustainable restoration



5	Pilot on intelligent solar powered turnout gate (Mahakanad arawa scheme)	Automated gate
<b>Medical Research Institute</b>		
1	Development of food composition tables	Sri Lankan Food Composition data base, To improve the Smallholder Livelihoods and Nutrition in Sri Lanka
2	Nutrition status, food consumption pattern, livelihood and food security of households in urban undeserved settlements in Colombo district	Sri Lankan Food Composition data base, To improve the Smallholder Livelihoods and Nutrition in Sri Lanka
3	Improving smallholder livelihoods and nutrition: An evaluation of WFP's Nutrition – Sensitive Food for Assets Program in Sri Lanka	Sri Lankan Food Composition data base, To improve the Smallholder Livelihoods and Nutrition in Sri Lanka
4	Preliminary study of detect mutations in UL97 gene in suspected ganciclovir resistant CMV patients' samples	CMV resistance genes
5	New technology to detect COVID 19(LAMP) method	New technology to detect COVID -19
6	Molecular detection of antibiotic resistance genes in Listeria monocytogenes in field collected raw milk isolates from Plonnaruwa district in Sri Lanka, Arerospective study	Listeria resistance genes
7	Rapid molecular identification of antifungal drug resistant candida strains from immune compromised patients at Apeksha hospital, Maharagama	Molecular Typing candida resistance
8	Structure activity relationship study of structural analogues of 6B- hydroxy betunolic acid as antimicrobial agents	
9	Derivatization of isolated pure compounds and evaluation of the enzyme inhibitory activities of derivatized compounds	Derivatized compounds with enzyme inhibitory activities
10	LC-MS analysis to identify secondary	Profile of the secondary metabolites
11	Bioaccumulation of Mercury and other selected Potential Toxic Elements (PTEs) in fish consumers of coastal areas in Puttalama district.; a case control study	Actual body burden of mercury & PTEs in adults
12	Estimation of 24 hours biting rhythm of medically important major mosquito vector species in Sri Lanka	To reduce mosquito borne disease morbidity & mortality
13	Burdens of human leptospirosis and effectiveness of an intervention to minimize delays in seeking treatment among patients in Monaragala District	

14	Comparison of community acquired and hospital acquired methicillin resistant staphylococcus aureus in the national hospital of Sri Lanka	
15	Enhancement of early , rapid and definitive diagnosis of Leptospirosis together with study on risk factors in the district of Gampaha	
16	Comparison of aminoglycoside, carbapenem & colistin by different antibiotic susceptibility methods for Acinetobacter	
17	Zebra Fish Egg Model as an indicator to environment Toxicity	Assessment of Environmental Toxins in selected water sources for CKDu in high disease prevalent areas in North Central Province using zebra fish egg model
18	Food borne outbreak surveillance programme	
<b>National Aquatic Resource Research and Development Agency</b>		
1	Study of flotsam associated fishery in offshore to introduce management strategies for sustainable fishery	a. Sound scientific regulatory measures and environmentally friendly efficient fishing methods for coastal fishery to enhance fish production. b. Enhance the living standards and socio-economic aspect among lobster fishing community in coastal zone of Sri Lanka.
2	To study the fishing efficiency of mono filament nets comparison with nylon nets used in inland	Comparison of fishing efficiency of each type of gill net for the inland reservoirs
3	Monitoring and Assessment of Pelagic (small pelagic and large pelagic) and non-fin fish fishery resources (sea cucumber, sea urchin and lobsters) using Port sampling	Information on biology and stock status of different fishery resources
4	Study of some biological and fisheries aspects of selected edible finfish species in the demersal fishery in the South-eastern coast of Sri Lanka	Scientific recommendations for conservation and management of major reef fish species with export interest.

5	NARA's contribution for Norway-Sri Lanka bilateral project improved management of the marine resources in Sri Lanka	<p>a. Outputs WP1: a) Digital system for fisheries landing data implemented.</p> <p>b. Outputs WP2: c) Systems implemented by NARA to manage and safeguard data from the time-series surveys in a central repository.</p> <p>c. Outputs WP3: b) Specific fisheries regulations relevant for management plan developed.</p>
6	Studying the fisheries and marine mammal interactions and population estimate of blue whale ( <i>B. musculus</i> )	conservation of the marine mammals, minimize marine mammal and fisheries interactions
7	Marine museum upgrade and skeleton preparation	<p>a. Whale skeleton established to public</p> <p>b. Upgraded museum opened to public</p> <p>c. Specimens of ETP species / other species exhibit to public</p>
8	Assessment of fisheries and aquaculture potential in floodplain ecosystems of Nilwala river basin	<p>1. Introduction of Alternative livelihoods</p> <p>2. Maximum utilization of abandoned paddy fields and lands due to flooding</p> <p>3. Maximizing fish production in the area through aquaculture</p> <p>4. Proper management plan for existing revering fishery (if any)</p> <p>5. Development of fish yield predictive models for the flood plain</p>
9	Reef restoration for enhancing the spat availability for commercial scale oyster farming	<p>1. 3 New oyster reefs near farming areas</p> <p>2. Improved spat collectors</p> <p>3. 1 awareness workshop</p> <p>4. Publications</p>
10	Survey on natural pearl oyster resource in North West and East coasts regard to regain the pearl industry in Sri Lanka	Introduce non-traditional aquaculture to fisher communities and create employment opportunities.
11	Establishment of gene pool of <i>Kappaphycus alvarezii</i> doty strains in relation to cope with different environmental conditions.	Establishment of quality seed with environmentally adapted strain. Introduced adaptive seeds to the framers.
12	Enhancing mangrove crab ( <i>Scylla serrata</i> ) aquaculture in Sri Lanka through better feed and health management with special reference to popularize the crab farming industry	Economically sound quality feed for farming
13	Bio floc Technology as an Integral Approach to Enhance Production Performance of ornamental fish Guppy ( <i>Poecilia reticulata</i> ) farming	a. Introducing application of biofloc technology in to the Sri Lankan aquaculture industry

14	Maintenance of Endemic fish captivity breeding and display section (removed research project title and continue maintenance of endemic fish section)	a. Baseline data on climate condition and reproductive performance of fish species on current exposure to floods and drought. b. Build institutional framework and mechanisms to support adaptation and adaptive capacity.
15	Proceeding on biotechnological application of Aquatic plants and seaweeds and growth studies in aquaponic recirculation system	Economic development of the country through better aquaculture practices.
16	Study on Disease prevalence in ornamental fish and cultured Tilapia	Baseline information of TiLV infections. Control measures developed for mitigating the disease problems No. of species affected by diseases in natural habitat
17	Monitoring disease conditions of shrimp aquaculture industry in Sri Lanka	Facilitate to improve disease management programmes in shrimp culture industry thereby minimize the losses from disease out breaks and increase the quality and quantity of production and finally income from the industry.
18	An Evaluation of Traditional Fishing Activities in Negombo Estuary, Bolgoda Lake, Madu Ganga and Jaffna lagoon and Strategies for Proper Management.	Recommendation for an effective management of traditional fisheries in Sri Lanka.
19	Culture based fisheries in Perennial reservoirs; related to Limnological studies in selected reservoirs leading to optimum stocking of fish	Limnological data, plankton diversity and abundance, fish harvesting data, suitable species combination and stocking density
20	Development of ornamental fish feed and ornamental fish culture at Panapitiya Regional Research Center- NARA	i. Identifying/introducing economical ornamental fish feeds. ii. Identifying stage specific ornamental feeds iii. Identifying species specific ornamental feeds.
21	Enhancement of quality of fish handled in multiday boats, monitoring safety of shellfish and antimicrobial resistance in aquatic environment	a. Efficient system for fish quality enhancement b. Assure the safety of bivalves c. Minimize the development and spread of antimicrobial resistance
22	Investigation of incidences of histamine forming bacteria in chilled Yellow fin tuna (Thunnusalbacares) in export fishery industry	Report on occurrence, risk and control of histamine forming bacteria in chilled fish in Multiday boats and fish processing plants
23	Extraction and characterization of bioactive peptides from Tuna fish waste	Report on properties of bio active peptides extracted from fish waste, Marketable fish based snack product
24	Development and commercialization of fish/seaweed products and extraction of bioactive compounds from seaweeds	Marketable seaweed based products Enhance employment opportunities Extraction of seaweeds based natural products

25	Development of capacities of Laboratories	<ul style="list-style-type: none"> <li>• Method validation and verification</li> <li>• Demonstrations for university students and others</li> </ul>
26	Investigation of causes for emergency incidents such as Oil Spills, algal blooms and fish kills (Emergency studies)	Reports and recommendations on mitigation of pollution and preventive measures for similar incidents in future.
27	The study on impact of urban pollution on the water-sediment system of the Hamilton Canal	<p>a. Identified the status of water-sediment system in the Hamilton canal</p> <p>b. Suitable preventive measures with recommendations to minimize/prevent urban pollution</p>
28	Study of Marine litter in coastal areas of Sri Lanka. (Continuous Project)	<p>a. Number of plastic and polyethene samples analyzed (Quantitative and Qualitative).</p> <p>b. Waste sources identified.</p> <p>c. Number of research papers/leaflet published.</p>
29	Identify the most appropriate fresh water fish species as bio-indicators in lower and upper catchments of the Kelani river basin for Environmental pollution Assessment (continuous project)	Consign the new findings to improve aquatic health by using fresh water fish as biological indicator
30	Assessment of Water Pollution Status of Selected Fishery Harbours in the Southern Province of Sri Lanka (Mirissa, Kudawalla, Dewundara)	<p>Identified the status of water safety and quality of Fishery Harbours in Southern province.</p> <p>Suitable recommendations to minimize harbour pollution.</p> <p>Provide recommendations to relevant government authorities for sustainable management of Fishery Harbours.</p>
31	Tuna Fishing Ground Advisory and Fisheries Information Service	Improved potential fishing zone forecast
32	Numerical Model in Assessing the Impact of Offshore Dredging on the Coastal Environment along Wadduwa-Negombo	<p>1. Calibrated and validated area morpho dynamic model for the western region of Sri Lanka.</p> <p>2. Mapping coastal system responses to waves, currents, sand transport rates and morphology derived under different sand extraction scenarios.</p> <p>3. investigate the erosion and deposit patterns under different sand extraction scenarios</p>
33	Prospecting Sand Resources in Off-shore, Galle	<p>Surface geology of the area</p> <p>Grain Size distribution map</p> <p>Chloride, shell and mineral content of the area</p> <p>Sediment thickness map</p>
34	Monitoring the Aggregation of Micro-plastics in Coastal Waters around Sri Lanka	<p>Capacity building on monitoring of micro-plastics in sea water and beach sand</p> <p>Report on abundance, distribution and characteristics polythene and plastic debris</p>

35	Assessment of Climate Change Impacts on the Ocean Environment: Impacts of Temperature, Salinity and Water Level on Coral Reefs in the East and the West Coasts of Sri Lanka	In-situ temperature, salinity and water level dataset in east and west coast of Sri Lanka. Major coral reef species composition in those two sites and their growth rate in natural environment. Blended sea temperature, salinity and water level product. Reports and scientific publications based on temporal and spatial ocean temperature variability around Sri Lanka and its impact on coral growth rates.
36	Ocean Acidification and the Changes of the Marine Carbon System in Sri Lankan Waters	Capacity building on monitoring station of acidity and alkalinity in sea water together with other in situ parameters in southern coastal water Report on ocean acidification status in Sri Lankan waters. Report on Seasonal variability of calcified phytoplankton with response to ocean acidification status
37	Sea Level Observation and Formulation of Oceanographic Data Base	Sea level station established at all the sites of Sri Lanka, Sea level data network established at NARA
38	Seasonal and inter annual variation of Coccolithophore sinking fluxes and their contribution to total carbon fluxes in upwelling regions of Sri Lankan waters.	To establish time-series sediment traps around Sri Lanka Create time-series data base for carbon export in Sri Lankan waters. Identify the reaction of phytoplankton to global climatic events & their contribution to primary production and carbon export Identify environmental drivers for seasonal variation in Coccolithophore population Quantify the phytoplankton abundance and composition together with special climatic events
39	National Charting Program	1. Fair Sheet of Trincomalee to Kudremalai point with the scale of 1:300,000 by 2020 2. Fair sheet for covering 50% of Coastal Nautical Chart from Little Basses Reef to Pulmoddai Roads by 2020 with the scale of 1: 300,000 3. Fair Sheet of Coastal Nautical Chart of Weligama to Colombo with the scale of 1: 150,000 by 2020 4. Fair Sheet of Nautical Chart of Mannar Island with the scale of 1: 75,000 by 2020
40	Establishment of Database and online data processing Unit for Crowd Sourced Bathymetry parallel with the “Sea Bed 2030” global mapping project of General Bathymetric Chart of the Oceans (GEBCO)/Nippon Foundation	Bathymetry data around Sri Lanka

41	An Assessment of Tidal Asymmetry around the Sri Lankan Coastline	Regional tidal model. Tidal datum variability map around the coastline.
42	Investigating Vulnerability of Coastal Erosion in Kalutara	Comprehensive scientific report on “Investigating Vulnerability of Coastal Erosion in Kalutara” GIS based model indicating coastal erosion patterns in Kalutara
43	Fisheries Information Centre (FIC) of NARA	a. Number of inquiries received from the hotline b. Number of inquiries successfully solved c. Number of promotional activities conducted d. Number of industry analysis reports prepared
44	An analysis of Gender Role in small scale coastal fisheries (SSF) in Sri Lanka (SL)	Progress reports
45	Bio-Economic analysis of declared Marine Protected Areas (MPAs) in Sri Lanka	a. Number of field visit completed b. Final report c. Number of meetings held with stockholders
46	An Analysis of Herring and Sardinella Fisheries in Sri Lanka	a. Mapped value chains for Herring and Sardinella fisheries b. Database including, catch data, fisheries data, cost of production and price information of Herring and Sardinella fishery c. Recommendations for value chain development in Herring and Sardinella fisheries d. Final report
<b>National Building Research Organization</b>		
1	Development of test method and specification for coir geotextiles	Bioengineering erosion control geotextile application
2	3D Subsurface geotechnical mode for disaster resilience housing	Online database
3	Suitability of Fly ash blended cement for construction of concrete water storage tank	Fly ash blended cement
4	Development of cost-effective green masonry products using waste materials	Sustainable use of waste materials

5	Suitability of offshore sand sludge for value added building products	Filler for tile adhesive material
6	Systematic diagnostic assessment of chemical disaster risk in Sri Lanka	Reduce chemical disaster risk
7	Development of real-time air quality monitoring network in urban areas in Sri Lanka for air quality prediction and preparedness system	Development of real-time air quality monitoring network
8	Hydrological functions of small tank eco systems and its role in sustainable water management	Study soil moisture variation in different ecological zones.
9	Sustainable roof based rainwater harvesting system to overcome domestic water deficit condition in Anuradhapura	installation of sample harvesting system, rain water harvesting manual, excel based online calculator
10	Air Quality Study on concentrations and significance of Chrysotile Asbestos fiber in household dust and household ambient environment in Sri Lanka	Ambient/indoor air quality database on chrysotile fiber and develop policy guideline
<b>National Engineering Research &amp; Development Centre</b>		
1	Semi- automated tea vending machine	
2	Cold storage for preservation of vegetables	
3	Cold storage for multi day fishing boats	
4	Coir braiding machine	
5	Power line career operated light control system	
6	Universal data acquisition system	
7	Fuelwood chip feeding system for Tea Industry	
8	Advancement of NERDC crematoria	



9	Aquatic weeding machine	
10	PET bottle crushing machine	
11	Coir pith dryer	
12	Soil based rainwater harvesting system	
13	Automated tea vendor	
<b>National Institute of Fundamental Studies</b>		
1	Earth Resources and Renewable Energy	
2	Environmental Science research Programme	
3	Evolution, Ecology & Environmental Biology	
4	Plant & Environmental Sciences	
5	Plant Taxonomy & Conservation	
6	Primate Biology	
7	Condensed Matter Physics & Solid-State Chemistry	
8	Energy & Advanced Material Chemistry	
9	Material Processing & Device Fabrication	
10	Nanotechnology & Advanced Materials	
11	Microbial Biotechnology	
12	Microbiology & Soil Ecosystems	
13	Rhizobium Project	

14	Molecular Microbiology & Human Diseases	
15	Plant Stress Biology & Molecular Genetics	
16	Food Chemistry	
17	Natural Products	
18	Nutritional Biochemistry	
19	Quantum Physics & Applied Electronics	
<b>National Institute of Postharvest Management</b>		
1	Design & Construction of a Tunnel Type Forced-air Cooler for Cooling of Fresh Mango	A cost effective method to remove field heat from fresh mangoes. Low cost tunnel type forced air cooler. Extended storage life of mango along with improved quality which will facilitate programmed year round marketing thus overcome market glut and price fluctuation. Same mechanism can be applied to reduce postharvest losses of other fruits and vegetables also.
2	Evaluation of the chemical residues associated with artificial ripening and establish safe and economically viable dosing protocols for major fruit crops	To establish a safe and economically viable dosing protocol to minimize the hazardous effect of artificial ripening on consumers by increasing the market availability of good quality and safe fruits
3	Reduction of Postharvest Losses of Big Onion ( <i>Allium cepa</i> ) by Improved Curing and Storage Technologies	Reduction of onion postharvest loss, Increase the economic status of onion farmer High income through offseason sales , Prolong storage period of onion to be used for the seed production
4	Investigation of Nutritional and functional Properties of Value-Added Products from soursop ( <i>Annona muricata</i> )	Reduce the post-harvest loss of soursop. - Introduce new food products produced from soursop to local food industry
5	Mitigating rice stickiness to enhance consumer preference through accelerated aging of fresh paddy	Mitigation of stickiness of freshly harvested rice while enhancing the consumer demand Introduction of alternative method for artificial aging of freshly harvested paddy to increase the quality of cooked rice
6	Enhancement of quality characteristics in dehydrated fruits by optimizing process parameters of dehydrating technologies	Improving quality characteristics of dehydrated fruits, as suitable to the export market, by manipulating various parameters involving in dehydrating process

7	Development of ready to use formulation for enhance the shelf life and quality of cut flowers	Develop ready to use formula to improve keeping quality of cut flowers, widely use in decorations
8	Development and performance evaluation of washing equipment for selected up country vegetables combined with ozone treatment	Fabrication of ozone assisted vegetable washer
9	Development of heat pump dryer for drying wet paddy.	Fabrication of heat pump drier for drying wet paddy
10	Field application of rice husk silicon to control pre-harvest and postharvest disease of bitter gourd and green chilies.	Reduce the pre harvest disease in green chili
<b>Natural Resources Management Centre</b>		
1	Assessment of Atmospheric Nitrogen Pollution Sources, Impacts on Environmental Sustainability, Human Health and Remedial Measures in Three Unique Pollution Regions in Sri Lanka	Identify Sources of nitrogen pollutants in rain water in different locations
2	Assessment of recent trends of extreme weather events in Sri Lanka	Agricultural decision-making tool
3	Assessment of soil erosion and rate of runoff generation under different soil conservation measures	Evaluate different types of soil conservation techniques
4	Assessment of the temporal variation of the highest rainfall receiving area of Sri Lanka	Identify the wettest place in the Wet zone of Sri Lanka
5	Comparative assessment of soil erosion, soil moisture and crop performance in contour soil bund system introduced as an adaptation measure to climate change impacts in Anuradhapura district with other land uses	To minimize the adverse impact of soil erosion and improve the soil moisture content in maize cultivation,
6	Development of AI range maps for each district by aggregating GN maps within each Agrarian Service Center divisions	AI Range Map for Sri Lanka
7	Development of land use classification system for agriculture related agroecosystems	land classification system for Sri Lank
8	Development of the Soil Atlas of Asia and National Soil Information Systems	Developed soil data sets
9	Effect of Indian Ocean Dipole (IOD) events on inter-seasonal variability of rainfall in Wet and Dry zones of Sri Lanka	To assert the rainfall variation in DZ of SL under the effect of IOD
10	Identification of sources and transport of agrocontaminants in hilly agricultural watersheds in the declared conservation area in Sri Lanka	The source and mode of transport phosphorus to water bodies in downstream areas.

11	Implementation of Soil Conservation Act (SC Act)	Increase awareness of soil conservation act using different media types.
12	Issuing weather-based SMS alerts as a decision-making tool for crop management under sudden unexpected weather changes	Weather pg. 12 National S & T Review 2020- NASTEC Questionnaire Survey based SMS alerts to the registered users.
13	Land Degradation Assessment in Kandy, Badulla & Nuwara-Eliya through LADA approach.	Implement interventions to mitigate land degradation and establish sustainable land use and management practices.
14	Decomposition and nutrient release pattern of different organic manures and synchronization of nutrient release from organic manure with nutrient demand in different growth stages of Green gram ( <i>Vigna radiata</i> (L.) Wilczek)	Decomposition rate and nutrient release pattern of five organics manures
<b>Office of the Registrar of Pesticides</b>		
1	Establish Maximum residue limits and pre harvest levels	Establish MRL and Pre harvest interval for all spectrum of pesticides
2	Incidences monitoring and occupational exposure study of highly hazardous Pesticide (HHPs) and severely hazardous pesticide formulation (SHPF) among farmers in Sri Lanka	Familiarize with tools for data collection on incidents caused by pesticides formulation (SHPF) among farmers in Sri Lanka
	Development / Validation of test methodologies and identification of toxicity status of twenty selected commonly used insecticides on local honey bee ( <i>Apis cerena</i> ) to ensure pollinator safety	Develop a reference toxicity data base with 1%, 50% and 90% mortalities for tested chemicals Generate and collect data for a baseline toxicity assessment criterion for local honey bees
<b>Palmyrah Research Institute</b>		
1	Preparation of instant hand sanitizer using Palmyrah	More revenue will be generated though palmyrah sprit.
2	Preparation of pleasant Palmyrah palm wine	Marketability of alcoholic beverages will be enhanced
3	Investigating the Effect of Palmyrah Fruit Pulp Extract on Antioxidant and Antibacterial Activities of Aloe vera based Soap	Utilization of Palmyrah fruit pulp and aloe vera gel will be enhanced through marketing antioxidant enriched soap.
4	Formulation and standardization of novel toothpaste based on the Palmyrah fruit pulp	Livelihood of Palmyrah dependents will be improved.
5	Microbial, physicochemical and sensory evaluation of Palmyrah fruit pulp-based sauce	More revenue will be generated.

6	Formulation of Palmyrah fruit pulp powder using spray dryer and its nutritional analysis	Foreign exchange will be earned.
7	Comparative study on vitamin, mineral profile, Antioxidant properties and total phenolic content of Palmyrah ( <i>Borassus flabellifer</i> ) sap and sap-based Products	Palmyrah sector will be expanded.
8	Formulation and standardization of flavored tea syrup using Palmyrah treacle and molasses	Value will be added to Palmyrah resources.
9	Determination of effective de-bittering method for un-boiled Palmyrah tuber flour	Livelihood of Palmyrah dependents will be improved.
<b>Plant Genetic Resources Center</b>		
1	Seed and planting material production	
2	study the storage behavior of selected crop species (chilly, brinjal and okra) under hermetic conditions for long term conservation in seed Genebank	
3	Molecular and morphological characterization of selected traditional rice varieties towards identification of accessions responsible for resistance to Brown plant-hopper	
4	Genetic diversity assessment and evaluation of selected crop wild relatives in Sri Lanka for crop improvement	
<b>Rice Research and Development Institute</b>		
1	Development of new rice variety for 4 months	Develop high yielding 4 m variety with expected grain quality and pest disease reactions
2	Evaluation of Yield potential of newly bred promising lines (Preliminary Yield Trial)	4-month high yielding rice variety to test in MYT
3	Evaluation of Yield potential of newly bred promising lines against the recommended varieties under Major Yield Trial	4-month high yielding rice variety to nominate NCRVT
4	Purity maintenance and multiplication of elite lines	Maintain genetic purity of recommended rice varieties
5	Seed production of Breeder seeds and recommended varieties	Breeder seeds
6	Development of new rice varieties tolerant to salinity	salinity tolerant rice lines with high yield, resistant to pests and diseases, and improved grain quality
7	Identification of introduced elite salt-tolerant rice varieties to national release (AFACI)	Superior salt-tolerant lines with better adaptation to Sri Lanka
8	Development of new rice variety for 3 1/2 months	Development of high yielding 3 1/2 m rice varieties with expected grain quality characters and pest disease reactions
9	Evaluation of Yield potential of newly bred promising lines in PYT (Preliminary Yield Trial)	Selection of 3 1/2 month high yielding rice varieties to test in MYT
10	Evaluation of Yield potential of newly bred promising lines against the recommended varieties under MYT (Major Yield Trial)	3 1/2 month high yielding rice varieties to nominate NCRVT

11	Breeder seed production.	Maintain genetic purity of recommended rice varieties
12	Multiplication of elite lines	Obtaining 30 kg pure seeds from each
13	Development of high yielding 3 months age rice varieties for favorable environments	New 3 months age rice varieties with high yield potential, non-lodging, acceptable grain qualities and resistant to major pest and diseases
14	Development of rice varieties with low moisture stress tolerance	New rice varieties with low moisture stress tolerance
15	Development of drought escaping short age rice varieties (NRC project)	New drought escaping short age rice varieties with acceptable yield, non-lodging, acceptable grain qualities and resistant to major pest and diseases
16	Development of rice varieties with high temperature stress tolerance	New rice varieties with high temperature stress tolerance
17	Breeder seed production (Bg 300, Bg 310)	Genetically purified and certified breeder seeds
18	Multiplication and maintaining the genetic purity of recommended 3 months age rice varieties and promising lines (Bg 304, Bg 305, Bg 301, Bg 34-8, Bg 276-5, H10, Zhonghua, Bg 11-1051, Bg 14-2374, Bg 14-2448, Bg 17-2525)	Genetically purified seeds
19	Development of 2 ½ month (ultra-short age) rice varieties	Develop high yielding 2 1/2 m variety with expected grain quality and pest disease reactions
20	Breeder seed production	4 bushals of breeder seeds from each variety
21	Evaluation of Yield potential of promising lines a. Preliminary Yield Trial(PYT) b. Major Yield Trial (MYT)	Select best lines to test in CRVT (3 lines)
22	Purity maintenance and multiplication of elite lines	200Kg from Bg 13-1265 and 40 Kg per each other line
23	Development of BPH resistant rice varieties through Marker Assisted Breeding program	7 BCF2 populations will be phenotypically screen and advanced
24	Germplasm multiplication and conservation	135 accessions will be multiplied and conserved in short term cold storage
25	Purification of selected traditional rice cultivars	3 bushels of purified seeds of each variety will be produced
26	Development of quality rice varieties through mutation	10 promising lines will be test in yield trials
27	Development of new improved quality rice varieties with acceptable yield	new quality rice varieties
28	Evaluation of new elite rice lines in preliminary yield trial (PYT)	High yielding quality rice lines with pest and disease tolerance to evaluate in MYT
29	Evaluation of promising rice lines in major yield trial (MYT)	High yielding quality rice variety with pest and disease tolerant for further evaluation in NCRVT

30	Multiplication and maintaining the genetic purity of promising rice lines	Genetically purified seed
31	Nuclear seed production of promising hybrid	Produced pure seeds of promising hybrids
32	Evaluation of exotic Hybrid lines for local condition	Well adapted hybrid line for local condition
33	Breeder seed production of recommended inbred varieties	Produced - 3 bubals Produced - 9 bubals Produced - 14 bubals
34	Testing of grain quality characteristics of promising rice lines	Introduce the physical and chemical properties of new rice lines
35	Incorporation of AG1 gene into Bg 366 through MAS	Rice variety Bg366+AG1 with capability of anaerobic germination for direct seeding areas
36	Incorporation of Sub1 gene into popular varieties (Bg 455, Bg 379-2, Bg 360)	Improved lines for abiotic stress tolerant of popular varieties having comparable yield with their recurrent parents.
37	Development of BLB resistant rice lines	BLB resistant rice lines
38	Calli mediated mutation breeding using chemical mutagen	1. White pericarp rice variety with At 362 plant characters. 2. High yielding long slender rice varieties
39	Pyramiding of BLB and Blast resistant genes in rice	BLB and Plats resistant rice lines
40	Development of Phosphorus deficiency tolerant rice varieties	P efficient rice lines
41	Marker Assisted breeding of Gall midge resistant rice line/ variety	High yielding and Gall midge resistant rice line variety
42	Testing of promising rice lines in low county intermediate zone - (NCRVT)	New rice lines for regional /national cultivation
43	Adaptability testing of promising rice lines (VAT/LSVAT)	New rice lines for regional /national cultivation
44	Screening of rice lines for drought tolerance	Drought tolerant lines
45	Productivity and quality improvement of rice through maximizing water and nutrient use efficiency during grain filling in irrigated direct seeded rice	Improvement of yield and quality of rice
46	Multiplication of abiotic stress tolerant lines	50-100 kg of drought tolerant seed stock 5-10 kg cold tolerant seed stock of each variety/line
47	Combining of Plots	5% yield increment, 5 labor/ha reduction
48	Monitoring near canopy environment under heat & drought at flowering stage and Early morning flowering ability of rice (DOA / NIAES)	Develop heat and drought mitigatory options.
49	Purification of EMF IR64 for early morning trait	Genetically purified seed
50	Long term effect of P application on soil P content and grain yield of rice	Importance of organic manure application to sustain productivity in paddy fields will be estimated
51	Long term effect of application of organic manure and chemical fertilizer to rice fields	Information on nitrogen response of elite rice lines will be made available to breeders
52	Nitrogen response of elite breeding lines	Importance of K fertilizer application in rice cultivation and most suitable method

		of K application to improve K use efficiency will be understood
53	Long term effect of K fertilizer on soil and plant K content in rice cultivation	Soil fertility and grain yield changes in paddy fields without application of manure or fertilizer
54	Maintenance of rice fields without application of chemical fertilizer or organic manure	Best N, P combination
55	Spatial Distribution of Mineral Elements and Metalloids in Rice Fields, and Its' Relation with the Productivity and Quality of Rice Grains in Sri Lanka (AHEAD Project: DOA-UOP)	Spatial distribution of elements, Elements of soil and plant Relation with the Productivity and Quality of Rice Grains
56	Study the nutrient availability in soil and plant with different moisture/water level in paddy fields	Information on nutrient availability in soil and plant with tested irrigation methods
57	Evaluation of new fertilizer products from different companies	New fertilizer products which performed well for high grain yield will be recommended for farmer practices
58	Effect of Sulfur and Mg on grain yield of rice grown in soils of LCIZ	If responses of rice crop to added Sulfur and Mg fertilizers are observed Sulfur and Mg fertilizer recommendations are given to receive the optimum yield of rice
59	Evaluation of Biofilm Bio fertilizer (BFBF) on growth and yield of paddy cultivation	If bio film bio fertilizer is effective on grain yield of rice, recommended Inorganic fertilizer rate can be reduced
60	Seed production of selected traditional varieties under organic conditions	To supply seeds for organic rice producers
61	Re-evaluation of already recommended rice varieties and traditional rice varieties for BPH	Current status of varietal reaction to BPH will be determined as an indicator of bio type development
62	Evaluation of silica containing products as nutrient cum plant-resistance inducers for Leaf Folder, BPH and Stemborer in rice. (3 experiments)	Plant resistance inducers are identified as alternative pest management strategy
63	Screening of NCVT rice lines / breeding lines/ INGER lines/progenies for resistance to Brown plant hopper (BPH)	Sources of resistance to Brown plant hopper
64	Screening of NCRVT rice lines / breeding lines for resistance to Rice Gall Midge (RGM)	Sources of resistance to RGM
65	Evaluation of Pheromones traps for rice stem borer	Effective dose of pheromone and the source for the control of yellow stem borers
66	AFACI(PMP) Project; Establishment of prevention network for migratory pests in Asia region Development of pest management techniques (Chemical and non-chemical) for BPH	Timely exchange of information regarding Pest forecasting system, identification of different species and management methods of BPH to the AMIVS system Non chemical and economical pest management technologies for RPH / FAW Comparatively safer insecticides to manage RPH
67	Evaluation of effectiveness of insecticides against major rice pests	Recommend the new insecticide for major rice pests- thrips, Paddy bug - Leaf folder, mites - stem borer and BPH
68	Study of faunal diversity in rice ecosystem	Identify different faunal species associated with rice cultivation Forecasting the faunal contribution



		(beneficial) on controlling the pest occurrence Identify the importance of faunal diversity maintenance as an IPM technique
69	Screening of rice breeding lines for bacterial blight resistance	Resistant rice lines
70	Screening of rice breeding for blast resistance	Resistant rice lines
71	Investigation of Si supplements on grain discoloration disease	Management practice for grain discoloration
72	National coordinated herbicide testing program	Selection of new herbicide for rice
73	Re-evaluation of weed control efficacy of new candidate herbicide	Testing of weed control efficacy
74	Evaluation of phyto toxicity effect of herbicide	Estimate phyto toxicity of rice varieties for new candidates
75	Evaluation of weed control efficacy of new rice lines	Enhance weed controlling ability for sustainable rice production systems
76	Evaluation of seed bank depletion by poly mulching	Enhance weed controlling ability for sustainable rice production systems
77	Clarification of weed suppressive characters of traditional rice varieties	Provide information for plant breeders to develop weed suppressive rice varieties to minimize chemical usage
78	Development of new improved quality rice varieties with acceptable yield	new quality rice varieties
79	Evaluation of new elite rice lines in preliminary yield trial (PYT)	High yielding quality rice lines with pest and disease tolerance to evaluate in MYT
80	Evaluation of promising rice lines in major yield trial (MYT)	High yielding quality rice variety with pest and disease tolerant for further evaluation in NCRVT
81	Multiplication and maintaining the genetic purity of promising rice lines	Genetically purified seed
82	Improvement of high yielding rice varieties for problematic soils in LCWZ through conventional breeding technique	Improvement of promising rice lines with expected qualities which are suitable for yield testing at the research center
83	Improvement of rice varieties for submergence and iron toxic conditions	Selection of few promising rice lines having submergence and iron toxicity tolerance
84	Testing Yield Potential of Promising rice lines	Selection of good performing promising rice lines for NCRVT program
85	Breeder seed production of recommended Bw rice varieties	Required amount of Breeder seeds of Bw 367, BW 372 and Bw 312
86	Seed Purification of Promising lines	Pure seeds of Bw 12-574, Bw 14-509 , Bw 15-971, Bw NP BLB 93-1-11 , Bw NP BLB 72-1 , Bw NP BLB 99-2-1 , Bw 15-501 , Bw 17 – 1558, Bw 17 – 1561, Bw 18 – 604, Bw 17- 926, Bw 14-523, Bw 14-764 , Bw 15-3-1309, Bw Se 14-1806 , Bw se 06 – 486 , Bw se 14 – 1811, Bw 15-519, Bw NP-14-4-1 Bw NP-14-5-1, Bw16-1567, Bw 16-764, Bw 16-1577, Bw 17 – 1565, Bw 17 - 1751 , Bw 18 -500, Bw 18 - 532

87	Seed Multiplication of Promising lines	60 kg of Bw 12-574,30 kg of 14-509,30 kg of 15-3-1322,30 kg of 15-971,10 kg Of NPBLB72-1, and quality seeds of Bw 400, Bw 451, Bw 452, Bw 453, Bw 266-7, Bw 302, Bw 351, Bw 363, Bw 267-3, Bw 364, Bw 367, Bw 372
88	Supply of quality seeds of selected traditional rice varieties	Quality seeds of Suwendel, Madathawalu, Beheth heenati, Kuruluthuda and Herath banda
89	The sixteen International Rained Rice Observational Nursery (IRLON 2018)	Selection of good performing rice lines under the local conditions
90	Effect of Silicon supplements(Si) against Brown-Spot Resistance and yield of rice in LCWZ	management of brown spot disease with induce resistance
91	Screening of fungicides against leaf blast	Effective fungicide to control leaf blast
92	Screening of NCRVT rice lines / varieties , promising breeding lines & INGER material for Blast disease	new blast resistant sources
93	Screening of NCRVT rice lines / varieties, promising breeding lines & INGER material for BLB	New bacterial blight resistant lines/ varieties
94	Testing of different types of new fertilizers for rice grown in LCWZ.	Suitable new fertilizer products for rice cultivation
95	The effect of long term application of inorganic fertilizer on rice grown in LCWZ	Sustainable fertilizer management system
96	The effect of application of Mg & S to paddy lands in LCWZ	Effective rate of Mg & S to be applied
97	Evaluation of selected rice varieties/lines for phosphorous deficiency tolerance under greenhouse condition	P deficiency tolerant rice varieties/lines for cultivation under low P soil condition
98	Evaluation of developed bacterial biofertilizer under greenhouse and field condition	Bacterial biofertilizer for rice cultivation
99	Green house screening of NCRVT lines, breeding lines/ varieties& INGER material for BPH	Sources of resistance to BPH
100	Screening of improved rice varieties for rice sheath mite.	Sources of resistance to rice sheath mite
101	Field evaluation of breeding lines for resistance to Rice Gall Midge (RGM)	Sources of resistance to rice gall midge
102	The effect of silica tabs & diatom soil for control of rice moth	Management of rice moth
103	The effect of silica tabs & diatom soil for control of rice weevil	Management of rice weevil
104	Screening of improved rice varieties for BPH by honey dew test	Sources of resistance to BPH
105	National coordinated herbicide screening test (NCHST)	Effective new herbicides for wet seeded rice in LCWZ
106	Observational yield trial of selected rice line for water seeding	Potential rice line for water seeding
107	Testing of different rice varieties/ABL for weed competitive ability under LCWZ condition	Rice varieties/ABL with high weed competitive ability

108	National coordinated herbicide screening test (NCHST)	Effective new herbicides for wet seeded rice in LCWZ
109	Observational yield trial of selected rice line for water seeding	Potential rice line for water seeding
110	Testing of different rice varieties/ABL for weed competitive ability under LCWZ condition	Rice varieties/ABL with high weed competitive ability
111	1. Testing of promising rice lines in low county wet zone -(NCRVT )	New rice lines for regional /national cultivation
112	2. Adaptability testing of promising rice lines (VAT).	New rice lines for national release
113	3 Evaluation of improved rice lines for submergence tolerance under field condition	Submergence tolerant rice lines for low lying areas of LCWZ
114	4. Yield evaluation of developed submergence tolerant rice lines	Rice varieties for salinity and submerged condition
115	5.Evaluation of developed P fungal bio-fertilizer under field condition at different locations	P biofertilizer for rice cultivation
116	6. Studying the shelf-life of sterilized rice porridge as a low-cost medium for mass multiplication of nitrogen-fixing and phosphate-solubilizing bacteria	Suitable low-cost media for mass multiplication of beneficial bacteria
117	7.. Evaluation of different rice varieties /lines for ridges of Sorjan cultivation system	Suitable rice varieties/ lines for Sorjan system
118	8. Vegetable cultivation in Sorjan system	Suitable crops for sorjan system
119	9. Multiplication of Bg 455, suwadhal, Bw 372 and Bw 367	Commercial seeds for farmers
120	1. Development of improved rice varieties through Conventional breeding methods	F1 generation
121	2. Production of breeder seed	Required amount of breeder seeds of recommended 'At' varieties will be produced. At 307, At 308 At 311, At 373, At 362
122	3.Yield evaluation of promising breeding lines through Major and Preliminary Yield Trials	High yielding varieties with good agronomic traits
123	4.Yield evaluation of promising breeding lines through Major and Preliminary Yield Trials	High yielding varieties with good agronomic traits
124	5. Evaluation of black rice lines	Suitable black rice line
125	6. Studying the yield, agronomic and grain quality performances of traditional rice varieties compared to improved rice established under organic fertilizer	Yield and other advantages of organic cultivation
126	7.Grain quality evaluation of promising breeding lines	Desirable varieties with acceptable grain quality
127	8. Production of seed paddy	Establishment of nurseries, transplanting as rows, continuous evaluation, harvesting & processing
128	9. Multiplication of promising breeding lines	Evaluating agronomic, grain quality, yield and other attributes in three row progenies
129	10. Multiplication of promising breeding lines	Three rows progenies will be established. Evaluation will be continuously to maintain purity of the variety.
130	1. Rice variety improvement for high potential rice lands of LCWZ	2-3 new varieties Salinity and submerge tolerant rice varieties

131	2. Improvement of rice varieties for the salinity affected flood prone soil conditions of Low Country Wet Zone	
132	3. Development of thrips tolerant rice varieties	Thrips resistant improved rice varieties
133	4. Identification of suitable traditional rice varieties, documentation of farmers knowledge and strengthening of seed flow network of traditional rice in Low Country Wet Zone	Identified few traditional rice varieties match for the LCWS and strengthen the seed flow network of them
134	5. Breeder seed production	Breeder seeds of Ld. 365, Ld 408, Ld 368 Ld 371, Ld 253
135	6. Seed production of released varieties	Quality commercial seeds of Ld 253 and Ld 368
136	1. Evaluation of advanced breeding lines from the crosses of Dahanala with Ld 368, Bg 9024, Bg 300 short age varieties for the resistance of thrips. (Contin.)	Thrips resistant short age rice variety
137	2. Quality and yield evaluation of BLB Resistant INGER varieties	BLB resistant rice variety
138	3. Screening of advance Breeding lines for the resistance of Brown spot	Brown spot resistant rice lines
139	4. Screening of advance Breeding lines for the resistance of BLB	BLB resistant rice lines
140	5. Screening of advance Breeding lines for the resistance of Gall midge damage	Gall midge resistant rice lines
141	6. IR 012 selected from 28th INGER nursery established as progeny lines	
142	6. National Co-ordinated Herbicide Screening (NCHST) Trial for wet-seeded rice	Effective herbicides to control weeds in low country wet zone
143	01. Evaluation of selected rice varieties for aerobic rice cultivation in Low country wet zone	Better rice varieties for aerobic cultivation in LCWZ
144	02. Long term soil fertility monitoring in RRS Labuduwa	Seasonal changes of basic soil properties in selected site
145	04. National Coordinated rice variety testing trials	Identified adaptable and better performing rice varieties for LCWZ
146	1. Fertilizer recommendation for ultra short aged rice varieties.	
147	2. Management of weedy rice	Reduced weedy rice problems in the eastern region
148	3. Weedy rice seal bank dynamic study and estimation of the infestation.	
149	4. Study on weedy rice abundance, dynamic and yield loss of rice	To reduce weedy rice problems in Ampara District.
150	5. Induced resistance studies on BPH..	
151	6. Effect of BPH attack in different stages in different varieties of rice in Ampara district.	very essential for building up a successful pest management system
152	7. Seed Multiplication	Produce quality seed materials for future purposes.
153	1. Purification of local land races of rice in northern region	To obtain purified seeds of traditional rice varieties
154	2. Evaluation of selected locally collected popular rice lines for yield and the grain quality characters	Few rice lines having high yield with good grain quality for hybridization

155	3. Development of high yielding resistant to major pest & disease consumer preference to region, short-intermediate duration red rice varieties	Promising new improved elite lines with desirable traits
156	4. Yield evaluation of advanced rice lines	Promising lines with desirable characters for next yield evaluation level
157	5. Influence of Azolla in Rice Growth and Yield	Finding the effect of Azolla on weed suppression and rice yield improvement.
158	6. Evaluation of Loyant herbicide on different rice varieties	Effect of loyant herbicide
159	7. Weed control in dry drill-seeded rice.	Proper weed control method
160	8. Bio efficacy evaluation experiments of candidate herbicides	Promising new herbicide for controlling different types of paddy weeds
161	9. New Organic Fertilizer testing trial	Best performing fertilizer
162	10. Testing of promising rice lines in low county intermediate zone - (NCRVT)	New rice lines for regional /national cultivation
163	11. Adaptability testing of promising rice lines	New rice lines for national release
164	12. Seed production	Pure seeds
165	Recommendation of rate of application and time of application of Loyant herbicide with special reference of Bg 360	Predict the proper dosage and time of application of Loyant without phytotoxic effect and yield reduction
166	Management of Rice thrips through application of Calcium phosphate solution	Predict the proper concentration of $Ca_3(PO_4)_2$ for the effective control of Thrips
167	Seed Production	Supply seed paddy for maha season cultivation
<b>Rubber Research Institute of Sri Lanka</b>		
1	Breeding selection and evaluation of new genotypes using conventional strategies	Recommendation Add 05 genotypes to large scale trials Release 01 clone for smallholders Develop 02 yield indexes for clone evaluation (47% work has been completed)
2	Use of Molecular biology strategies to Increase the production and productivity of rubber	Characterize 01 genes Recommend 02 drought tolerant clones (55% work has been completed)
3	Improvement of nursery and propagation techniques, field establishment and immature upkeep	Three chemicals and one plant extract (botanical) tested, one technique for short term seed storage recommended
4	Intercropping diverse crop species with rubber for land productivity improvement, additional income generation and environmental sustainability	Two new crops tested for their suitability to grow under rubber
5	Training and trouble shooting in planting, tapping and intercropping	Thirty advisory visits made, twenty tapper training programmes, ten bud grafting and intercropping programmes conducted
6	Testing of different harvesting systems for sustainable utilization of bark and productivity improvement	Two improved tapping techniques tested, One botanical formula and two chemicals tested for their alleviating effect on TPD incidence

7	Evaluate the effectiveness of environmentally friendly agro-management practices for enhancing fertility in rubber soils	<ol style="list-style-type: none"> <li>1. Apply different techniques to enhance soil fertility and fertilizer use efficiency in rubber soils (7 techniques)</li> <li>2. Revise the recommendations for rubber (one recommendation)</li> <li>3. Establishment of demonstration plots based on rehabilitation of degraded rubber lands by using environmentally friendly agro-management practices (2 demonstration plots)</li> <li>4. Apply different mulching techniques to control weeds effectively (2 techniques)</li> </ol>
8	Introduction of new fertilizer mixtures for nontraditional rubber growing areas	<ol style="list-style-type: none"> <li>1. Develop databases based on soil and plant parameters (3 databases)</li> </ol>
9	Issuing certification for land suitability, site specific fertilizer applications and analyzing fertilizer samples	<ol style="list-style-type: none"> <li>1. Issuing site specific fertilizer recommendation reports &amp; total extent of survey land (45 reports &amp; 5000ha of extent)</li> <li>2. Land suitability reports &amp; total extent of survey land (5 reports &amp; 250 ha of extent)</li> <li>4. Analytical reports &amp; parameters analyze (150 reports &amp; 4000 parameters)</li> </ol>
10	Evaluation of low cost portable NIR (wear Intra – Red) spectrometer to prediction of different leaf and soil parameters in immature slop rubber lands	<ol style="list-style-type: none"> <li>1 Immediate identification of fertility parameters</li> <li>2 On the spot problem solving and advising</li> </ol>
11	Evaluation of different weed control methods	<p>Identification of effective weed control methods</p> <p>Development of new recommendation</p>
12	Micronutrient requirement of different Hevea grown soils and their effectiveness on Hevea plants	Practice reliable methods for micronutrient determination & evaluate the effectiveness of micronutrient on rubber plants
13	Screening of chemicals to control diseases and clones to identify disease resistant clones	<p>Revision of chemical recommendations – 01</p> <p>Introduction of annual disease severity levels of different clones against Oidium / Phytophthora / Corynespora</p>
14	Studies on the biology and molecular biology of pests	<p>Publications on the biology of pathogens 02</p> <p>Publications on the molecular biology of pathogens 02</p>
15	Studies on beneficial microbiology to explore methods to promote small scale cottage industries and to strengthen the microbiological testings	<p>Recommendation of a bio pesticide - 01</p> <p>Commercialization of a biopesticide – 01</p> <p>Expansion of beneficial culture collection and identification of growth promoting rhizobacteria from rubber growing soils</p>

16	Surveillance of potential pests and disease outbreaks to avoid unwanted sudden disease epidemics Advisory & Training Programmes	Record of new diseases Record of new alternative hosts for the existing diseases Tracing any disease outbreaks to avoid sudden disease epidemics Training programmes -08 Advisory visits to solve all the requested complicated problems
17	Research, development and commercial introduction of low intensity harvesting strategies	Level of development % Level of introduction%
18	Expansion of rubber cultivation	Protocols for the rubber cultivation in dry zone developed Socioeconomic impact of rubber cultivation in Eastern Province assessed New areas suitable for rubber cultivation identified
19	Increase the land productivity through the technology adoption.	Application frequency of new animal repellent for the intermediate zone identified. On farm productivity and variability among smallholder rubber farmers in Kegalle district identified. Willingness to accept bee keeping by rubber smallholders identified
20	Socioeconomic improvement in plantation workers.	Gender issues in plantation community identified Education level and child protection among plantation community children assessed. Problems and perspectives among plantation community younger generation identified.
21	Improving the reliability of interpretations through appropriate statistical methods.	Support for scientists in experimentation, data analysis & interpretation – 50 research trials/surveys.  Improvement of interpretations through development, modification and application of appropriate statistical methods – 2 applications & subsequent publications
22	Improving the knowledge base on climate, climate change & variability for better decision making in rubber growing areas.	Dissemination of research outputs to the scientists for better decision making, information for policy makers – 2 publications. Improvements in 4 meteorological observations.
23	Analysis on Socio-economic implications & sustainability issues of rubber cultivation with Different policies implemented in the rubber sector	Rubber industry growth indicators including Rate of Growth, Revenue generation, International Trade indicators Poverty indicators of small holder rubber farmers in different rubber growing

		districts and sustainability indicators Sustainability indicators of rubber-based farming systems Provision of policy recommendation to the industry
24	Rubber Industry data management	Recommendation made by the analysis; Data bases were made available to the industry
25	Strategic technology transfer approaches to improve the productivity of the smallholder sector	No. of farmers and estates successfully adopted key recommendations in identified areas
26	Transfer of technologies developed by the RRISL to improve the productivity of estate sector	No. of clearings successfully adopted key recommendations is in identified areas (50 clearings) No. of established demonstration plots and model clearings (50 demonstration plots)
27	Improvement for advisory services	No. of decisions conveyed to extension managers
28	Human resource development of all stake holders of the rubber sector	No. of farmers, estate managers, estate field staff and workers successfully trained No. of successfully conducted awareness and training programmes
29	Development of effective extension network in the rubber sector	Establishment of 03 Technology transfer centers Establishment of a Techno-Park
30	Development of Novel manufacturing Technologies for raw rubber manufacture	i. Introduce five modified SS tanks to the small-scale farmers ii. One Commercially viable method for Low protein contained NR latex & shelf-life time improved PVNRL iii. One pilot scale mechanized manufacturing process for RSS iv. Adaptation of one swift set smoke house (10 kg capacity) v. Performance study on different water reuse protocols
31	Preparation and characterization of Skim rubber/Plastics	Processing conditions for Skim/Plastic dynamically vulcanized blends Mechanical properties of vulcanized blends
32	Development of raw rubber blends-based formulations for specific applications	Preparation and performance evaluation of composites
33	Assessment of efficiency of present anaerobic-aerobic rubber effluent treatment system and its modification to suit to smallholder sector Suitability of Disposal of treated rubber effluent water for irrigation purposes	i. Report on efficiency of present rubber effluent treatment system available in raw rubber manufacturing industry. ii. Pilot scale treatment plant for small holder sector i) Experimental design ii) Recommendation on treated water disposal in rubber lands
34	Quality analysis of latex, raw rubber & rubber processing chemicals	(i) Issuing 1200 test reports (ii) Providing 05 sampling services on customer request (iii) 06 Training Programmes Preparation of standers manuals,



		conducting training programmes on uncertainty calculation, method verification and validation and quality assurance practices, conducting inter-laboratory crosscheck programmes.
35	Quality improvement & quality assurance of latex, raw rubber and rubber processing chemicals	Introduce an alternative method to produce light colour crepe rubber  To prove the quality of latex crepe with compared to TSR (L) grade  Clone recommendation based on raw rubber and latex properties  To compare the quality of rubber with the harvesting system
36	Development of novel recycling processes for latex /dry rubber based compound /product waste	Development of one reclaiming process for rubber waste
37	Development of rubber composites with waste materials for different applications	Development of one rubber composite with a waste material
38	Development of rubber composites with coconut husk materials for special applications	Manufacture of one rubber product with a coconut husk material for a special application.
39	Development of cellular rubber products with latex /dry rubber for special applications.	Manufacture of a cellular rubber product for a special application.
40	Synthesis of natural nano-fibers and development of rubber composites with nano-fibers	Synthesis of a natural nano-fiber
41	Development of a nitrosamine safe accelerator system for sulfur vulcanization of dry rubber compounds	Establishment of property correlations for new systems No. of new systems
42	In-situ filler reinforced natural rubber latex	One novel method for preparation of reinforced natural rubber lattices
43	Introduction of new preservative system for NR field latex	Novel preservative system for natural rubber latex
<b>Seed Certification Service</b>		
1	Determination of suitable seed film coating technique	Overcome quality deterioration problems of local vegetable seeds over time
2	Development of seed vigour test protocol for selected Solanaceae crops	Vigour testing methods were identified for Solanaceae crops
3	Impact of climate change on quality of seed paddy and strategies practiced by farmers for climate change adaptation in Anuradhapura district	A program to mitigate effect of climate change on seed production were identified
4	Determination of most suitable pod range for the seed yield and quality of Okra	Enhancement of seed production technology of Okra
5	Studying seed longevity of Spinach ( <i>Basella alba</i> L.) under ambient and low temperature storage conditions	Information on lifespan of the seeds that can be used for planting purposes
6	Studying the possibility of using the pods of side branches of the okra plant to produce seeds	Clear recommendation to seed producers on possibility of using the pods of side branches

7	Studying seed longevity of first true seed Passion fruit ( <i>Passiflora edulis</i> L.) variety, “Horana Gold” under ambient and low temperature storage conditions	Information on lifespan of the seeds that can be used for planting purposes
<b>Sri Lanka Atomic Energy Board</b>		
1	To contribute to clean drinking water supply for the communities with lack of accessibility to clean water in the dry zone of Sri Lanka (Malwathu Oya and Lower Mahaweli basin)	Identify and introduce clean groundwater sources for drinking purposes in Malwathu Oya and Lower Mahaweli basins
2	Improved Assessment of Initial Alarms from Radiation Detection Instruments	Enhance the Nuclear Security Detection Capabilities of the Country
3	Advancing Radiation Detection Equipment for Detecting Nuclear and Other Radioactive Material out of Regulatory Control	Enhance the Nuclear Security Detection Capabilities of the Country
<b>Sri Lanka Institute of Nanotechnology (Pvt)Ltd</b>		
1	Swabs for COVID 19 sample collection	Supplied 200,000 swabs which saves 80 Mn of Gov. expenditure
2	RT-LAMP & COVID detection	Helps gov. to accelerate the testing and reduce the cost significantly
3	Immunity boosting nutraceuticals	Import substitution and empowering local production - In line with “Saubhagaye Dekma”, Chapter 04; Sub Chapter-Indigenous and Ayurvedic Sector - Align with the UNDP SDG 3 – Good health and wellbeing
4	Value addition to instant tea	Creating a market for herbal Tea, flavored Tea and green tea instead of black tea which can be exported as value added tea. - Target to export more than 50% of tea in value added form - In line with Saubhagaye Dekma, Chapter 05; Sub Chapter-Agriculture
5	Cinnamon based low GI sugar	Value addition to Sri Lankan cinnamon - Reduces diabetes - Increase in exports - In line with Saubhagaye Dekma, Chapter 05; Sub Chapter-Agriculture
6	Cinnamon nutraceutical	Value addition to Sri Lankan cinnamon - Reduces diabetes - Increase in exports - In line with Saubhagaye Dekma, Chapter 05; Sub Chapter-Agriculture
7	Slow release urea fertilizer	Saves over Rs. 2.6 Bn per year - Reducing the importation of inorganic fertilizers - Reducing the import FX bills, meeting global commitments based on Paris agreement 2015,

		In line with Saubhagaye Dekma, Chapter 05; Sub Chapter-Agriculture
8	Soil test kit	Reducing the import FX bills, Cite specific NPK level indicators will lead to issue adequate amounts of fertilizers to farmers and hence reduce the excess usage of inorganic fertilizers. - In line with Saubhagaye Dekma, Chapter 05; Sub Chapter-Agricultur
9	Increasing phosphorous solubility	Value addition to existing natural resources - Reduces the importation of inorganic fertilizers (TSP, etc.) - In line with Saubhagaye Dekma, Chapter 05; Sub Chapter-Agriculture
10	Sustainable packaging to replace polystyrene (Styrofoam)	Meeting global commitments based on Paris agreement 2015 - Leveraging on OBOR for manufacturing and distribution - Opportunity to increase exports and new industrial opportunities (job creation) - In line with Saubhagaye Dekma, Chapter 08: A Sustainable Environmental Policy
11	Coconut oil based cosmeceuticals	Value addition to Sri Lankan natural resources - Increase in exports
12	Removal of algae in Beira Lake	Management of Colombo as a last remaining wetland city - Increasing tourist attraction - In line with Saubhagaye Dekma, Chapter 08: A Sustainable Environmental Policy - In-line with SDG 6, 9 & 11
13	Functional coatings	To be a key player in supply chain in future industries - Reducing the import FX bills - More employment opportunities - In-line with SDG GOAL 9: Industry, Innovation and Infrastructure
14	Natural colorant based textile dyeing	Meeting global commitments based on Paris agreement 2015 - Leveraging on OBOR for manufacturing and distribution - Increase exports
15	Smart labels for apparels	Increase in export In-line with SDG 12
16	Sustainable print ink	Reducing the import FX bills, aubhagaye Dekma, Chapter 05, Sub chapter-Business and Enterprise development, & Chapter 06, Sub chapter-Technology and Innovation
17	Waste fabric based for oil pollution remediation/ocean cleaning	Reduce imports/import substitute, Empowering local manufacturing In line

		with Saubhagaye Dekma, Chapter 05: A Sustainable Environmental Policy
18	Respiratory detection smart mask sensor	Value addition to graphene in a form of an application - Leveraging on OBOR for manufacturing and distribution
19	Energy storage system (ESS) solution	Complimentary electricity storage capacity to the national grid by storing solar energy. - Reducing the import FX bills and empowering local manufacturing - In-line with the UNDP SDG goal 7,9,11. In-line with Paris Agreement 2015 to create a sustainable low carbon future - In line with Saubhagaye Dekma, Chapter 7, Subchapter: Transformation Toward Renewable energy
<b>Tea Research Institute of Sri Lanka</b>		
1	Breeding of new tea cultivars to improve productivity, quality and to face emerging challenges	
2	Integrated approach to soil fertility management	
3	Land productivity through agronomic practices	
4	Developing, modifying & evaluating of harvesting devices	
5	Evaluating different media and mixtures for tea nurseries	
6	Evaluating micro irrigation systems for tea nurseries	
7	Integrated Crop Protection approaches, to minimize economical damage & address health, safety & environmental issues& meet consumer requirements	
8	Development & evaluation of sustainable farming systems - Organic farming & other farming systems	
9	Development of an efficient hot air supply system through radiating steam and hot water circulation	
10	Development of dust removing system for fluid bed dryer	
11	Development of monitoring and controlling method for rolling parameters for orthodox roller	
12	Investigation on combined IR and Fluid bed drying in relation to quality and cost against normal fluid bed drying	

13	Identifying factors affecting blackness and curliness of Low Country teas	
14	Value addition, new product development and product diversification	
15	Investigation of health promoting effects of Sri Lankan Tea cultivars	
16	Investigation on worker shortage in small holder sector	
17	Identification of typology and trajectories of tea based peasant farming systems by modeling land use and land cover dynamic changes in Low Country Region	
18	Exploration on performance of Sri Lanka Tea Industry	
19	Investigating social and economic impacts of alternative worker deployment models (AWDMs) in large scale tea plantations in Sri Lanka	
20	D/Econ- Evaluating research recommendations & micro-analyses for tea sector and activities of Agricultural Economics Division	
21	Impact of Product Diversification towards Firm Performance and Growth in Tea Industry	
22	Refining techniques for sampling, laboratory and field experimentation, surveys and statistical designs for studying insect, mites	
23	Establishment of anatomical, biochemical, molecular and physiological basis of different tea cultivars for SHB, LCLWT and Nematodes	
24	Development of a Multiplex PCR diagnostic kit to identify fungal pathogens in tea	
25	Development of qPCR technique to screen tea for blister blight resistance	

### Veterinary Research Institute

1	Establishment of metabolizable energy (ME) and organic matter digestibility(OMD) values of locally available ruminant feed stuffs in Central and Wayamba provinces	Establishment of ME and OMD values of LRF available in Central and Wayamba provinces Publication of ME and OMD values of LRF among stakeholders including farmers, extension workers, nutritionists etc.
2	Occurrence of Ethanol unstable milk and its relation with physico-chemical characteristics of milk	To study the occurrence of ethanol unstable milk in different farming systems and its relation with physico – chemical characteristics of milk.

3	Relationship among bacterial counts and somatic cell counts and factors influencing their variation in cow, buffalo and goat milk in four provinces	Determination of the relationship between SCC and bacterial counts in individual and bulk cow , buffalo and goat milk samples  Determination of individual SCC count in association with age, breed, different parities and stage of location
4	Development of strip based methods for detection of common adulterants in milk	To develop the paper based dry reagent strips for detection of adulteration in milk  To validate the working of developed strips in raw and processed milk
5	Evaluation of veterinary drug residues in animal products	To examine whether the current level of veterinary medicinal residues is at the European import thresholds in animal products of local origin
6	Examine the efficacy of selected probiotics and photobiotic to replace antibiotics in poultry feed	Examine the effect of dietary natural gut health enhancers compared to dietary antibiotic growth performances on the production performances
7	Study of the underutilized poultry production systems including duck, turkey, guinea fowl, Japanese quail and indigenous chicken in Sri Lanka	To identify and characterize the existing subsystems in the small holder underutilized poultry production systems  Economic evaluation of different subsystems in the smallholder underutilized poultry production systems"  To investigate the potentials and constrains in the existing small holder alternate poultry production systems to minimize the impediments to low input small holder underutilized poultry production systems
8	Screening of Imported dairy cattle for acute Fasciola hepatica (Ab) by Using ELISA and Confirmation of the Clinical Disease if present	Screening of imported dairy cattle for acute Fasciola hepatica (Ab) Using ELISA.  Individual identification of dairy cattle with Fasciolosis caused by Fasciola hepatica using Anti-Fasciola hepatica capture ELISA
9	Study on use of Histopathological and Immunohistochemical techniques for detection of bovine tuberculosis	1. Establishment of immunohistochemical (IHC) technique for diagnosis of bovine tuberculosis at VRI
10	Introduction of serological vaccine matching technique to assess ability of cross protection of locally produced FMD vaccine against field isolates	2. Comparison of detection rates of bovine TB through histopathology H&E staining, Ziehl - Neelsen technique and immunohistochemistry  Estimating the level of cross- protection affords by locally produced FMD vaccine against field viruses
11	Improving locally produced FMD vaccine by 146S quantification and shelf life extension	FMD 146S Quantification by sucrose density gradient centrifugation and formulate FMD vaccine with induces protective antibody level

		Extend shelflife of FMD Vaccine Determine the dose and efficacy of FMD Vaccine in goats
12	Detection of infectious bronchitis using enzyme including hemagglutination assay.	To establish an enzyme induced hemagglutination assay protocol for identification of IBV in Sri Lanka
13	Molecular tools and geographical information system to develop specific control strategies for bovine mastitis	Characterize clusters of mastitis based on management system and causative organisms Appropriate treatment regimes and preventive measures
14	Molecular detection methods and diversity of M. bovis , for effective control strategies	To detect MTC from tissues and excretions of TB suspected animals. Diversity of Micobacterium bovis or other MTC isolates To evaluate the possible interspecies transmission and public health importance
15	Genetic polymorphism in livestock to identify biological markers in different populations	Determine the polymorphism among selected populations of cattle and goats To detect specific markers associated with production, weather conditions, health, breeds or groups
16	Microbial molecular profiling to determine origin and transmission of bovine mastitis	To identify causative agents of bovine mastitis in highly affected farms in Uva and Central Provinces.  Molecular characterization of the causative microorganisms and profiling them farm wise and animal wise
17	Establishment of fatty acid profiles of animal feeds and products	Establishment of analysis methods for gas chromatography detection of fatty acids  Establishment of fatty acid profiles of commonly found animal feeds in country`
18	Identification of native wild life species in extinction as a technical assistance to prevent illegal slaughtering	To establish technology to identify two native animal species in extinction.
19	Preparation of poultry foundation stock 1 to Central Poultry Research Station (CPRS), Karandagolla	To introduce new genetic makeup to the CPRS for higher production performance with tropical adaptability and disease resistance
20	Evaluation of agronomic characters and nutritive values of Napier Hybrid fodder varieties of CO5 and Sampoorna in different harvesting intervals in Yala and Maha seasons	To study agronomic characters of Napier Hybyid CO5 and Sampoorna fodder varieties To evaluate the nutritive values of fodder varieties at different harvesting interval in Yala and Maha season To prepare a data base of nutritive values of Napier Hybyid CO5 and Sampoorna

		fodder varieties and distribute among stakeholders including farmers, extension workers, nutritionists etc.
21	Determination of quinolone resistance in E. coli isolated in Commercial broilers.	To characterize E- coli by quinolone resistant phenotypes isolate from commercial poultry. To determine minimum inhibitory concentration /MIC for nalidixic acid, enrofloxacin and ciprofloxacin. To identify the common quinolone resistant genes in E-coli from commercial
22	Detection of carcinogenic and mutagenic nitrofurant metabolites in animal products.	To investigate whether the Aflatoxin present in local milk To trace back to feed aflatoxin concentrations

#### Annexure 04: New Products Developed

<b>Arthur C. Clarke Institute for Modern Technologies</b>	
1	Carbon fibre multicopter
2	Climate monitoring Real-time weather information systems (IoT product)
3	River water level gauge (IoT)
<b>Centre for Defence Research and Development</b>	
1	Ballistic Rubber
<b>Coconut Research Institute</b>	
1	Nano gel dispenser for red weevil pheromone
2	Red weevil repellent
<b>Department of Export Agriculture</b>	
1	Cinnamon incense sticks
2	Cinnamon hand wash
3	Cinnamon soap
4	Alovara jell yoghurt
5	Alovara drink
6	Alovara jell powder
7	Cinnamon incense stick
8	Alovara toffee
9	Alovara gugguls
<b>Farm Mechanization Research Centre</b>	
1	Mushroom substrate bag filling machine
<b>Field Crops Research and Development Institute</b>	
1	Three drought tolerant high yielding maize hybrids varieties were released



2	Two high yielding Groundnut varieties were released
<b>Fruit Research and Development Institute</b>	
1	Mango varieties with improved yield and fruit quality
2	Two bread fruit varieties
3	Two gaduguda varieties
<b>Gem and Jewellery Research and Training Institute</b>	
1	Orthopedic Mattress with therapeutic Properties, made of tourmaline and mica embedded Foam Rubber
2	Tourmaline infused cotton fabric produced via a screen printing process
<b>Industrial Technology Institute</b>	
1	"frozen French fries from local potato varieties"
2	Spicy appetizer paste
3	Cereal based burger
4	Mushroom based burger
5	Vegetable based burger
6	Ginger sauce
7	Spicy sauce range
8	Garlic sauce
9	Red pepper sauce
10	Green pepper sauce
11	Coconut based Bio surf fruits & vegetable wash
12	Coconut based Bio surf surface disinfectant
13	AVID herbal mouth wash
14	Herbal hand sanitizer gel
15	Immunity boosting food products
<b>Medical Research Institute</b>	
	Zebra fish egg is very sensitive to environmental toxicity
<b>National Building Research Organisation</b>	
1	Air Sense devise
<b>National Engineering Research &amp; Development Centre</b>	
1	Smart PET bottle crushing machine
2	Aquatic weeder for cleaning of canals
<b>National Science Foundation</b>	
1	Calcium carbonate nanoparticles with two different morphologies were produced. Synthesized nano-precipitated calcium carbonate (NPCC) particles and other variants with spherical and rod like morphology were blended with natural rubber (NR) to investigate the effects of the size and shape properties of the nano-filler on NPCC/NR composite

2	Superhydrophobic precipitated calcium carbonate (SHPCC) was synthesized and they were coated on apolyester textile to transform it into a water repellent
3	Formulated a whey- protein rich energy beverage
<b>Natural Resources Management Centre</b>	
1	National Soil Organic Carbon Map
<b>Palmyrah Research Institute</b>	
1	Long term preservation of sweet sap with native characteristics
2	Formulation of Facial cream and solid lotion Bar using palmyrah fruit pulp
3	Formulation of hand sanitizer
4	Formulation of Toothpaste
<b>Rice Research and Development Institute</b>	
1	At313, Bg314, Bg375
<b>Seed Certification Service</b>	
1	Quality certified paddy, OFC and vegetable seed lots
2	Quality certified planting materials of fruit crops
3	Certified mother plants and nurseries
4	Certified GAP farms
<b>Sri Lanka Institute of Nanotechnology (Pvt)Ltd</b>	
1	Mask Sensor – BreathTech S Smart Mask
2	Antibacterial book cover coating
3	SLINTEC Swabs
4	Graphene Lead Acid Battery
5	Antimicrobial coating - NOVID
<b>Sugarcane Research Institute</b>	
1	Completion of preliminary development of Organo-mineral fertilizer pellets using compost made out of the sugarcane industry by-products and synthetic mineral fertilizers.
2	Designing a hot-water treatment plant (HWTP) with the capacity of 01 tonne/hour for Ethimale plantations (Pvt) Ltd.
<b>Tea Research Institute of Sri Lanka</b>	
1	Producing 4,871 kg of jaggery

## Annexure 05: New Processes

<b>Centre for Defence Research and Development</b>	
1	An MOU has been signed with a M/S Pot company to mass production of ballistic rubber developed by CDRD
<b>Coconut Research Institute</b>	
1	Protocol for analysis of volatile organic compounds from coconut fruits
2	Protocol for analysis of phenolic compounds from coconut fruits
3	Protocol for analysis of waxes from coconut fruits
<b>Field Crops Research and Development Institute</b>	
1	Bio control agent suitable for controlling onion flower black mold and onion bulb black mold was identified
2	A non-chemical management method for virus diseases in chili. using polythene mulching was identified
<b>Fruit Research and Development Institute</b>	
1	Study on growth enhancement of mangosteen seedlings were tested with Nano chemicals
2	Fruit fly management programme
<b>Gem and Jewellery Research and Training Institute</b>	
1	Value addition of gem minerals
<b>Industrial Technology Institute</b>	
1	Multigrain instant string hopper flour mix
2	Gluten free, Casein free complimentary mix
3	Candy peel processing
4	PuhulDosi processing
5	Ready to serve pineapple juice decontaminated by ozone
6	Tomato sauce base formulation using local tomato
7	Tomato preserved in tomato juice
8	Shampoo ginger plus
9	Bio-G transparent soap
10	Harankahahand sanitizer spray
11	Coriander herbal shot
12	Turmeric herbal shot

13	Daluanupanaya syrup and lozenge
14	Ready to serve water soluble Paspanguwa
15	Air-sanitizer/fresheners
<b>Medical Research Institute</b>	
1	Environmental toxicity detection
<b>National Building Research Organization</b>	
1	Particulate matter measurement using light scattering sensor method
<b>National Engineering Research &amp; Development Centre</b>	
1	Fuelwood chip feeding system
2	Soil based rainwater harvesting system
<b>National Institute of Fundamental Studies</b>	
1	A method of recovering waste graphite attached to wall rocks
<b>National Science Foundation</b>	
1	Developed a process of converting low quality minerals to gem quality minerals E.g., Heating, Nano diffusion
2	Developed the Vacuum Assisted Resin Transfer Molding (VARTM) process
<b>Natural Resources Management Centre</b>	
1	weather based SMS alerts as a decision-making tool for crop management under sudden unexpected weather changes
<b>Sugarcane Research Institute</b>	
1	Developing an in-vitro culture protocol for elimination of sugarcane White Leaf Disease (WLD) from infected sugarcane.
2	Optimization of a q PCR program to quantify the available amount of WLD Phytoplasma in sugarcane.
<b>Tea Research Institute of Sri Lanka</b>	
1	Validation of process automation in fluid bed drying
2	Development of an efficient hot air supply system through radiating steam and hot water circulation
3	Establishment of inherent sugar concentrations in black tea from Mid country
4	Investigation of health promoting effects of Sri Lankan tea cultivars

## Annexure 06: New Technology Developed

<b>Coconut Research Institute</b>	
1	Coconut butter making technology (2019)
2	Natadecoco making technology (2019)
<b>Department of Export Agriculture</b>	
1	Coco-peat pellets as a nursery pot for cinnamon seedlings
<b>Field Crops Research and Development Institute</b>	
1	Sprinkler irrigation based agronomic management packages capable of giving higher yields for chili, onion and mung bean
2	Drip irrigation based agronomic management packages capable of giving higher yields for chili and onion
<b>Fruit Research and Development Institute</b>	
1	Extension of shelf life of soursop fruits ( <i>Annona muricata</i> L.) can be done under low temperature with edible coating and plastic film packing.
2	Technologies were given for Tom EJC plantation
3	Released a technology on “In situ grafting of citrus” in 2020 TRC meeting
<b>Industrial Technology Institute</b>	
1	model UV Sterilizer for spice sterilization
2	Bamboo charcoal Products and Technology
	Bamboo wood tile
	Technology for Spray dried powders - Aloe vera, Carrot, Beetroot and Strawberry powders
	Kithul Palm Wine
	Sadikka peel tablet
	Herbal-based nebulizing agent and inhaler
	Design and fabrication of Mist Tunne
	Ultrasound sensing automatic hand sanitizer dispenser
	Hand sanitizer filing machine
<b>Medical Research Institute</b>	
1	Using Zebra fish egg
<b>National Building Research Organization</b>	
1	Sensor Based
<b>National Engineering Research &amp; Development Centre</b>	
1	Universal data acquisition system

2	Advancement of NERDC crematorium
<b>National Institute of Fundamental Studies</b>	
1	Hydrothermal synthesis of nano-zeolite
2	Microwave assisted synthesis of nano-zeolite
<b>National Institute of Postharvest Management</b>	
1	Safe fruit ripening technologies
2	Preservation of cut flowers
3	Disease controlled by organic silicon application
4	Wet Paddy drying
<b>National Research Council</b>	
1	Tea Shifter: Developed a Self-Cleaning Sifter with multiple mesh frames for grading long leafy & wiry type tea
<b>National Science Foundation</b>	
1	Developed a technology for Separation of waste oil water from service centers
<b>Sri Lanka Atomic Energy Board</b>	
1	Detection of Ionization Radiation
2	Identification & Detection of Ionization Radiation
<b>Sri Lanka Institute of Nanotechnology (Pvt)Ltd</b>	
1	Advanced gold therapy cosmetics
2	Tea-based natural dyeing
<b>Sugarcane Research Institute</b>	
1	The varieties of SL 86 13 and SL 92 5588
<b>Tea Research Institute of Sri Lanka</b>	
1	Installation of a commercial type PLC based monitoring and control system to the fluid bed dryer (TRI-CCC FBD). Control panel, operator panel and motorized louver control mechanism have been installed to the fluid bed dryer.
2	A microprocessor based commercial type withering control system was developed for withering leaves in troughs. Hot air supply for the trough was arranged from the drier exhaust and by automatically adjusting hot air damper. Further development of the control system to suit hot air supply through hot water generator-radiator system.
3	Maximum Permissible levels of sugars in mid grown teas have been successfully taken for analysis
4	Optimization of $\alpha$ -amylase inhibition assay, $\alpha$ -glucosidase inhibition assay, lipase inhibition bioassay and acetylcholinesterase inhibition assay were completed using 5 tea cultivars.
<b>Veterinary Research Institute</b>	
	Real time Polymerase Chain Reaction (PCR) technique was standardized to diagnose Porcine Reproductive and Respiratory Syndrome (PRRS).
	Nested PCR was standardized to diagnose Tilapia lake virus which is emerging threat for Tilapia industry worldwide

❖ **Approval Process of the Report by the Commission:**

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2. *First Review: 17<sup>th</sup> May 2021*
3. *Second Review: 28<sup>th</sup> December 2021*
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